

# MARCH THROUGH SEARCH

A Multidisciplinary Research Book



Editors

**Sudipta Ghosh**

**Suryatapa Das**

Maharani Kasiswari College  
Kolkata, West Bengal, India

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**ROHINI NANDAN**

19/2, Radhanath Mallick Lane  
Kolkata - 700 012

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Dr. Sudipta Ghosh  
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*Dedicated*

*to*

*All Covid warriors*

*who work relentlessly during this pandemic to save the mankind*

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## PRINCIPAL'S FOREWORD

I'm delighted to introduce a multidisciplinary research book "March through Search" in its success to highlight some of the achievements over the last few years of a broad and extensive community of college teachers in humanities, science as well as commerce across and beyond Maharani Kasiswari College who worked as researchers along with impulsive teaching. These collaborations bring new perspectives on research, drive innovation and enrich education while serving the needs of all sectors of human society.

This research book contains good number of papers specifically 1(one) in research methods, 13(thirteen) in commerce, 6(six) in food and nutrition, 2(two) in education, 1(one) in sociology and 1(one) in computer science. It's a privilege to be a part of a college where arts, commerce and science are fully embedded in Research for Education and Service in so many mutually beneficial ways. The projects and programmes that follow are just a small sample of the myriad activities in research to grow and continue to thrive in the years ahead. I express my gratitude to the research cell/committee of our college along with the editorial board, panel of advisors and all the authors involved in this publication, specially who have extended their hands from other institutions to enrich the book with their thoughts and research outcome. I feel so happy that the longest pandemic situation we could utilize academically through the publication by supports enhanced by internal and external networks that guided direction bringing new connections, offering platforms to demonstrate impact or generate opportunities to further research and studies. The present publication of a book that is a good collection or collaboration is the first attempt from Maharani Kasiswari College and I look forward to seeing the college teachers' community involved in research to be brought to focus for public interest in larger forms through further books in future.

**Dr. Sima Chakrabarti**  
Principal  
Maharani Kasiswari College

## EDITORIAL FOREWORD

The word 'research' refers to the quest for knowledge. Research is a scientific and systematic search for pertinent information on a specific topic.

Research in education refers to an activity, directed towards the development of an organized body of scientific knowledge about the events with which educators are concerned.

The same views drive the Research Cell of Maharani Kasiswari College to publish a peer reviewed edited book on research articles from authors of various disciplines.

The title of this peer reviewed edited volume is 'March through Search: A Multidisciplinary Research Book'. As the title of the book suggested by Dr. Sima Chakrabarti, Principal of Maharani Kasiswari College, we hope this book will decipher the readers' search for knowledge in an integrated way.

The editors express immense gratitude to Dr. Sima Chakrabarti, Principal, Maharani Kasiswari College and the college authority for granting permission to publish this peer reviewed edited book, for granting financial aid and for constant support.

The editors also convey their gratitude to the IQAC coordinator and all members of IQAC, Maharani Kasiswari College for their encouragement towards the publication of this peer reviewed edited volume.

The editors express a humble thank to the all internal faculty members of Maharani Kasiswari College for their well wishes in publishing this book.

The editors convey immense thanks to all the authors from various disciplines and from various states for their article contribution in this peer reviewed edited book. We received research articles from several disciplines viz. Commerce, Education, Food and Nutrition, Sociology and Computer Science. We are thankful for your overwhelming response. We must convey our special thanks to Dr. J. K. Das, Professor, Department of Commerce and Director, Internal Quality Assurance Cell, University of Calcutta for contributing an article on qualitative and quantitative methods in social research. This a guiding article for all researchers. We are really enriched and honoured.



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The editors express a humble thank to the following esteemed professors of different institutions for their valuable suggestions, contributions and constructive inputs regarding publication of this peer reviewed edited book. We are really grateful and indebted to Dr. Dhrubaranjan Dandapat, University of Calcutta; Dr. Jadab Krishna Das, University of Calcutta; Dr. Ashish Kumar Sana, University of Calcutta; Dr. Amlan Chakravarti, University of Calcutta; Dr. Annalakshmi Chatterjee, University of Calcutta; Dr. Nandini Ghosh, IDSK; Dr. Bappaditya Biswas, University of Calcutta; CA (Dr.) Anandaraj Saha, University of Calcutta; Dr. Sourish Jha, Rabindra Bharati University; Dr. Radhanath Pyne, S.A Jaipuria College; Dr. Shamindra Nath Sanyal, Globsyn Business School; Dr. Lakshmeshri Roy, Techno India College, Kolkata and Dr. Sanjib Mitra, Sarsuna College for guiding us.

The editors express special thanks to Dr. Radhanath Pyne, Associate Professor of Commerce, S.A Jaipuria College and Dr. Annalakshmi Chatterjee, Assistant Professor, Department of Home Science, University of Calcutta for their help in developing this peer reviewed edited book.

The editors express thanks to the office of Maharani Kasiswari College for materialisation of this book.

The editors are also thankful to the Rohini Nandan for publishing the peer reviewed edited book on behalf of Maharani Kasiswari College.

We have taken every care to make this peer reviewed edited book error free. Despite our best efforts, there may be some unintentional errors for which no one, but we are responsible. We apologise for that.

Hope this peer reviewed edited book will fulfil the aim intended to and will spread the ray of knowledge through the readers.

**Dr. Sudipta Ghosh**  
**Suryatapa Das**  
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# Qualitative and Quantitative Methods in Social Research

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## I. INTRODUCTION

Research is the search for knowledge that has shaped the human civilization. This search for knowledge has led to scientific development through stages of invention, innovation and diffusion. This is an unending process too. What we establish today may become insufficient to explain the future experiences. For example, the concept that light travels in a straight line was a sort of knowledge with which experiences of reflection and refraction could be explained. But the presence of minute dark and light bands at the end of a shadow could not be explained with that knowledge. This called for a re-examination of the entire concept and the knowledge that came out of the new search was the wave theory for the movement of light. In fact, light is considered variously as a wave, corpuscular or quantum phenomenon. This process of examination and re-examination of different issues based on observations and or experiences is aimed at expanding the domain of knowledge. This is a continuous process. It starts from where it ends. It is a movement from known to unknown. This movement is called Research. Thus, one may formally define research as a scientific and systematic search for pertinent information on a given topic.

It has also been observed that quite often irrelevant information is collected because of unclear idea about the information needs. Collection of irrelevant data not only increases the cost of the research and duration of the work but also create difficulties during the analysis stage. It is therefore absolutely necessary to diagnose the information needs of a research topic to plan the process of data collection. If properly planned, one can restrict the flood of irrelevant information and collect pertinent information only. A clear understanding about the research problem eliminates much of the hurdles. This is because the search process can then be made more systematic and more scientific. The research methods and techniques to be used at different stages of the search process can be outlined in a better way. These in turn can give

a clear idea about the information requirement. Researcher will know which information is pertinent and which information is not. Thus, formulation of the research problem and development of the search process are two very important aspects of research. The later one is often referred to as Research Methodology.

Scope of research methodology is related with the scope of research itself and the way it is to be carried out. Be it scientific field or economic field or administrative field, research and research methodology have very important roles to play. In fact, in the recent past the role of research in the field of macro and micro economic activities has assumed a significant position widening the scope of both research and economic activities. This change in the role of research can be attributed mainly to growing complexities in the economic environment and to discrete changes in the business environment throughout the globe. Now - a - days nearly all government policies on the economic system are having an in - depth research backdrop. Government machineries carry out detailed analysis on the needs and desires of people at large and societal segments in particular to arrive at the future plan of the government. No government can survive for long without meeting the social requirements. In fact, cost of carrying out research is much less than the cost of repairing measures if policies move in the wrong direction due to incomplete analytical studies. These remarks are equally applicable for corporate planning or operational planning of a business organization. If a business organization does not carry out adequate analysis of the business environment, it may have no other way out but to go for early retrenchment strategy.

In our country, research in government has been playing an important role by facilitating the decision-making process and providing with pertinent information to the policy makers. Since there is region heterogeneity not only in respect of language and culture but also in respect of the level of development and economic growth, there is a basic need of understanding of the regional requirements and make allocation of nation's resources in a judicious manner so as to eliminate the disparities and march together for a better future. Our five-year plans are aimed at a balanced development, which is more than a mere growth in the national income of our country. To become effective in respect of targets and efficient in respect of utilization of human and non-human resources, planning commission is engaged in applied economic research with Central Statistical Organization and National Sample Survey Organization as the main source for pertinent and detailed information. In fact, research as a tool for economic development and formulation of economic policy has three distinct phases of operation. The first phase of operation is

known as investigation of economic structure. This phase involves continuous compilation of facts and figures for depicting the structure of the economy. In the second phase one diagnose the events along with their root causes of occurrence. Once the underlying causes are known it will be easier for the researcher to regulate them or take preventive measures to neutralize them. Next comes the obvious problem of prediction, the corresponding phase being known as prognosis phase. Keeping in mind the prediction requirement one may work out for future forecasting and arrived at an appropriate economic policy.

In view of the growing environmental complexity and uncertainty and global competition, research is also having an important role to play for business planning to efficiently handle the functional activities and draw the future strategy. Basic functional activities cover social research, logistics management, human resource development, research & development etc.

## **II. DIFFERENT ASPECTS OF RESEARCH**

Research is the fountain of knowledge for the sake of knowledge and an important source of providing guidelines for solving different business, governmental and social problems. It is a kind of formal training that enables researchers to understand the new developments in their respective fields in a better way.

### **Research Methods versus Research Methodology**

Research can be understood as the systematic and rigorous search for appropriate information on a specific subject. It involves enunciation of the problem, developing a hypothesis, collecting and analysing data and drawing conclusions, based on the facts and data collected. And to do so, the researcher uses Research Methods, during the course of conducting research.

Research Method pertains to all those methods, which a researcher employs to undertake research process, to solve the given problem. The techniques and procedure that are applied during the course of studying research problem are known as the Research Method. It encompasses both qualitative and quantitative methods of performing research operations, such as survey, case study, interview, questionnaire, observation, etc. Research Methods further determines the behaviour and instruments used in selecting and constructing various research techniques.

However, the Research Methods are often confused with Research Methodology, which implies the scientific analysis of the Research Methods,



so as to find a solution to the problem at hand. Research Methodology is a technique of systematically solving the research problem. It may be understood as a science of studying how research is done scientifically. It has many dimensions to address. It not only describes the research methods to be adopted but also explains the suitability of one method over the other. It deals with the assumptions in sequence, their feasibilities. It describes as a whole how the researcher wants to arrive at a rational solution to his research problem. In this sense, Research Methodology is problem specific. It explains how the research problem has been formulated. It presents the reasons behind the choice of hypothesis, choice of data sources. It presents the methods of data collection and describes the importance of data. It defends the choices of analytical techniques for extraction of information from the collected data. It covers many other aspects of the research activities to ultimately make the research results acceptable to others.

Thus, Research Methodology is problem specific whereas Research Methods are problem independent i.e., they are more general. Research Methods provide a set of different tools and techniques but in Research Methodology we make specific choices of different methods along with the reasons for such choices. Further, Research Methodology addresses the complete problem under study but Research Methods are of use for sub problems of the entire problem.

Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation, how to apply particular research techniques, but they also need to know which of these methods or techniques are relevant and which are not, and what would they mean and indicate and why. Research methods are tools and techniques the researchers make use of while performing their research activities. So when we talk of Research Methodology we not only talk of the Research Methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others.

The following tabular distinction will clearly point out the differences between Research Methods and Research Methodology:

Basis of Comparison	Research Methods	Research Methodology
Meaning	Research Method implies the methods employed by the researcher to conduct research.	Research methodology signifies way to efficiently solving research problems.
What is it?	Behavior and instrument used in the selection and construction of the research technique.	Science of understanding, how research is performed methodically.
Encompasses	Carrying out experiments, tests, surveys and so on.	Study different techniques which can be utilized in the performance of experiment, test, surveys etc.
Comprise of	Different investigation techniques.	Entire strategy towards achievement of objective.
Objective	To discover solution to research problem.	To apply correct procedures so as to determine solutions.

### **The Need of Research Techniques for Scientific Decisions**

The two terms, research and scientific method, are closely related. Scientific method is the pursuit of truth as determined by logical considerations. It attempts to achieve a systematic interrelation of facts by experimentation, observations, logical arguments from accepted postulates and a combination of these three in varying proportions. Thus, for proper decision making, under the following constraints, a researcher must follow scientific methods of research:

- Complex Operating Environment
- Complex Social Structures
- Complex Information Systems
- Increased Uncertainty
- Changing Social Expectations
- Changing Social behaviour
- Social and Environmental Securities

- Larger Error Costs
- Reduced Reaction Times
- Increasing Competition

## **Types of Research**

**Cross Sectional versus Longitudinal Research:** Both cross-sectional research and longitudinal research are observational studies. This means that researchers record information about their subjects without manipulating the study environment. In the former case the research is confined to a single time-period, whereas in the latter case the research is carried on over several time-periods.

**Conceptual versus Empirical Research:** Conceptual research is that related to some abstract idea or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones. On the other hand, empirical research relies on experience or observation alone, often without due regard for system and theory. It is data-based research coming up with conclusions which are capable of being verified by observation or experiment. Empirical research is appropriate when proof is sought that certain variables affect other variables in some way.

**Quantitative versus Qualitative Research:** Quantitative research is applicable to phenomenon that can be expressed in terms of quantities. It is therefore the quantitative measure of some characteristics. Qualitative research, on the other hand, is concerned with phenomenon relating to or involving quality or kind. Qualitative research is especially important in the behavioural sciences, where the aim is to discover the underlying motives of human behaviour.

**Descriptive versus Analytical Research:** Descriptive research includes surveys and fact-finding enquiries of different kinds. In social science and business research we quite often use the term Ex post facto research for descriptive research studies. The main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening. Example: frequency of shopping, preferences of people or similar data. In analytical research, on the other hand, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

**Applied versus Fundamental Research:** Applied research aims at finding a solution for an immediate problem facing the society or an industrial/business organisation, whereas fundamental research is mainly concerned with

generalisations and with the formulation of a theory. Gathering knowledge for knowledge's sake is termed as fundamental research. On the other hand, research aimed at certain conclusions facing a concrete social or business problem is an example of applied research.

**Conclusion-oriented versus Decision-oriented Research:** While doing conclusion-oriented research, a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes. Decision-oriented research is always for the need of a decision maker and the researcher in this case is not free to embark upon research according to his own inclination. Operations research is an example of decision-oriented research.

Some more types of research are field-setting research, laboratory research, simulation research, clinical or diagnostic research, historical research and so on.

## **Research Design**

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It constitutes the outline or the blueprint of what the researcher will do for the collection, measurement and analysis of data. It aims to ensure that the evidence obtained enables you to effectively address the research problem as unambiguously as possible. Different research design can be categorized as below:

**Exploratory Research Studies:** Exploratory research studies, also termed as formulative research studies, mainly aims at formulating a problem for more precise investigation or of developing the working hypothesis from an operational point of view. The major emphasis in such studies is on the discovery of ideas. It is a lot like exploration or detective work fuelled by curiosity. Researchers should use their instincts to find clues and venture into new territories in search of information. Flexibility is important in exploratory research and it is bound to result in new ideas, revelations and insights. Therefore, the research design appropriate for such studies must be flexible enough to provide opportunities for considering different aspects of a problem under study.

**Descriptive or Diagnostic Research Studies:** Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. For example, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation. Diagnostic research studies, on the other hand, determine the frequency with which something occurs or its association with something

else. For example, studies concerning whether certain variables are associated. The research design in case of descriptive/diagnostic studies is a comparative design throwing light on all points narrated above and must be prepared keeping in view the objective(s) of the study and the resources available.

**Causal or Hypothesis-Testing Research Studies:** Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality. Therefore, when we discuss about the research design in such studies, we usually mean the experimental designs.

### **Criteria of Good Research**

Every research, irrespective of its different types and forms, still meets on the common ground of scientific methods employed by them. Following are some criterions that constitute a good research:

- The purpose of the research should be clearly defined and common concepts be used.
- The research procedure used should be described in sufficient detail to encourage and permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
- The procedural design of the research should be carefully planned to yield results that are as objective as possible.
- The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
- The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.
- Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis.
- Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

### III. QUALITATIVE METHODS IN SOCIAL RESEARCH

Qualitative research involves collecting and analyzing non-numerical data (e.g., text, video, or audio) to understand concepts, opinions, or experiences. It can be used to gather in-depth insights into a problem or generate new ideas for research. Qualitative research is commonly used in the humanities and social sciences, in subjects such as anthropology, sociology, education, health sciences, history, etc. It relies on data obtained by the researcher from first-hand observation, interviews, questionnaires, focus groups, participant-observation, recordings made in natural settings, documents, artifacts and the data so collected are generally non-numerical in nature.

#### **Different Types of Primary Scales with their Characteristics**

In Statistics, the variables or numbers are defined and categorised using different scales of measurements. Each level of measurement scale has specific properties that determine the various use of statistical analysis. There are four different scales of measurement. The data can be defined as being one of the four scales. The four types of scales are: Nominal Scale, Ordinal Scale, Interval Scale and Ratio Scale.

**Nominal Scale:** A nominal scale is the first level of measurement scale in which the numbers serve as “tags” or “labels” to classify or identify the objects. Nominal scales are used for labelling variables, without any quantitative value. Therefore, nominal variables can be placed into categories and since they do not have a numeric value, they cannot be added, subtracted, divided or multiplied. A good way to remember all of this is that “nominal” sounds a lot like “name” and nominal scales are kind of like “names” or labels. Example: assignment of numbers to basketball players in their jersey or registration/roll numbers of students to identify them.

**Ordinal Scale:** The ordinal scale is the second level of measurement that reports the ordering and ranking of data without establishing the degree of variation between them. Ordinal represents the “order.” Ordinal data is also known as qualitative data or categorical data. It can be grouped, named and also ranked. Ordinal scales are typically measuring of non-numeric concepts like satisfaction, happiness, discomfort, etc. Example: Educational qualification or Ranking of school students – 1st, 2nd, 3rd, etc.

**Interval Scale:** The interval scale is the third level of measurement scale. It is defined as a quantitative measurement scale in which the difference between the two variables is meaningful. In other words, the variables are measured in an exact manner, not as in a relative way in which the presence of zero is arbitrary.

Therefore, the primary limitation of the interval scale is the lack of a true zero or origin; it does not have the capacity to measure the complete absence of a trait or characteristics. However, it provides more powerful measurement than ordinal scales for interval scales also incorporate the concept of equality or interval. Example: Temperature in scales or degree of agreement with statement.

Ratio Scale: The ratio scale is the fourth level of measurement scale, which is quantitative. It is a type of variable measurement scale that allows researchers to compare the differences or intervals. The ratio scale has a unique feature i.e., it possesses the character of the origin or zero points. Ratio scale represents the actual amount of variables and thus all statistical techniques are usable with it along with all manipulation that one can carry out with real numbers. Example: Physical dimensions like weight, height, distance, diameter, volume, time etc.

Primary Scales	Order	Magnitude	Origin	Example
Nominal Scale	No	No	No	PAN or Aadhaar number
Ordinal Scale	Yes	No	No	Educational qualification
Interval Scale	Yes	Yes	No	Temperature
Ratio Scale	Yes	Yes	Yes	Weight or lifespan

### Different Types of Scales as per their Applications

- Scales for Stimuli or Stimuli Centered Approach
- Scales for Respondents or Subject Centered Approach
- Scales for both Stimuli and Respondents or Response Approach

### Different Types of Rating and Ranking Scales

Rating scale is defined as a closed-ended survey question used to represent respondents' feedback in a comparative form for specific particular features/products/services. It is one of the most established question types for online and offline surveys where survey respondents are expected to rate an attribute or feature. Rating scale is a variant of the popular multiple-choice question which is widely used to gather information that provides relative information about a specific topic. Researchers use a rating scale in research when they intend to associate a qualitative measure with the various aspects of a product

or feature. Generally, this scale is used to evaluate the performance of a product or service, employee skills, customer service performances, processes followed for a particular goal etc. Rating scale survey question can be compared to a checkbox question but rating scale provides more information than merely Yes/No.

A ranking scale is a survey question tool that measures people’s preferences by asking them to rank their views on a list of related items. Using these scales can help your business establish what matters and what doesn’t matter to either external or internal stakeholders. You could use ranking scale questions to evaluate customer satisfaction or to assess ways to motivate your employees, for example. Ranking scales can be a source of useful information, but they do have some disadvantages. Businesses typically use ranking scales when they want to establish preferences or levels of importance in a group of items. A respondent completing a scale with five items, for example, will assign a number 1 through 5 to each individual one. Typically, the number 1 goes to the item that is most important to the respondent; the number 5 goes to the one that is of least importance. In some cases, scales do not force respondents to rank all items, asking them to choose their top three out of the five, for example. Online surveys may remove the need to key in numbers, allowing respondents to drag and drop items into order.

Various types of rating scales and ranking scales are as follows:

Rating Scales	Ranking Scales
Dichotomous Scale	Thurstone’s Paired
Category Scale	Comparison Scale
Likert Scale	Thurstone’s Equal
Semantic Differential	Appearing Interval Scale
Scale	Forced Ranking Scale
Numerical Scale	Comparative Scale
Itemized Rating Scale	
Fixed or Constant Sum	
Scale	
Fractionation Scale	
Verbal Scale	
Staple Scale	
Graphic Rating Scale	
Consensus Scale	
Multidimensional Scale	
Q- Sort Scale	



#### IV. QUANTITATIVE METHODS IN SOCIAL RESEARCH

Quantitative methods comprise of Mathematics, Statistics, Operations Research and Computer Applications.

Chance is what makes life worth living. If everything was known in advance, imagine the disappointment. If the decision maker had perfect information about future as well as present and the past, there would be no need to consider the concept of probability.

However, it is unusually the case that uncertainty cannot be eliminated and hence its presence should be recognized and used in the process of decision making. Information about uncertainty is often available to the decision maker in the form of probabilities. Results of many events associated with our real life cannot be predicted with certainty. Such phenomena are frequently observed in business, economic and social sciences or even in our day-to-day life.

The role of statistics is to help a decision-maker in a decision-making situation of a complex problem. A decision maker can imagine himself sitting in a three-dimensional space with the first dimension (X-axis) representing the degrees of uncertainty associated with the decision problem. The degree of uncertainty is not necessarily same in all business problems. It will vary from zero to totally uncertain in nature. If the uncertainty is zero then the problem will be known as deterministic type. But, if in an uncertain situation, the decision maker ignores the uncertainty, then the solution to the problem will be based on a number of assumptions which will lead to an unrealistic solution. The statistical technique will help a manager to reduce the uncertainty of a problem, not the elimination of it. That is making the decision problem of risk type which is in between absolutely certainty and totally uncertainty.

The second dimension (Y-axis) can be viewed as the number of variables associated with the decision-problem. Here problem can vary from univariate type to multivariate type depending on the degree of complexity.

The third dimension (Z-Axis) to the decision maker can be considered as the dynamism of the problem. It might change from static to strictly dynamic in nature.

Therefore, depending on the degree of uncertainty, number of variables involved and the amount of dynamism associated with the decision-making problem; the position of a decision maker will be somewhere in a three-dimensional space. So the simplest problem to a decision maker can be of deterministic, univariate and static type and the most complex problem may

be of totally uncertain, multivariate and strictly dynamic in nature. Any other problem in the business scenario will be in between these two extreme types.

### **Mathematical Methods**

Statistics is intimately related to and essentially dependent on mathematics. The modern theory of statistics has its foundation on the theory of mathematics. Further the development of statistical techniques is based on wide application of mathematical tools like algebra, trigonometry, coordinate geometry, differential and integral calculus, matrix theory etc. Statistics is a branch of applied mathematics which specializes in data.

### **Statistical Methods**

Statistics is the mathematical science involving the collection, analysis and interpretation of data. Following are few of the definitions that are used to describe what statistics is:

Statistics may be defined as the science of collection, presentation, analysis and interpretation of numerical data – Croxton and Cowden

Statistics is the Science of estimates and probabilities – Boddington

Statistics is the key technology in Science and Social Sciences –R.A. Fisher

### **Applications of Statistics:**

Science without Statistics bear no fruit, Statistics without Science have no root. Knowledge of Statistics like knowledge of foreign language or of algebra may prove to use at any time under any circumstances (A. L. Bowley).It is a method of decision making in the face of uncertainty on the basis of numerical data and calculated risks (Chau).

Statistics is the method of conducting a study about a particular topic by collecting, organizing, interpreting, and finally presenting data. Statistical methods are mathematical formulas, models, and techniques that are used in statistical analysis of raw research data. The application of statistical methods extracts information from research data and provides different ways to assess the robustness of research outputs. Statistical methods have wide applications in different disciplines i.e., the subject is interdisciplinary. Policy making, economics, business, management, astronomy, geology, geography, meteorology, botany, zoology, physiology, medical science, anthropology, environmental science, psychology, education, engineering, etc. are some of the application areas. The government also uses statistics to make decisions about populations, health, education, etc. Moreover, every large company employs its

own statistical research divisions or firms to research issues related to products, employees, customer service, etc. Business success relies on knowing what is working and what isn't.

**Following is a list of some widely used statistical methods in research:**

Statistical Methods	
Descriptive Statistics  Data Collection Data Representation Frequency Distribution Central Tendency Dispersion or Variability Skewness Kurtosis Correlation and Regression Analysis	Inferential or Inductive Statistics  Probability Theory Probability Distributions Sampling and Sampling Distributions Theory of Estimation Testing of Hypothesis (Parametric and Non-Parametric) Design of Experiments Analysis of Variance and Co- Variance
Other Types of Statistics  Time Series Analysis and Forecasting Index Numbers Association of Attributes Statistical Quality Control Psychological Scaling Demography or Vital Statistics Official Statistics Decision Theory	Multivariate Statistics  Multiple Regression Analysis Total Correlation, Multiple and Partial Correlation, Part Correlation, Canonical Correlation Principal Component Analysis Factor Analysis Cluster Analysis Discriminant Analysis Conjoint Analysis Path Analysis Structural Equation Modeling

**Misuses of Statistics:**

Statistics are like clay of which you can make a God or a Devil as you please. Science of Statistics is the useful servant but only of great value to those who understand its proper use (King).

Statistics only furnishes a tool though imperfect which is dangerous in the hands of those who do not know its use and deficiencies. It is only a tool which is rightly used may prove extremely useful and if misused might be a disastrous

(A. L. Bowley).

In the words of Benjamin Disraeli, a British Politician, there are three kinds of lies – lies, damned lies and Statistics.

Statistics consists of tests used to analyze data. These tests provide an analytic framework within which researchers can pursue their research questions. This framework provides one way of working with observable information. Like other analytic frameworks, statistical tests can be misused, resulting in potential misinterpretation and misrepresentation. Researchers decide which research questions to ask, which groups to study, how those groups should be divided, which variables to focus upon, and how best to categorize and measure such variables. The point is that researchers retain the ability to manipulate any study even as they decide what to study and how to study it.

### **Potential Misuses:**

- Manipulating scale to change the appearance of the distribution of data
- Eliminating high/low scores for more coherent presentation
- Inappropriately focusing on certain variables to the exclusion of other variables
- Presenting correlation as causation

### **Measures against Potential Misuses:**

- Testing for reliability and validity
- Testing for statistical significance
- Critically reading statistics

### **Operations Research Methods**

Operational research (OR) encompasses the development and the use of a wide range of problem-solving techniques and methods applied in the pursuit of improved decision-making and efficiency, such as simulation, mathematical optimization, queueing theory and other stochastic-process models, Markov decision processes, econometric methods, data envelopment analysis, neural networks, expert systems, decision analysis, and the analytic hierarchy process. Nearly all of these techniques involve the construction of mathematical models that attempt to describe the system. Because of the computational and statistical nature of most of these fields, OR also has strong ties to computer science and analytics. Operational researchers faced with a new problem

must determine which of these techniques are most appropriate given the nature of the system, the goals for improvement, and constraints on time and computing power, or develop a new technique specific to the problem at hand (and, afterwards, to that type of problem). Following are a list of widely used operation research methods by the researchers:

Operations Research Methods	
Operations Research Methods Transportation & Assignment Problems Game Theory Queuing Theory Replacement Theory Inventory Models Simulation Models Reliability Theory PERT & CPM Sequencing Problems Markov Process	Optimization Methods Linear Programming Goal Programming Geometric Programming Dynamic Programming Integer Programming Convex Programming Non-Linear Programming Stochastic Programming

### Role of Computer and Statistical Packages

With the advent of computer and statistical packages, it becomes a great advantage in practical implementation of research methods with large number of variables and data in different types of researches. Statistical programs are becoming increasingly important in the work of researchers all over the world. The researchers in their scientific work show not only in theory but also solutions numerals indicators. Some of the popular statistical packages in use are:

Statistical Packages	
SPSS	Strata
Statistica	Jmulti
Eviews	Gretl
Statview	SAS
Sysstat	S-Plus
Minitab	R

### Research Process

Research process consists of series of actions or steps necessary to effectively carry out any research. There are a variety of approaches to research in any field of investigation, irrespective of whether it is applied research or basic research.

Each particular research study will be unique in some ways because of the particular time, setting, environment, and place in which it is being undertaken. Nevertheless, all research endeavour share a common goal of furthering our understanding of the problem and thus all traverse through certain basic stages, forming a process called the research process.

An understanding of the research process is necessary to effectively carry out research and sequencing of the stages inherent in the process. The following are the different steps for carrying a research successfully:

Different Steps of Research Process	
<b>1. Problem Formulation</b> ✓ Problem Definition ✓ Literature Review ✓ Research Objectives ✓ Hypothesis Formulation	<b>2. Designing the Research</b> ✓ Type of Research ✓ Experimental Design ✓ Scaling Techniques ✓ Questionnaire Design
<b>3. Sources and Collection of Data</b> ✓ Type and sources of data ✓ Methods of data collection ✓ Sampling design ✓ Sample size decisions ✓ Field work	<b>4. Data Preparation and Analysis</b> ✓ Coding ,editing and data entry ✓ Univariate data analysis ✓ Multivariate data analysis ✓ Forecasting techniques ✓ Use of statistical packages
<b>5. Report Preparation and Presentation</b> ✓ Characteristic of a well-written report ✓ Title page; Table of contents, statistical tables, charts and diagrams; Executive summary; Introduction; Methodology; Data analysis and findings; Summary and conclusions; Recommendations; Limitations; Future scope of research; Annexure; Bibliography; Author Index; Subject Index. ✓ Oral presentation; OHP and Slide presentation; Power Point presentation.	

Research is a system of interdependent related stages. Violation of this sequence can cause irreparable harm to the study. However, it is also true that several alternatives are available to the researcher during each of the stages which will be unique to each researcher and his/her research.

## Bibliography

- 】 Anderson, Q. R., Sweeny, D. J. and Williams, T. A. *An Introduction to Management Science*, Cengage.
- 】 Beri, G. C. *Marketing Research*, Tata McGraw Hill.
- 】 Bradley, N. *Marketing Research: Tools and Techniques*, Oxford University Press.
- 】 Bryson, A. *Business Research Methods*, Oxford University Press.
- 】 Budhnick, F. S. *Mathematics for Business, Economics and Social Science*, Tata McGraw Hill.
- 】 Cooper, D. R. and Schindler, P. S. *Business Research Methods*, Tata McGraw Hill.
- 】 Das, J. K. *Statistics for Business Decisions*, Academic Publishers.
- 】 Das, N. G. and Das, J. K. *Business Mathematics and Statistics*, Tata McGraw Hill.
- 】 Enders, W. *Applied Econometric Time Series*, John Wiley.
- 】 George, D. and Mallary, P. *SPSS for Windows: Step by Step*, Pearson Education.
- 】 Green, P. E., Tull, D. S. and Albaum, G. *Research for Marketing Decisions*, Prentice Hall of India.
- 】 Hanke, J. E., WiChern, D. W. and Reitsch, A. G. *Business Forecasting*, Prentice Hall of India.
- 】 Johnson, R. A. and Wichern, D. W. *Applied Multivariate Statistical Analysis*, Prentice-Hall of India.
- 】 Johnson, R. A. and Wichern, D. W. *Business Statistics*, John Wiley and Sons.
- 】 Jonker, J. and Pennink, B. *The Essence of Research Methodology*, Springer.
- 】 Kothari, C. R. *Research Methodology*, New Age International Ltd.
- 】 Kumar, R. *Research Methodology*, Pearson Education.
- 】 Maddala, G. S. and Lahiri, K. *Introduction to Econometrics*, John Wiley and Sons.
- 】 Majumdar, R. *Marketing Research: Text, Applications and Case Studies*, New Age International Ltd.
- 】 Makridakis, S., Wheelwright, S. C. and Hyndman R. J. *Forecasting Methods and Applications*, John Wiley and Sons.
- 】 Malhotra, N. *Marketing Research: An Applied Orientation*, Pearson Education.
- 】 Mishra, P. *Business Research Methods*, Oxford University Press.
- 】 Murthy, S. N. and Bhojanna, U. *Business Research Methods*, Excel Books.
- 】 Nargundkar, R. *Marketing Research: Text and Cases*, Tata McGraw Hill.
- 】 Panneerselvam, R. *Research Methodology*, Prentice Hall of India.
- 】 Parasuraman, A.D., Grewal, D. and Krishnan, R. *Marketing Research*, Biztantra.
- 】 Ramamurthy, G. C., *Research Methodology*, Dreamtech Press.
- 】 Sekharan, U. *Research Methods for Business*, John Wiley and Sons.

- 】 Sharma, J. K. *Business Statistics*, Pearson Education.
- 】 Sharma, J. K. *Operations Research: Theory and Methods*, Macmillan.
- 】 Shenoy, G. V. and Pant, M. *Statistical Methods in Business and Social Science*, McMillan.
- 】 Sounderpandian, J. and Aczel, A. D. *Complete Business Statistics*, Tata McGraw Hill.
- 】 Sounders, M., Lewis, P. and Thornhill, A. *Research Methods for Business Students*, Pearson Education.
- 】 Srivastava, U. K, Shenoy, G. V. and Sharma, S. C. *Quantitative Techniques for Managerial Decisions*, New Age International.
- 】 Taha, H. *Operation Research*, Prentice Hall.
- 】 Vohra, N. D. *Quantitative Techniques in Management*, Tata McGraw Hill.



# Impact of Board Qualities on the Financial Performance of Listed Deposit Money Banks in Nigeria

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## **ABSTRACT**

**T**he study examines the impact of qualities of board members on the financial performance of listed Deposit Money Banks in Nigeria. The study used secondary data from the annual reports and accounts of a sample of 12 banks for the period of six years from 2012-2017. The study used return on assets (ROA) to measure financial performance and uses multiple regression to examine the impact of board qualities on financial performance. The study found that multiple directorship has negative and significant relationship with financial performance of listed deposit money banks in Nigeria, while directors' remuneration has positive and significant relationship with financial performance of listed deposit money banks. Based on the findings, the study recommends that regulators should impose restrictions on the number of outside board membership that a director can hold

simultaneously to make him more effective. In addition, good and sound corporate governance should be put in place to restrict excessive payments being made to directors and remuneration should be largely determined by the firm's performance.

**Keywords:** *Financial Performance, Multiple Directorships, Directors Remuneration, Board Expertise, Listed Banks, Nigeria.*

## I. INTRODUCTION

As a key component of the financial system, banks play an important role in the operation of an economy. They channel funds from savers to borrowers for investment which increases economic growth rate and development of a country. For sustainable mediation functions, well financial performance of banks needs to be maintained. Financial performance has critical implication for economic growth of countries. Good financial performance rewards investment, while poor financial performance can lead to institutional failure and crisis which may affects the economic growth (Assfaw, 2018). The growth and stability of the financial condition of a country depends on the soundness of its banking sector (Dakito, 2015). Financial performance is the reflection of efficiency and effectiveness of the management in making use of the resources of the company as expressed in the form of sales turnover, employment, or stock prices (Okumu & Oyugi, 2016). The soundness of banks financial performance can be directly attributable to the quality of corporate governance. In other words, corporate governance determines the extent to which an organization is being run in a honest manner (Sanusi, 2012).

Corporate governance encompasses and embraces transparency, accurate reporting and adherence to statutory regulations and prudential guidelines (Oyetunji, Akande, & Olurin, 2017). Corporate directors drew increased public attention in the recent decades, in the wake of massive firms' collapse, accounting scandals, and managerial compensation excesses. Directors' expertise (financial literacy) and compensation were the focus of regulations (Sarbanes-Oxley) and stock exchange standards (Bar-hava, Gu, & Lev, 2013). Directors play both monitoring and advisory roles in corporate governance, while very few studies address the advisory roles.

In addition, directors' monitoring pressure out of their expertise helps them see through decisions harmful to financial performance (Qiao, Chen, & Hung, 2018). On the other hand, directors' remuneration is broadly used as an incentive that affects strategies planned and decisions made and adopted by directors which cause great impact on financial performance (Kirsten & Du

Toit, 2018).

Members of a board of directors have numerous responsibilities, including an ethical duty to represent the interests of the shareholders and to oversee the financial well-being of the organization (Clements, D.Neil, & Wertheim, 2015). When a director simultaneously serves on the boards of more than one company (i.e. holds “multiple directorships”), that service has the potential to either add to or subtract from the director’s effectiveness in fulfilling his or her ethical responsibility to each firm (Geoffrey & Gavin, 2016). The high workload and prevalence of multiple directorships spark a debate over the concern that busy board structures are inefficient and destroy value (Hauser, 2013). In fact, the directors prefer serving on more outside boards than serving on their board committees in order to reinforce their reputation, their prestige, their experience and their external relations (Baccouche, 2015). He further stated that, more of multiple directors dominating the board seats could reduce effectiveness of corporate governance.

According to Godwin Emefiele, Governor of Central Bank of Nigeria (CBN) in 2018, poor corporate governance and non-adherence to regulation contribute significantly to incessant bank failures both in Nigeria and other parts of the world. He said the failure of banks’ boards in carrying out their oversight functions by checking managements’ excessive risk taking; advisory roles through expertise, conflict of interest, undue concentration on short term gains and excessive executive compensation fundamentally affect their financial performance (The Nation, 2018). In the same vein, Collins as cited in The Nation (2018) expressed that the two commercial banks (i.e. skye and diamond banks) lost the battle of existence to poor corporate governance which eventually crippled their financial performance. Also, poor boards could in turn lead to a run on the bank unemployment, fraudulent activities, questionable dealings that may result to negative impact on the banks’ shareholders’ return on asset (Ogbechie & Koufopoulos, 2010). Thus ROA allows users to assess how well a firms’ corporate governance system is with particular reference to board quality in securing and motivating efficient management of the firm (El-Maude, Bawa, & Rimamshun, 2018).

Several studies have been conducted on board characteristics and financial performance both in developed and developing countries using board characteristics as the independent variable. For instance Aleksic, Pavic, and Pejic-bach (2018), Gurusamy (2017), Herrera-echeverri, Gaitan, Orozco, and Soto (2019), Rahman, Waliuddin, and Razali, (2019), Ujunwa, (2013), focused on sector other than financial sector. Thus, Abidin, Ahmad-zaluki, and Ilona,

(2011) studied board quality and performance of listed Indonesian companies. The study used multiple directorships among other variables. However, the reason for the mixed empirical evidence could be the difference in economic and legal conditions of countries.

Moreover, few studies have been conducted in Nigeria on board qualities for instance Ujunwa, (2013), and Saleh (2017), but the studies did not include the variables in this study. It is in recognition of this that it is deemed imperative to examine the effects of board quality (proxied by multiple directorship, board remuneration and board expertise) on financial performance of listed deposit money banks in Nigeria. The motivation of this study is due to failure of banks' boards in carrying out their management functions. More so, conflict of interest, undue concentration on short term gains and excessive executive compensation fundamentally as it duly affects their performance (The Nation, 2018).

This led to the objective of the study to examine the impact of board qualities on the financial performance of listed deposit money banks in Nigeria for the period 2012-2017. The researcher therefore hypothesized that board qualities do not have a significant impact on financial performance of listed deposit money banks in Nigeria. The study will contribute to the existing literatures on board qualities and financial performance of listed deposit money banks in Nigeria.

The remainder of the paper is organized as follows: section 2 presents relevant extant studies. Section 3 discusses the methodology employed for the study. In section 4, the results of data analysis are presented and discussed. Section 5 concludes the study by highlighting the findings and recommendations.

## **II. LITERATURE REVIEW**

Financial performance is the reflection of efficiency and effectiveness of the management in making use of the resources of the company as expressed in the form of sales turnover, employment, or stock prices (Okumu & Oyugi, 2016). Financial performance of an entity is important to stakeholders in general, and to shareholders in particular as it increases the business value, offers the basis for the distribution of dividends, and may be used to attract potential investors (Müller, 2014).

### **Multiple Directorship and Financial Performance**

Kamardin, Latif, Mohd, and Adam (2015) define multiple directorships as the number of external appointments held by corporate directors. Several studies have been conducted to examine the relationship between multiple

directorship and financial performance.

For example, Zaidi and Nadeem (2017) examined the impact of overboarded directors on firm performance in Pakistan from the agency theory perspective. Variables used include multiple directorships among others. The sample of the study includes 100 firms listed from 2011 to 2014. Secondary data was collected from annual reports of listed firms and the data were analyzed using regression analysis. The study found a negative relationship between multiple directors and performance. However, there is a need to replicate this study in Nigeria due to cultural and economic heterogeneity between Nigeria and Pakistan.

However, Latif, Kamardin, Mohd and Adam (2013) studied the effect of multiple directorships on firm performance in Malaysia from the agency theory perspective. Data were extracted from annual report of the 132 select companies for the year 2008. Ordinary least squares regression was employed to examine the effect of multiple directorships on firm performance and the findings shows that multiple directorships affect firms' market performance positively but not significantly. They argue that multiple directorships are neither beneficial nor detrimental to performance. However, there is a need to replicate this study in Nigeria due to cultural and economic heterogeneity between Nigeria and Malaysia. Furthermore, the period of study is only one year. A study with a longer period may be preferred.

Similarly Abidin, Ahmad-zaluki, and Ilona (2011), examines the effect of board quality on company performance in Indonesia from the agency theory and resource-dependent perspective. Variables used include multiple directorships among others. The sample of the study includes 133 companies listed on the Jakarta stock exchange in the year 2007. Secondary data was collected from annual report of the selected companies and analyzed using Ordinary Least Square regression. The results revealed an insignificant relationship between multiple directorships and firm performance that is multiple directorships is not associated with performance. However, the study is a cross-sectional study, therefore, more study is needed because the period of study is one year.

Ngonidzashe and Oscar (2014) examined the impact of multiple directorships on performance of companies listed on the Johannesburg Stock Exchange (JSE) from the agency theory perspective. The sample of the study includes all companies listed on the Johannesburg stock exchange from 2006 to 2012. Secondary data was collected from annual reports of the listed companies using correlation analysis. The study found no association between multiple directorships and company performance. However, there is a need to replicate

this study in Nigeria due to cultural and economic heterogeneity between Nigeria and South Africa.

Contrary to the above studies, Daniel (2013) studied the relationship between multiple directorship and financial performance in Kenya from agency theory, resource dependency theory and stewardship theory perspective. The sample of the study includes 43 commercial banks in Kenya from 2008 to 2012. Secondary data was collected from annual reports of the banks and analyzed using Pearson correlation and multiple regression analysis. The study shows that there is a positive and statistically significant relationship between multiple directorship and financial performance. However, there is a need to replicate this study in Nigeria due to cultural and economic heterogeneity between Nigeria and Kenya.

### **Directors' Remuneration and Financial Performance**

Directors' remuneration is the payment made for services or employment of directors on the board of company or corporation (Talha, Sallehuddin, & Masuod, 2009). Several studies have been conducted to examine the relationship between directors' remuneration and financial performance.

Kirsten and Du Toit (2018) examined the relationship between director remuneration and financial performance of companies listed on the Johannesburg Stock Exchange from the agency theory perspective. The sample of the study includes 42 listed South African companies from 2006 to 2014. Secondary data was collected from annual reports of the selected companies. Pearson correlation and regression analysis were used for the analysis. The findings show that directors' remuneration does not have a significant relationship with financial performance. However, there is a need to replicate this study in Nigeria due to cultural and economy heterogeneity between Nigeria and South Africa.

However, Razali, Joslin, Rahman, Tak, and Salawati (2018) studied directors remuneration and firm performance in Malaysia. The study was based on the agency theory perspective. The sample of the study includes 266 firms listed from 2013 to 2015. Secondary data was collected from annual reports and analyzed using multiple regression analysis. The study found a significantly positive relationship between directors' remuneration and firm's performance. However, the period of the study is just within two year and cannot be used for a conclusive judgment.

Ruparelia and Njuguna (2016) examined the relationship between board remuneration and financial performance in Kenya. The study is grounded by

agency theory. The sample of the study consists of 20 listed companies within the period of 2003 to 2013. Secondary data was collected from annual reports and analyzed using regression analysis. The findings show a negative relationship between board remuneration and financial performance. However the study is not a Nigerian study, therefore, there is a need to replicate this study in Nigeria due to cultural and economy heterogeneity between Nigeria and Kenya.

Azutoru, Obinne, and Chinelo (2017) examined the effect of corporate governance mechanisms on financial performance of insurance companies in Nigeria from the agency theory perspective. The sample of the study consists of 20 insurance companies quoted on the Nigerian stock exchange from 2011 to 2015. Variables used include executive directors' remuneration, non-executive directors' remuneration, among others. Secondary data was collected from the annual reports of the quoted firms and analyzed using multiple regression analysis. The study found that executive directors remuneration positively affect performance while non executive directors remuneration has a negative impact on performance. However, the study did not include banks and cannot be used as a basis for justification.

### **Board Accounting Expertise and Financial Performance**

It is important for board members to have an understanding of accounting principles and financial statements which will lead to better board supervision and this will serve to the better interest of shareholders (Gu, Malmendier, & Tate, 2008). Also, directors with professional financial knowledge will be able to provide valuable advice to the management especially during financial crisis (Francis, Hasan, & Wu, 2012). Several studies have been conducted to examine the relationship between board expertise and financial performance.

Nawafly and Alarussi (2018) studied board of directors, audit committee and the financial performance from the resource dependency perspective. Independent variables used include board expertise among others. Data were extracted from annual report of the listed companies for the year 2015. Ordinary least square regression was employed to examine the impact of board of directors on financial performance and the findings shows a positive and significant relationship between board expertise and financial performance. However, the study is a cross-sectional study and also there is a need to replicate this study in Nigeria due to cultural and economy heterogeneity between Nigeria and Malaysia.

Similarly, Johl and Salami (2014) examined the impact of board composition on firm performance in Malaysia. Data were extracted from annual report



of the listed companies for the year 2011. Variables used include directors with accounting expertise among others. Regression analysis was employed to examine the impact of board composition on firm performance and the findings show that directors with accounting expertise are positively associated with firm performance. However, the study is a cross-sectional study and the study failed to use theories to express the relationship between the variables. Therefore, there is a need to replicate this study in Nigeria using appropriate theories.

Furthermore, Johl, Kaur, and Cooper (2015) studied board characteristics and firm performance in Malaysia. Data was collected from annual reports of the listed firms for the year 2009. The study proxy board characteristics with board accounting expertise among others. Regression analysis was employed to examine the impact of board characteristics on firm performance and the findings show that board accounting/financial expertise are positively associated with firm performance. However, the study is cross-sectional study. Furthermore, the study failed to use theories to express the relationship between the variable. Therefore, there is need to imitate using appropriate theories.

However, Imad (2015) studied board characteristics and firm performance in Palestine from the agency period perspective. Variables used include board expertise among others. The sample of the study consists of 48 listed companies on the Palestine stock exchange from 2010 to 2013. Secondary data was extracted from annual reports of 48 listed companies. Multiple regression was used to analyze the data. The result showed that board expertise has a negative relationship with performance. However, there is a need to replicate this study in Nigeria due to cultural and economy heterogeneity between Nigeria and Palestine.

### **Theoretical Framework**

For the purpose of this research, the theory that underpins the study is agency theory.

#### **Agency Theory**

Agency theory assumes that there is a conflict of interest between principal and agent. It argues that the agent is motivated to pursue their own goals, rather than to increase the principal's wealth. In order to reduce this agency conflict, the principal has to control the behavior of the agent through good corporate governance (Jensen, M., &Meckling, 1976). This agency theory serves to underpin the relationship between corporate governance and company performance, including the role of the board of directors to improve a



company's performance. Those agency variables include multiple directorships, director remuneration and board expertise.

The agency theory suggests that good remuneration pack for executive and non-executive directors can help to reduce the opportunistic behavior of manager (Jensen, M., & Meckling, 1976; Kevin, A., 2003). According to Jensen and Murphy (1990); Murphy (1985) agency theory can be used to justify the positive correlation between executive remuneration and firm performance.

Michaud, D.W., and Gai, (2009) hypothesized that directors such as CEO who received higher pay tend to work harder and then succeed to improve firm's financial performance. Fama (1980) argue that multiple directorships may be valuable to companies. It has been argued that the directors who serve on multiple boards have broader experience, and network and commercial contacts (Mace, 1986). Arguably, these directors will have more valuable director capabilities than directors with a single directorship. They have a higher potential for service effectiveness and thus can have positive effects on company performance.

Fama and Jensen (1983) stated that, since the board was mandated to supervise the organization they were required to have the knowledge which would allow them to carry out their roles perfectly. According to Carcello, Hermanson, Neal, and Riley (2002) those board members, who have experience are able to contribute positively to the decision making process. In turn, this leads to the organization achieving a better performance with increased experience (Vo, D. & Phan, 2013).

### **III. METHODOLOGY**

The study adopted the correlational research design. The population of the study comprised of all the fifteen (15) deposit money banks listed on the Nigeria Stock Exchange (NSE) as at 31<sup>st</sup> December 2017 of which three (3) banks were filtered out due to non-availability of data in the annual financial reports of the firms for the period under study i.e., 2012-2017. The study used secondary source of data collected from annual reports of the listed deposit money banks in Nigeria. The research employed multiple regression on the panel data. The dependent variable which is financial performance (ROA) is measured by dividing the net profit after tax by the total assets as supported by Abdulazeez, Ndibel, & Mercy (2016).

The independent variables for this study comprise three board qualities (multiple directorships, directors' remuneration and board accounting expertise) mechanism. Multiple directorship is measured as the average number of outside

directorships held by the board member, as calculated by the total number of directorships held by all the members of the board divided by the board size as supported by Fich & Shivdasani (2006). Directors remuneration is measured as the directors annual fees as supported by Ruparelia & Njuguna (2016). Board accounting expertise is measured by the proportion of accounting experts on the board to the number of directors on the board of the company as supported by Johl et al. (2015).

Therefore, the model of the study is expressed below:

$$ROA_{it} = \beta_0 + \beta_1 MD_{it} + \beta_2 DREM_{it} + \beta_3 BEXPT_{it} + e_{it} \dots\dots\dots 1$$

Where;

- ROA = Financial performance
- MD = Multiple directorship
- DREM = Directors remuneration
- BEXPT = Board expertise
- e = Error term
- i = Firm
- t = Time

$\beta_0$  denote constant of the model

$\beta_1$  is the parameter of MD

$\beta_2$  is the parameter of DREM

$\beta_3$  is the parameter of BEXPT

#### IV. RESULTS AND DISCUSSION

**Table 4.1: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	72	.015	.022	-.095	.069
MD	72	.115	.241	.067	.145
DREM	72	1.08e+09	4.79+08	7.69e+08	1.42e+09
BEXPT	72	.193	.167	.091	.286

*Source: Summary of STATA output*

Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables for the sample listed deposit money banks in Nigeria. This shows the average indicators of variables computed from the financial statements. The financial performance measured by return on asset (ROA) reveals an average return of 1.5% with a standard deviation of 0.022 which shows high variability across listed deposit money banks in Nigeria. The minimum and maximum values of return on asset are -9.5% and 6.9% respectively. This means the lowest return on asset is -9.5% and the highest return on asset is 6.9%.

On the other hand, the average proportion of multiple directorship as indicated from the result is 11.5% with the standard deviation of 0.241, which shows that there is a wide dispersion in terms of directors occupying more than one board seat across the listed deposit money banks in Nigeria. The minimum and maximum proportion of multiple directorships are 6.7% and 14.5% respectively. The average amount of directors' remuneration as captured in this study is N 1.08 billion, while the standard deviation of N 478 million shows low variation across the listed deposit money banks in Nigeria. The minimum and maximum of directors' remuneration are N 769 million and N 1.42 billion respectively. Finally, the average proportion of board expertise as indicated from the result is 19.3%, while standard deviation of 16.7% shows low variation in respect of number of board expertise across listed deposit money banks in Nigeria. The minimum and maximum proportion of board expertise as captured in this study are 9.1% and 28.6% respectively.

**Table 4.2: Correlation Matrix of the Variables**

Variables	ROA	MD	DREM	BEXPT
ROA	1.000			
MD	-0.207	1.000		
	0.173			
DREM	0.098	-0.099	1.000	
	0.524	0.516		
BEXPT	-0.444*	-0.1184	-0.206	1.000
	0.002	0.226	0.174	

Source: Summary of STATA output

From the correlation matrix table 4.2, it can be seen that directors' remuneration (DREM) has a positive relationship with return on asset (ROA) of the listed deposit money banks in Nigeria, implying that the variables move in the same direction with return on asset (ROA). However, multiple directorship (MD) and board expertise (BEXPT) have negative relationship with return on asset (ROA). The implication is that the above variables move in the opposite direction with the return on asset (ROA). With respect to association among the independent variables themselves, the table reveals that DREM and BEXPT have negative relationship with MD. Finally, the table shows that BEXPT has negative relationship with DREM. On the other hand, the relationship among the independent variables is not too strong to warrant problem of multicollinearity.

### Residual Tests

To test for the existence of heteroskedasticity, the present study used Breuch Pagan/Cook-Weisberg. The study revealed that  $\chi^2$  of 0.13 with p-value of 0.4501, implying absence of heteroskedasticity and that the null hypothesis that the variance of the residual is constant (homoscedastic) is not rejected. The study conducted multicollinearity test to show the strength of relationship among the explanatory variables themselves, which may affect the result of the study. Variance inflation factor (VIF) was conducted and the values for all the variables are less than 10 and the tolerance values for all the variables are greater than 0.10 (rule of thumb). This shows there is no multicollinearity problem. The Hausman specification test was conducted to choose between the fixed and random effect model. The result of the Hausman test revealed that the value of  $\chi^2$  is 0.75 and the  $\text{prob} > \chi^2$  is 0.8608, the insignificant value as reported by the probability of  $\chi^2$  indicates that the Hausman test is in favor of random effect model. Further to this, the Breusch and Pagan lagrangian multiplier test for random effect was conducted to choose between the random effect result and OLS regression. The result deduced from the test showed  $\chi^2$  of 0.64 with the p-value of 0.1263. This implies that OLS regression is the best suitable to be interpreted in this study.

**Table 4.3: OLS Regression Coefficients**

Variable	Coefficient	T-value	P-value
Intercept	0.739	3.93	
MD	- 0.376	2.424	0.031

Variable	Coefficient	T-value	P-value
DREM	0.603	1.99	0.045
BEXPT	- 0.0162	-0.02	0.401
R <sup>2</sup>	0.2847		
Adjusted R <sup>2</sup>	0.2324		
F-Sig			0.000

*Source: Summary of STATA Output*

Table 4.3 also reported a beta coefficient of -0.376 with a p- value of 0.031 which is statistically significant at 5%. The result indicates that multiple directorship has negative and significant relationship with return on asset. By implication, it means that increase in directorship will negatively affect the performance of listed deposit money banks in Nigeria. This is because while holding many directorships simultaneously, directors will be forced to share their time and efforts between the different directorships served and, thus, they will be less able to perform their duties and their oversight tasks which will reduce banks performance. This provides basis for rejecting null hypothesis which states that, multiple directorship has no significant effect on the financial performance of banks. This finding is in line with that of Zaidi and Nadeem (2017) who found negative relationship between multiple directorship and firm performance. However, the result does not support the proposition of the agency theory and the findings of Latif, Kamardin, Mohd and Adam (2013), Abidin, Ahmad-zaluki, and Ilona (2011) and Ngonidzashe and Oscar (2014).

In addition, the result reported a beta coefficient of 0.603 with a p- value of 0.045 which is statistically significant at 5%. The result shows that directors' remuneration has positive and significant relationship with return on asset. By implication, it means that increase in directors' remuneration will enhance directors' effectiveness which in turn improves banks' financial performance. This is because compensation contracts can actually motivate directors to embark on actions that maximize shareholders' interest and wealth. This provides evidence for rejecting null hypothesis which states that directors' remuneration has no significant effect on the financial performance of listed deposit money banks. This finding support the proposition of agency theory and that of Kirsten and Du Toit (2018) and Razali, Joslin, Rahman, Tak, and Salawati (2018) who found positive relationship between directors' remuneration and firm performance. However, the finding is contrary to that of Ruparelia and Njuguna (2016) who found that directors' remuneration has negative relationship with firm performance.

Finally, the result reported a beta coefficient of -0.0162 with a p- value of 0.401 which is statistically insignificant. The result shows that the negative relationship between board expertise and financial performance is not significant. However, we fail to reject null hypothesis which states that, board expertise has no significant impact on the financial performance of listed deposit money banks in Nigeria.

## V. CONCLUSION AND RECOMMENDATION

This study established the relationship between quality of board members and financial performance of listed deposit money banks in Nigeria. Based on the findings of the study, we conclude that multiple directorship has negative and significant relationship with financial performance of listed deposit money banks in Nigeria. However, the study reveals that directors' remuneration has positive and significant relationship with financial performance of listed deposit money banks in Nigeria. While negative relationship between board expertise and financial performance is not significant. In line with the findings of this study, we therefore recommend that regulators should impose restrictions on the number of outside board membership that a director can hold simultaneously to make him more effective, as multiple directorship can reduce the time and the efforts of directors to execute their oversight tasks and it will reduce firm performance. In addition, good and sound corporate governance should be put in place to restrict excessive payments being made to directors and remuneration should be largely determined by the firm's performance. Nonetheless, no prescription on how to determine the directors' remuneration is provided by corporate governance principles or best practice. Rather, the board through the remuneration committee using the services of management consultants and other experts coupled with market surveys should design a remuneration package that would be attractive enough to retain the directors who have the expertise to manage the company successfully and that the structure of the packages for the directors should be linked with the corporate and individual performance.

## References

- 1) Abdulazeez, D., Ndibel, L., & Mercy, A.M. (2016). Corporate Governance and Financial Performance of Listed Deposit Money Banks in Nigeria. *Journal of Accounting & Marketing*, 5(1), 1–6. <https://doi.org/10.4172/2168-9601.1000153>
- 2) Abidin, S., Ahmad-Zaluki, N. A., & Ilona, D. (2011). Board Quality and the Performance of Indonesian Listed Companies. *Corporate Board: Role, Duties and Composition*, 7(1), 57-65.
- 3) Aleksic, A., Pavic, T., & Pejic-bach, M. (2018). Measuring the Impact of

Board Characteristics on the Performance of Croatian Insurance Companies. *International Journal of Engineering Business Management*, 10, 1–13. <https://doi.org/10.1177/1847979018765864>

- 】 Assfaw, A. M. (2018). Determinants of the Financial Performance of Private Commercial Banks in Ethiopia: Bank Specific Factors Analysis. *Global Journal of Management and Business Research*, 18(3), 65-77.
- 】 Azutoru, I. H. C., Obinne, U. G., & Chinelo, O. O. (2017). Effect of Corporate Governance Mechanisms on Financial Performance of Insurance Companies in Nigeria. *Journal of Finance and Accounting*, 5(3), 93–103. <https://doi.org/10.12691/jfa-5-3-4>
- 】 Baccouche, S. (2015). Directors' Multiple Directorships and their Appointment to Board Committees: Evidence From France. *International Review of Management and Business Research*, 4(1), 322–335.
- 】 Bar-hava, K., Gu, F., & Lev, B. (2013). Busy Directors are Detrimental to Corporate Governance, <https://en-coller.tau.ac.il/sites/nihul.tau.ac.il/files/management/seminars/account/gu.pdf>.
- 】 Carcello, J., Hermanson, D., Neal, T., & Riley, R. (2002). Board Characteristics and Audit Fees, *Contemporary Accounting Research*, 19(3), 365–384.
- 】 Clements, C., D.Neil, J., & Paul Wertheim. (2015). Multiple Directorships, Industry Relatedness, and Corporate Governance Effectiveness. *Corporate Governance*, 15(5), 590-606. <https://doi.org/10.1108/CG-05-2014-0060>
- 】 Dakito, A. (2015). Assessment of Banking Performance using Capital Adequacy in Ethiopia. *Journal of Economics*, 4(6), 106–111.
- 】 Daniel, O. (2013). The Relationship Between Busy Directors and Financial Performance of Commercial Banks in Kenya. Reg No : D63 / 72381 / 2011, A Research Project Submitted in partial fulfilment of the requirements of the Degree of Master of Science in Fina.
- 】 El-Maude, J. G., Bawa, A. B., & Shamaki Aranpu Rimamshung. (2018). Effect of Board Size, Board Composition and Board Meetings on Financial Performance of Listed Consumer Goods in Nigeria. *International Business Research*, 11(6), 1–10. <https://doi.org/10.5539/ibr.v11n6p1>.
- 】 Fama, E. F. (1980). Agency Problems and the Theory of the Firm. *The Journal of Political Economy*, 88(2), 288–307.
- 】 Fama, E. F., & Jensen, M. C. (1983). Agency Problems and Residual Claims. *Journal of Law and Economics*, 26(2), 327–329.
- 】 Fich, E., & Shivdasani, A. (2006). Are Busy Boards Effective Monitors? *Journal of Finance*, 61(2), 689–724.
- 】 Francis, B., Hasan, I., & Wu, Q. (2012). Do Corporate Boards Affect Firm Performance ? New Evidence From The Financial Crisis. [https://www.researchgate.net/publication/256017566\\_Do\\_Corporate\\_Boards\\_Affect\\_Firm\\_](https://www.researchgate.net/publication/256017566_Do_Corporate_Boards_Affect_Firm_)

Performance\_New\_Evidence\_from\_the\_Financial\_Crisis

- 】 Geoffrey, K., & Gavin, N. (2006). Multiple Directorships and Corporate Performance in Australian Listed Companies. *Corporate Governance: An International Review*, 14(6), 530-546.
- 】 Gu, A. B., Malmendier, U., & Tate, G. (2008). Financial Expertise of Directors. *Journal of Financial Economics*, 88(2), 323–354. <https://doi.org/10.1016/j.jfineco.2007.05.009>
- 】 Gurusamy, P. (2017). Board Characteristics, Audit Committee and Ownership Structure Influence on Firm Performance of Manufacturing Firms in India. *International Journal of Business and Economics Research*, 6(4), 73–87. <https://doi.org/10.11648/j.ijber.20170604.16>
- 】 Hauser, R. (2013). Busy Directors and Firm Performance : Evidence From Mergers. *Unpublished working paper, Chicago University*, 1–46.
- 】 Herrera-echeverri, H., Gaitan, S., Orozco, L. A., & Soto, N. (2019). Board Characteristics, Compliance and Firm Performance : Empirical Findings from Colombia. *Latin American Business Review*, 1–33. <https://doi.org/10.1080/10978526.2018.1540935>
- 】 Jensen, M., & Meckling, W. (1976). Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3(4), 305–360.
- 】 Jensen, M. & Murphy, K. . (1990). .Performance Pay and Top Management Incentives. *Journal of Political Economy*, 98, 225–264.
- 】 Johl, S. K., Kaur, S. & Cooper, B. J. (2015). Board Characteristics and Firm Performance : Evidence from Malaysian Public Listed Firms. *Journal of Economics, Business and Management*, 3(2). 239-243.
- 】 Johl, S. K., & Salami, O. L. (2014). Impact of Board Composition on Firm Performance : A Study on Listed Firms In Malaysia, *Journal of Contemporary Management Sciences*.
- 】 Kamardin, H., Latif, R. A., Mohd, K. N. T., & Adam, N. C. (2015). Multiple Directorships and the Monitoring Role of the Board of Directors : Evidence from Malaysia. *Jurnal Pengurusan*, 42(2014), 51–62.
- 】 Kevin, A., & Drake, L. (2003). Executive Remuneration and Firm Performance: Evidence from a Panel of Mutual Organisations. <https://ideas.repec.org/p/lec/leecon/03-13.html>.
- 】 Kirsten, E., & Du Toit, E. (2018). The Relationship between Remuneration and Financial Performance for Companies Listed on the Johannesburg Stock Exchange. *South African Journal of Economic and Management Sciences*, 21(1), 1–10. <https://doi.org/10.4102/sajems.v21i1.2004>
- 】 Kutum, I. (2015). Board Characteristics and Firm Performance: Evidence from Palestine. *European Journal of Accounting Auditing and Finance Research*, 3(3), 32-47.



- 】 Latif, R. A., Kamardin, H., Mohd, K. N. T., & Adam, N. C. (2013). Multiple Directorships , Board Characteristics and Firm Performance, in Malaysia. *Management*, 3(2), 105-111. [https://doi.org/ 10.5923 / j.mmm.20130302.07](https://doi.org/10.5923/j.mmm.20130302.07)
- 】 Mace, M. (1986). *Directors's Myth and Reality*. Harvard Business School Press, Boston, MA.
- 】 Michaud, D.W., & Gai, Y. (2009). .CEO Compensation and Firm Performance. Available at SSRN 1531673.
- 】 Müller, V. (2014). Do Corporate Board Compensation Characteristics Influence the Financial Performance of Listed Companies. *Procedia-Social and Behavioural Sciences*, 109, 983-988.
- 】 Murphy, K. (1985). Corporate Performance and Managerial Remuneration. *Journal of Accounting and Economics*, 7(1-3), 11-42.
- 】 Nawaffly, A. T. M., & Alarussi, A. S. A. (2018). Board of Directors, Audit Committee and the Financial Performance of Listed Companies in Malaysia. *The Journal of Social Sciences Research*, 951-957.
- 】 Ngonidzashe, C., & Oscar, C. (2014). Impact of Multiple Directorships on Performance for Companies Listed on the Johannesburg Stock Exchange (JSE). *Economics World*. 2(6), 378-387. [https://doi.org/ 10. 17265/ 2328- 7144/ 2014.06.003](https://doi.org/10.17265/2328-7144/2014.06.003)
- 】 Ogbegie, C., & Koufopoulos. (2010). Corporate Governance and Board Practices in Nigerian Banking Industry. Available at : [www. cogbechie@ ibs. edu. ng](http://www.cogbechie@ibs.edu.ng) or [Dimitrios. koufopoulos@ brunel. ac. u](mailto:Dimitrios.koufopoulos@brunel.ac.uk).
- 】 Okumu O. J., & Oyugi, L. (2016). Factors Influencing Financial Performance of Savings and Credit Cooperative Societies in Kisumu County, Kenya. *International Journal of Current Research*, 8(5), 31293-31310.
- 】 Oyetunji, O. T., Akande, O. C., & Olurin, O. (2017). Ethics and Corporate Governance in the Nigerian Banking Industry. *JAPBE*, I(1), 81-94.
- 】 Qiao, Z., Chen, K. Y., & Hung, S. (2018). Professionals Inside the Board Room : Accounting Expertise of Directors and Dividend Policy. *Applied Economics*, 50(56), 1-12. <https://doi.org/10.1080/00036846.2018.1489501>
- 】 Rahman, N. A., Waliuddin, M., & Razali, M. (2019). Board Characteristics and Firm Performance : Malaysia's Government-Linked Companies ( GLCS ) Compliance to Green Book. *International Journal of Academic Research in Business and Social Sciences*, 9(1), 174-190. [https://doi.org/10.6007/ IJARBSS/v9-i1/5387](https://doi.org/10.6007/IJARBSS/v9-i1/5387)
- 】 Razali, M. W. M., Joslin, F. E., Rahman, N. A., Tak, A. H., & Salawati, S. (2018). The Directors Remuneration and Firm Performance in Property and Construction Industries Listed on Bursa Malaysia's Main Board. *International Journal of Business & Management Science*, 4(9), 1-16.
- 】 Ruparelia, R., & Njuguna, A. (2016). Relationship between Board Remuneration and Financial Performance in the Kenyan Financial Services Industry. *International*

*Journal of Financial Research*, 7(2), 247–255. <https://doi.org/10.5430/ijfr.v7n2p247>

- 】 Saleh, M. (2017). Effect of Board of Directors ' Attributes on the Financial Performance of Listed Deposit Money Banks in Nigeria, (October 2016). [https://www.researchgate.net/publication/320407396\\_EFFECT\\_OF\\_BOARD\\_OF\\_DIRECTORS\\_ATTRIBUTES\\_ON\\_THE\\_FINANCIAL\\_PERFORMANCE\\_OF\\_LISTED\\_DEPOSIT\\_MONEY\\_BANKS\\_IN\\_NIGERIA](https://www.researchgate.net/publication/320407396_EFFECT_OF_BOARD_OF_DIRECTORS_ATTRIBUTES_ON_THE_FINANCIAL_PERFORMANCE_OF_LISTED_DEPOSIT_MONEY_BANKS_IN_NIGERIA).
- 】 Sanusi Lamido Sanusi. (2012). Banking Reform and its Impact on the Nigerian Economy. (February), 1–7. <https://www.bis.org/review/r120320d.pdf>.
- 】 Talha, M., Sallehuddin, A., & Masuod, M. S. (2009). Corporate Governance and Directors' Remuneration in selected ASEAN Countries. *Journal of Applied Business Research*, 25(2), 31–40.
- 】 The Nation (2018). <https://thenationonlineng.net/rumble-banking-halls-polaris-bank-rises-skyes-rubble-diamond-merges-access/>
- 】 Ujunwa, A. (2013). Board Characteristics and the Financial Performance of Nigerian Quoted Firms. <https://doi.org/10.1108/14720701211275587>
- 】 Vo, D., & Phan, T. (2013). Corporate Governance and Firm Performance: Empirical Evidence from Vietnam. *Journal of Economic Development*, 7(1), 62-78.
- 】 Zaidi, S. M. T., & Nadeem, F. (2017). Impact of Overboarded Directors on the Firm Performance : Evidence From Pakistan. *International Journal of Advances in Science Engineering and Technology*, 5(3), 13–21.

# Exploring Entrepreneurial Barriers: A Study of Female Business Owners of Kolkata

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## ABSTRACT

Entrepreneurship plays a vital role to create a prosperous society in a fast developing country like India. Entrepreneurs act as agent for economic growth of a nation. Women organize the family which leads to society and nation. Women entrepreneurship was a neglected domain during the past in India but with the spread of education and awareness among the women it is the present trend that the number of women who prefer business as a carrier has significantly increased. In the current scenario this study aims on examining the demographic profile and problematic factors of women entrepreneurs in Kolkata city, West Bengal (India). The data for the study collected from the respondents belonging to the Kolkata city of West Bengal. A sample of 100 respondents was taken. Five-point Likert scale was used to measure the problematic level of the women entrepreneurs. Reliability of the scale by Cronbach's Alpha was employed. Explanatory Factor Analysis using SPSS 20 software was applied to the data. It was concluded that Personal problem, Financial assistance problem and Business operating problem restrict women entrepreneurs becoming successful entrepreneurs. Special training and development programmes should be provided to women entrepreneurs to accelerate their growth and expansion.

**Key words:** *Women Entrepreneurs, Demographic Profile, Problematic Factors.*

## I. INTRODUCTION

Entrepreneurship is basically an economic concept. It has been of massive interest to researchers. Over the centuries researchers from various field of knowledge have tried to narrate different aspects of entrepreneurship. During 18<sup>th</sup> century the term entrepreneurship as first introduced by Cantillon (Cantillon, R. 1755). Later on Schumpeter put forward the concept of innovation in the theory of entrepreneurship (Schumpeter, J. A. 1934). 'Entrepreneur' is a French term and it is derived from the verb 'entreprendre' which means 'to do' or 'to undertake'. It is divided into two parts-'entre' meaning 'between' and 'preneur' meaning 'taker'. Entrepreneur can be defined as the one who maximizes opportunities (Drucker, P.F1964). Entrepreneurship has been traditionally characterized as one of the four factors of production. It thus refers to general trend of setting up new enterprise in a society (Begum, 1993). The International Labour Organization (ILO, 1984) defines an entrepreneur as a person with a set of characteristics that typically includes self-confidence, risk taking, leadership, originality and future oriented. They are the innovators, researchers, risk-takers, managers of the company. Entrepreneurs play very important role in socio-economic welfare of the country. Entrepreneurship has been a male-dominating field from ancient periods. But in the modern times the scenario has been changed. Women already step into the area of entrepreneurship.

The United Nations Report has also mentioned that economic development is closely related to the advancement of women. In countries where women are more progressive, economic growth has usually been steady. But in countries where women have been restricted, the economy has been stagnant. Women development can be done by financially empowering them. According to Dr. A.P.J Abdul Kalam, former President of India, "Empowering women is a prerequisite for creating a good nation, when women are empowered, society with stability is assured. Empowerment of women is essential as their thoughts and their value system lend to the development of a good family, good society and ultimately a good nation". Entrepreneurship development among women can be considered a possible approach to economic empowerment of women (Devi et al., 2014). Moreover entrepreneurship development among the women-force would strengthen the economy and promote regional upliftment (Hisrich & Lerner, 1997). Women have been considered as most innovative and inspirational entrepreneurs. It is proved that women entrepreneurs contribute immensely to improve poverty levels, per-capita income, and employment creation (Kumar, S.M.et al 2013), (Ogidi, A.E. 2014). Women entrepreneurship is one of the latest modes of empowerment. Women entrepreneurs may be defined as the women or group of women who initiate, organize and operate

a business enterprise. In this dynamic world, women entrepreneurs are a significant part of the global expedition for sustained economic development and social progress. Due to the growing industrialization, urbanization, social legislation and along with the spread of higher education and awareness, the emergence of women owned businesses are highly increasing in the economics of almost all countries.

## **II. CONCEPT OF WOMEN ENTREPRENEURSHIP**

Women entrepreneurship has gained worldwide momentum in recent decades. Male entrepreneurs have been extensively studied and now focus has shifted to the study of female entrepreneurs (Schutte, 1995). Most of what is known about entrepreneurs, their background, motivations for starting a business and business problems faced by them are based on studies of male entrepreneurs (Hisrich & Brush, 1984). It is now necessary to differentiate entrepreneurs on the basis of gender if women entrepreneurship is to be promoted (John, 2004). Recent survey shows that in 2012 more than 126 million women in the world were engaged in their own business activity (GEM, 2013).

Researchers are keenly interested to cultivate the concept of women entrepreneurship from different dimensions. They have resorted to arrive at a comprehensive definition of women entrepreneur. Women entrepreneurs can be defined as those women or group of women who initiate, organize and co-operate a business enterprise. They like to take realistic risks because they wanted to be a successful entrepreneur (Charboneau, 1981). Women who take the responsibility to organize and manage the resources of her enterprises and bear all the risk in presumptions of earning profit can be described as women entrepreneur (Coughlin, J.H., & Thomas, A.R., 2002). Women entrepreneurs are those who chose to take the challenging role of an entrepreneur driven by their want to fulfill their need of independence and achievement i.e. Women who adapt to entrepreneurship driven by their free will (Dhameja, S.K., 2002). But this definition factor out necessity driven entrepreneurs who are compelled to opt entrepreneurship out of some bare need. When a women or group of women engaged in initiating, organizing and managing their business enterprise, they are termed as women entrepreneur (Suganthi, 2009). Creative activity of promoting and operating a business venture lending to economic empowerment and social betterment of women in the society can be explained as women entrepreneurship (Munshi, S. et al, 2011). Government of India has marked out women entrepreneurship as “an enterprise owned and controlled by women having a minimum financial interest of 51% of the capital and giving at least 51% of the employment generated in the enterprise of women (Government of India, 2012). Women entrepreneurs prepare various plans and

execute them under their own supervision and control. There may be some persons to help them but ultimate control lies with the women (Sharma, 2013). By amalgamating the concept of women entrepreneurs from available literature it can be said that women having dominant financial control over their enterprise, who either choose or are driven out of some necessity to take up risk and venture towards starting, organizing and managing resources at their disposal in expectation of profits are called as women entrepreneurs. Women entrepreneurship also leads to social and economic empowerment of women.

### **III. WOMEN ENTREPRENEURSHIP IN INDIA**

In Indian society, women sector is a dormant one due to dominance of men. But in the emerging complex social scenario the situation has by and large been changed. They are now considered as a potential source of power and symbol of progress. Unlike earlier days, Indian women are now no more treated as show pieces to be kept at home. Due to the urge to be economically self-independent and spread of education women are also encouraged to work outside with men. Women are doing a remarkable job in making balance between their house and career. The Planning Commission as well as the Indian Government recognizes the need for women to be part of mainstream of economic development. A special chapter on Women's Development had been included in the Seventh Five Year Plan: it details the plan of action for "Integration of women in Development". Women entrepreneurs are considered as key players in any developing country like India particularly in terms of their contribution to economic growth. Women entrepreneurship is a recent event which has come into limelight in 1970. But this concept became prominent in the year 1991 with the introduction of new industrial policy. The policy promoted Privatization, Liberalization and Globalization which in turn create maximum self-employment opportunities to both men as well as women.

In past times looked strangely at women who were running a Xerox center or STD booth, But today the situation has been changed. We can now see women entrepreneurs in almost every type of businesses- either a manufacturing or service business or any trading business. Women entrepreneurship in India is now progressing from pickles, papad and powders and becoming visible in field like engineering (Munshi, S. et. al., 2011). Women entrepreneurs of India are now emerging as "techpreneurs". At a global level, about 126 million women have started or are running their businesses and whereas in India, there are about 8 million women have started or are running their businesses. As per Global Entrepreneurship Development Institute, India rank 70 among 77 countries studied. India lags behind even African countries (Jerjesen & Lloyd, 2015). According to "Women Business Ownership" index, a survey revealed

that India rank 49 among 54 countries. A study by Mastercard Index of Women Entrepreneurs (MIWE) has ranked India 52<sup>nd</sup> out of 57 countries judged on the basis of the ability of women entrepreneurs to capitalize opportunities offered by their local environment. Currently women entrepreneurs may be less but overall women comprise about 30% of corporate senior management position, which is notably higher than the global average of 24%. Globally, around 37% of formal enterprises owned by women whereas only 10% of formal enterprises in India are being operated by women. The overall median proportion of female execution in successful companies is 7.1%, compared to 3.1% at unsuccessful companies. According to the Sixth Economic Census by National Sample Survey Organization (NSSO), released by the Ministry of Statistics and Programme Implementation, there are 58.5 million businesses in India, of which 8.05 million are managed by women, employing over 13.48 million people and the top five states in women entrepreneurship are Tamil Nadu (13.51%), Kerala (11.35%), Andhra Pradesh (10.56%), West Bengal (10.33%) and Maharashtra (8.25%).

Indian Government time to time has provided several schemes and incentives in order to motivate increasing number of women to choose entrepreneurship as their carrier. Despite the fact that government offers a range of financial support services to female entrepreneurs through financial institutions, industrial development organizations and commercial banks, it is clearly depicted that very few female entrepreneurs avail formal finance. Due to lack of awareness among women they could not able to avail this sort of assistance provided to them. According to the Report of International Finance Corporation in India the total financial requirement for women entrepreneurs was \$158 billion in 2012 but they only had access to around \$42 billion from formal lenders. There is still lot of scope to do for development and eradicating obstacles of women entrepreneurs. In this context the research has been conducted to throw focus on the profile and major problematic factors of women entrepreneurs in Kolkata city, West Bengal (India).

#### **IV. RESEARCH OBJECTIVES**

The purpose of this research is to study the demographic profiles of women entrepreneurs in order ascertain their current status and also to provide guidance regarding the obstacles to the existing as well as prospective women entrepreneurs in Kolkata city, West Bengal (India).

The objectives of the proposed study are

- To ascertain the demographic profile of women entrepreneurs.
- To explore and ascertain possible factors of lacking entrepreneurship among women.



## V. RESEARCH METHODOLOGY

The study is descriptive in nature. The study is carried out through a field survey and interview of women entrepreneurs of Kolkata city. It is based on both primary and secondary data. For secondary data text books, research articles, magazines, reports, newspapers, Government policies and strategies regarding women entrepreneurship development used in order to present the fact and finding in the logical format. The study made an intensive reference to the primary data for analyzing the above objectives. The primary data collected through field survey and direct personal interview of the 100 respondents who include both the registered and unregistered women entrepreneurs of city of Kolkata in the State West Bengal. Structured questionnaire based on previous literature followed for conducting direct personal interview with the respondents. The first part of the questionnaire comprised with questions regarding demographics of the respondents and the second part consisted with questions regarding problematic factors of women entrepreneurs. The measures of these factors were derived from established scale.

**Table 1: Variable used in the Survey Construction**

Latent Construct	Type	Scale
Problematic Factor	First order reflective	PR1: Difficulties in getting financial assistance from banks or financial institutions or Govt. PR2: Higher interest rates. PR3: Delay in sanctioning the financial assistance by lending institutions or Govt. PR4: Suffer from liquidity problem. PR5: Difficulties in travelling anytime from place to place for business purposes. PR6: Overburden of family responsibilities. PR7: Affected by gender inequalities. PR8: Religious restrictions. PR9: Limited ability to bear risk. PR10: Lack of managerial quality. PR11: Lack of awareness of modern technology. PR12: Lack of quality of innovativeness.



The scale for Problematic factor consisted of 12 items such as “Difficulties in getting financial assistance from banks or financial institutions or Government” and “Religious restrictions”. Questions were assessed on 5 point Likert-scale that ranged from, “Strongly disagree” to “Strongly agree” respectively.

The sampling technique used for this study was non-probability sampling as the tool to select the target respondents in sample. The research study used convenience sampling from the target population of interest to get the response for the main survey which was later analyzed to find out the problematic factors of women entrepreneurs.

Statistical tools like Tabulation, Percentage, and Frequency used to analyze the demographic characteristics of the sample collected. Explanatory factor analysis is applied to understand the major problematic factors faced by women entrepreneurs. Cronbach’s alpha is a convenient test used to estimate the reliability of the measures or to check the internal consistency or correlation between variable. Statistical Packages for Social Sciences (SPSS), Excel were used to analyze the data.

## **VI. DEMOGRAPHIC PROFILE OF WOMEN ENTREPRENEURS**

West Bengal is a state in Eastern India. This studies shapes of 19 districts, 347 CD blocks, 909 towns and 40,203 villages. It extends from 21°25’ N to 26°50’ N latitudes and 86°30’ E to 89°58’ E longitudes and it encloses an area of about 88.968 km<sup>2</sup>. Metropolitan city Kolkata (formerly Calcutta) is the capital of West Bengal. Kolkata is the commercial and financial hub of East and North-East India. According to the 2011 census, Kolkata is 3<sup>rd</sup> most populous metropolitan area in India with total 14.5 million populations in city and suburb. Sex ratio in urban region of Kolkata district is 908 as per 2011 census data. Women comprise nearly 50% of the total population of West Bengal as well as of Kolkata city. But women have low status in respect of social and economic fields due to unemployment. Therefore, development of economic and social conditions of women is considered as indispensable for faster growth of Indian economy and this could be done through self-employment and economic empowerment of women. Entrepreneurship is most favored mode of self-employment.

Entrepreneurship development among women is probably the best way to overcome the problem of unemployment in a short period because all women (literate, semi-literate or illiterate) find their avenue of earning. Now a day’s male dominating family is being reduced to a certain extent and a favorable condition is created for women entrepreneurs. During field survey

the Researcher has observed that women entrepreneurs in Kolkata involved themselves in various types of production and trading activities. In this section of dissertation researcher tries to analyze different aspect of sample women entrepreneurs dedicated in field survey.

A) Employment Opportunities Created by Sample Women Entrepreneurs

Unemployment is chronic problem in any developing and underdeveloped country. It slows down the country’s economic growth. India is not an exception. As per The Periodic Labor Force Survey (PLFS) of the National Sample Survey Office (NSSO), India’s unemployment rate stood at 6.1% in 2017-18, which is very alarming, while the unemployment rate in West Bengal is 4.6%. When Government and Semi Government fail to occupy huge numbers of unemployed population then entrepreneurship development is the only way that absorbs entrepreneurs and also creates job opportunities for unemployed people in their units which in turn solve the unemployment problem to some extent. Women entrepreneurs also cater the economy in the same sense.

**Table: 2 Employment Opportunities Created by Sample Women Entrepreneurs**

No. of Workers	Number of Entrepreneurs
Nil	46
1-2 workers	19
3-5 workers	13
6-10 workers	6
Above 10 workers	16
Total	100

*Source: Field Survey*

It is observed from Table 2 that out of 100 women entrepreneurs 19 women entrepreneurs create job opportunities from 1 to 2 workers, 13 entrepreneurs create job opportunities for 3-5 workers, 6 entrepreneurs create 6-10 job opportunities and 16 entrepreneurs create job opportunities for more than 10 workers. But 46 women entrepreneurs did not create any job opportunity. It is noticed from our field study that more job opportunities are created by those entrepreneurs who are running Tailoring business, Boutique business, Beauty Parlours business, School and training institutions, NGO’s.

### **B) Line of Activities of Sample Women Entrepreneurs:**

In earlier days most of the women entrepreneurs engaged in limited line of business activities like manufacturing and trading of Papad, Sauce, Jam, Jelly, Powder, Pickles etc. But now the entire scenario has been changed due to globalization and rise in education and awareness among women. Today they are involved in different types of manufacturing, trading and servicing activities such as ladies garments, beauty parlours, soft doll and toys, woolen garments, imitation ornaments, Xerox centre, stationary, food and catering etc. They are running Training institutions, NGO's, Schools, Retailed shops etc. because they are mentally prepared to take the new challenges and risk and also intend to do something innovative.

**Table 3: Category of Units Owned by Women Entrepreneurs**

<b>Category of Units</b>	<b>Number of Entrepreneurs</b>
Only Manufacturing	3
Only Trading	49
Manufacturing & Trading both	12
Servicing	36
Total	100

*Source: Field Survey*

It is portrays in Table 3 the category of units owned by women entrepreneurs. Only 3 women entrepreneurs out of 100 women entrepreneurs are engaged in only manufacturing units, 49 entrepreneurs running only trading units and 12 women entrepreneurs are running both manufacturing and trading units. Tailoring business, Boutique business, General and fancy shops etc. are come under the unit of manufacturing and trading. It is also noticed that 36 women entrepreneurs are operating servicing units. This servicing unit includes Food and catering business, Schools and training institutions, Beauty Parlours, NGOs etc.

**Table 4: Nature of Business of Women Entrepreneurs**

Nature of Business	Number of Entrepreneurs
Beauty Parlours	8
Ladies Tailors	3
Fashion Boutique	20
Imitation Jewellery Shop	6
Fancy & General Stores	8
Food & Catering	23
School & Training Institution	4
Dealer & Whole Seller	11
Cut-flower Selling	5
Vegetable & Fruit Selling	7
Xerox Centre	1
Medicine Shop	1
Printing on Sarees	1
NGO	2
Total	100

*Source: Field Survey*

We have observed from Table 4 that 23 women entrepreneurs engaged themselves in Food and catering business, 20 entrepreneurs are in the whole seller, 8 entrepreneurs are engaged in each Beauty parlours and Fancy and general stores, 6 entrepreneurs are operating in schools and training institutions, 15 entrepreneurs are engaging themselves in different types of trading activities like selling cut-flowers, vegetables, fruits and in tailoring business. 3 entrepreneurs are in activities of non-traditional trade and industries like Xerox center, printing on sarees, Medicine shops. 2 entrepreneurs are involved in NGOs women entrepreneurs are entering in all kinds of trade and industries which were earlier controlled by men.

**C) Form of Organization of Sample Entrepreneurs:**

It is very important for an entrepreneur to select right form of enterprise according to his/her capability. If the form of enterprise is not properly constructed then it may adversely affect the potential growth of an enterprise.

**Table 5: Form of Organization of Women Entrepreneurs**

<b>Form of Organisation</b>	<b>Number of Entrepreneurs</b>
Sole proprietorship	71
Partnership	24
Private Limited	2
Others	3
Total	100

*Source: Field Survey*

It is revealed in Table 5 that most of the units i.e. 71 units owned by women entrepreneurs are Sole Proprietorship form of organization. 24 units out of 100 units are partnership form of organization which includes partnership firms as well as family partnership firms. Only 2 units out of 100 units are Private Ltd. organizations and rest 3 units are other form of organizations which includes cooperative form; societal form of organizations. It is cited that 71 women entrepreneurs follow the Sole Proprietary form of organizations because creation of this type of organization is very simple and it is very admired form of ownership for tiny and small ventures and industry in India. It indicates that women are interested in the simple type of organization on which they have sole control.

**D) Marital Status of Sample Entrepreneurs while Initiated Ventures:**

Marriage is an institution. It plays a vital role in a woman's life. In earlier days, due to our conservative society structure married women were not allowed to go outside either for education or for earnings. But now society's attitudes towards women have been changed. Married women are no more confined at home. They are allowed to go everywhere- for education, for service, for doing business.

In this study researcher also want to highlight that whether their marital status prior to start the venture influence their decision to become an entrepreneur or not.

**Table 6: Marital Status of Women Entrepreneurs while Started Enterprise**

<b>Marital Status</b>	<b>Number of Entrepreneurs</b>
Unmarried	19
Married	76
Widowed	4
Divorced	1
<b>Total</b>	<b>100</b>

*Source: Field Survey*

It is observed from the Table 6 that majority of the women entrepreneurs were married (76) while they had initiated their ventures. It is depicted from the Table 6 that only 19 entrepreneurs were unmarried. Our field survey reveals that unmarried women were continued their enterprise after marriage and others are willing to do the same after marriage if situation permits. 4 widowed women and 1 divorced woman were decided to choose entrepreneurship for their livelihood. Therefore we can say that currently in our society there is no reservation. In maximum families husband are allowing their wives to be self-independent.

**E) Age of the Sample Entrepreneurs while Sample Ventures:**

Age is just not a number for an individual's life; it rather indicates an individual's capability. Entrepreneur's age is one of the crucial factors. Their risk bearing capacity definitely depends on their age. The energy, spirit and enthusiasm are also assumed to be higher of early age entrant than the aged entrant. If an individual enters into entrepreneurship at an early stage she would certainly get more time to expand and develop her enterprise than the aged entrant.

**Table 7: Age of Women Entrepreneurs while Started Enterprise**

<b>Age Group</b>	<b>Number of Entrepreneurs</b>
Below 25 years	24
25-34 years	57
35-44 years	15
45-54 years	4
55 & above years	Nil
<b>Total</b>	<b>100</b>

*Source: Field Survey*

Table 7 shows that highest number of entry into entrepreneurship is within the age group of 25-34 years i.e. 57 number of women entrepreneurs out of 100. The entry into entrepreneurship at an age group below 25 comes next. It is cited that 24 entrepreneurs which appears to be a natural phenomenon for both the age groups. The next position goes to the age group 35-44 years with 15 entrepreneurs. 4 women entrepreneurs initiated their ventures at the age group between 45-54 years. But there is none who had started their enterprise at an age group of 55 and above years. Interestingly, women over 45 years are entering into entrepreneurship because they are thinking about their independence; they wanted to do something for themselves and for their families and overall they want to utilize their leisure time in a creative way.

**F) Educational Qualification of the Sample Entrepreneurs:**

Educational qualification refers to the official confirmation, usually in the form of a certificate, diploma or degree, certifying the successful completion of an education program. Education enables a man or woman to acquire desired knowledge and skill for exploring the future possibilities of individual growth, for establishing business units and for communicating diversified knowledge in different fields. But in a developing country like India, generally the well qualified people, specifically women, prefer to do service than to get into the area of entrepreneurship because our society service people receive more respect and provides assured stable income. But entrepreneurship is the only area where literate, semi-literate or illiterate women and women from all segments of society find their livelihood.

**Table 8: Educational Qualification of Women Entrepreneurs**

<b>Educational Qualification</b>	<b>Number of Entrepreneurs</b>
Illiterate	12
Up to Primary school	8
Up to Secondary school	5
Up to H.S school	12
ITI/Diploma	0
Graduate	44
Post graduate	19
Others	0
<b>Total</b>	<b>100</b>

*Source: Field Survey*

It is revealed from Table 8 that out of the 100 women entrepreneurs 12 entrepreneurs have been illiterate, 8 entrepreneurs have an education up

to Primary level, 5 entrepreneurs have education up to Secondary level, 12 entrepreneurs having education up to Higher Secondary level, 44 entrepreneurs up to Graduate level and 19 entrepreneurs up to Post-graduate level. Thus it is observed from the Table that 88 of women entrepreneurs having at least a reasonable level educational background. It is cited from the research that the 12 illiterate women entrepreneurs are involved in selling of cut-flowers, vegetables, fruits, snacks etc. But they do not face any difficulties to calculate the price of their goods sold.

**G) Annual Income of Family of Sample Entrepreneurs:**

Family income of a woman entrepreneur is one of the motivating factors of women entrepreneurs. This is also provided strength to the women to adopt risky projects and capacity to develop their ventures. This is why researcher analyzes the yearly family income of sample entrepreneurs under this study. The volume of income also assesses her economic status.

**Table 9: Annual Income of Family of Women Entrepreneurs**

Annual Family Income	Number of Entrepreneurs
Less than Rs. 50,000	12
Rs. 50,000-less than Rs. 1 lakh	17
Rs. 1 lakh-less than Rs. 2 lakhs	12
Rs.2 lakhs-less than Rs. 4 lakhs	32
Rs.4 lakhs & above	27
Total	100

*Source: Field Survey*

Table 9 shows that annual family income of women entrepreneurs. It is observed that 12 of women entrepreneurs annual family income is less than Rs. 50,000, 17 having annual family income ranging from Rs. 50,000 to less than Rs 1 lakh, 12 of women entrepreneurs having annual family income ranging from Rs. 1 lakh to less than Rs. 2 lakhs, 32 women entrepreneurs out of 100 entrepreneurs having annual income ranging from Rs. 2 lakhs to less than Rs. 4 lakhs and 27 of them having annual family income ranging from Rs. 4 lakhs and above. It appears on the first flash that annual family income of most of the women entrepreneurs is assumed to be moderate.

**H) Sources of Finance of Sample Entrepreneurs at Initial Stage:**

Finance is an essential factor for any kind of business. The success of any business is mainly depends on adequate amount of finance. As well as business expansion also need sufficient amount of capital. But most of the existing



women entrepreneurs have been suffering from insufficient supply of finance. Although Government has been trying to provide financial assistance to women to establish new ventures through different self-employment schemes, but during the survey researcher found that most of the women entrepreneurs are unaware of these schemes. This section gives light on how most of the women entrepreneurs arrange funds.

**Table 10: Sources of Finance of Women Entrepreneurs at Initial Stage**

Sources of Finance	Number of Entrepreneurs
Own funds only	81
Own funds and borrowed funds	19
Total	100

*Source: Field Survey*

It is observed from Table 10 that majority of women entrepreneurs contribute capital from their own funds at the time of starting their enterprises. It reveals that only 19 women entrepreneurs out of 100 entrepreneurs started their ventures from own and borrowed funds. By interviewing the sample entrepreneurs it is clear that 19 women entrepreneurs collect the borrowed funds from commercial banks. Most of the women entrepreneurs failed to take the advantage of taking loan from banks and other financial institutions because they are unaware of the facilities provided by the banks and financial institution as well as they are not at all mentally prepared to take the risk involved in taking the loans from banks and financial institutions.

#### **I) Participation of Women Entrepreneurs in Entrepreneurship Development Programme (EDP):**

Entrepreneurial development is a process by which participants are induced for achieving goals and enhanced capabilities to tackle uncertainties and risky situations especially in business undertaking. Entrepreneurship Development Programme (EDP) concentrates on training, education, orientation and measures to be taken to set up and growth of an enterprise. EDP assist to make link suitable projects with each one, gives training for developing managerial and entrepreneurial capabilities, make arrangement for counseling and provides required follow up support in establishing the venture.

In West Bengal there are different institutes that organize EDP courses in collaboration with other Government and financial institutions. Centre for Rural Entrepreneurship Development (CRED), West Bengal Consultation Organization Ltd. (WEBCON), Bengal National Chamber of Commerce (BNCCI), Small Industries Service Institute (SISI) are some organizations that make arrangements for EDP courses.

**Table 11: Entrepreneurship Development Programme (EDP)  
Participated by Women Entrepreneurs**

<b>Participated in EDP</b>	<b>Number of Entrepreneurs</b>
Yes	26
No	74
Total	100

*Source: Field Survey*

Table 11 portrays that out of 100 entrepreneurs only 26 participated and completed EDP course. This sort of programme helps them to set up their ventures. It depicts that 74 women entrepreneur who did not get any formal training from any Institute. They set up their enterprise after gathering knowledge either from her family or relatives or friends or previous engagement in this type of activities. It is observed that women did not take part in EDP are engaged in selling cut-flowers, fruits, vegetables, running general stores etc.

## **VII. PROBLEMS OF WOMEN ENTREPRENEURS**

Studies found that female-owned businesses are facing relatively low level of turnover in comparison to male-owned businesses. They are worse in terms of profit & other performance measures (Robb & Watson, 2009). According to the research findings the relatively small size of women-owned enterprise is the main factor associated with their lower profits and their slightly lower probability to increase the number of their employees. The other prominent factors such as age of female owned businesses, difference in experience, approach to management, different education levels and access to relevant resources. One reason for the lower earning of women owner might be that women are less willing to take risks. However, there is no conclusive evidence that women entrepreneurs are systematically less willing to take risks than men (Croson & Gneezy, 2009).

Problems however are plenty for a woman owned business enthusiast who wishes to start her own unit. In certain businesses that are traditionally male dominated women are looked at with suspicion on their seriousness of managing the business with a long-term prospective. Another most critical problem faced by women entrepreneurs worldwide is difficulty in accessing credit from banks and financial institutions. Generally, the most common start-up problems appeared to be lack of capital. There is absence of confidence from the part of banks, suppliers and clients, in women entrepreneur's ability (Gosselin & Grise, 1990). They consider women borrowers a higher risk than men borrowers. There are two very different reasons why women entrepreneurs

might be treated differently in financial markets: 1) they lack significant assets (experience, capacity/cash flows, collateral) that are valued by credit providers, 2) there is cultural bias reflecting a lack of confidence in the ability of women as business owners. (Muravyev et. al., 2007) using data from 26 countries in the Eastern European & Central Asian (ECA) region, show that women are charged higher interest rates than men (0.6% more). In the United States, women entrepreneurs seem more likely to be discouraged from applying for fear of rejections, though not more likely to be denied credit when they apply (Cole & Mchran, 2009).

The over burden of household responsibilities is another problem for women entrepreneurs which create obstacles in the way of their success as an entrepreneur. Their responsibilities towards their children and the old members and family as whole, results in very little time left for them to engage themselves in any business activity (Malathi, 2005). Society's attitude towards women creates complication in the path of women entrepreneurs. Woman's opinion and advice are not always considered as expert compared to a man's opinion (Vijay Kumar & Jaychitra). In addition to that marketing and labor problems and disagreement with associations may create difficulties after the start-up phase to the women entrepreneurs (Gosselin & Grise, 1999). The other inhibit external factors include gender discrimination, inaccessibility to information, inadequate training opportunities, poor infrastructure etc. Some internal factors like risk aversion by women, lack of self-confidence, lack of vision of strategic leader etc can also make halt for the women entrepreneurship development.

In this section researcher analyzed the problems faced by the women entrepreneurs. The researcher employed the twelve-item scale to measure the Problematic factors of women entrepreneurs. To explore the dimensions of problems scale principal component analysis with varimax rotation was employed. Questions construction was based on the existing research works of previous different researchers. In the survey, respondents indicated degree to which they agreed or disagreed with each item along with a 5-point Likert scale (1=strongly disagree; 5=strongly agree). In order to measure sampling adequacy measurement of Kaiser-Mayer-Olkin was 0.789, which indicated that the sample was adequate and the researcher can proceed further. Bartlett's test of sphericity is a test of the strength of relationship among variable. This test that null hypothesis is: correlation matrix is an identity matrix. Here, Bartlett's test of sphericity was statistically significant with. Chi-square=795.071; DF=66;  $p < 0.000$ . This output indicated the appropriateness of the data for factor analysis.

This analysis resulted in three factors, accounting for 71.137% of the ratings

total variance. In the total variance explained table, the first factor explained the largest part of the variance which was 40.171%, second factor 19.030%, third factor 11.936%. The factor loading of the twelve items ranged from 0.588 to 0.959 which was above the threshold of 0.5 as recommended by Hair et. al., (2006). No of fixed factors to be extracted was mentioned according to previous literature. Explanatory factor analysis of problems showed that each item loaded on the appropriate factor, showing a clear result.

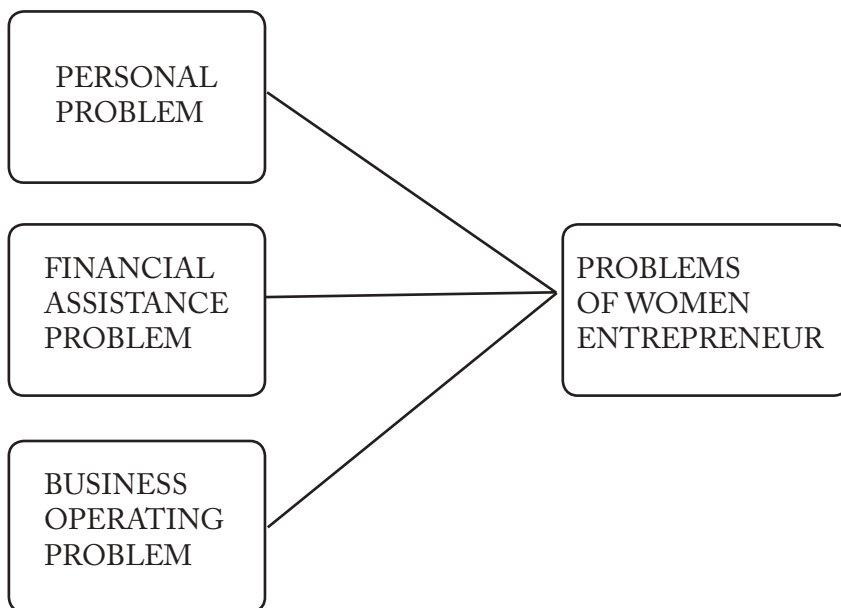
**Table 12: Explanatory Factor Analysis Result for Problematic Measures of Women Entrepreneurs**

Components	Items	Factor Loading	Cronbach's Alpha
Personal Problem	PPR1: I am not affected by gender inequalities.	0.715	0.862
	PPR2: I have no religious restriction	0.846	
	PPR3: I have enough ability to bear risk	0.601	
	PPR4: I have sufficient managerial quality	0.803	
	PPR5: I am aware of modern technology	0.724	
	PPR6: I have the quality of innovativeness	0.847	
Financial Assistance Problem	FPR1: I have not faced any difficulties in getting financial assistance from banks or financial institutions or Government	0.945	0.964
	FPR2: Interest rates charged by lending institutions is reasonable	0.942	
	FPR3: There is no delay in sanctioning the financial assistance by lending institutions or Government	0.959	
Business Operating Problem	OPR1: My business does not suffer from liquidity problem	0.755	0.572
	OPR2: I have no difficulty in travelling anytime from place to place for business purposes	0.768	
	OPR3: My business does not suffer due to overburden of my family responsibilities	0.588	

Table 12 shows that Cronbach's Alpha is above 0.7 for first two factors and above 0.5 for last factor (acceptable because as the items in the scale less than 10). Consequently, the reliability test concluded that the collected data had suitable internal consistency for research.

On the basis of the common features of items of each of the three factors, here researcher named the factors and it can be concluded from the above analysis that women entrepreneurs in Kolkata are suffered from majorly three factors namely Personal problem, Financial assistance problem, Business operating problem. Researcher developed a model based on this result.

**Figure 1: Problematic Factors of Women Entrepreneur**



### **VIII. CONCLUSION**

Overall the present study found that now a day's more and more women in Kolkata as well as in different parts of modern India are coming to this field for achieving their goals. Women are taking up entrepreneurial activities especially in medium and small scale enterprise with a basic urge of proving financial security to their families. But still women entrepreneurs in India are handicapped in the matter of organizing and running businesses on account of their generally low levels of skills and for want of support system. The transition from homemaker to sophisticated business women is not that easy. Since independence Indian government has adopted a planned approach for

development and growth. Five year plans were the fundamental plans framed targets and mechanisms to achieve such development. Several schemes and programs like Trade Related Entrepreneurship Assistance and Development (TREAD); Mahila Coir Yojana; Mudra Yojana Scheme for Women; Prime Minister's Employment Generation Program; Standup India Scheme; Cluster Development Scheme; Entrepreneurship Development Programs for Women etc. are constructed by Ministry of MSME for the encouragement and upliftment of women entrepreneurs. Ministry of Women and Child Development also formulated vital programs and schemes for providing assistance to female entrepreneurs. Several public and private sector banks generate several schemes to provide financial assistance to the women entrepreneurs. Government and Semi Government institutions are earnestly addressing the problems relating to women entrepreneurs and recommending remedies. But due to the lack of awareness among the women entrepreneurs in Kolkata they could not able to avail this. To remove this issue awareness programmes in the form of seminars and workshops should be arranged by different authorities in order to educate existing women entrepreneurs about their rights and motivating more and more women for choosing entrepreneurship as their career. More and more existing and potential women entrepreneurs should be encouraged to participate in several EDPs organized by Government and Semi-Government authorities, where from they can learn the skill to handle their Business operating problems. Women will definitely be inspired to start a new business or expand their existing venture if their financial need will be properly addressed. Public and Private sector banks and financial institutions should minimize their complex loan processing formalities in order to provide financial assistance to women entrepreneurs. Above all women entrepreneurs have the potentiality to deal with several obstacles if they will be supported by the family members. Therefore the outlook and attitude of the family members as well as society towards women should be changed.

## References

- 1) Census (2016). All India Report of Sixth Economic Census of India. <http://www.mospi.gov.in/all-india-report-sixth-economic-census>.
- 2) Cantillon, R. (1755). *Essai sur la nature du commerce en general*. London.
- 3) Gyler, F., Cole, A. A., & Mehran, H. (2009). Gender & the Availability of Credit to Privately Held Firms: Evidence from International Data. Discussion paper, DIW Berlin, German Institute of Economic Research.
- 4) Conghlin, J.H., & Thomas, A. R. (2002). *The Rise of Women Entrepreneurs: People, Processes & Global Trends*. Westport, Greenwood Publishing Group.

- 】 Corson R. & Gneezy, U. (2009). Gender Differences in Preferences. *Journal of Economic Literature*, 47(2), 448-474.
- 】 Devi, A. & Goswami, G. (2014). Women Entrepreneurship Development in Assam with Special Reference to Kamrup District, India. *Clarion Multidisciplinary International Journal*, 3(1).
- 】 Dhameja, S. K. (2002). *Women Entrepreneurs: Opportunities, Performance & Problems, India*. Deep & Deep Publications.
- 】 Maysami, R. C. (1999). Female Business Owners in Singapore and Elsewhere: A Review of Studies. *Journal of Small Business Management*, 37(1).
- 】 Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate Data Analysis* (6<sup>th</sup> ed.). Uppersaddle River, N.J., Pearson Prentic Hall.
- 】 Hisrich, R. D., & Lerner, M. (1997). Israeli Women Entrepreneurs. *Journal of Business Venturing*, 12(4), 315-339.
- 】 <https://www.google.com/amp/s/inc42.com/features/union-budget-2019-nirmala-sitharaman-budget-pins-hopes-on-india>
- 】 <https://www.thebetterindia.com/67942/tax-benefits-for-startups-in-india/>
- 】 Human Development Report (2007). United Nations Development Programme, USA.
- 】 Kumar, S. M., Mohan, H. C., Vijaya, C., & Lokeshwari, M. (2013). The Role of Women Entrepreneurship in Modern World. *International Journal of Current Engineering & Technology*, 100-104.
- 】 Munshi, S., Munshi, A., & Singh, V. P. (2011). A Study on Trends Visible in Women Entrepreneur in India & Globally. *Asia Pacific Business Review*, 7(3), 155-166.
- 】 Ogidi, A. E. (2014). Women Entrepreneurship & Poverty Reduction. *Journal of Business & Entrepreneurship*, 1(1), 1-8.
- 】 Robb, A., & Watson, J. (2009). Comparing the Performance of Female and Male-controlled SMEs: Evidence from United States and Australia. *Frontiers of Entrepreneurship Research*, 30(8).
- 】 Schumpeter, J.A. (1934). *The Theory of Economic Development*. Harvard University Press.

# An Insight into Crowdfunding with Emphasis on Medical Crowdfunding: A Brief Review of Literature

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## **ABSTRACT**

**T**he paper makes an attempt to review literature on crowdfunding as a unique way of raising funds from a pool of people for variety of causes ranging from fine arts activity, medical and healthcare, health research, mobilisation of social causes simultaneously with funding for startups in the field of technology and innovation. The paper makes a comparative study of venture capital financing with crowdfunding. Among different forms of crowdfunding, equity crowdfunding is yet to find its place in the Indian financial scenario. Hence, the paper critically reviews the draft regulation in this aspect as identified in literature. The article observes and analyses some of the ethical considerations in medical crowdfunding and gives a brief overview of the activities of the two major crowdfunding platforms in India i.e., Milaap and Ketto in the field of healthcare.

**Key words:** *Crowdfunding, Donation based Crowdfunding, Medical Crowdfunding, Venture Capital, Equity based Crowdfunding.*

## **INTRODUCTION**

Finance is the life blood of not only business enterprises but also for any activity ranging from a fine arts activity, medical and health research, mobilisation of a social cause, etc. The conventional sources of finance sometimes fail to invest in various activities due to their conservative outlook of risk taking, stringency of regulatory procedures, lack of flexibility to encourage innovative researches in various fields, etc. Hence, with a view to mitigate this gap between fund seekers and investors, a new form of financing emerged and it is named as Crowdfunding. The name itself suggests that this source of finance aims at



collecting funds from a pool of people i.e., crowd in small amounts and make it a point to reach it to the fund seeker. The entire system generally and the link between the investors and the fund seekers especially are done with the help of an intermediary namely the online crowdfunding platform and sometimes the project or the cause are also promoted in the social media for getting wider attention and visibility of the public in general. The crowdfunding platform provides the fund seekers the space to describe their need for finance, the amount of the fund they need, the timeline for receiving the funds and any benefit or return the investors may get from investing or funding in the cause or project. The crowdfunding platform provides this opportunity in exchange of the fee from the amount collected (Kumar, 2016). Some of the crowdfunding platforms operating globally are Kickstarter, Indiegogo, GoFundMe, Patreon, etc. In India, the names of such intermediaries are Ketto, Milaap, ImpactGuru, FuelADream, Wish Berry and so on.

There are primarily two types of funding models in crowdfunding namely the fixed model and the flexible model. The fixed model is a model where if the fund seeker is not able to collect the target amount, she/he will have to return the entire amount so collected. This is prevalent in the field of health research projects. The flexible model is a common one where if the fund seeker is not able to attain the target amount, she/he can proceed with the amount so collected for mobilising the cause or starting the startup or to finance a medical treatment (Nesta, 2012 as cited in Kumar, 2016).

There are various types of money exchange in crowdfunding like donation based crowdfunding, reward based crowdfunding, equity crowdfunding and debt crowdfunding. In donation based crowdfunding model, the investors are expected to donate for a social, medical or a philanthropic cause or for community development oriented projects without expecting any consideration in return. The investors are moved by the appeal of the cause and the project (Kumar, 2016). In reward based model, the investors get some reward in exchange of their investment in the form of token or a symbolic representation or a pre-purchase offer. The reward type will definitely depend on the project type and category. Like, for example, for a theatre project, the reward can be a form of symbolic representation in the form of tickets for the first day first show of the theatre. The reward is a pre-purchase offer for companies planning to raise funds for launching products, technological gadgets and services. Tokens are usually tangible items like gift bags, mugs, stickers, project related shirts, etc. that are given to appreciate the investment made by the investors and also to enhance the curiosity of the people and serves a promotional purpose too for

the projects (Siva Reddy, Ravikiran and Kalyan Kumar, 2019). Equity based crowdfunding offers the investors with the equity shares of the start-ups that seek to raise capital through crowdfunding and hence it gives the opportunity to have a share in the profits of the start-ups. Sometimes, the shares are available at a sale price which is lesser than the price it is offered to the general public. Two examples of the online platforms which allow equity based crowdfunding are CrowdCube in the UK and Symbid in the Netherlands. In India, still we don't have this form of crowdfunding. Debt based crowdfunding gives financial returns to the investors in the form of interest where interest rates are set by the online platforms themselves and may differ from one to another. It is also called as peer to peer lending but investors generally do not want to go for this form as there is a lesser chance to get back the invested amount. Some of the crowdfunding platforms of this type are Lending Club, Prosper in the USA, Funding Circle, Zopa in the UK (Hadli, 2016).

## **OBJECTIVES OF STUDY**

The present study tries to attain the following objectives mainly through the review of the previous literatures on Crowdfunding to have a comprehensive view of the same.

- ➔ To understand whether crowdfunding acts as a substitute of venture capital or a complement to venture capital in case of financing of start-ups;
- ➔ To critically review the draft regulation of equity crowdfunding in India;
- ➔ To point out the impact of crowdfunding in case of medical care;
- ➔ To understand the activities of two major crowdfunding platforms Ketto and Milaap in India who are working in the field of medical care.

## **CROWDFUNDING VERSUS VENTURE CAPITAL FINANCING**

D' Ambrosio and Gianfrate (2016) have tried to analyse whether the crowdfunding and the venture capital financing are substitutes of one another or they act as complements of one another in case of financing of start-ups. The study is based in USA and the data pertinent to crowdfunding have been collected from Kickstarter, the major crowdfunding platform globally. For analysis of the crowdfunding data to answer the research questions, the projects concerning business ideas and finally evolving into business ventures are selected from the fields of games, food, fashion, product design and technology. The venture

capital financing data have been obtained from Thomson One Investment Banking. In trying to explore answer to this question, they have classified the venture capital financing into seed stage where the start-ups require moderate amount of money to develop the product, service or technology and after seed stage. The after seed stage is further sub-divided into early stage where the start-ups tries to commence its operations but not commercial operations, expansion stage where the entrepreneur requires heavy investment in plant and equipment and finally later stage when the company has already started with commercial operations and before it goes for initial public offering. Since crowdfunding aims to collect money in small quantum from large group of public in general, the second research question that the literature tries to answer is whether crowdfunding is able to mitigate the geographical constraints and barriers or it is also clustered and geographically concentrated in some areas like its venture capital financing counterpart.

The study employs ordinary least square method of regression and cross correlations to study whether the two sources are substitute or complement of one another. The result supports the hypothesis that the authors make and i.e., in the seed stage, there has been a decline in venture capital financing after the emergence of crowdfunding but in the after seed stage there exists a positive relationship between the two. The study also uses bivariate vector autoregressive model and Granger Causality Tests to estimate whether crowdfunding is a predictor of venture capital activity and here also it is found that it is a predictor of the venture capital financing activity. Hence, the above statistical tests employed in the study confirms the fact that crowdfunding acts as substitute of venture capital financing in the seed stage helping the entrepreneurs to raise capital and acts as complement in the after seed stage facilitating the possibility of many rounds of venture capital financing in the after seed stages. As far as the geographical patterns are concerned, the trend shows that the crowdfunding is similarly concentrated in the same regions like New York and San Francisco like venture capital financing.

The study after answering to the two research questions discusses the major differences between the two sources of finance in the field of start-up financing. Venture capitalists are the people or the institutions having expertise in a certain businesses while crowdfunding aims to bring together people from diverse and uncertain background with or without any expertise in a given business. Crowdfunding depends on internet to reach to the investors and to the fund seekers while venture capital companies operate through the network of offices to connect to the start-ups. Venture capitalists are generally rewarded

by the mode of equity participation in the start-ups and some monitoring rights over the projects while the investors in the crowdfunding platform are given some rewards, may not necessarily be the equity participation in the start-ups. D' Ambrosio and Gianfrate (2016) also point out that since crowdfunding possesses certain attributes, it gives more convenience to the start-ups in case of raising capital than in the case of venture capitalists. The fund seekers just need to give a description of the project with certain appeal to attract the attention of the prospective investors. There is no need for them to chalk out a detailed business plan or any formal reports as in the case of venture capital financing. It is convenient for the fund providers as well as they can invest by the simple use of their e-wallet or credit card from any part of the globe. Crowdfunding enables the entrepreneurs to make a trial run of their products or technology or services to gauge the market acceptance. Similarly, it provides the entrepreneurs with the valuable feedback about their offerings from the large crowd in general. Crowdfunding safeguards the start-ups from the adverse effects of not being selected by the venture capitalists while financing. This is because of the ripple effects that impact other agents and institutions of the venture capitalists' network to not to associate and collaborate with such start-ups denied financing by the venture capitalists. In the aspect of retaining control by the entrepreneurs on their start-ups, crowdfunding again provides better opportunities to the entrepreneurs. But, the authors raise one concern regarding the quality of the projects chosen by the investors through crowdfunding platforms as they do not have such expertise. Mollick (2013) however, suggests that the parameters used by the venture capitalists in case of project selection are also used in case of crowdfunding as evidence suggest that good projects always have financial backup whereas the low quality ones do not have any takers (Mollick, 2013 as cited in D' Ambrosio and Gianfrate , 2016) .

## **A CRITICAL OVERVIEW OF THE DRAFT REGULATION OF EQUITY CROWDFUNDING IN INDIA**

SEBI's consultation paper on Crowdfunding in India classifies security based crowdfunding into three types namely Equity based Crowdfunding, Debt based Crowdfunding and Fund based Crowdfunding. The consultation paper mainly focuses on the draft equity crowdfunding regulations in India. Equity crowdfunding is the retail form of private equity investment where people or retail investors invest in smaller amounts in the start-ups and SMEs in consideration of equity interest therein. The former two are based on private placement mode as given in Section 42 of the Companies Act, 2013 and the last one is based on SEBI (Alternative Investment Funds) Regulations, 2012. The

paper enumerates three aspects with respect to the security based crowdfunding namely the types of investors who qualify to invest in this form, the types of entities who will be considered eligible to raise funds from crowdfunding platforms, the related disclosure requirements that they need to fulfil here and the nature of entities who can establish crowdfunding platforms ([https://www.sebi.gov.in/sebi\\_data/attachdocs/1403005615257.pdf](https://www.sebi.gov.in/sebi_data/attachdocs/1403005615257.pdf)).

Keeping in mind the Indian context, the consultation paper points out the necessity to balance the interests of the startups and the SMEs to have an alternative effective source of financing, on one hand and to safeguard the interests of the retail investors, on the other hand. Hence, the consultation paper permits only 'Accredited Investors' to invest in security based crowdfunding. Accredited Investors can be any of the following:

- Qualified Institutional Buyers (QIBs) as defined in SEBI ( Issue of Capital and Disclosure Requirements) Regulations, 2009 and as amended from time to time;
- Companies incorporated under the Companies Act, 2013 with a minimum net worth of Rs. 20 crore;
- High Net Worth Individuals (HNIs) having net worth of at least Rs. 2 crore (excluding the value of the primary residence and the loan secured such property)
- Eligible Retail Investors (ERIs) having some expertise of investing in securities market and fulfilling some additional criteria of annual gross income of at least Rs. 10 lakh, filing of income tax return for a minimum of three financial years. Along with that, the individuals will have to certify to not to invest more than Rs. 60,000 in an issue through a crowdfunding platform and also of investing a maximum of 10% of the net worth through crowdfunding (ibid.).

These onerous criteria of the Accredited Investors especially Eligible Retail Investors somehow dilute the purpose of the crowdfunding to reach to a large pool of investors. Though the risk aptitude of the retail investors along with their ability to adjust for the losses of their investments should be taken into mind, the procedural formalities of the retail investors are a bit cumbersome.

Since the consultation paper mentions that the equity based and the debt based crowdfunding will follow the principles of private placement, the limit of the offer to a maximum of 200 persons excluding the QIBs, employees under ESOP, the minimum offer value of RS. 20,000 per person of the

face value of the securities should be maintained. In this connection, SEBI proposes to fix the base minimum investment of the QIBs, companies, HNIs and Expert Retail Investors to 5 times, 4 times, 3 times and 1 time of the minimum offer value person respectively([https://www.sebi.gov.in/sebi\\_data/attachdocs/1403005615257.pdf](https://www.sebi.gov.in/sebi_data/attachdocs/1403005615257.pdf)).

According to Soni and Bagchi (2014), compulsory obligation to attract 5% of the issued securities from the Qualified Institutional Buyers may again defeat the very purpose of the crowdfunding model.

SEBI allows crowdfunding mode of raising capital for early stage startups and SMEs which are unlisted public companies. In addition to that, the companies will have to comply with various requirements ranging from the size of the issue capped to Rs. 10 crore in a time period of 12 months, promoters, directors, etc. not mentioned as a 'wilful defaulter' or 'defaulter' by the RBI or by the CIBIL (Credit Information Bureau of India Ltd.), to not to use multiple crowdfunding platforms in a period of 12 months, to provide for the provisions for oversubscription, etc. The companies will also have to abide by the disclosure criteria so that the investors are able to make an informed judgement of their investment. The disclosure criteria include the multiple matters to be stated in the Private Placement Offer Letter and also making time to time biannual disclosures to the crowdfunding platform in the form of audited financial statements, report exhibiting utilisation of funds raised according to the objects of the issue, etc ([https://www.sebi.gov.in/sebi\\_data/attachdocs/1403005615257.pdf](https://www.sebi.gov.in/sebi_data/attachdocs/1403005615257.pdf)).

Soni and Bagchi (2014) have made a critical analysis and observation of Securities and Exchange Board of India's (SEBI's) consultation paper on Crowdfunding in India, released in 2014. Though the draft paper exhibits agility on the part of the SEBI to reduce and address the funding gap experienced by the start-ups and the SMEs, but the paper leaves various areas unanswered and hence, confusing and ambiguous. According to the Companies Act, 2013, any company that intends to raise capital by issue of securities have two options primarily in the form of public offer of securities or going through the private placement mode. It is known to us that the public offer requires the company to draft prospectus containing some specified information and the company has to comply with various other statutory obligations and compliances as mandated by the SEBI to ensure transparent offer of securities and for protection of the interests of the unsophisticated investors. Hence, it is obvious that this route will be cumbersome for the start-ups to raise capital in the initial stage. The private placement route, on the other hand, requires less procedural formalities but the number and the categories of investors are limited in this case.

Against this backdrop, we have Crowdfunding as an innovative and a new way of raising equity capital for the start-ups that cannot be compartmentalised either in the category of public offer or in the category of private placement. It is a hybrid form containing some elements of both the routes. It is very essential to comprehend the inherent nature of crowdfunding to draft a regulatory framework.

Soni and Bagchi (2014) explain that the basic idea behind crowdfunding for the entrepreneurs and the start-ups is to use the internet based platform to reach to the large pool of investors in order to optimise on cost of raising finance. But, the draft consultation paper requiring the start-ups and the SMEs to go for the detailed identification and disclosure of business risks, the mode of securities valuation, disclosing future projections of earnings certified by an independent third party research, etc. ultimately defeat the very purpose of this unique fund raising vehicle. The authors are in the favour of layered or tiered regulation where they think that one band should comprise of equity offerings of Rs. 50,000 to Rs. 5 crore and another, in the range of more than Rs. 5 crore to Rs. 10 crore. This layered approach will try to balance the situation for the start-ups to face lesser regulatory hassles when they are raising moderate amount and also try to maintain vigilance in care of raising larger amount where the risk is higher. Lastly, the article points out that SEBI's approach in classifying the crowdfunding platforms in Class I entities (SEBI recognised stock exchanges and depositories), Class II entities (technology business incubators) and Class III entities (networks of private equity and angel investors) with onerous requirements in relation to entry, eligibility, existence and operation, again is expected to defeat the very spirit and aspirations of the crowdfunding platforms like Wishberry, Start 51, etc. that are functioning in India under the reward and donation based model. Though the intention of the market regulator is to protect the interest of the investors and keep a check on the fraudulent activities, it should be understood that innovation and the growth of the market is not possible in the environment of fear and suspicion. So, the paper concludes with the suggestion from the authors that the SEBI should make a detailed study of the legislations and the impact of the same in different nations as faulty regulation can lead to adverse effects on the market, start-ups, SMEs and hence, innovation in India in both short term and long term.

## **IMPACTS OF CROWDFUNDING ON MEDICAL CARE**

Crowdfunding on medical care has positive effects for the fund seeker as it helps her/him to reach a large section of people through the social networking nature of the crowdfunding platform and give an urgent and desperate



description of the need of the fund for the medical care. The very personal touch in the appeal helps to reach to the potential donors who are moved by the same and also they, themselves feel a sense of satisfaction by knowing the exact end use of the fund, progress of the patient which are absent in case of donation to the charitable institutions. In spite of the positive effects, Snyder (2016) critically narrates some of the ethical issues that should be addressed in case of crowdfunding in medical care. One of the pertinent issues is the fraud and the false information that may be provided by some using crowdfunding platforms. The article points out some Canadian instances where the fund seekers have fraudulently taken the funds raised for a falsely represented purpose. Moreover, since these websites provide the opportunity to the needy to reach to many people, they usually motivate them to use some terms and presentation that can generate empathy in the minds of the donors and can sensationalise their stories. The research paper states that often, these crowdfunding platforms are used to accumulate funds for a medical procedure that is not accredited and effective one in addressing the medical need. However, this issue of fraud and false information may be relevant in some cases but not in Indian context. One of the largest crowdfunding platforms in India, Milaap, has tie-ups with more than 2000 hospitals in India. Hence, the credibility of the campaigns is not an issue here and donors understand that the causes are verified (Aravind, 2020). The success of the campaigns largely depends on the fund seekers' personal, sensational appeal to the crowd, the social networking circle she/he is exposed to, whether the incident is linked to a major traumatic event like a terrorist attack, etc. Hence, it may be observed that the needy ones having limited social networking circle like in case of mental illness, depression may not be able to raise a decent amount through this platform. The luck, social position of the individual impacts on the mobilisation of the funds in this case and that dilutes the fairness factor in the field of medical care to some extent (Snyder, 2016). The crowdfunding platforms extend help to those masses of people who do not have access to medical care or do not have adequate medical insurance coverage to cover the costs of treatment or are unable to make savings to take care of their medical needs. By doing so, the research paper states that act of crowdfunding suppresses the underlying and the inherent causes that lead to this inequitable distribution of health care services. Indirectly, it helps to aggravate the medical injustices that already exist in the system (Romm as cited in Snyder, 2016). However, as far as this issue is concerned, I believe that the fact of not being able to address the causes behind inequitable distribution of medical care does not in any way reduce the positive impact of the medical crowdfunding. These platforms are truly coming to the help of those people and



families who have been the victim of this inequitable injustice of the system and making a genuine effort in trying to save human lives. Snyder (2016) has expressed concerns regarding the efficiency and effective utilisation of the resources and the funds raised by way of medical crowdfunding. According to the author, the donors in this case have the obligation to identify the campaign for which they intend to donate, remain updated about the progress of the campaign and always have to face the uncertainty of the misuse of the funds. She observes that donating to a professional charitable organisation would enable to foster efficiency and effective utilisation of funds and also would be able to address some of the inherent problems that lead to the inequitable distribution of the medical care. Though this may be true to some extent, this is nullified to some extent by the positive advantages that allow the donors to remain personally attached with the cause for which they have donated by remaining updated with the progress of the patient and giving the feeling of fulfilment and satisfaction to them. Such feeling of fulfilment and satisfaction is not available in case of donation of charitable organisations generally though they may possess the expertise in handling the resources raised. The research paper also argues and criticises the crowdfunding platforms for charging a small fee from the amount so collected which are not known to the donors (Snyder, 2016). According to Snyder (2016), the platforms compel the fund seekers to forego their privacy and bring more transparency in their cause to raise funds for the cause. The problem is aggravated when the patient concerned is a child who does not have any say regarding the fact of disclosure or non-disclosure of her medical condition. Lastly, the research paper reflects on the fact that the very nature of the medical crowdfunding leads to the commoditisation of the medical care. Various issues as discussed above may lead to this like the issues of fairness, privacy, the profit making nature of the crowdfunding platforms and avoiding medical issues that go against a popular opinion or political ideology in the fear of possible backlash.

## **KETTO AND MILAAP IN INDIAN CONTEXT**

The two most significant crowdfunding platforms in India that had been working in the field of medical crowdfunding are Ketto and Milaap. Milaap is few years senior to Ketto and was founded by a group of passionate entrepreneurs named Anoj Viswanathan and Mayukh Choudhury in 2010 and enables the fundraisers to raise funds for healthcare, education, sports, disaster relief and other personal great causes according to its terms. Milaap was originally started as an online platform to help in financing rural projects and micro entrepreneurs. But, now it has made a significant contribution in funding cancer treatments, transplants and other critical medical emergencies. Milaap was successful in

raising nearly INR 700 crores approximately as on August, 2019 to support 1,00,000 causes roughly (<https://milaap.org/about-us/overview>). The revenue model of Milaap is 5% platform fee of the amount raised. But, Milaap has also waived fee in about 5% cases such as natural disasters or when the beneficiaries are very poverty stricken (Aravind, 2020). Ketto stands for Key to Tomorrow, was founded by Varun Sheth, Kunal Kapoor and Zaheer Adenwala in December 2012. Ketto was the first donation based peer to peer crowdfunding platform. It allows the fundraiser to create a campaign page through which she/he can raise the fund for a genuine cause including medical causes, education and creative projects. Both in the cases of medical and educational needs, the team ensures due diligence and transfers the funds raised to the hospital or the educational institute concerned. Sometimes, the funds raised are also transferred to the fundraiser to cover post operative expenses or any educational costs. Beneficiary get the benefit of the funds raised after Ketto deducts a minor percentage as its commission (<https://en.wikipedia.org/wiki/Ketto>). Ketto charges a fee of 6% for NGOs and 4.5% for individuals and a transaction fee of 1% is charged by its partner payment gateways. Moreover due to the levy of GST on INR donations at 18%, the effective rate becomes 10.62% for the NGOs and the corresponding rate is 8.85% for the individuals. Ketto does not levy any fee on the donors for their contributions ([support.ketto.org](http://support.ketto.org)). Starting from funding chemotherapy of the cancer patients to the funding of liver transplant operations, Ketto is found to do a commendable job in the field of medical crowdfunding (<https://en.wikipedia.org/wiki/Ketto>). With the popularisation of the social networking sites and advent of various digital payment platforms, both these crowdfunding platforms are raising money from the donor to bring smiles on the faces of many with the responsibility of credibility.

## **CONCLUSION**

Globally, the crowdfunding model has made significant contribution in funding projects in design, tech product, film and publishing and also in medical care. In Indian context, the crowdfunding model has proved helpful and successful in case of medical care as the healthcare infrastructure is incompatible to support such a robust population with the majority below the poverty line. The lack of access to the medical insurance facility aggravates the problem among the ones falling in the critical income group of the population. The private healthcare facility is rather unaffordable for this critical group. It is at this juncture, the crowdfunding platforms intervene and try to meet the gap between the funds required for the critical medical treatment and the amount the families can afford from their own personal sources. The revenue models

of these two platforms should be flexible and customised to reconsider the fee that they levy based on the capacity of the fundraisers. It is a matter of time to observe whether the crowdfunding model gains prominence in other field as well in Indian scenario like the international counterparts.

## References

- 】 Aravind, I. (2020). Caring Crowd. *The Economic Times Magazine*, (March, 2020), 20.
- 】 D'Ambrosio, M. & Gianfrate, G. (2016). Crowdfunding and Venture Capital: Substitutes or Complements. *The Journal of Private Equity*, 20(1), 7-20. Retrieved from <https://www.jstor.org/stable/44396812>.
- 】 Hadli, S. N. (2016). Crowdfunding. *International Journal of Research in Social Sciences*, 6(1), 442-466. Retrieved from [www.IndianJournals.com](http://www.IndianJournals.com)
- 】 <https://en.wikipedia.org/wiki/Ketto>
- 】 <https://milaap.org/about-us/overview>
- 】 [https://www.sebi.gov.in/sebi\\_data/attachdocs/1403005615257.pdf](https://www.sebi.gov.in/sebi_data/attachdocs/1403005615257.pdf).
- 】 Kumar, N. (2016). Crowdfunding: A New Funding Mechanism for Health Researchers. *Journal of Medical Erudite*, 4(12), 21-30. Retrieved from [www.IndianJournals.com](http://www.IndianJournals.com)
- 】 Reddy, P.S., Ravikaran, K. & Kumar, B. K. (2019). Crowdfunding: The Investment Tool for Millennial Entrepreneurs. *Vision: Journal of Indian Taxation*, 6(1), 50-63. Retrieved from [www.IndianJournals.com](http://www.IndianJournals.com)
- 】 Snyder, J. (2016). Crowdfunding for Medical Care: Ethical Issues in an Emerging Healthcare Practice. *The Hastings Center Report*, 46(6), 36-42. Retrieved from <https://www.jstor.org/stable/44159348>
- 】 Soni, J. & Bagchi, K. (2014). Crowdfunding in India- A Tale of Misplaced Regulations. *Economic and Political Weekly*, 49(48), 14-16. Retrieved from <https://www.jstor.org/stable/24481069>
- 】 [support.ketto.org](http://support.ketto.org)

# Citizen Behaviour upon this World Pandemic- An Empirical Study

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## **ABSTRACT**

**T**oday the world is facing Covid-19 as the greatest fear of loss of its people as well as the economic structure. Through various proactive approach of Indian government and its citizens, it is setting examples in the world that it can overcome this pandemic without losing lives. The government is taking rapid steps by bringing awareness to the grass root levels by highlighting the measures of social distancing, sanitization, lockdown, following the hygiene parameters and so on so forth. Being a developing country the citizens are also strictly abiding the valuable information about safety and health-first motto. Meaning to prove that they are nowhere far from the fight. Having said that, there is huge loss due to this lockdown as the markets, offices, industries, educational centres, transport systems are completely shut down. This is leading to a bigger problem for the citizens associated to the above mentioned services. No work has created problems to the workers and their families for basic needs. Objective of the present study to analysis (i) citizen's behavioural pattern towards this COVID-19 pandemic situation, (ii) perception of customers categorically in the different zones like green, orange and red zones and (iii) citizen's perception on pandemic in purview of the children and seniors. The study is an empirical work which has

considered the responses of samples of the 70 unanimous respondents' citizens residing in Kolkata. A structure questioner has been prepared by using google form which was circulated during this lockdown time period. Period of survey is from 05-05-2020 to 10-05-2020.

**Key words:** *Covid-19, Citizens, Pandemic, People.*

## I. INTRODUCTION

The COVID-19 was first identified in Wuhan, China on 31<sup>st</sup> December 2019 at the WHO country office and was declared as a public health emergency of International concern on 30<sup>th</sup> Jan 2020. India reported the first case on 30<sup>th</sup> Jan 2020, having case history originated in China. The symptoms of the disease are severe fever, coughing and sneezing. Disease can spread through close contact with infected patients and also by touching contaminated surface and then touching their face.

On 22 March 2020, India observed a 14 hours voluntary public curfew at the request of the Prime Minister Narendra Modi. The government followed it up with lockdown in 75 districts where COVID-19 cases had occurred as well as the major cities. Further on 24<sup>th</sup> March, the Prime Minister ordered a nationwide lockdown for 21 days, affecting the entire 1.3 billion population of India. On 14<sup>th</sup> April, the Prime Minister extended the ongoing nationwide lockdown till 3<sup>rd</sup> May.

With country entering another phase of the nationwide corona virus lockdown, all districts in the country have been classified into red, orange and green zones. This zones classified is dynamic and will be revised every week. Containment areas within red and orange zones will have additional restrictions. The nationwide lockdown, impose to curb the spread of novel corona virus, has extended till May 17 and the government has moved to a district-wise zone classified system for this period. The zone classification determines the kind of restrictions placed on the movement of people and supply of goods in a district.

Observers have stated that the lockdown has slowed the growth rate of the Pandemic by 6<sup>th</sup> April to a rate of doubling every 6 days and by 18<sup>th</sup> April to a rate of doubling every 8 days. As on 27<sup>th</sup> April the state of Goa, Sikkim, Nagaland, Arunachal Pradesh, Manipur and Tripura have been declared as COVID-19 free with zero active cases by the Govt. of India. Excersing social gathering is halted and people are stuck at home, restlessly. All the educational institutions are unable to practice their routine during this pandemic causing difficulties on their as well as student's part. Similarly, students have to complete their courses on time to get promoted to the next class.

## II. NEED AND SCOPE OF THE STUDY

- The present study helps to understand the problems faced by the citizens during the pandemic.
- It can also help to determine that the people abide by the rules and regulations or not.

## III. LITERATURE REVIEW

Harapan H et.al (2020), in his research paper's title "Coronavirus disease 2019 (COVID-19): A literature review" concluded that COVID-19 is an international problem for public health. It also states that the corona virus is fragile and all countries must take proactive measures to prevent their citizens.

Parham Habibzadeh and Emily K Stoneman (2020), in his research paper's title "The Novel Coronavirus: A Bird's Eye View" states that coronavirus led to a public health emergency of international concern according to WHO. It also highlights the importance of effective public health strategies to counteract the never-ending threats imposed by emerging pathogens.

Yan- Rong Guo et.al (2020), in his research paper "The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status" concluded that studies are urgent to explore the transmission and pathogenicity mechanism of the emerging coronavirus. To make clear the evolutionary path from the original host to cross-species transmission so as to potentially limit the transmission to naïve animals or humans.

Bin Chen et.al (2020), in his research paper's title "Overview of lethal human coronaviruses" concluded that human beings have experienced several epidemic outbreaks, and each outbreak had a negative impact at different levels, including health, economy, and even psychology and human behaviour. In the future, more precautionary measures should be available to guide individuals and groups to take effective emergency measures and to support social stability, and physical and mental health.

## IV. OBJECTIVES OF THE STUDY

Objective of the present study to analysis

- Citizen's behavioural pattern towards this COVID-19 pandemic situation.
- Perception of customers categorically in the different zones like Green, Orange & Red zones.

- Citizen's perception on pandemic in purview of the children and seniors.

## V. METHODOLOGY

The study is an empirical work which has considered the responses of samples of the 70 unanimous respondents' citizens residing in Kolkata. Period of survey is from 05-05-2020 to 10-05-2020.

A structure questioner has been prepared by using Google form which was circulated during this lockdown time period. The sample responses have been analysed by using bar, chart, pie diagram & so on. The link has also been attached.

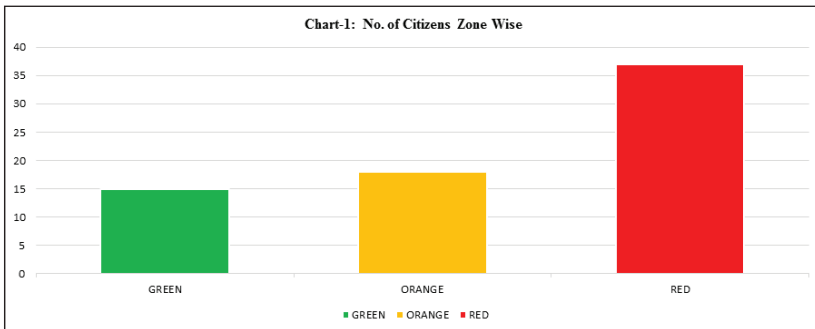
<https://docs.google.com/forms/d/1nykZdnNSvc4bpd-XAjz823sCJSN-RQ-zc2hvnvgtmSpTI/edit>

Secondary sources have also been used for the analysis of the study.

## VI. ANALYSIS AND FINDING

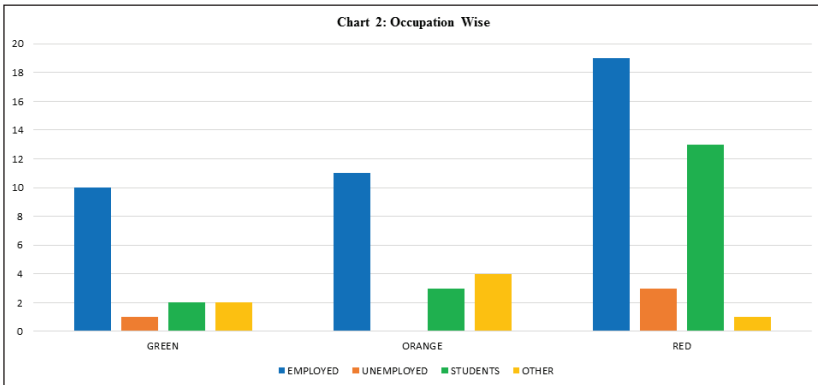
In order to satisfy the objective of the research paper the study shall elaborate more about the analysis and findings.

1. Study represents the sample of 70 respondents throughout Kolkata. Out of the 70 respondents – 15 are from Green zones, 18 from Orange zones and 37 are from Red zones.



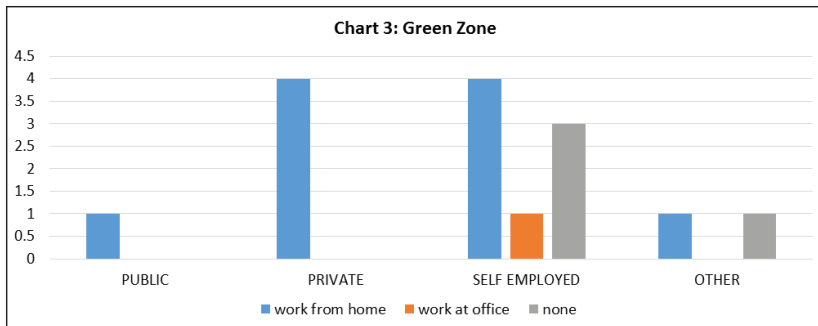
*Source: Primary Data*

2. The given chart denotes the zone wise occupation of the citizens, whereas most of the people are employed in all the zones however 5% of the citizen are unemployed & facing the problems like economical aids, regular ration/food, lack of availability of the other resources due to the crisis during the lockdown.



Source: Primary Data

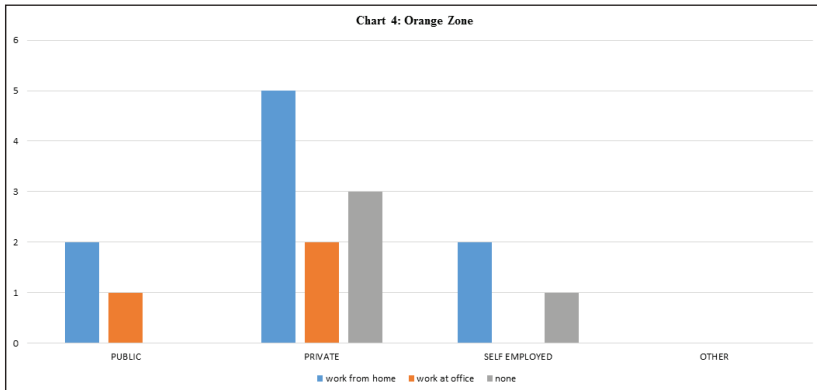
- Data given below shows that citizens are doing their work from home in the green zones and understanding the problem faced by COVID-19 by doing so they are saving the other people who are also engaged with their work however have separated themselves by staying home to save everyone from getting infected.



Source: Primary Data

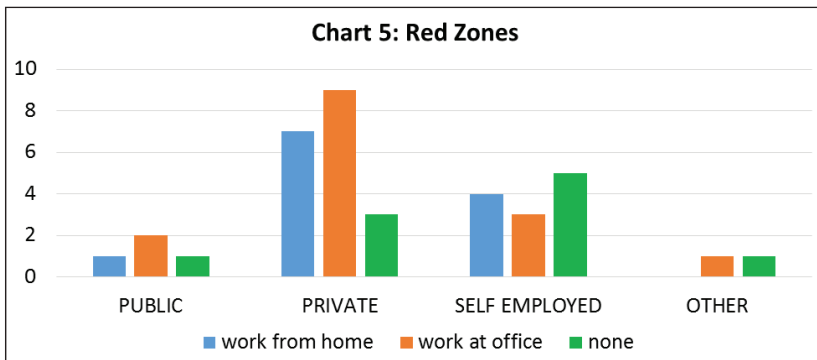
- Data given below shown in the orange zone represents a similar response to the green zone however some of the people from public and private sector employees in the orange zone are bound to do their job at office. They may face problems of getting infected in this situation. Moreover they have a risk of losing their job so they are performing their duties regularly.





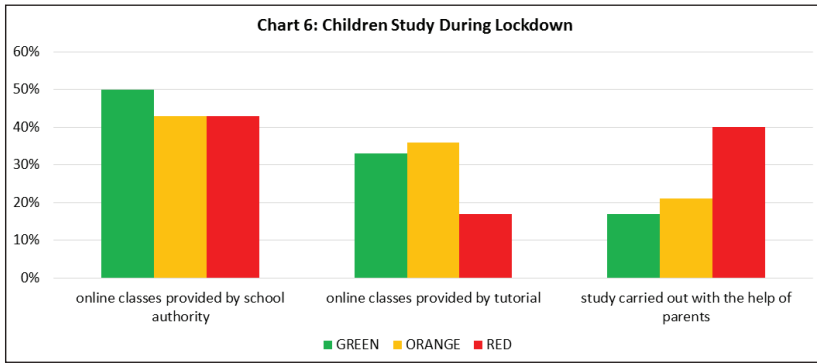
Source: Primary Data

- Data given below shown in the red zone represents the majority of people be it working in public sector, private sector or self-employed and others are working at office. They have great threat and by doing so they are facing the challenges of completing their targets. It also represents that the number of people working from home are lesser, comparatively. Having said that, they are trying as much as possible by distancing from social gathering even in office. They are also maintaining the hygiene parameters by sanitizing themselves, washing hands on a regular interval and wearing masks during the course.



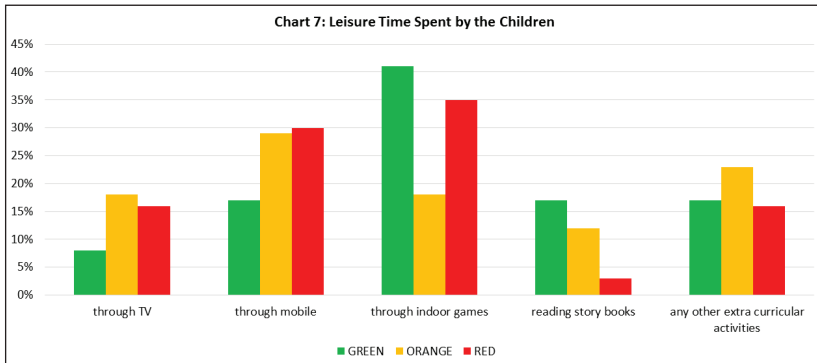
Source: Primary Data

- Data shown in the chart represent that children are studying in the green, orange and red zones with the help of the online classes provided by the school authority and also with the help of their parents. The lockdown has created problems on the study as well as there physical activities.



Source: Primary Data

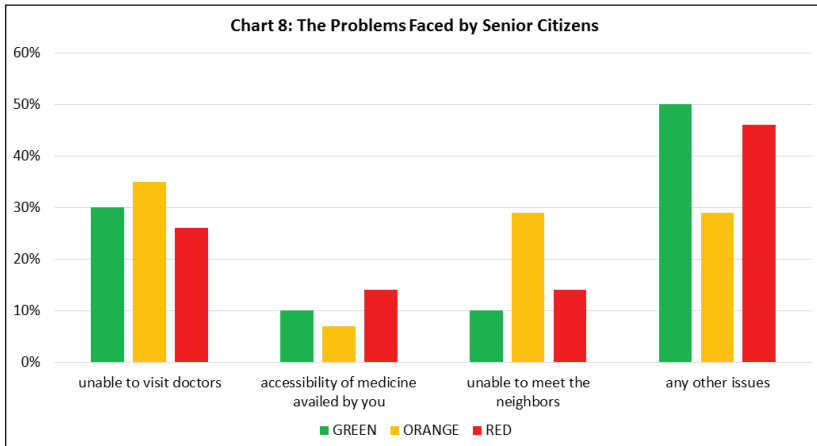
7. Chart represents that the children spent their leisure time through TV, Mobile, Indoor games, reading story books and extra activities. In the green and red zones most of them are playing indoor games. Whereas, in the orange zone they are spending the leisure time through mobile phone. Children are facing huge problem during this pandemic as they are bored and are restricted at home. Their school activities are also closed because of this pandemic and they are not allowed to go out from home.



Source: Primary Data

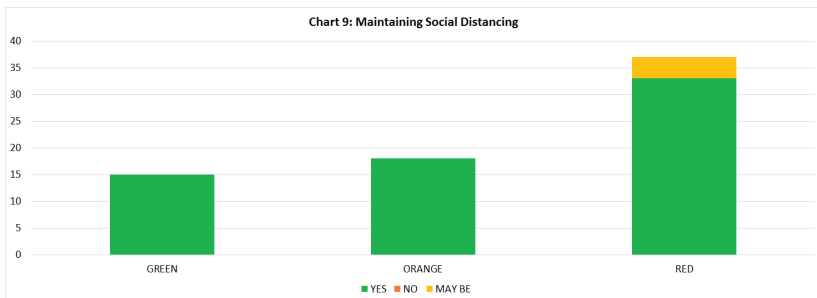
8. Senior citizens are also suffering a lot during this lockdown, as their immunity power is less and they are already coping from different diseases like sugar, pressure, heart problems and so on. The elderly ones always want to be surrounded with the people and need special care, but this cannot happen in this lockdown period. Chart represents the problem faced by the senior citizens are unable to meet

doctors, accessibility of medicine availed by them, unable to meet the neighbours and any other issues. It concludes that they are suffering in every aspect during the lockdown.



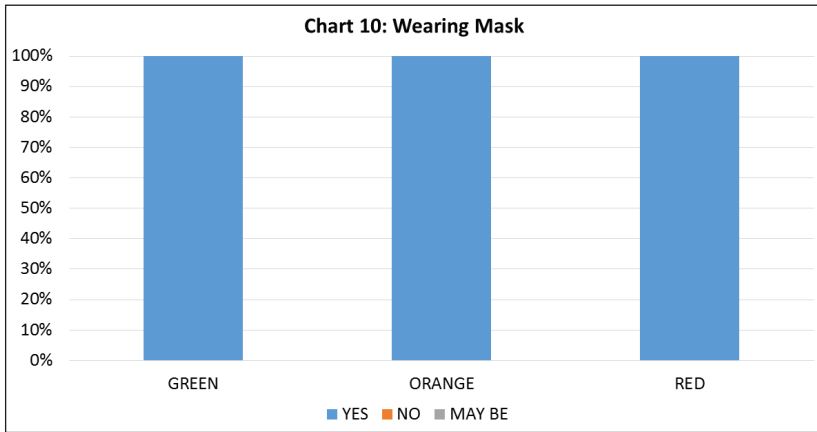
Source: Primary Data

- It shows the zones have been able to maintain social distancing except some may or may not. They don't not want to take any risk of spreading of the covid-19, this will lead them in maintaining social distancing and caring other human lives.



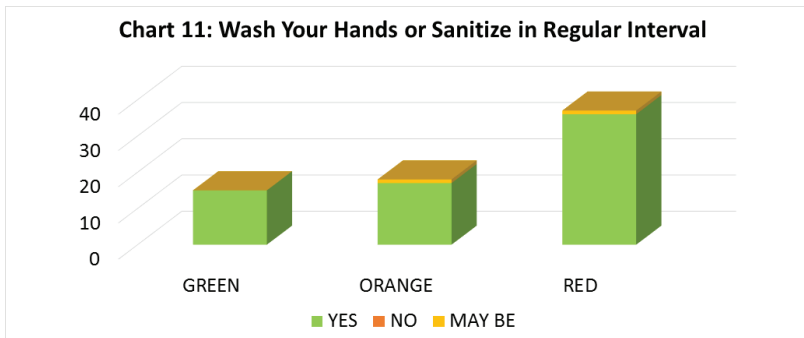
Source: Primary Data

- The chart shows that everyone is wearing mask. Masks help them protect from spreading the infection and also by sneezing, coughing and talking with each other as the small droplets aren't spreading either. They also help them not getting infected while touching the infected surface and touching their faces, respectively.



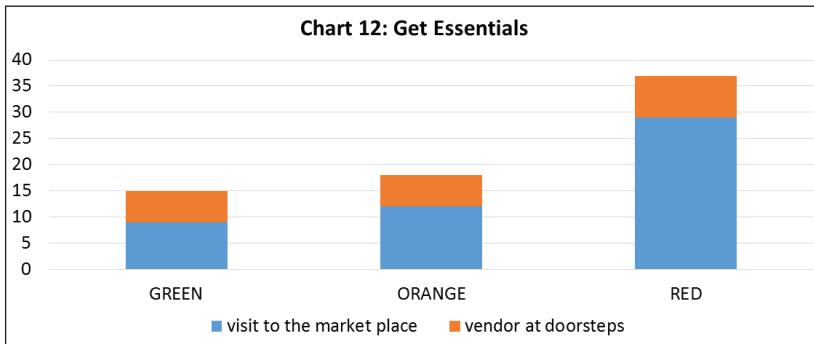
Source: Primary Data

11. The chart represents everyone is able to sanitize their hands, except few. Sanitization helps them to remove the infected virus and kill the germs that cause different health issues. It has turned out to be a habit and an important step to fight the Covid 19, now a days.



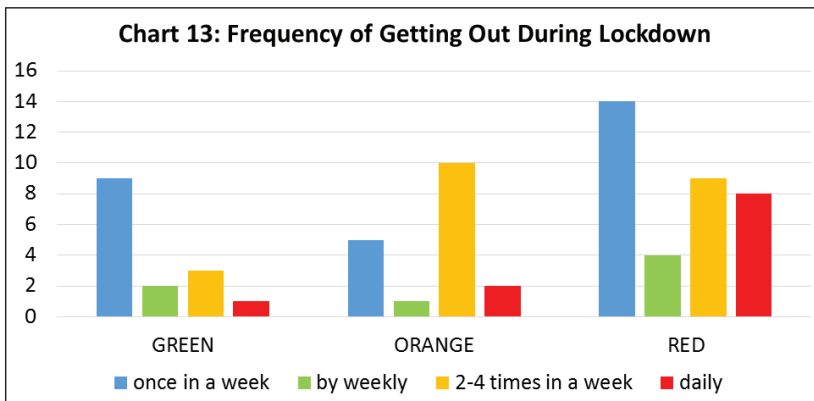
Source: Primary Data

12. The chart represents most of the people are visiting the market place for their essentials and some are able to get it through the doorstep delivery. Market place is the more sensitive area as chances are high people can be infected while getting their essentials. During this pandemic situation everyone should keep in mind that going to the market place will lead to a bigger problem of getting infected as explained in the Red zones where people aren't able to maintain social distancing and so on. Trying to avoid so and taking their essentials from the vendors is a safer choice, whatsoever.



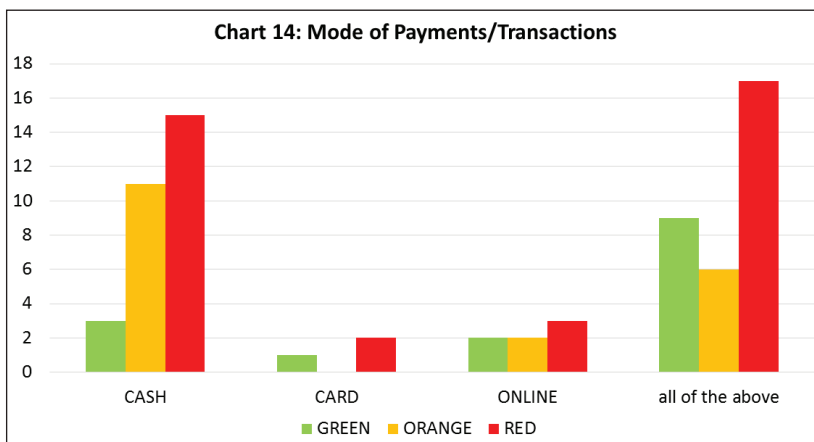
Source: Primary Data

13. The present table shows the frequency of the person going out during the lockdown. It also shows that the citizens belonging to the red zone are going out very frequently as compare to the other zones. Nevertheless, in the red zone there are many infected people going to the market place, very frequently also bring them in a situation of getting touched with the others.



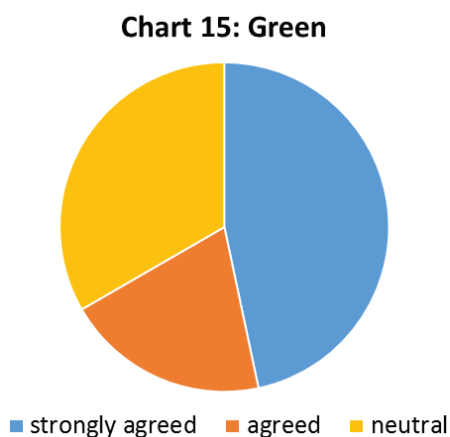
Source: Primary Data

14. Chart represents that the payment mode adopted by the citizens during the lockdown are cash, card and online. In green and Red zone most of the people are adopting all methods for payment. Whereas in orange zone most of them are using cash to do so. Using cash is very risky as the virus can stay on the cash for a long time. However, online payment is the best mode as it helps citizens to stay away from this panic situation.



*Source: Primary Data*

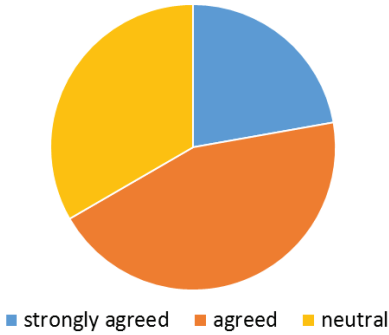
15. The below pie chart shows that the citizens in the green zone are strongly agreeing regarding the measures taken by the Government / Authorities.



*Source: Primary Data*

16. The below pie chart shows that the citizens in the orange zone are agreeing regarding the measures taken by the Government / Authorities.

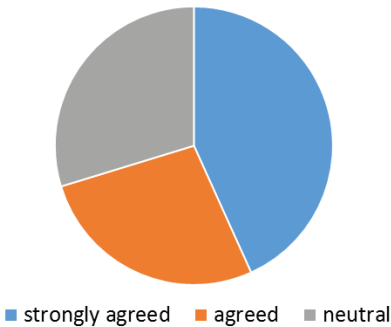
**Chart 16: Orange**



*Source: Primary Data*

17. The below pie chart shows that the citizens in the Red zone are strongly agreeing regarding the measures taken by the Government / Authorities.

**Chart 17: Red Zones**



*Source: Primary Data*

## VII. CONCLUSION

It shows that most of the respondents in the green zone are working from home to overcome this pandemic. The respondents belonging to the private sector are abiding to do work at office, which might lead to the spread of the disease. Data found here shows that most of the respondents are adhering to the primary norms of social distancing i.e. wearing masks, washing hands and sanitizing themselves. It is also found that the people are well aware of the digital platform and they are using online/card payments as their mode of payment. However there are cases in most of the zones where the respondents

couldn't abide by the rules and regulations such as going to the market place regularly, using cash as mode of payment which can lead to the spread of this disease. Seniors are also facing havoc, chaos like visiting the doctor's place or meeting their friends and neighbours and accessibility of the medicines and so on. Children are not far from the race reason being not able to attend outdoor games, going to the school, having regular sessions. Despite a poor economy and with limited infrastructures it is quite impossible to overcome the situation. Nevertheless, after analysing the global scenarios we're standing way apart by all measures and guidelines performed and are in a better position compared to the countries where the cases are worst despite having good infrastructures. All of us together can overcome this situation by following the guidelines provided by the government, standard measures by the health authorities, instructions given by doctors, hospital authorities' to fight and win the situation.

## References

- 1) Chen, B., Tian, E. K., He, B., Tian, L., Han, R., Wang, S. & Cheng, W. (2020). Overview of Lethal Human Coronaviruses. *Signal Transduction and Targeted Therapy*, 5(1), 1-16.
- 1) Guo, Y. R., Cao, Q. D., Hong, Z. S., Tan, Y. Y., Chen, S. D., Jin, H. J., & Yan, Y. (2020). The Origin, Transmission and Clinical Therapies on Coronavirus Disease 2019 (COVID-19) Outbreak—An Update on The Status. *Military Medical Research*, 7(1), 1-10.
- 1) Habibzadeh, P. & Stoneman, E. K. (2020). The Novel Coronavirus: A Bird's Eye View. *The International Journal of Occupational and Environmental Medicine*, 11(2), 65.
- 1) Harapan, H., Itoh, N., Yufika, A., Winardi, W., Keam, S., Te, H. & Mudatsir, M. (2020). Coronavirus Disease 2019 (COVID-19): A Literature Review. *Journal of Infection and Public Health*.
- 1) [https://en.wikipedia.org/wiki/COVID-19\\_pandemic#Background](https://en.wikipedia.org/wiki/COVID-19_pandemic#Background), accessed on 05/05/2020
- 1) [https://en.wikipedia.org/wiki/COVID-19\\_pandemic](https://en.wikipedia.org/wiki/COVID-19_pandemic), accessed on 03/05/2020
- 1) [https://en.wikipedia.org/wiki/COVID-19\\_pandemic](https://en.wikipedia.org/wiki/COVID-19_pandemic), accessed on 05/05/2020



# Impact of Non-Banking Financial Companies (NBFC's) on Indian Economy: A Study on Growth Prospective and Challenges

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## ABSTRACT

Since decades NBFC'S play an important role in promoting inclusive growth in the country by providing various financial services. Access to safe, easy and affordable credit and other financial services by poor and vulnerable groups in remote areas and lagging sectors is recognised as a pre-condition for accelerating growth and reducing income disparity and poverty. Banking sector plays an important role in providing financial services to all categories of people of our country. In spite of that, there are some sections of people or there are some remote areas where people are unable to access banking facilities. A customer falling in low or middle income group may not be able to pass the credit worthiness test of banks. Non- Banking Financial companies (NBFC's) are filling these unhealthy gaps left by banks. They have also helped in providing various financial services in developing small and micro business. The present study encompasses the role played and the challenges faced by the Non – Banking financial Companies in Economic Development of India with the help of secondary data collected from various resources. This sector has always played a critical growth of the Indian Economy and hence needs to be nurtured appropriately.

**Key words:** *Non Banking Financial Companies, Indian Economy, Growth, Financial Services, Crisis.*

## **I. INTRODUCTION**

In recent years, Non Banking Financial Companies (NBFCs), in India plays a very important role for financial progress of the country by providing various kinds on financial services. They act as the financial intermediaries by providing a wide range of financial services and satisfying the diverse financial needs of millions of small firms as well as individuals, become an imperative part of the Indian Financial System.

NBFCs also play a crucial role in the core development of the country's infrastructure. By offering long term funds and credit to the Indian traded and commerce industry, these institutions are enabling the funding and growth of large infrastructure projects across the country. Apart from this, small sized businesses, start –ups and MSMEs, which are slowly mushrooming in the country, are dependent on funds offered by NBFCs. Additionally, as these small businesses expand their presence and operations, they needed both skilled and unskilled labour in order to perform various activities, and as a result more job opportunities can be created at the macroeconomic level. This sector also creates an urge of savings among the people especially for the people of rural and semi- urban areas of the country. This could help the country to go a step ahead towards the Economic Development.

## **II. REVIEW OF LITERATURE**

The modern Economy is basically depends on the goods functioning of the Financial system, and the financial system is depended on the functions of the Financial Institutions. With the introduction of NBFCs in the financial system, investors could invest their money for earning lucrative returns in comparisons to the Bank deposits.

Bhole (2007) in his book explains that NBFCs in India perform a diversified range of functions and other various financial Services to individual, corporate and institutional client. It also plays a positive role in accessing certain depositor segment and clearing credit requirements of borrower.

Gupta (2011) in his book defines money market as an opportunity for balancing the short – term surplus fund of the investor with the short term requirement to borrowers. Another feature of money market is that they provide with offer liquidity varying degree. It also notes that NBFCs play a vital role as financial intermediaries because they can take quick decision making, assume greater risks and design their product to the need of the customer.

Singh (2014) in “A Journal of Radix International Educational and research

Consortium” studied the evolution, growth and development of NBFCs in India.

Goel (2016) in “ELK Asia Pacific Journal” studied the growth prospects of NBFCs in India.

### **III. CONCEPT OF NON – BANKING FINANCIAL COMPANIES (NBFCs)**

A Non – Banking Financial Company (NBFC) is a company registered under the companies Act 1956 engaged in the business of loans and advances, acquisition of shares/stocks/bonds/debentures/securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire purchase, insurance business, chit business but does not include any institution which is principally engaged in the business of agriculture activity, industrial activity, purchase or sale of any goods ( other than securities) or and sale / purchase/ construction of immovable property.

### **IV. OBJECTIVES OF THE STUDY**

The objectives of the proposed study are:

- To study the growth perspective of NBFCs, (In terms of trends in Borrowings and Advances).
- To analysis the impact of NBFCs on Indian Economy.
- To study the issues or challenges faced by this particular sector.

### **V. RESEARCH METHODOLOGY AND DATA SOURCE**

The proposed research paper is Exploratory in nature and is based on Secondary Data. The relevant information are collected from various research papers, reputed Journals, Reports on Trend and progress in Banking, RBI (2005-2019) , various circulars published by RBI from time to time ( [https:// www.rbi.org.in](https://www.rbi.org.in)) and various reports from rating agencies and from other related website etc.

### **VI. GROWTH PROSPECTS OF NBFC IN INDIA – IN TERMS OF TRENDS IN BORROWINGS AND ADVANCES**

Under the various segments of the Banking industry, the growth of NBFCs in terms of credit has been remarkable. The major growth of NBFCs during the years 2015- 19 on account of borrowing and advances can be divided into 4 periods----1) 2005-10(Take off), 2) 2010-15 (high growth), 3) 2015-18 (Sustained growth), 4) 2018-19 onwards (moderation of growth)

### 1) 2005-10 (Take off Periods)

The CAGR is 20%, between F.Y 2005- F.Y 2010 in terms of borrowing and advances of NBFCs. Table 1 shows that there is an increase in the assets financing and this is due to the reason that there is an increasing number of financiers ventured into infrastructure finance and core investment, which led to growth and diversification in the loan book of the NBFCs. and the growth in advances was led by the rising level of income and consumption.

**Table 1: Major Financials of NBFCs  
(March 2005 to March 2010) (Rs. Lakh Cr)**

NBFC CAGR	March 2005	March 2010
Net worth 34.6%	0.4	1.8
Borrowings 23.9%	1.5	4.5
Total Assets 27.2%	2.0	6.8
Advances 24.8%	1.5	4.6
LTI 40.7%	0.2	0.9
GNPA	2.6%#	1.9%#
LTI – Long Term Investment, # GNPA – Gross NPA as a % of total Assets		

*Source: Report on Trend and Progress of Banking in India, RBI*

### 2) 2010-15 (High Growth Periods)

The CAGR is continued to be high during the period 2010-15.

**Table 2: Major Financials of NBFCs  
(March 2010 to March 2015) (Rs. Lakh Cr)**

NBFC CAGR	March 2010	March 2015	
Net worth	1.8	3.2	12.2%
Borrowings	4.5	10.5	18.7%
Total Assets	6.8	14.8	16.7%
Advances	4.6	11.1	19.2%
LTI	0.9	1.4	8.8%
GNPA	1.9%#	4.1%#	
LTI – Long Term Investment, #GNPA – Gross NPA as a % of total Assets			

*Source: Report on Trend and Progress of Banking in India, RBI*

From the Table 2, it is seen that the growth of NBFCs in net worth is lower as compared to the growth of borrowing; the reason behind this is NBFCs operating at a high leverage level as compared with that during the period 2005-10. The ratio of Gross NPA to gross advances increased from 1.9% in F.Y 2010 to 4.1% in F.Y 2015, on account of the change in the NPA recognition norms.

### **3) 2015-18 (Sustained Growth period)**

During the Periods 2015-2018 there is a substantial growth in net worth of NBFCs which is in line with the rising profitability of the Non – Bankers along with the sharp growth in the share capital of the NBFCs.

**Table 3: Major Financials of NBFCs  
(March 2015 to March 2018) (Rs. Lakh Cr)**

NBFC CAGR	March 2015	March 2018
Net worth 17.3%	3.2	5.2
Borrowings 15.1%	10.5	16.0
Total Assets 15.5%	14.8	22.8
Advances 16.7%	11.1	17.6
LTI 14.9%	1.4	2.1
GNPA	4.1% <sup>#</sup>	5.8% <sup>#</sup>
LTI – Long Term Investment, <sup>#</sup> GNPA – Gross NPA as a % of total Assets.		

*Source: Report on Trend and Progress of Banking in India, RBI*

From the Table 3, it is seen that there is a contraction in NBFCs borrowings from banks and the growth in GNPA ratio is higher in 2018(5.8%) as compared to 2015(4.1%) which is mainly because of the reason that a major share of credit by NBFCs is towards industrial sector, this sector displaying a slow movement in their activity during this period. The RBI had begun to progressively revise the assets recognition norms for NBFCs from 2014 onwards.

#### **4) Present Scenario (Y- O –Y Growth during 2018-19)**

The growth of borrowings of NBFCs in F.Y 2019 has remained at approximately the same level as that of March 2018 i.e. at 19.6%. Similarly the net worth of NBFCs registered subdued growth, indicating that the leverage levels have been pushed up as compared to that recorded in the previous years.

Table 4 shows that y-o-y growth of advances by NBFCs for F.Y 2019 stood at 18.6% compared with 21.1% recorded in F.Y 2018. The moderation in the loan component is majorly on account of slowing economy (GDP growth y-o-y moderated from 8% in Q1 F.Y 2019 to 5.8% in Q4 F.Y2019) and due to liquidity tightening by banks / investors owing to concerns rising out of the asset – liability mismatches of some entities.

**Table 4:- %y-o-y Growth in Major Financials of NBFCs  
(March 2018 to March 2019)**

NBFC March 2019	y-o-y Growth% March 2018
Share capital	6.0
6.3	
Reserves	18.7
14.6	
Total Borrowings	19.6
19.6	
Debentures	13.1
5.2	
Commercial Papers	13.3
4.0	
Banks	34.4
47.9	
Loans	21.1
18.6	
Investment	12.9
20.6	

*Source: Report on Trend and Progress of Banking in India, RBI 2018-19*

## **VII. IMPACT OF NBFCs ON INDIAN ECONOMY**

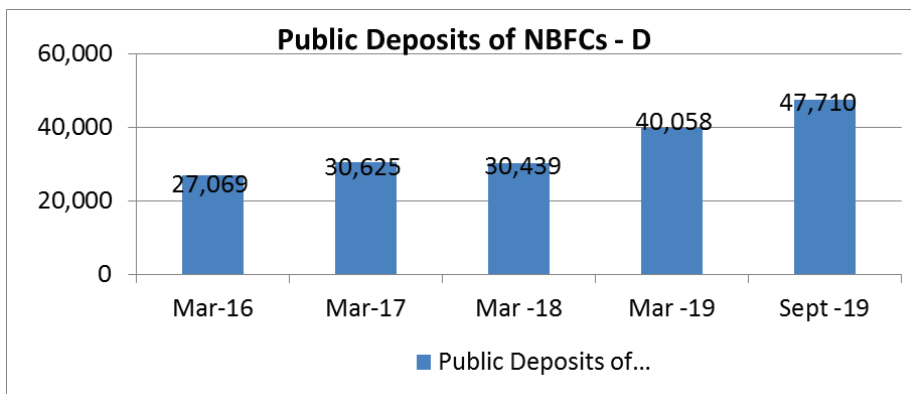
The well being of a developing economy depends on the well being of all sections of that economy. In this context NBFCs plays an important role. They can support our economy in various ways; in one hand this sector focused on the small and medium enterprises (SME) sector and stimulating microfinance and on the other side they create motivation among sections of our society by providing them various kinds of financial services, and thus helps in Financial Inclusion of the Country. The roles played by the NBFCs are discussed below.

### **Role of NBFCs in Financial Inclusion**

Financial Inclusion has been defined as the “Provision of affordable financial services”, to those who have been left unattended or under attend by formal agencies of the financial system. These financial services include payment and remittance facilities, savings, loan and insurance services. Micro – Finance has been looked upon as an important means of financial inclusion in India.

Chart – 1 represents that there is a growing trends of Public Deposits with NBFCs that means public are now much aware regarding their savings. This can Show a positive impact of NBFCs towards Financial Inclusion.

**Chart 1: Public Deposits with NBFCs at the End of September 2019 (Rs. Crore)**



Source: Report on Trend and Progress of Banking in India, RBI 2018-19

### **Role of NBFCs in Infrastructure Financing**

A country's economy is defined by the state of its infrastructure. NBFCs contribute extensively to the economy by lending funds to infrastructure sector, which is very crucial for a developing nation like India. An infrastructure venture requires a large amount of funds which generates revenue only after a longer time frame, thereby making such projects carry risk when it comes to lending. Hence banks deter from lending to infrastructure projects in the last few years. Besides NBFCs have contributed more to infrastructure lending



**Table – 5: Position of Infrastructure Finance Company (amount in Rs. Crore) Trend and Progress Report 2018-19 of RBI**

Category/ Liabilities	At the end of March 2018			At the end of March 2019			At the end of September 2019		
	Borrowings	Other Liabilities	Total Liabilities	Borrowings	Other Liabilities	Total Liabilities	Borrowings	Other Liabilities	Total Liabilities
Infrastructure Finance Company	6,63,621	1,49,364	8,12,985	8,01,996	1,90,288	9,92,284	8,24,946	1,99,216	10,24,162
Category/ Assets	At the end of March 2018			At the end of March 2019			At the end of September 2019		
	Loans and Advances	Other Assets	Total Assets	Loans and Advances	Other Assets	Total Assets	Loans and Advances	Other Assets	Total Assets
Infrastructure Finance Company	7,60,240	52,745	8,12,985	8,91,659	100,625	9,92,284	9,25,588	98,575	10,24,162

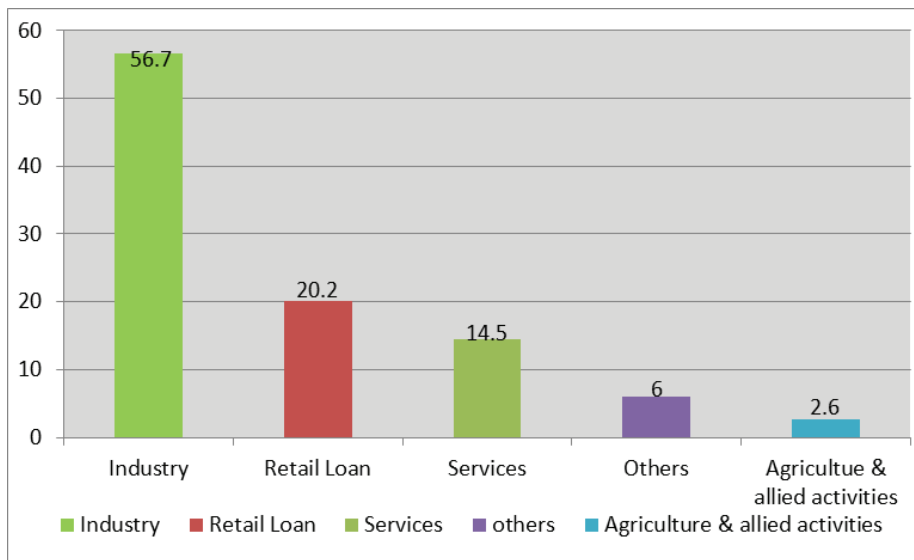
*Source: Report on Trend and Progress of Banking in India, RBI 2018-19*

So, from the above table (Table 5) it can be shown that despite of liquidity stress faced by the sector there was expansion in assets size of Infrastructure Finance Company. It can also be observed from this table that there is a strong growth in borrowings and other liabilities as compared to the year 2018. So, the contribution towards infrastructure Financing is in increasing trend.

### **Extension of Credit to Various Sectors**

A vibrant NBFC sector plays a critical role in extension of credit and deepening finance, given their expertise in developing solutions to meet the unique nature of credit demand of the country. Credit extended by NBFCs continued to grow in 2018- 20. Industry is the largest recipient of credit provided by the NBFC sector, followed by retail loans and services. Credit to industry and service was subdued in relation to the previous year. However growth in retail loans continued to be momentum [Refer – Chart 2].

**Chart 2: Distribution of NBFC Credit (At end September 2019)**



*Source: Report on Trend and Progress of Banking in India, RBI 2018-19*

Chart -2 depicts the Distribution of credit by NBFCs among various sector of the Economy and it is seen that the amount of credit disbursement is higher in Industry sector among other sectors

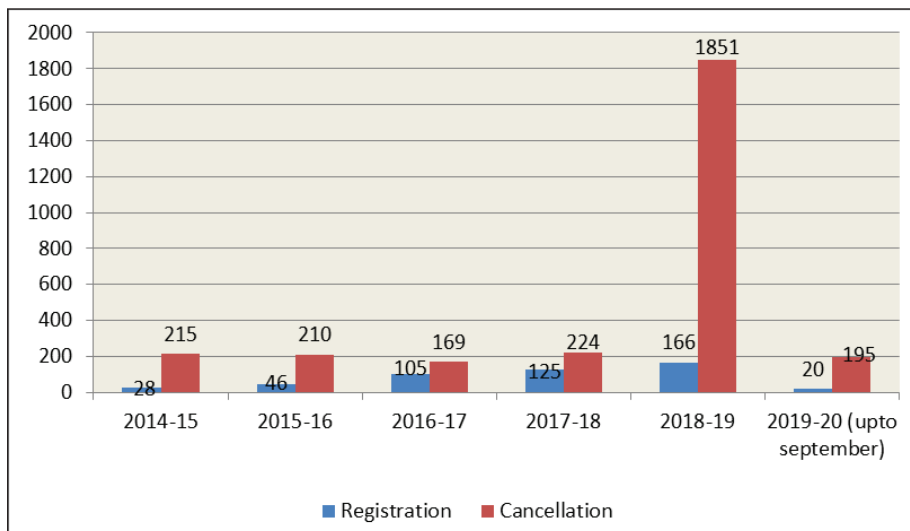
## **VIII. CHALLENGES FACED BY NBFCs IN INDIA**

Currently Small and medium sized NBFCs are most at risk due to the disruption caused by the Covid -19 outbreak. Large lenders will be able to tap RBI's Rs. 1 lakh crore targeted longer term financing operations window but others are likely to face a crunch. Some of the major challenges and issues are as follows:

### **Liquidity Crunch (NBFC Crisis)**

Amid severe Liquidity crunch and the aftermath of IL and FS crisis, the RBI cancelled registration of a huge no. of NBFCs as compared to the previous year's and the number of NBFCs are in decreasing trends as compared to the last 10 years. [Refer Chart 3]. Chart 3 – depicts the current position regarding the certificate of registration.

**Chart 3: Registration and Cancellation of Certificate of Registration of NBFCs**

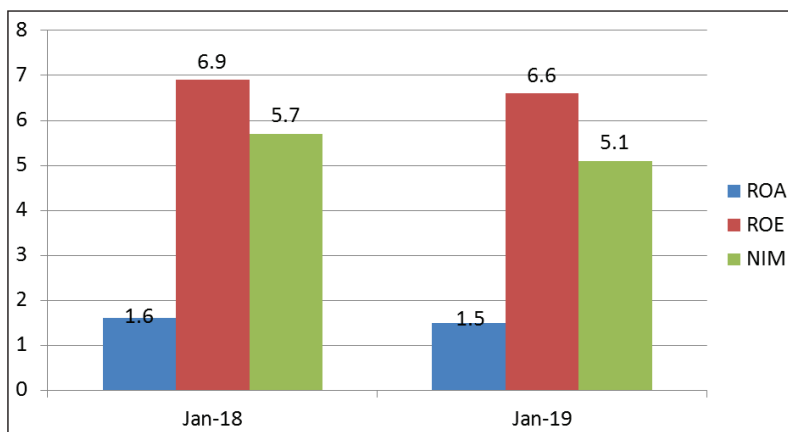


Source: Report on Trend and Progress of Banking in India, RBI 2018-19

### Reduction in Profitability Ratio

The Profitability indicators of NBFCs i.e. Return on Assets (ROA), Return on Equity (ROE), and net interest margin decreased in 2018-19 as compared to the 2017-18, as the regulation proposed tight prudential norms. Chart – 4 shows that there is a decreasing trend in profitability ratios.

**Chart 4: Probability Ratio of NBFC (at end March) (in %)**



ROA - Return on Assets, ROE - Return on Equity, NIM - Net interest margin.

Source: Report on Trend and Progress of Banking in India, RBI 2018-19

## **Funding Issue Due to the Absence of Refinancing Option**

After the asset classification norms are revised, something which still lacks is the recovery tool at par with banks. However, NBFCs today lack statutory recovery tool available.

**Deterioration of Asset quality-** There is deterioration in the quality of asset in 2018-19, while the gross performing assets (GNPAs) ratio increased, and net performing assets (NNPAs) ratio edge up marginally, reflecting sufficient provisioning.

## **Minimum Mandatory Credit Rating for Deposit Taking NBFC**

As per the revised regulatory framework, it is obligatory for NBFCs accepting Public deposit to get investment grade credit. In case the rating of any NBFC is downgraded to below the minimum investment grade rating, then it cannot accept public deposits. Further it must report the RBI regarding its position within 15 working days.

**Difficult Compliances for NBFC in India** -After incorporation of NBFC, there is a need to follow its compliances strictly. There are a number of NBFC compliances for different types of NBFCs which may have to file quarterly, half – yearly and annually. Furthermore, it becomes really difficult to figure out how and when to file the prescribed returns.

## **IX. CONCLUSION**

NBFCs have been playing a very significant role for the development of Indian economy and the structure of the Indian Financial system. They are the perfect or even better alternatives to the traditional banks for meeting a range of financial requirements of a business activity. They offer rapid and efficient services without going through complex formalities. Currently NBFCs have been kept outside the purview of SARFAESI Act and reform in this area is urgently needed. The SARFAESI Act empowers Bank/Financial Institutions to recover their Non- Performing Assets without intervention of the court. So, in order to survive and continuously grow, NBFCs have to focus on the core strengths while recovering their weakness. They need to be vibrant and constantly try to search for new products and services in order to carry on this competitive financial market

## **References**

- 1) Banking on Non-Banking Finance Companies. Retrieved from [http://www.pwc.in/assets/pdfs/publications/2015/babkingonnon-bankingfinance companies.Pdf](http://www.pwc.in/assets/pdfs/publications/2015/babkingonnon-bankingfinance%20companies.Pdf).

- 】 Bhole, L. M. (2007). *Financial Institution and Market*, New Delhi: Tata McGraw Hill, 3<sup>rd</sup> Edition, 242-311.
- 】 Goel, A. (2016). The Growth Prospectus of NBFC in India. *ELK Asia Pacific Journals*, Retrived from <https://www.elkjournals.com/microadmin/UploadFolder/3208GROWTH%20PROSPECTS%20OF%20NBFC%20IN%20INDIA.pdf>
- 】 Gupta, S. K. (2011). *Financial Institution and Market*, New Delhi: Kalyani Publication, 21-32.
- 】 Kaushal, H.R. (2016). Impact on Non-Banking Financial Companies (NBFCs) in Indian Economic Growth. *EPRA International Journal of Economic and Business Review*, 4(3), 90-95.
- 】 Pattankar, M. (2016). Performance of Non-Banking Housing Financial Companies terms of Profit and Growth in India. *International Journal of Creative Research Thoughts*, 4, 141-147.
- 】 Report on Trend and Progress of Banking in India 2014-15-by RBI. Retrieved from <https://rbidocs.org.in/>
- 】 Report on Trend and Progress of Banking in India 2015-16– by RBI. Retrieved from <https://rbidocs.org.in/>
- 】 Report on Trend and Progress of Banking in India 2016-17– by RBI. Retrieved from <https://rbidocs.org.in/>
- 】 Report on Trend and Progress of Banking in India 2017-18– by RBI. Retrieved from <https://rbidocs.org.in/>
- 】 Report on Trend and Progress of Banking in India 2018-19 – by RBI. Retrieved from <https://m.rbi.org.in/>
- 】 Singh, K.R (2014). Growth and Development of Non- banking Financial Companies in India. *Radix International Journal of Research in Social Science*, Retrieved from [www.researchgate.net](http://www.researchgate.net).
- 】 The Role of NBFCs in the Indian Economy – Nelito. Retrieved from [www.nelito.com/](http://www.nelito.com/)
- 】 Trend in Borrowings and Advances of NBFCs and HFCs – CARE’S Ratings. Retrieved from [www.careratings.com/](http://www.careratings.com/)

# Mergers in Banking Industry of India: Challenges and Prospects

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## ABSTRACT

**M**ergers and acquisitions are among the most extensively researched topics in finance. The corporate world is in a state of unrest, being influenced by the forces of globalization and fast technological changes and as a consequence firm across the world is facing intense competition. In recent times, banks in India are facing various challenges from downtrend of deposits growth, lower growth of credit disbursement, target to fulfill the financial inclusion and mounting of non-performing assets, rising of operational cost, the requirement of capital infusion by the government and many more. Besides, public sector banks are facing competition with private banks with their higher growth of business and way of providing services to their customers. The numerous mergers and acquisitions all over the world, including in India, in the banking sector, appear to be driven by the objective of leveraging the synergies arising from the process of merger and acquisition. The present study is an attempt to evaluate the recent mergers status in the banking sector and its growth. This study further enumerates the threats they can face from the different angles of operational, synchronize of products, integrating technology, cultural differences, etc. The researcher concludes that the mergers decision may due to the building of global-sized banks and the merger will also help in consolidating the strong national presence and global reach of these banks.

**Key words:** *Merger and Acquisition, Public Sector Banks, Anchor Bank, Amalgamating Bank.*

## **I. INTRODUCTION**

With the changing environment, many different strategies have been adopted by different sectors to remain efficient and to surge at the forefront in the global arena. To be more efficient in the changing environment, the banks in the public sector space need to be bigger to meet the credit needs of a growing economy, absorb shocks and have the capacity to raise resources without depending unduly on the exchequer. The idea of restructuring of Indian Banking system was first mooted in the first Narasimham Committee Report on the financial system in 1991. The idea behind this was to strengthen the banking system so that it could meet the forthcoming challenges emanating from banking reforms. On August 30, 2019, the Honorable Finance Minister announced the recent merger plan to consolidate ten state-owned lenders into four, accompanied by governance reforms, to create fewer and stronger global-sized lenders to support the economy.

After the implementation of reform measures, there have been large changes in the philosophy, perceptions, and functioning of commercial banks and banks are expected to manage the large inflows and outflows of financial resources. Therefore a strong banking system through a merger is required. Under such situations, it is necessary to study the impact of a merger on different profitability and efficiency parameters of the banks. The present study is an endeavor to study the recent merger scenario in the Indian Banking industry and further enumerates the various challenges during the merger period.

## **II. REVIEW OF LITERATURE**

Over the years, there has been considerable progress in mergers in Indian banks and the mergers have happened not only between the weak and the healthy banks but also, of late, between healthy and well-functioning banks as well. The previous literatures collected on recent studies have been summarized below:

Studies conducted in the context of potential gains from the merger. In line with that Badreldin & Kalhoefer (2009) have examined the performance of Egyptian banks which have undergone mergers and acquisitions (M & A) by calculating return on equity of 2004-07. The investigation shows that mergers do not have a clear effect on the profitability of banks in Egyptian. In a study by Deo & Shah (2012) have examined the short-term market response to merger announcements in the Indian banking and information technology industry. Findings show that shareholders of the bidding firms would incur a loss on merger announcements. In another study, Sinha & Jain (2015) have

measured the potential gains from the merger of State Bank of India (SBI) with its associates. Further, Maity & Sahu (2017) have mentioned that before mergers took place most of the associate banks of SBI operated at an efficient level and mergers will help to decrease unhealthy competition between SBI and its associate banks, mitigate the risk and better focus on the defaulter.

In line with that, Kumar (2013) has concluded that after the merger between Bharat Overseas Bank with Indian Overseas Bank there is an improvement in all the efficiency parameters (like profit per employee, business per employee, investment and advances, interest income, return on assets, non-performing assets, etc.) of the banks. According to Ganguly & Maity (2011), the primary objective behind M & A in the banking sector is to attain growth at the strategic level in terms of size and customer base. This, in turn, increases the credit-creation capacity of the merged banks tremendously. Further, Kaur & Kaur (2010) in their study indicate that mergers led to a higher level of cost efficiencies for the merging banks. The previous studies show that operational synergy, reduce business risk and development of market share are the indicators of M & A (Kemal, 2011; Ombaka & Jagongo, 2018). So the present study has much importance in the Indian Banking market.

### **III. OBJECTIVES OF THE STUDY**

The following objectives have been framed to accomplish the aim of the present study:

- To study the recent merger of public sector banks in India.
- To observe the various challenges and opportunities of the proposed merger.

### **IV. DATA AND METHODOLOGY**

The present study is conclusive and descriptive. The study was conducted from the data of secondary sources. The data is collected from Database on the Indian Economy, Reserve Bank of India (RBI) and further from the website of the respective banks wherever is necessary. Data also collected from the newspapers of the Economic Times, Times of India, The Telegraph, etc. The study considers all the eighteen Public Sector Banks (PSBs) after the merger of Dena Bank and Vijaya Bank with Bank of Baroda (BOB) and the merger of all associates and Bharatiya Mahila Banks (BMB) with SBI. The data of various parameters are presented in tabular form.



## V. DISCUSSIONS AND FINDINGS

There is no doubt that Indian banks will need to scale up in terms of size if they have to compete globally. Through mergers, one bank can adopt another and quickly grow in the domestic and global financial markets. This part of the study presents the current merger situation of ten PSBs.

Since 1961 to till date, there have been as many as 87 bank mergers, of which 46 mergers took place before nationalization of banks, 13 mergers took place mostly between PSBs and Private Sector Banks (PVBs) cases during nationalization phase (1969-1992) and remaining 28 occurred in the post-reform period. (Table 1).

**Table 1: Bank Mergers in India from 1961 to 2017**

Period	Number
Pre-nationalization of banks (1961-1968)	46
Nationalization period (1969-1992)	13
Post-reform period (1993-2017):	
Forced Mergers	15
Voluntary Mergers	10
Convergence of Financial Institutions into Banks	2
Other Regulatory Compulsions	<u>1</u>
Total number of mergers	87

*Source: Compiled by Author's from various publications of RBI*

### Recent Merger of Public Sector Banks in India

The merger of banks began in India in the 1960s to bail out the weaker banks and to protect the customers' interest. But the proposed four mergers decisions are taken by the regulator and government in a situation when PSBs are facing various challenges. As per the plan, United Bank of India (UNI) and Oriental Bank of Commerce (OBC) are to be merged with Punjab National Bank (PNB), Syndicate Bank is to be merged with Canara Bank, while Allahabad Bank will be merged with Indian Bank. Andhra Bank and Corporation Bank will amalgamate with the Union Bank of India (UBI). With this merger announcement, the total number of PSBs will come down to twelve. Earlier this year, BOB merged Vijaya Bank and Dena Bank with itself and SBI merge its five associates and BMB with itself effective from April 2017. Before 2017, when the government rolled out a bank-merger plan, the number of PSBs was twenty-seven.

**Table 2: Position of the Amalgamated Banks (March 2019)**

Bank	Total Business (₹ In billion)	Gross Advances (₹ In billion)	Deposits (₹ In billion)	Branches (domestic)	ATMs Network	Employees	Gross NPAs (₹ In billion)	Net NPAs (₹ In billion)
Punjab National Bank	11,342	4,582	6,760	6,579	9,255	70,810	785	300
Oriental Bank of Commerce	4,041	1,715	2,326	2,374	2,625	21,729	217	94
United Bank of India	2,081	731	1,350	2,007	2,017	14,296	121	58
Amalgamated Bank	17,464	7,028	10,436	10,960	13,897	1,06,835	1,122	453
Canara Bank	10,432	4,442	5,990	6,311	8,851	58,350	392	230
Syndicate Bank	4,770	2,171	2,599	4,044	4,509	31,535	247	126
Amalgamated Bank	15,202	6,613	8,589	10,355	13,360	89,885	639	356
Indian Bank	4,300	1,879	2,421	2,825	3,892	19,604	134	68
Allahabad Bank	3,779	1,636	2,143	3,229	836	23,210	287	74
Amalgamated Bank	8,079	3,515	4,564	6,054	4,728	42,814	421	142
Union Bank of India	7,413	3,254	4,159	4,288	6,650	37,262	487	203
Andhra Bank	3,985	1,787	2,198	2,881	3,798	20,346	290	91
Corporation Bank	3,196	1,350	1,846	2,449	3,015	17,776	207	69
Amalgamated Bank	14,594	6,391	8,203	9,618	13,463	75,384	984	364

Source: Compiled by Author's from the Banks' Annual Reports 2018-19

Table 2 depicts the post-merger position of the four amalgamated banks in respect of the total business, gross advances, deposits, number of branches, number of automated teller machines (ATMs), number of employees, gross non-performing assets (NPAs) and net NPAs. The data presented in the table shows that during post mergers there is a huge jump of business size (both deposits and gross advance) of the amalgamated banks.

Table 3 also presents the various ratios like CASA ratio, Common equity tier 1 (CET-I) ratio, net NPAs ratio, Capital to Risk Assets Ratio (CRAR) to check the position of the new entity.

**Table 3: Ratios (in per cent) of the Amalgamated Banks (March 2019)**

Bank	CASA Ratio	CET-I Ratio	CRAR Ratio	Net NPA Ratio
Punjab National Bank	42.16	6.21	9.73	6.55
Oriental Bank of Commerce	29.40	9.86	12.73	5.93
United Bank of India	51.45	10.14	13.00	8.67
Amalgamated Bank	40.52	7.46	10.77	6.61
Canara Bank	29.18	8.31	11.90	5.37
Syndicate Bank	32.58	9.31	14.23	6.16
Amalgamated Bank	30.21	8.62	12.63	5.62
Indian Bank	34.71	10.96	13.21	3.75
Allahabad Bank	49.49	9.65	12.51	5.22
Amalgamated Bank	41.65	10.36	12.89	4.39
Union Bank of India	36.10	8.02	11.78	6.85
Andhra Bank	31.39	8.43	13.69	5.73
Corporation Bank	31.59	10.39	12.30	5.71
Amalgamated Bank	33.82	8.63	12.39	6.30

*Source: Compiled by Author's from the Banks' Annual Reports 2018-19*

**Table 4: List of Twelve Survive PSBs after Proposed Mergers**

Srl.	Bank	Total Business (₹ Lakh Crore)	Share (%)
1	SBI	52.05	35.01
2	PNB+OBC+UNI	17.94	12.07
3	Bank of Baroda (including Vijaya and Dena Bank)	16.13	10.85
4	Canara+Syndicate	15.20	10.22
5	UBI+Andhra+Corporation	14.59	9.82
6	Bank of India (BOI)	9.03	6.08

7	Indian Bank+Allahabad	8.08	5.43
8	Central Bank of India (CBI)	4.68	3.15
9	Indian Overseas Bank (IOB)	3.75	2.52
10	UCO Bank	3.17	2.13
11	Bank of Maharashtra (BOM)	2.34	1.57
12	Punjab & Sindh Bank (P&S Bank)	1.71	1.15
	Total	148.67	100.00

*Source: Compiled by Author's from the Banks' Annual Reports 2018-19*

Further, Table 4 presents the lists of twelve survive PSBs after the recent mergers with their business size and share of business size. In the list, it shows that CBI, IOB, UCO Bank, BOM, and P&S Bank together hold 10.52 percent of businesses of PSBs, whereas SBI alone holds 35.01 percent of PSBs businesses. So, in future government may have the plan to merge these five banks into a single entity when the number of PSBs will reduce to eight only, as the objective of the government is trying to create big next-generation banks. Further, the intention is not just to give capital but also to give good governance. In this circumstance, all of us have to wait and watch their business growth, growth of NPAs level, financial performance, the requirement of capital infusion and their efficiency level, etc.

To be globally competitive, they should be bigger and stronger. Large financial institutions have the ability to whether economic shocks and benefits of scale help them to provide banking services at a relatively lower cost.

### **Challenges of the Proposed Mergers**

**Technology Integration** – The process of technology integration between the merger banks would take a long time which may 2 to 3 years' time. Website, mobile apps, IVR – all have to get merged into one and to complete these merged processes the backend integration is so huge. Different banks use different software packages for core banking. The government has taken these decisions to merge these efficient and inefficient banks that are using the same technology to integrate and synchronize of products smoothly (Table 5). However, OBC and UNI use Finacle-7 while PNB uses Finacle-10. So, OBC and UNI need to upgrade their software solutions to have a seamless integration. Further, while these would get merged cyber security becomes an important matter.

**Table 5: Core Banking System**

Anchor Bank	Amalgamating Bank	Core Banking System
Punjab National Bank	Oriental Bank of Commerce	Finacle
	United Bank of India	
Canara Bank	Syndicate Bank	iFlex
Indian Bank	Allahabad Bank	BaNCS
Union Bank of India	Andhra Bank	Finacle
	Corporation Bank	

*Source: Ministry of Finance*

**Synchronize of Products** – In the case of common core banking software, the task may be easier for integration but it is not so easy, as there is a difference in respect of financial products among the merged group. So synchronize of financial products is essential during integration.

When the bank merger takes place, how does it impact an existing borrower is also a big question. The loan rates may change as there may be a change in the Marginal cost of funds-based Lending Rate (MCLR), the composition of deposits and the cost of funds of the combined merged entity.

**Mounting of Bad Loans** – In recent years, banks are facing distressing signals on durability and sustainability due to an increase in NPAs. The overall picture of NPA management is not satisfactory (Maity & Sahu, 2019). A key reason for proposed mergers is due to the mounting of bad loans or NPA over the years. Gross NPAs of SCBs stood at ₹ 73,954.1 billion in March 2019. The worst-hit could be Indian Bank, as Allahabad Bank which will be merged into the former, has net NPAs exceeding the net worth.

**Deterioration of Asset Liability Management (ALM)** – Banks with higher funding gaps are going to amalgamated into anchor banks, resulting in deterioration of the ALM. According to India Rating Analyst the three mergers of PNB, Canara Bank and UNI could have a detrimental effect on the acquiring banks due to the gap between the advances (inflows) and deposits (outflows) of these banks just like the previous merger of BOB acquiring Dena Bank and Vijaya bank.

**Harmonizing Human Resources** – Harmonizing human resource issues will be another key aspect of these mergers, as seen in the past. Asymmetrical entities coming together, so there are bound to be some challenges.

**Restructuring and Retrenchment** – Merger all over the world involve restructuring and retrenchment. Even so, bank trade unions are trying to fight the merger tooth and nail. One of their grievances is the retrenchment and transfer of bank employees.

**Short-term Cost** – The merger will have costs in the short term, IT integration, fair valuation of loans, and loss of business during the integration phase. Indian banks and financial institutions invested around \$ 19.1 billion in 2017 on IT, which includes money spent on upgrading existing infrastructure, according to a November 2017 Gartner report.

**Customer Service** – Essentially, retail customers of the amalgamating banks are likely to get directly affected due to change of account number, customer IDs, MICR code, IFSC code, etc. whereas customers of the anchor bank are not likely to face much change.

### **Opportunities of the Proposed Mergers**

The study reveals that the regulators have considered the mergers proposal in respect of the same technology platform (Table 5). This will help them to technology integration and synchronize of products smoothly.

During integration, the lenders will generate huge amounts of data and analytics will play a bigger role to create 360<sup>0</sup> user profiles, taking data from multiple banks. With the repository of such trusted data available, banks and other lenders will be able to take better credit decisions.

Having a presence in the same geography, the merger will lead to a sharp reduction in costs due to the overlapping of branches and services. In the previous merger of Dena Bank and Vijaya Bank with BOB estimated to save of ₹ 95 billion through cost rationalization and revenue synergies in the next five years. The merged entity identified 537 branches out of which 192 will be relocated and 345 will be merged.

Customers will get access to a large number of branches and ATMs due to the combined entity.

The integration of HR to form a wider talent pool holds the promise of strong growth for the bank and greater exposure and better career prospects for the employees.

## **VI. CONCLUSION AND RECOMMENDATIONS**

The merger of banks is indeed a very strong approach to the fast growth of the country. Through a merger of banks a larger bank will be created which

will have the capability to face the global competition, risk management, etc. Explaining the rationale behind these mergers, the Honorable Finance Minister said that these decisions were taken to make them “global-sized banks” and the merger will also help in consolidating strong national presence and global reach of these banks. The present study observes the recent merger situation of PSBs operating in India.

The study observes that the proposed mergers will help the amalgamated bank to strengthen from an enhancement of deposit and credit volume and further improve and enhance the technology-based banking. The benefits are expected to flow from the rationalization of costs in the long run, as the government has selected merger partners based on their IT compatibilities instead of geographical reach. BOB, Dena Bank, and Vijaya Bank were using Finacle IT which was an important reason for the government’s decision to merge them. The merged entity may follow the structure of SBI with local head offices in every region to leverage the strengths of each merger candidate. The backend integration is so huge, which has been seen in the amalgamation process of SBI and its associates in the previous merger. Consider the cost of keeping PSBs from being sunk by their enormous NPAs. Over the past five years, PSBs have received ₹ 2.5 lakh crore from the government for recapitalization. These banks have formed twenty-three committees covering every aspect of the merger, such as IT, HR, and product offerings, to ensure the success of the exercise. All these exercises to be finalized as soon as possible so that the merged entities can focus on business from the very beginning. The countrywide lockdown in 2020 due to Covid-19 also has major impacts on all the sectors including the banking sector which may impact the Indian as well as the global economy. So, will the merged PSBs be the building blocks for the sought after \$ 5 trillion economies? With the current economic conditions, one needs to wait and watch for accrual benefits accruing.

## References

- 1) Badreldin, A., & Kalhoefer, C. (2009). The Effect of Mergers and Acquisitions on Bank Performance in Egypt. Working Paper No. 18, Egypt, The German University in Cairo, Retrieved on 07.09.2019 from <https://core.ac.uk/download/pdf/6296902.pdf>
- 2) Deo, M., & Shah, A. (2012). Testing Hubris Hypothesis of Mergers and Acquisitions: Evidence from India. *Business and Management Quarterly Review*, 3(2). Retrieved on 15.09.2019 from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2156134](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2156134)
- 3) Ganguly, D., & Maity, S. (2011). Business Valuation in Mergers and Acquisitions. *The Management Accountant*, 46(12), 1123-1126.

- 】 Kaur, P., & Kaur, G. (2010). Impact of Mergers on the Cost Efficiency of Indian Commercial Banks. *Eurasian Journal of Business and Economics*, 3(5), 27-50.
- 】 Kemal, M. (2011). Post Merger Financial Performance: A Case of Royal Bank of Scotland. *International Journal of Business and Social Science*, 2(5), 157-162.
- 】 Kumar, S. (2013). Impact of Bank Mergers on the Efficiency of Banks: A Study of Merger of Bharat Overseas Bank with Indian Overseas Bank. *International Journal of Academic Research in Business and Social Sciences*, 3(12), 221-242.
- 】 Maity, S., & Sahu, T. N. (2017). Pre-Merger Performance Measures of State Bank of India and Its Associate Banks Using Data Envelopment Analysis. *Business Spectrum*, 7(2), 16-26.
- 】 Maity, S., & Sahu, T. N. (2019). Is the efficiency of banks degenerating due to the mounting of non-performing assets? An empirical investigation using DEA. *Malaysian Management Journal*, 23(December), 27-32.
- 】 Ombaka, C., & Jagongo, A. (2018). Mergers and Acquisitions on Financial Performance among Selected Commercial Banks, Kenya. *International Academic Journal of Economics and Finance (IAJEF)*, 3(1), 1-23.
- 】 Sinha, R. P., & Jain, M. K. (2015). Potential Gains from Merger: A Study on SBI and Its Associates. *The IUP Journal of Bank Management*, 14(2), 57-60.



# Implementation of IFRS as Indian Accounting Standard

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## ABSTRACT

One of the main requirements to operate a business successfully is to have good financial reporting system. Keeping this in mind, International Financial Reporting Standards (IFRS) are issued by the International Accounting Standards Board (IASB). IASB came out with IFRS which are adopted formally by the members of European Union in 2005. In subsequent year, many countries either adopted IFRS or converged to IFRS. Our country, India, too decided to converge to IFRS. This study tries to analyze the process of convergence of IFRS in India. This paper also presents a literature about the benefits of adoption of IFRS, Challenges of implementation and the roadmap of adoption of IFRS in India

**Key words:** *IFRS, IASB, Convergence of IFRS, IndAS.*

## I. INTRODUCTION

Accounting provides the companies, investors, regulators and others with a standardized way to describe the financial performance of the entities. The accounting standards present a set of rules to abide by when preparing an entity's accounts, ensuring the standardization across the market. Due to globalization of business, it becomes very much important to speak about the business in a global language.

International Financial Reporting Standards (IFRS) are set by International Accounting Standards Board (IASB), which was established in 2001. IFRS are the standards, interpretations and framework for the preparation and presentation of financial statement. More than 144 countries around the world

have adopted IFRS, which aims to establish a common global language for accounting affairs.

**IFRS and IndAS:** India has chosen the path of IFRS conversion and not adoption. Therefore, there are some differences between IFRS and IndAS. Some of those are stated below:

- Under IndAS, only one statement comprising both profit and loss and other comprehensive income will be presented. In case of IFRS, there is no option to present other comprehensive income under a separate statement.
- IndAS allows presentation of expenses by nature only. Presentation of expenses by function is not allowed. Under IFRS, it is policy election.
- Under IndAS, earning per share (EPS) required to be presented for both standalone and consolidated financial statements. Under IFRS, earning per share is not required in separate financial statement if both separate and consolidated financial statements are presented.
- Under IndAS, the bargain purchase gain on business combination is to be recognized either in other comprehensive action or capital reserve but not profit and loss. Under IFRS, the same is recognized in profit and loss.
- Under IndAS, investment property is to be accounted using only cost model with fair value disclosure. Under IFRS, both cost and fair value options of accounting are available.

## II. LITERATURE REVIEW

Ananda Paul and Eddy Burk (2009), “Preparing for International Financial Reporting Standards” stated that the accounting profession is on the precipice of one of the biggest changes to face it since 1930s. In the very near future, there is a strong possibility that United States Generally Accepted Accounting Principles (GAAP), as it is known today, will cease to exist. In its place will be a global standard encompassed by the International Financial Reporting Standards (IFRS).

Chand and White (2007), in their paper “Convergence of Domestic Accounting Standards and IFRS”, demonstrated that the influence of multinational enterprises and large international accounting firms can lead to transfer of economic resources in their favor.

Ray (2012), investigated the effect of voluntary adoption of IFRS. The

study discovered that there were fewer variations in the net income positions disclosed by financial statement of Wipro Ltd under IFRS reporting and Indian GAAP.

Kapoor and Ruhela (2013), studied problems regarding IFRS implementation in India and discovered that lack of proper training and guidance programs were two major problems in implementation of IFRS.

Nagale and Bapat (2013), studied the effects of transition of IFRS on the equity and net profit reported under IFRS and Indian GAAP.

### III. OBJECTIVES OF THE STUDY

The objectives of the study can be listed as below:

- To discuss the IFRS adoption procedure in India.
- To study the IFRS and Indian Accounting Standard (IndAS)
- To evaluate the benefits and challenge of IFRS.

### IV. RESEARCH METHODOLOGY

The study is primarily descriptive in nature and does not use any quantitative tools to analyze data. It has been conducted mainly on the basis of literature survey and secondary information. The use of data and information are based on secondary sources are collected through various websites, journals, as well as published book.

### V. IFRS ADOPTION PROCEDURE IN INDIA

To rationalize accounting practices in the country, the Indian Government in 1949, established Institute of Chartered Accountants of India by passing ICAI Act, 1949. Accounting Standard Board was constituted by ICAI in 1977 in order to create harmony among the diversified accounting policies and practices in India. Three steps process was laid down by the accounting professionals in India which are as follows:

**IFRS impact assessment:** In this step the firm will assess the impact of IFRS adoption on accounting and reporting issues, on procedures and systems, and on core business entities. The firm will find the key conversion dates according to IFRS training plan has laid down.

**Preparations of IFRS implementation:** This process carry out such activities required for IFRS implementation process. Then the firm will reform the internal reporting systems and processes. IFRS first deals with the adoption and implementation of first time adoption.

**Implementation:** The final step of the process which deals with the actual implementation of IFRS. The initial phase of this step is to prepare an opening balance sheet at the date of transition to IFRS. To understand the actual impact of the transition from the Indian Accounting Standards to IFRS is to be developed.

## VI. ROADMAP OF IFRS IN INDIA

**Voluntary adoption:** Companies can voluntarily adopt IndAS for accounting periods beginning on or after 1<sup>st</sup> April, 2015 with comparative for period ending 31<sup>st</sup> March, 2015 or thereafter. However, once they have chosen this path, they cannot switch back.

### **Mandatory adoption:**

**Phase – I:** IndAS will be mandatorily applicable to the following companies for periods beginning on or after 1<sup>st</sup> April, 2016 with comparative for the period ending 31<sup>st</sup> March, 2016 or thereafter:

Companies whose equity and debt securities are listed or are in the process of listing on any stock exchange in India or outside India stock having net worth of Rs.500 crore or more.

Companies having net worth of Rs.500 crore or more other than those covered above.

Holding, subsidiary, joint venture or associate companies of companies covered above.

**Phase – II:** IndAS will be mandatorily applicable to the following companies for provides beginning on or after 1<sup>st</sup> April, 2017 with comparatives for the period ending 31<sup>st</sup> March, 2017.

Companies whose equity and debt securities are listed or are in the process of listing on any stock exchange in India or outside India and having net worth of less than Rs.500 crore.

Unlisted companies other than those covered in Phase I and Phase II whose net worth are more than Rs.250 crore but less than Rs.500 crore.

Holding, subsidiary, joint venture or associate companies of companies covered above.

## VII. BENEFITS OF IFRS IN INDIA

- Since the last two decade, India has emerged as a strong economy on world's map. Indian companies are not only establishing the plants

abroad but also acquiring other firm across the world so they need fund at small cost which is available other markets.

- The presences of International Financial Reporting Standards around the world wide allow organization to cut down on the amount of time they spend on preparing financial statements.
- Using a philosophy that is based on principles, instead of rules, this set of standards will have the goal of arriving at a reasonable valuation with various way to accomplish tasks. This would give business the freedom to adopt IFRS to their specific situations which will result in financial statements that are more easily read and useful.
- Large companies of the country like TATA, RELIANCE, AMBANI and ADANI have companies registered in India as well as abroad. These companies registered in India and prepare financial statements as per Indian Accounting Standards. But adoption of IFRS ensures to solve this reporting standards difficulty of multiple financial reporting standards.

### **VIII. CHALLENGES OF IFRS IN INDIA**

- Adoption of IFRS means that the entire set of financial statements will be required to undergo a drastic change. The differences are wide and very deep. It would be a challenge to bring about awareness of IFRS among the users of financial statements.
- Lack of training and academic knowledge in IFRS is a challenge as far as Indian economy concerned. There is a need to impart education and training on IFRS and its applications.
- IFRS uses fair value base to measure majority of items in financial statements. The use of fair value accounting can bring a lot of volatility and subjectivity in financial statements.
- International expertise shows that companies would be required proper preparation time to plan a fair transition and to communicate the effect of transition to all stakeholders.

### **IX. CONCLUSION**

IFRS has become the financial reporting standard for a significant amount of countries around the world. However, out of all countries, only a particular handful actually fully adopts IFRS as issued by IASB. India has several constraints and practical challenges to adoption and compliance with IFRS.

Finally, the paper concludes that the benefits for IFRS convergence are real but not automatic in other hand challenges in the way of adoption and convergence cannot be ignored thus the recommendation to all the stakeholders that they must participate actively for a successful move.

## References

- 】 Chand, P. & White, M. (2007). Adopting International Financial Reporting Standards for Small and Medium-Sized Enterprises. *Australian Accounting Review*, 25(2), 139 -154.
- 】 Kapoor, B. & Ruhela, J. (2013). IFRS Implementation Issues and Challenges for India. *International Journal of Business and Management Research*, 3(2), 103-106.
- 】 Paul, A. & Burks, E. (2010). Preparing for International Financial Reporting Standards. *Journal of Finance and Accountancy*, 4, 1.
- 】 Rawat D. S. (2016). *Student Guide to Accounting Standards*, New Delhi: Taxmann Publication Pvt Ltd.
- 】 Ray, B. (2012). International Financial Reporting Standard (IFRS): Pros and Cons for Investors. *Accounting and Business Research*, 36(1), 5-27.

# SWIFTNet and Correspondent Banking: An Introductory Analysis to the Use of ICT by the International Financial System

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## ABSTRACT

**I**nternational transfer of money takes place at lightning speed due to the Information and Communication Technology (ICT). A complex decentralised correspondent banking system operating in conjunction with a private world-wide computer network called SWIFTNet, owned and operated by SWIFT, is responsible for the safe and reliable transfer of money internationally. Correspondent bank system originated many centuries ago. However, it has evolved over the centuries, to meet the needs of the modern international financial system. SWIFTNet, which is a communication network, is of recent origin. But it has within four decades of its existence, emerged as the backbone of the international financial system.

**Keywords:** *SWIFTNet, Correspondent Banking, Information and Communication Technology (ICT), Electronic Fund Transfer (EFT).*

## I. INTRODUCTION

Today's world is a highly globalised one. There is an ever-increasing desire for movement of people and goods across international borders. To facilitate this movement, there must also be a corresponding movement of money and other financial resources. The money must move swiftly and there must also

be reliability and confidentiality to this movement. While doing so, it must successfully cross the barriers created by different legal systems, different languages and different currencies. The advances in the field of Information and Communication Technology (ICT) has enabled such a movement of money across international borders feasible. The money is transferred from a banking/ financial institution in one country to another such institution in another country by using a complex system based on correspondent banking. The information necessary to accomplish this transfer is send across a private computer network called SWIFTNet owned and operated by an institution called SWIFT (Society for Worldwide Interbank Financial Telecommunications). SWIFT ensures the availability, confidentiality and integrity of the messages send across its network by one participant institution to another participant institution (SWIFT, 2016).

Today, the International financial system extensively uses the correspondent banking system and SWIFTNet for accomplishing international movement of money. Both the correspondent banking system and SWIFTNet have undergone separate historical development processes. This chapter seeks to analyse these development processes. The initial parts of this chapter would briefly explain, the historical growth and role of correspondent banks in the international financial system. The subsequent parts of this chapter would analyse the evolution of SWIFT and its role in the international financial system.

## **II. REVIEW OF LITERATURE AND RESEARCH METHODOLOGY**

There are a number of published works dealing with the use of ICT in the international financial system. Most of these works also deals with SWIFT networks. For example, Batiz-Lazo & Wood (2002), Chorafas & Steinmann (1988) and Colton & Kraemer (1980) extensively studies the evolution of the use of Information Technology in the banking and financial sector. Similarly, Rambure & Nacamuli,(2008) and Turner & Wunnicke (2003) analyses the use of ICT in international banking system in the context of payment systems. Scott & Zachariadis (2014) on the other hand, exclusively studies the origin, growth and working of SWIFT networks. Similarly, there is no dearth of published works on the topic of corresponding banking system. Most of these works are published by official international bodies like World Bank, European Central Bank, IMF, etc. For example, IMF (2017) and BIS (2016) extensively analyses the concept of correspondent banking among other things. However, there are very few published works that analyses the evolution and role of both correspondent banking system and SWIFTNet as complementary to each



other in the context of the international financial system's use of information technology. This chapter tries to fill the above said research gap.

This chapter is primarily a theoretical work, which relies on information available in published articles, books and working papers. A significant amount of information used in the preparation of this chapter has been obtained from the published works of official agencies like World Bank, SWIFT, European Central Bank, etc. The objective of this chapter is to primarily understand the concepts of correspondent banking and SWIFTNet and trace their historical evolution.

### **III. CORRESPONDENT BANKING**

Correspondent banking can be defined as an arrangement/agreement under which a bank (called correspondent bank) holds deposits owned by other banks, (called the respondent banks) and provides payment and other services to those respondent banks (Bank for International Settlements, 2016). These arrangements/agreements are contractual relationships between banks to provide payment and other services to each other (European Central Bank, 2014). Thus simply put, correspondent banking is the provision of banking service by one bank to another bank (World Bank, 2018),(World Bank , 2015).

However, it must be remembered that in today's globalised world, correspondent banking services is not limited to banks alone, but are available to individuals, legal entities and other financial institutions. The general characteristic feature of a Correspondent Bank Relationship (CBR) is its on-going and repetitive nature. A CBR does not exist in the context of one-time/one-off transactions. CBR involves an agency relationship and the correspondent bank acts as an agent of the respondent customer in respect of the transactions covered by the agreement. In view of such a wide dimension of modern day corresponding banking, it can be more comprehensively defined as the 'provision of a current or other liability account and other related services, to another financial institution, including affiliations, used for the execution of third party payments and trade finance, as well as its own cash clearing, liquidity management and short term borrowing or investment needs in a particular currency'(The Wolfberg Group, 2014).

The correspondent banking system was evolved many centuries ago for the purpose of facilitating long distance trade. This highly decentralised system of payment enabled banks located in distant locations to pay funds and receive funds from one another. This system gave small local banks access to clearing facilities that would have otherwise not been available to them due to long

distances and lack of branches (Norman, Shaw , & Speight, 2011).

Over the centuries, the corresponding banking system gradually evolved and it has become the most important mechanism for making long distance payments. The correspondent banking system was used by banks for making both domestic and international payments. However, in the last quarter of the 20<sup>th</sup> century, electronic payment systems emerged and the decentralised domestic correspondent banking system was replaced by a centralised domestic payment system controlled by the central bank of the particular country (Dorry & Robinson, 2018). Such a centralised system was advantageous for domestic banks as the need to pay commission fee to correspondent banks was eliminated and hence there was cost saving. Also, the liquidity requirements of the banks got reduced (Rambure & Nacamuli, 2008).

However, such a centralised payment system was not possible at the international level as payments had to travel across different national borders, legal systems and currencies. The centralised payment system of a particular country could only be accessed by the banks which had a banking license in that country. Hence, foreign banks cannot directly access a national payment system, unless it obtains a banking license. However, in actual practice, foreign banks indirectly access national payment systems, without license, through correspondent banks. The foreign bank will enter into a bilateral correspondent bank agreement with a local/national bank which has a national banking license. Through this correspondent bank, the foreign bank can access the payment system of the concerned country (Scott & Zachariadis, 2010). A foreign bank will have to establish separate correspondent bank relationships with national banks of each and every country, whose payment system it wishes to access. Only large banks can afford to enter into such numerous cross border correspondent bank relationships. Consequently, small banks in a country rely on larger banks in the same country to carry out international transactions. For the purpose of carrying out international transactions, small banks enter into correspondent bank agreement with large national banks within their own country. This has resulted in the proliferation of bilateral correspondent banking agreements across the national and international banking industry. There are at present more than 1.3 million such agreements in the banking industry (Zscheschang, 2018).

#### **IV. SWIFTNET**

In order to transfer money from one bank/institution to another bank/institution, using correspondent banking relationship or otherwise, information regarding the transaction must be sent from the sending bank to the receiving

bank/correspondent bank. The information regarding the amount to be transferred, the details about the customer desiring the transfer, etc. must be safely transmitted from the sending bank to the receiving bank or the correspondent bank as the case may be. Only, if all necessary details of the transactions are properly transmitted can those transactions be completed.

In today's modern-day banking which is based on ICT, this information is sent electronically. There is no actual physical transfer of money. Based on the electronic information received from the sending bank, the receiving bank or the correspondent bank makes the payment and adjusts that amount to the account maintained by the sending bank in the receiving bank or the correspondent bank as the case may be. Such accounts are called 'Nostro' accounts (Rambure & Nacamuli, 2008). The transfer of funds using the information received electronically is called Electronic Fund Transfer (EFT) (Niblack, 1976), (Ambrosia, 1980).

In case of domestic banking, the EFT done by banks is managed by the central bank of the concerned country and information is sent electronically through the networks managed by the said central bank. However, in case of international banking, the payment system is decentralized as the payments are made through correspondent banks. Also, the system is complex, because the transactions are usually carried out in different currencies having varying exchange rates (Dorry & Robinson, 2018). For such a complex system to work efficiently there must be a robust mechanism to reliably transport accurate information about the transaction from the sending bank to the receiving bank through the correspondent bank. This function of transporting information is done by SWIFT, through the communication network called SWIFTNet which is owned and operated by it. (SWIFT, 2016), (Scott & Zachariadis, 2014)

## **V. EVOLUTION OF SWIFT AND SWIFTNet**

For international fund transfer to take place, the essential information regarding the money to be transferred must be communicated from the sending bank to the receiving bank/correspondent bank. Prior to the advent of modern means of communication, this information was sent through the postal department (Karl, 1983). Subsequently, when modern means of telecommunication emerged, postal mail was replaced by telex (abbreviation of **teleprinter exchange**). Telex is a communication system that allows users of the system to send written messages to one another using teleprinters. The teleprinters establish connection with one another through an exchange based switching network that relies on the public telephone/telegraphic network for

interconnection (Huurdean, 2003)(Carre, 1993). This enhanced the speed of international money transfer by many folds, but it had many limitations. Some of those limitations are:

1. As the number of transactions increased, the international telex system got congested. The maximum speed of telex was only 8 bytes/second (Scott & Zachariadis, 2014).
2. Telex messages were sent through the public telegraph/telephone network. Consequently, the security of the data transmitted could not be guaranteed (Scott & Zachariadis, 2014).
3. There was no standard format of the telex message. A sending bank would include any information it thought was necessary to perform the fund transfer. Due to lack of standardisation, it was not possible to have an automatic messaging system and data had to be manually processed to complete the transaction. Manual processing made the system error prone (Scott & Zachariadis, 2014),(Karl, 1983).
4. Since the messages sent through the telex system were manually processed, the operation of the messaging system was slow. Also, tedious manual checking was required to verify whether there was any error in the data being sent (Karl, 1983).

These limitations of the telex-based messaging services prompted banks in the early 1970s to explore other options. It was at this time that computers and computer networks were becoming popular. Consequently, attempts were made to create a private computer network owned by banks for the purpose of transmitting information relating to international fund transfer (Scott & Zachariadis, 2014). In 1973, the first major effort in this direction was made by the US based Citibank (then known as the First National City Bank of New York (FNCB)). It developed a proprietary messaging standard called MARTI (Machine Readable Telegraphic Input) (Rambure & Nacamuli, 2008). By mid-1974, MARTI based private network became operational. Citibank and other banks supporting it, tried to impose their proprietary standard on others and even fixed a deadline for its implementation by other banks (Scott & Zachariadis, 2014).

The development of MARTI by Citibank, has caused worry for other banks, particularly European banks. A consortium of European banks supported by some American banks had in 1970 established the 'Banks International Message Switching Project' (MSP) to examine the feasibility of a private international communication network for the transmission of international payment

and related messages between participating banks (Scott & Zachariadis, 2014). When Citibank kept pushing with its effort to develop MARTI, the MSP project was speeded up. In 1973, for the purpose of constructing and maintaining a worldwide communication network, a cooperative society of participating banks was registered under the Belgian law at Brussels (Karl, 1983). The society was named as the 'Society for Worldwide Interbank Financial Telecommunications' (SWIFT) (Scott & Zachariadis, 2014). At the time of its establishment, 239 banks from 15 countries were members of the society (SWIFT, 2016). This society initiated the process of constructing a private computer network for the purpose of creating a secure communication channel for its member banks so as to facilitate end to end automated processing of international financial transactions. By the end of 1974, the initial design was completed and Burrough's Corporation was given the contract to supply the computer equipment's and install the system (Scott & Zachariadis, 2014).

The installation of the system was completed in the early half of 1977 and the first SWIFT message was sent on 7<sup>th</sup> May, 1977 by Prince Albert of Belgium (Rambure & Nacamuli, 2008) (Cowan, 2017). This network, subsequently called as the SWIFT-I network had initially two switching centres at Brussels and Amsterdam. These two centres were linked by leased telephone lines to data concentrators (send/receive points) located in fourteen countries. The two switching centres were also similarly inter-connected. Each switching centre was connected to half of the data concentrators. Member banks were linked to the network through the data concentrators via dial up telephone connections (Scott & Zachariadis, 2014). The technology used for communication was the traditional circuit switching technology used by telephones. The communication protocol used by SWIFT-I network was a proprietary protocol developed by Burrough's Corporation. The working of the network was such that it ensured that most messages transmitted across the system would be delivered anywhere in the system within one minute of being entered (Scott & Zachariadis, 2010). The message had to be transmitted in a specific format or standard format developed by SWIFT (Scott & Zachariadis, 2014). Initially, no standard terminal equipment were provided to the member banks and they could connect to the network using different forms of interface devices including telegraph and telex machines. While, this reduced the equipment cost for banks, it resulted in many practical operational problems. Consequently, SWIFT developed standard terminal devices called SID (SWIFT Interface Device) (Scott & Zachariadis, 2010).

In the same year that SWIFT-I network began its operation, Citibank closed down its MARTI network (Scott & Zachariadis, 2014). SWIFT-I

network became popular among banks and the membership of SWIFT rapidly increased. In 1977 itself, the membership touched 518 banks from 23 countries. The 1980's saw the SWIFT-I network expanding to all major continents of the world. In 1983, Central Banks of most countries were connected to the network and this solidified SWIFT-I network's prominence as the financial backbone for high value financial transaction across international borders (Cowan, 2017). India joined the SWIFT network in 1991 (Scott & Zachariadis, 2014).

In 1987, SWIFT decided to permit the use of its network for international messaging by non-banking entities and permitted SWIFT-I network to be used for securities market transactions. Consequently, brokerage firms were permitted to join SWIFT (SWIFT, 2016). Now, banks, brokerage firms, securities dealers, asset management companies, clearing houses, depositories, exchanges, corporate business houses, treasury market participants, foreign exchange brokers, etc. are all members of SWIFT.

The ever-increasing membership of SWIFT and the use of SWIFT-I network for non-banking financial transactions resulted in the network being overloaded. Consequently, there were frequent updates to the network. In 1980, a new third central switching centre was established in Culpeper, Virginia, USA (Scott & Zachariadis, 2010). Many new data concentrators were added to the network. However, this did not ease the congestion in the system, particularly at the three central switches. The capacity limitations of SWIFT-I network prompted SWIFT to restructure SWIFT-I network by using the distributed networking concept (Scott & Zachariadis, 2014) (Norman, Shaw, & Speight, 2011). Under this concept, direct links were established between the various national level data concentrators so as to bypass the three central switches to some extent (Scott & Zachariadis, 2010). The network that emerged out of this restructuring was called SWIFT-II network. The SWIFT-II network was also called as the FIN network (Scott & Zachariadis, 2014). The implementation of SWIFT-II began in 1984 and was completed in 1990 (Scott & Zachariadis, 2010). The most important feature of SWIFT-II network was that, it used packet switching technique instead of circuit switching technique for data communication between the sender and user. The network used X.25 packet switching protocol (Cowan, 2017). This protocol allowed speeds of upto 9.6 kilobits/second. It also allowed the development of new services like Interbank File Transfer (IFT), capacity to handle larger messages, etc. (Scott & Zachariadis, 2014).

Even as SWIFT-II network became fully operational, further developments had taken place in the field of network technology. X.25 packet switching



protocols had become less popular and most networks around the world, opted for TCP/IP protocol. TCP/IP was popular as it was the communication protocol used by Internet. Consequently, in 1998 SWIFT decided to adopt TCP/IP as the communication protocol for its network. SWIFT thereafter built a new network based on TCP/IP protocol and it became operational in 2001. This new network was named SWIFTNet and the migration of all users from the old network to the SWIFTNet was completed in 2004. In 2005, SWIFT-II network was dismantled (Scott & Zachariadis, 2014). It is this SWIFTNet network, that is still in use. However, frequent updates are made to the network. For example, sanctions enforcement software has been implemented to ensure that the messages send across the network are in compliance with international law. Similarly, a fraud detection software has been implemented to ensure that the transactions occurring across the network is secure (Cowan, 2017).

## **VI. WORKING OF SWIFTNet**

SWIFTNet, which is owned and operated by SWIFT, is a network that enables financial institutions including banks to send and receive information about financial transactions in the form of secured standardised digital messages (Cook, 2014). It is only an international messaging system. It does not provide clearing or settlement services to the participants (Turner & Wunnicke, 2003). It also does not operate a payment system (Scott & Zachariadis, 2014). Hence, SWIFTNet does not manipulate the data it transports.

The role played by SWIFTNet is that of a postman. The SWIFTNet picks up the money transfer message from the interface device of the sending bank/financial institution and delivers the message to the interface device of the receiving bank/financial institution. In between this transmission, if any correspondent bank or payment system is involved, the message will be delivered at the input interface device of the correspondent bank or payment system as the case may be, for processing. The processed message will be picked up from the output interface device of the correspondent bank /payment bank and transmitted to the interface device of the receiving bank/financial institution (Scott & Zachariadis, 2014).

In order to permit automated messaging, SWIFT developed standard formats for messages to be adopted by all participants while sending messages. SWIFTNet will not accept messages that is not in the standard format and will reject the same (Rambure & Nacamuli, 2008). SWIFT has over the years, developed standard message formats for different types of financial transactions. All SWIFT messages consist of the text message to be transmitted, along with

routing and system information. For each type of message, the defined standard format specifies a number of fields, some of which are mandatory and others optional. The field contents are governed by the rules of the standard format specified by SWIFT (Karl, 1983). There are more than 100 such standard such formats developed by SWIFT for different types of financial services. An example of SWIFT message type is MT 103, which represents a single customer credit transfer. It is the most commonly used SWIFT message type and instructs transfer of funds between customers of financial institutions (Cook, 2014). Similarly, SWIFT has also developed a standard format for bank addresses. The said standard is as under:

BBBB CC LL (bbb)

BBBB – is a unique four-character bank code.

CC – is a two-character country code.

LL – is a two-character location code.

(bbb) – is an optional three-character branch code (Rambure & Nacamuli, 2008).

The use of such standard formats have enabled error free transmission of data between the sending and receiving institutions. Messages are also encrypted and authentication algorithms are used for the purpose of ensuring origination, integrity and non-repudiation of messages send across SWIFTNet(Rambure & Nacamuli, 2008).

SWIFT does not operate SWIFTNet on a pure profit basis. It only charges a nominal fee for each message send across the network. Further, some of the surplus earnings from its operations are returned to the members in the form of discount/rebates. Further it is the policy of SWIFT to reduce the price charged per message as the volume of the messages send across SWIFTNet increases. In 2001, the fee charged per message was US \$ 0.26 after rebate, whereas in 2011, it was US \$ 0.04 after rebate (Scott & Zachariadis, 2014).

Over the years, SWIFTNet has emerged as the backbone network of the international financial system. On 31<sup>st</sup> May, 2011, 20 million messages were sent for the first time in a single day through SWIFTNet (Scott & Zachariadis, 2014).In 2016, more than 11,000 financial institutions across the world were using SWIFTNet(Cowan, 2017)(Dorry & Robinson, 2018).

The annual traffic across the SWIFT networks over the years 1977-2019 in tabular and graphic form is presented below (Scott & Zachariadis , 2014), (SWIFT, 2017), (SWIFT, 2018), (SWIFT, 2019):

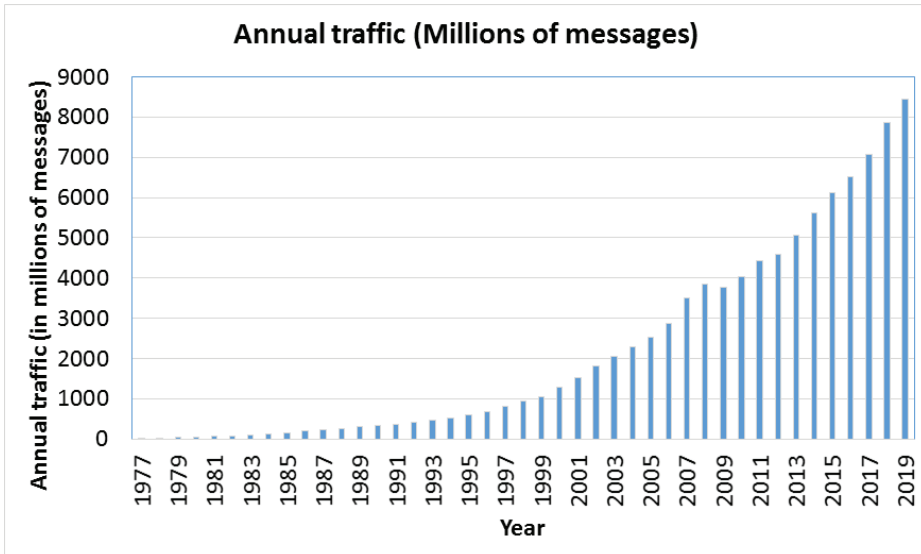


**Table: 1**

Year	Annual traffic (Millions of messages)	Year	Annual traffic (Millions of messages)	Year	Annual traffic (Millions of messages)	Year	Annual traffic (Millions of messages)
1977	3.4	1988	255.1	1999	1059	2010	4032
1978	21.6	1989	296.1	2000	1274	2011	4431
1979	34.5	1990	332.9	2001	1534	2012	4589
1980	46.9	1991	365.2	2002	1817	2013	5066
1981	62.5	1992	405.5	2003	2047	2014	5613
1982	79.9	1993	457	2004	2299	2015	6107
1983	104.1	1994	518	2005	2518	2016	6526
1984	129.9	1995	603	2006	2865	2017	7076
1985	157.2	1996	688	2007	3501	2018	7874
1986	192	1997	812	2008	3855	2019	8454
1987	222.3	1998	937	2009	3760		

Source: Swift Annual Report, 2017,2018,2019

**Figure: 1**



## VII. ADVANTAGES OF SWIFT NETWORKS

Some of the advantages of SWIFT networks are:

1. The speed at which messages are transmitted across the SWIFT networks (SWIFT-I, SWIFT-II and SWIFTNet) is much faster than that of the telex-based messaging systems (Karl, 1983).
2. The messages are sent across the SWIFT network in a standard format. This reduces the possibility of errors (Scott & Zachariadis, 2014).
3. Unlike the telex system, the messaging system under SWIFT is automatic and not manual. Hence it improves efficiency and reduces cost (Karl, 1983).
4. The SWIFT messaging service provides feedback. The sending bank receives notification of delivered/undelivered messages (Karl, 1983).
5. SWIFT network is a private network owned by SWIFT. Hence only members have access to the network. Hence the network infrastructure is fully controlled by SWIFT (Karl, 1983).
6. The SWIFT networks have built in mechanism to check for the authenticity of the messages. Hence there is no need for manual decoding (Karl, 1983).
7. SWIFT networks permitted transmission of not just text messages but also data in other forms like files, reports, statistics, etc. (Scott & Zachariadis, 2014).
8. The messages sent across the SWIFT networks are encrypted. Sophisticated techniques of authentication are also used. This ensures the security and integrity of the message send (Rambure & Nacamuli, 2008).
9. The use of SWIFT networks are now not limited to banking but is used for many other international financial transactions like security markets, foreign exchange transactions, etc. (Scott & Zachariadis, 2014).
10. Numerous security measures have been implemented as a result of which hacking SWIFTNet is difficult. This has increased the reliability of the network (Rambure & Nacamuli, 2008).
11. The fee per message is very low compared to any other private messaging network. As of 2012, the fee per message was only US \$

0.04 after rebate (Scott & Zachariadis, 2014). This is a meagre amount compared to the average fee of US \$ 13 per message using telex (Scott & Zachariadis, 2010).

12. The SWIFT networks are able to handle much large volume of transactions compared to telex and other networks (Scott & Zachariadis, 2010).
13. Each message sent via the SWIFT network is stored in two operating centres for up to 124 days. This facilitates recovery of messages in case of system breakdown (Dorry & Robinson, 2018).
14. SWIFT networks have implemented many software packages to enhance the quality of the messages send through the network. For example, sanctions enforcement software is implemented to ensure that the message transported through the network compiles with international law. Similarly, fraud detection software has also been implemented (Cowan, 2017).

## VIII. CONCLUSION

SWIFTNet in association with the correspondent banking system is responsible for making international payments across international borders inexpensive, fast and reliable. The correspondent banking system is no longer used in relation to domestic transfer of money due to the emergence of the centralised national payment system operated by the central bank of the concerned country. However, due to the use of different currencies by different countries, international transfer of money is still done through correspondent banks.

The backbone of the international banking/financial system is the communication network, SWIFTNet, developed and operated by SWIFT. It is the private network that facilities the communication of electronic/digital data between banks/financial institutions located in different countries. The fee payable for sending a message across the SWIFT network is comparatively low. SWIFTNet is used for transmitting electronic message with respect to a wide variety of financial services. This has made SWIFTNet very popular. Due to its popularity, SWIFTNet is still functioning even while many other wide area networks got merged into the Internet and have lost their respective separate identities.

## References

- 】 Ambrosia, D. W. (1980). New Swift Rules on the Liability of Financial Institutions for Interest Losses Caused by Delay in International Fund Transfers. *Cornell International Law Journal*, 13(2), 311-327.
- 】 Bank for International Settlements (2016). *Corresponding Banking*, Bank for International Settlements.
- 】 Batiz-Lazo, B. & Wood, D. (2002). An Historical Appraisal of Information Technology in Commercial Banking. *Electronic Markets*, 12(3), 192-205.
- 】 BIS. (2016). *Committee on Payments and Market Structures – Correspondent Banking*, Bank for International Settlements.
- 】 Carre, P. A. (1993). From the telegraph to the telex: a history of technology, early networks and issues in France in the 19th and 20th centuries. *Flux*, 9(11), 17-31.
- 】 Chorafas, D. N. & Steinmann, H. (1988). *Implementing Networks in Banking and Financial Services*, London: The Macmillan Press Ltd.
- 】 Colton, K. W. & Kraemer, K. L. (1980). *Computers and Banking: Electronic Funds Transfers Systems and Public Policy*, New York: Plenum Press.
- 】 Cook, S. (2014). The Global Network of Payment Flows. *SWIFT Institute Working Paper No. 2012-006*.
- 】 Cowan, T. C. (2017). *Network Control in a Globalized World: How Visa and Swift's Founding Structures Serve Their Stakeholders on the International Stage*. Massachusetts Institute of Technology, Department of Science, Technology and Society for requirements for the Degree of Bachelor of Science in Science and Technology and Society.
- 】 Dorry, S. & Robinson, G. (2018). There is no Alternative: SWIFT as Infrastructure Intermediary in Global Financial Markets, *Financial Geography Working Paper Series*.
- 】 European Central Bank. (2014). *Ninth survey on correspondent banking in euro*, Germany: European Central Bank.
- 】 Huurdeman, A. A. (2003). *The Worldwide History of Telecommunications*, New Jersey: Wiley-Interscience.
- 】 IMF (2017). *Recent Trends in Correspondent Banking Relationships – Further Considerations*, IMF.
- 】 Karl, T. J. (1983). International Electronic Funds Transfer System: SWIFT and its Interface with the New Payments Code. *Penn State International Law Review*, 2(1), 185-204.
- 】 Niblack, W. C. (1976). Development of Electronic Funds Transfer Systems. *Federal Reserve of St. Louis*, 10-18.
- 】 Norman, B., Shaw, R. & Speight, G. (2011). The history of interbank settlement arrangements: exploring central banks' role in the payment system, *Bank of*

*England Working Paper No. 412.*

- 】 Rambure, D. & Nacamuli, A. (2008). *Payment Systems from the Salt Mines to the Board Room*, Palgrave Macmillan.
- 】 Scott, S. V. & Zachariadis, M. (2010). Origins and development of the global S.W.I.F.T network, 1973–2009. Working paper series. *Information systems and Innovation Group, Department of Management, London School of Economics and Political Science.*
- 】 Scott, S. V. & Zachariadis, M. (2014). The Society for Worldwide Interbank Financial Telecommunication (SWIFT) Cooperative governance for network innovation, standards and community. *London and New York: Routledge (Taylor & Francis Group).*
- 】 Scott, S. V., & Zachariadis, M. (2014). The Society for Worldwide Interbank Financial Telecommunication (SWIFT). *Routledge Global Institutions Series.*
- 】 SWIFT (2016). SWIFT: The global financial messaging provider, *SWIFT.*
- 】 SWIFT (2017). SWIFT Annual Review, *SWIFT.*
- 】 SWIFT (2018). SWIFT Annual Review, *SWIFT.*
- 】 SWIFT (2019). SWIFT Annual Review, *SWIFT.*
- 】 The Wolfsberg Group (2014). Wolfsberg Anti-Money Laundering Principles for Correspondent Banking. *Wolfsberg Correspondent Banking Principles.*
- 】 Turner, P. S. & Wunnicke, D. B. (2003). *Managing the Risks of Payment Systems*, New Jersey: Wiley (John Wiley & Sons, Inc.).
- 】 World Bank (2015). Withdrawal from Correspondent Banking; Where, Why, and What to Do About It. *Finance and Markets Global Practice, The World Bank Group.*
- 】 World Bank (2018). The Decline in Access to Correspondent Banking Services in Emerging Markets: Trends, Impacts and Solutions. *The World Bank Group.*
- 】 Zschieschang, K. (2018). Cash Management - Financial Intelligence Guide - Know Your Customer. *The Banker*, 115-116.

# Comparative Insight on Selected Ferry Services in Kolkata – A Study on Consumer’s Perception

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## ABSTRACT

The current crisis of the world has affected a lot of people. Not only just people but also various organizations as well. One of the most vital factors behind these crises was the shortage and increased prices of petroleum products. Inflation increased and as reaction layoffs starts taking place. Because of lesser job securities, it resulted in less affordability of the luxuries. It becomes difficult for people to afford many things and personal transport was also one of those luxuries. According to Peter Drucker “*quality in a service is not what the employers put into it. It is what the customers get out of it*”. Ferry services, being a part of public transport, is considered as an alternative means of transportation. It is a very eco-friendly mode of transport and also cheaper than other modes of transport. The present study has been conducted to measure the various dimension of customer satisfaction on the basis of the service provided by the organization related to ferry service on Hooghly River plying between Howrah and Kolkata.

**Keywords:** *Ferry Services, Customer Satisfaction, Hooghly River, Howrah, Kolkata.*

## I. INTRODUCTION

India has an extensive network of rivers, lakes and canals. Development of which can provide an efficient network of inland transport. Indian inland waterways play a vital role in economic development. India has a long history of inland water transport prior to the development of road and railways. Although the day by day the system of water transport is improving but unfortunately it is the most neglected part of existing transport scenario of India.

West Bengal is one of the few states of India where the inland waterway plays a vital role for passenger and cargo movement. One of the marginalized yet significant modes of urban transport in Kolkata, Howrah and South 24 Parganas is the ferry service on Hooghly River which helps in the transport of daily swap from one bank of the river to another, i.e. between Howrah and Kolkata, Howrah to South 24 Parganas or from one place to another on the same bank.

The first ferry service on the Hooghly River starts in 1975 under the authority of **Sunderban Launch Syndicate**. But this agency could not continue this service for a long time. After that in 1980, another organization was created called **Hooghly Nodi Jalapath Paribohon Samabai Samiti Limited (HNJPSSL)** which is a government-sponsored cooperative organization started to continue this service. The service of this organization was first launched between Howrah to Babughat. As a result of which travel from Howrah to Kolkata become very easy and also within a very short time. In 1992, Government of West Bengal starts its own ferry service with **West Bengal Surface Transport Corporation (WBSTC)**. Currently these two organizations are mainly providing ferry service on Hooghly River. Except these two there are two other organizations relating to the ferry service are available, named **Ghatal Stream Navigation Private Limited (GSNPL)** and **Indo Swiss Trading Company Private Limited (ISTCPL)**. These four authorities are currently providing ferry service on Hooghly River from Howrah to Kolkata which make the travel from Howrah to Kolkata extremely smooth and comfortable.

## II. BRIEF REVIEW OF LITERATURES

Reeti Agarwal, (2008) opined that in today's competitive market scenario building and maintaining a healthy relationship with the customers is extremely momentous for the sustainability of the business. For which organization needs to focus on the identification of the factors causing customers satisfaction and dissatisfaction.

Oktiani Astuti Budiono (2009) designated that as Indonesia is one of the most populated countries in the world next after China, India, and USA face a large number of travel demand. Therefore Indonesia deals with an explosive growth in vehicle ownership and utilization. High increasing motorization in Indonesia causes many problems like traffic congestion; a high level of pollution, a high consumption non-renewable energy resource etc and Public transport is one important solution for this problem. But unfortunately through this study it is revealed that customer is not satisfied yet with public transport service as public bus transport cannot compete with the attractiveness of the private car. The result of the additional analysis that was carried out in Jakarta and Jogjakarta shows that the main reasons behind the dissatisfaction of the customers regarding the public bus transport are-

- i. The lower frequency of the buses which can't fulfill the excessive travel demand,
- ii. Lower capacity of fulfillment in public bus transport bringing longer travel time.
- iii. Customer do not experience of better value that they pay for public bus transport.

Therefore these three factors have to be improved to keep existing customer and attract more customer in public bus transport.

Lierop, D., Badami, M., & El-Geneidy, A. (2018) stated that Public transport ridership retention is a challenge for many cities now-a-days. Passengers' satisfaction and loyalty depends on various factors. The service factors that are associated with satisfaction are on-board cleanliness and comfort, courteous and helpful behavior from operators, safety, as well as punctuality and frequency of service and on the other hand, loyalty is associated with users' perceptions of value for money, on-board safety and cleanliness, interactions with personnel and the image and commitment to public transport that users feels.

Amayrol Zakaria, Muhammad Fawwaz Farahan Mohd Nasir , Norazlina Abdul Nasir , Rasidah Shafie , Azila Ayub , Norazimah Mazlan , Nik Harnida Suhainai (2018)revealed that with the development of the transport industry quality of the service become an apparent part of it. This study was conducted to provide a valuable insight to an organization that operates the Kuala Perlis terminal regarding the quality of jetty terminal towards passenger satisfaction. Findings of this study state that most of the passengers are found to be satisfied with the facilities at the Kuala Perlis ferry terminal. Therefore, the service



provider should take responsibility for the seating arrangement in order to provide more comfort to all passengers at the ferry terminal.

Manoj Kumar, Vikas Anand and Anup Srivastava (2016) measured the level of customer satisfaction with the quality of bus services offered by Uttar Pradesh State Public Transport Corporation (UPSRTC) in Uttar Pradesh (India) from various dimensions of service that includes safety, behavior, facilities, response to quarries, comfort, cost, availability etc.

### **III. OBJECTIVES OF THE STUDY**

This study primarily aims to assess the effects of consumer perceptions from the various dimensions of service quality provided by the transportation organization on their level of satisfaction with reference to the ferry service on the Hooghly River plying between Howrah and Kolkata. So, the research conducted on ferry service on Hooghly River between Howrah and Kolkata mainly focused on:

- i. To identify the present status of ferry services on Hooghly River between Howrah and Kolkata in some selected Ghats.
- ii. To measure the overall customer's satisfaction on the basis of various dimensions of the service related to the ferry services between Howrah and Kolkata on Hooghly River
- iii. To make a comparative study between these service providers (WBSTC & HNJPSS) on the basis of consumers' perception.
- iv. To suggest the way of developments so as to provide better experiences to the customers.

### **IV. RESEARCH METHODOLOGY**

At first a pilot survey has been conducted here within 20 respondents to gather a basic knowledge about the customers' perception regarding ferry service.

- Then on the basis of the factors identified a structured questionnaire has been prepared on Likert 5-point scale to conduct the market survey within 120 respondents (60 of HNJPSS Ltd. & 60 of WBSTC).
- The questionnaires include questions related to the various dimension of the satisfaction level of the customers as well as passengers travelling behavior, personal information, information about the trip and perception on fare charged & others.

- The time period of this study is 3 months i.e. Apr'19 to June'19.
- The data thus gathered has been analyzed through various tables and charts.
- The customer satisfaction relating to the ferry service on Hooghly River between Howrah and Kolkata are analyzed by using the one sample student T- test of 59 degree of freedom at 5% significance level.

## V. GENERAL INFORMATION REGARDING THE FERRY SERVICE

In this study we considered the two service providers of ferry service – i. WBSTC and ii. HNJPSS Ltd. to estimate the satisfaction level of the passengers avail the ferry service. The general information which have been gathered from the office of these two service providers are constructed bellow

**Table 1: Passengers Travel in Each Single Trip Daily on an Average Basis and No. of Ferries Operate in Each Route**

### WBSTC

Route Name	No. of passengers	No. of ferry operate
Shipping	60000	4
Fairly	40000	3

### HNJPSS Ltd.

Route Name	No. of passengers	No. of ferry Operate
Fairly	4404	2
Babughat	14874	3
Bag bazaar	3292	4

*Source: Author's own tabulation (according to the data provided)*

**Table 2: Information Regarding Service Starting and Ending Time and Total Hour of Operation**

Service Provider	Starting Time	Ending Time	Total operating time
WBSTC	8 am	8 pm	12 hours
HNJPSS Ltd.	7.30 am	9 pm	13.5 hours

*Source: Author's own tabulation (according to the data provided)*

**Table 3: Total No. of Single Trip in a Day in Each Route for Each Service Provider**

Service provider	Route name	No. of trip
WBSTC	Howrah to shipping	85
WBSTC	Howrah to fairly	69
HNJPSS Ltd.	Howrah to fairly	81
HNJPSS Ltd.	Howrah to Babughat	81
HNJPSS Ltd.	Howrah to Bag bazaar	25

*Source: Author's own tabulation (according to the data provided)*

**Table 4: Safety Measures Per Vessel**

Service provider	Life jackets	Life boya
WBSTC	40	200
HNJPSS Ltd.	7	7

*Source: Author's own tabulation (according to the data provided)*

**Table 5: Time Interval between Each Single Trip**

**WBSTC: Howrah to Shipping**

Time	Duration	Interval time (mints)
8 am to 9 am	1 hr	20 mints
9 am to 9.30pm	30 mints	10 mints
9.30 pm to 11.30 pm	2 hrs	6 mints
11.30 pm to 5 pm	5.5 hrs	10 mints
5 pm to 7 pm	2 hrs	6 mints
7 pm to 8 pm	1 hr	10 mints

**WBSTC: Howrah to Fairly**

Time	Duration	Interval time (mints)
8 am to 9 am	1 hr	20mints
9 am to 8 pm	11 hrs	10 mints

**HNJPSS Ltd. : Howrah to Fairly**

Time	Duration	Interval time (mints)
7.30 am to 9 pm	13.5 hrs	10 mints

### Howrah to Babughat

Time	Duration	Interval time (mints)
7.30 am to 9 pm	13.5 hrs	10 mints
9.30 am to 11.30 am	2 hrs	15 mints
11.30 am to 5.30 pm	6 hrs	1 hr
5.30 pm to 7.30 pm	2 hrs	15 mints
7.30 pm to 9 pm	1.5 hrs	30 mints

*Source: Author's own tabulation (according to the data provided)*

## VI. DATA ANALYSIS

This chapter is concerned with the presentation of the data collected from our survey of the customers based on a questionnaire prepared by us. In our selected area there were two service providers of ferry service- WBSTC and Hooghly Nodi Jalapath Samabay Samity Ltd. (HNJSS Ltd.). WBSTC provides this service in two routes- Howrah to Fairly and Howrah to Shipping whereas HNJSS Ltd. provides service in three routes Howrah to Fairly, Howrah to Babughat and Howrah to Bagbazar. We had conducted our survey among the customers of each route.

### Area Covered-

- i. Howrah ferry ghat to fairly ghat and vice versa
- ii. Howrah ferry ghat to shipping ghat and vice versa
- iii. Howrah to Babughat and vice versa
- iv. Howrah to Bagbazarghat and vice versa

**Sample size-** Total Sample= 120

**Table 6: SAMPLE DETAILS**

### HNJSS Ltd.

Route Name	No. of sample
Howrah to fairly	20
Howrah to BabuGhat	20

Howrah to Bag bazaar	20
TOTAL	60

**WBSTC**

Route Name	No. of Sample
Howrah to Fairly	30
Howrah to Shipping	30
TOTAL	60

**TOTAL**

Name of service provider	No. of Sample
HNJSS Ltd.	60
WBSTC	60
TOTAL	120

*Source: Author's own tabulation*

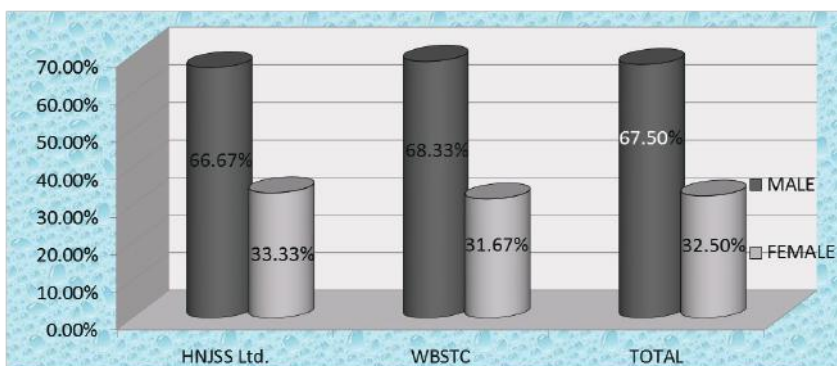
**Nature of Sample-** Convenient Sampling

Thus, gathered data relating to the personal information, Passengers' travel behavior and passengers' perception regarding fare charged & others are presented here in form of graph and tables and also analyzed accordingly

**Personal Information**

**Figure 1: Gender**

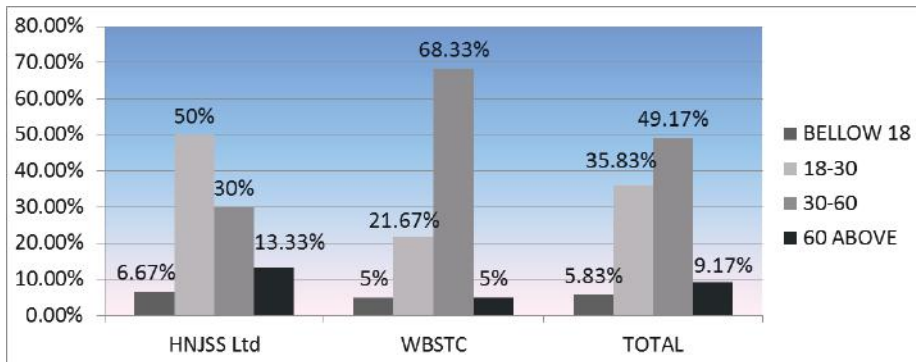
**TOTAL**



*Source: Author's own calculation*

**Observation:** It can be observed from the aforesaid tables that out of total 60 respondents of the routes of HNJSS Ltd. 66.67% respondents are male and 33.33% respondents are female whereas in WBSTC out of total 60 respondents 68.33% respondents are male and 31.67% respondents are female. Overall, out of 120 respondents 67.5% are male and 32.5% are female.

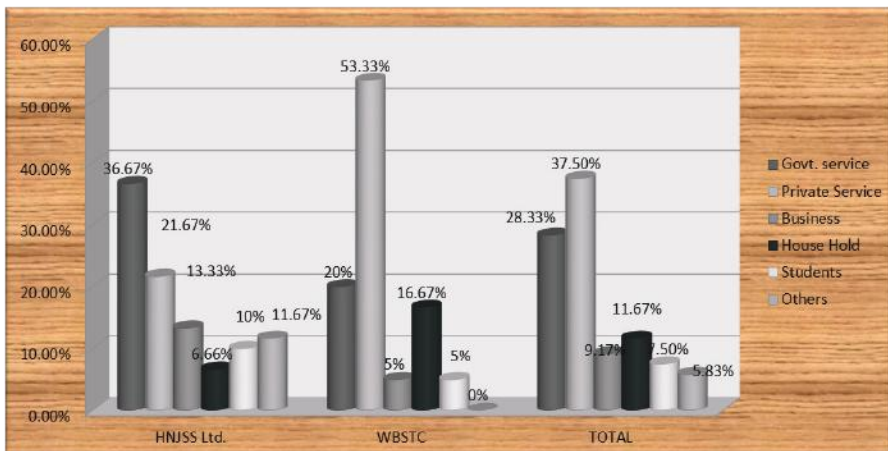
**Figure 2: Age**



*Source: Author's own calculation*

**Observation:** It can be observed from the above tables and chart that most of the respondents of HNJSS Ltd. and WBSTC belong to the age group of 18 to 30 and 30 to 60 respectively whereas in overall most of the respondents are belong to the age group of 30 to 60 and only 5.83% of the total respondents are belong to the age group of bellow 18.

**Figure 3: Occupation**



*Source: Author's own calculation*

**Observation:** It can be noticed from the above tables and chart that most of the respondents of HNJSS Ltd. and WBSTC are involved in Govt. Service and private service respectively. Whereas in overall many respondents are involved in Govt. service next to the Private service which is 28.33% and 37.5% respectively.

**Income:**

**Table 7: HNJSS Ltd.**

Income (in Rs.)	Nil	Bellow 10000	10000 to 20000	20001 to 30001	30001 & above	TOTAL
Frequency	10	10	4	25	11	60
Percentage	16.67%	16.67%	6.67%	41.66%	18.33%	100%

*Source: Author's own tabulation*

**Observation:** The above information depicts that 10 respondents (16.67% of total respondents) of HNJSS Ltd. have no income. Out of this 10 we have seen before that 6 are students and 4 are housewives. Out of the remaining 50 respondents 50% and 22% have monthly income between Rs. 20001 to 30000 and Rs. 30001 & above respectively.

**Table 8: WBSTC**

Income (in Rs.)	Nil	Bellow 10000	10000 to 20000	20001 to 30001	30001 & above	TOTAL
Frequency	13	3	13	22	9	60
Percentage	21.67%	5%	21.67%	36.66%	15%	100%

*Source: Author's own tabulation*

**Observation:** The above table shows that 13 respondents (21.67% of total respondents) of WBSTC have no income. Out of this 13 we have noticed before that 10 are housewives and 3 are students. Out of the remaining 47 respondents 46.81% have monthly income between Rs. 20001 to 30000 whereas only 19.15% respondents of remaining 47 have monthly income Rs. 30001 & above.

**Table 9: TOTAL**

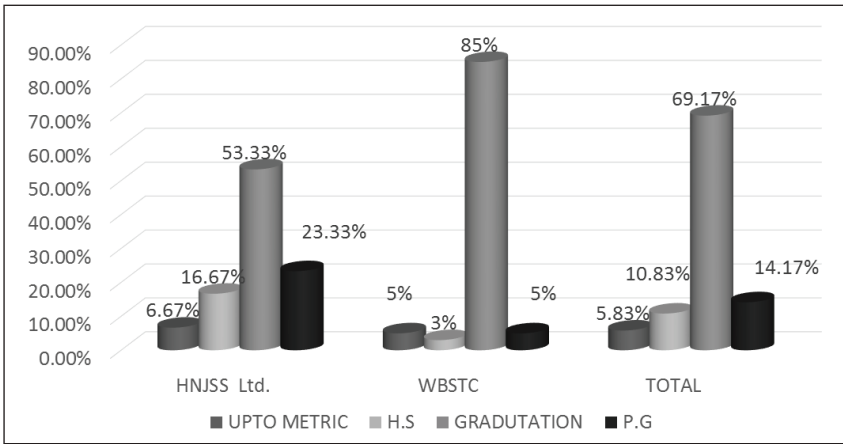
Income (in Rs.)	Nil	Bellow 10000	10000 to 20000	20001 to 30001	30001 & above	TOTAL
Frequency	23	13	17	47	20	120

Percentage	19.17%	10.83%	14.17%	39.16%	16.67%	100%
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Source: Author's own tabulation

**Observation:** From this abovetable we can see that 23 respondents (19.17% of total respondents) have no income. Out of the remaining 97 respondents most of the respondents have monthly income of Rs. 20001 to 30000 i.e. 48.45% of the remaining whereas only 13.40% and 20.62% of the remaining respondents have the monthly income of bellow Rs. 10000 and above Rs. 30000 respectively.

**Figure 4: Education**



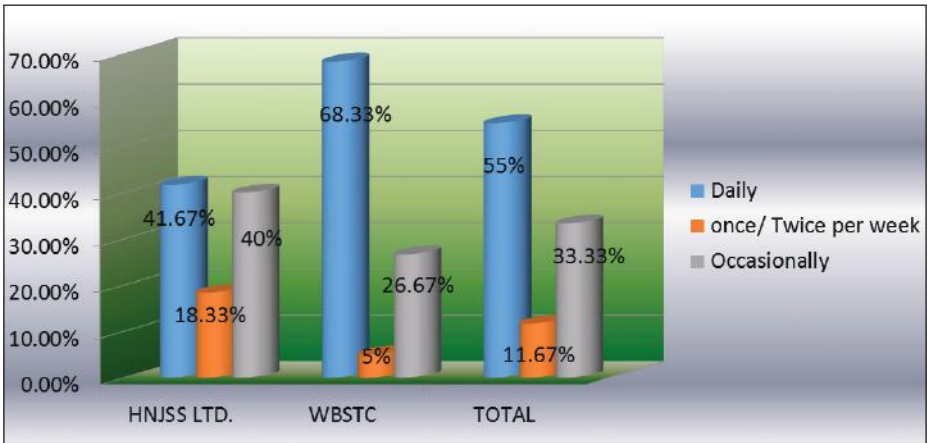
Source: Author's own calculation

**Observation:** From this above tables and chart it can be observed that most of the respondents are graduated.

**Passengers' Behavior**

**Figure 5: How Often Do You Use ferry?**

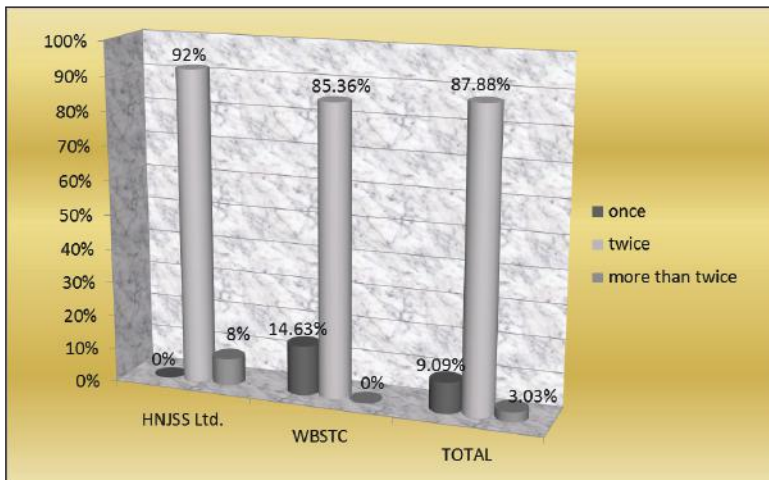




Source: Author's own calculation

**Observation:** The above table shows that out of total 60 respondents of in HNJSS Ltd. 41.67% used the ferry service daily whereas in case of WBSTC out of total 60 respondents 68.33% used this service daily. Overall, out of total 120 respondents more than 50% respondents avail this service regularly.

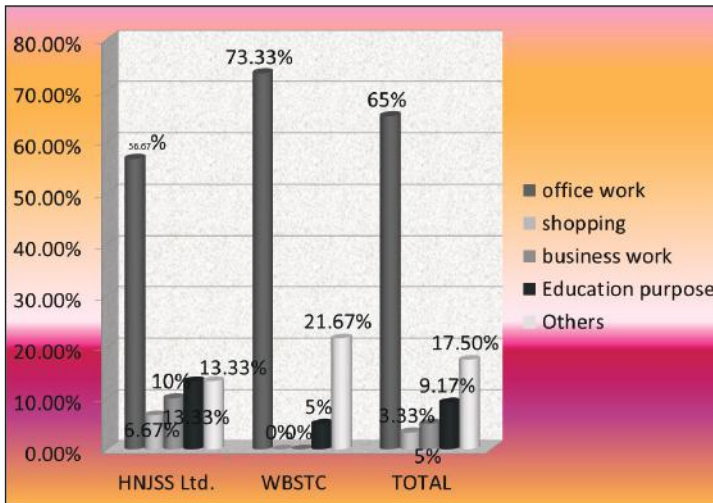
**Figure 6: If Daily, then How Many Times in a Day?**



Source: Author's own calculation

**Observation:** The above tables and chart depict that more than 80% of the daily passengers avail this service twice in a day both in case of each service providers and in total.

**Figure 7: What is the Purpose of Using Ferry?**



*Source: Author's own calculation*

**Observation:** The above tables and chart depicts that more than 50% of the respondents avail this service for the office purpose both in case of HNJSS Ltd and WBSTC. In case of WBSTC it can be observed that this ferry route is mainly used for the office purpose than any other purpose.

### Perception on fare charged and Others

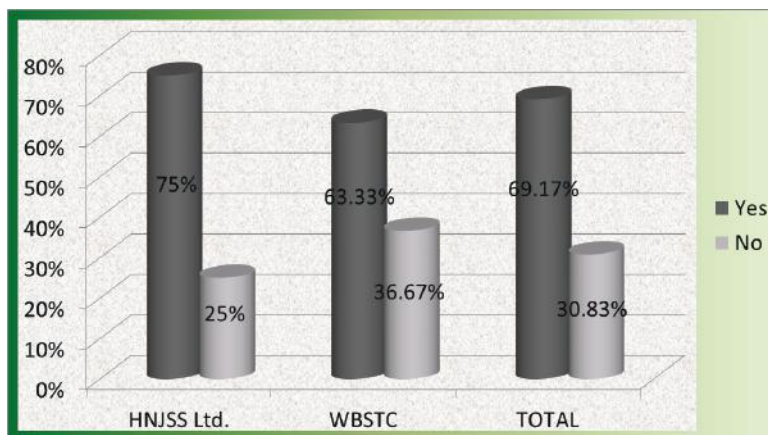
**Table 10: Are You Satisfied With the Fare Charged?**

Service provider	Yes	No
HNJSS Ltd.	60	0
WBSTC	60	0
TOTAL	120	0

*Source: Author's own tabulation*

**Observation:** It can be easily observed from the above table that all the respondents are very much satisfied with the fare charged.

**Figure 8: If the Fare is Increased, Will You be Satisfied in the Same Way?**



Source: Author's own calculation

**Observation:** It can be observed from the above tables and chart that more than 60% respondents will be satisfied with the fare in the same way even if it is increased by 66%. According to the satisfied passengers as this route is less time consuming and free from traffic so they are agreed to pay more to avail this service. But out of the dissatisfied respondents many of them thought that their decision will be depend on how much fare is increased. If the fare is not increasing not too much then they can think about to pay this.

**Figure 9: Would You be Willing to Pay More For a Trip if You had More Secured, Faster and Comfortable Ferry?**



Source: Author's own calculation

**Observation:** It can be easily noticed from the above table and chart that more than 90% respondents are agreed to pay more for availing better experience of ferry service.

To analyze the customers' satisfaction level relating to the ferry service the satisfaction type of the customers has been categorized on the basis of four variables- **i. Convenience, ii. Customer care iii. Frequency & iv. Safety measures.** The respondents have ranked those forms of satisfaction based on a scale within '1' to '5' where '1&2' refers to **dissatisfied**'3' refers to **neutral** and '4&5' refers to **satisfied**. The data collected are analyzed by doing a T-test with level of significance= 0.05 and degree of freedom (n-1) =59 [where, sample size (n) = 60 & assumed that population mean ( $\mu$ ) =3]. Further the various services provided by the ferry operators under these 4 types of variables are also ranked based on the % of satisfied respondents.

### WBSTC

**Table 11: Calculations and Result of One Sample T-Test and Confidence Interval (d.f = 59; = 0.05) [where, n = 60]**

Variables	Hypothesis (H0)	Mean (x)	Stdev (s)	C.V [s/x]	T statistic	Tabulated Value (T.V)	Result	Margin of error [m.e= T.V*(s/√n)]	C.I=[x±m.e]	
									Lower Bound	Upper Bound
Convenience	H01: Customers don't get convenience satisfaction	3.5	1.255496	0.358713	3.084822	1.6711	Rejected	0.270858	3.22914	3.770858
Customer Care	H02: Customers don't get the customer care satisfaction	4.15	1.204863	0.29033	7.393257	1.6711	Rejected	0.259935	3.89006	4.409935
Frequency	H03: Customers don't get frequency satisfaction	3.31667	1.17158	0.35324	2.09366	1.6711	Rejected	0.252754	3.063912	3.569412

Safety measures	H04: Customers don't get safety satisfaction	2.533333	1.171218	0.462323	-3.08635	1.6711	Accepted	0.252676	2.280657	2.78601
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Source: Author's own tabulation

## HNJPSS Ltd.

**Table 12: Calculations and Result of One Sample T-Test and Confidence Interval (d.f = 59;  $\alpha = 0.05$ ) [where, n = 60]**

Variables	Hypothesis (H0)	Mean (x)	Stdev (s)	C.V [s/x]	T statistic	Tabulated Value (T.V)	Result	Margin of error [m.e = T.V* (s/ $\sqrt{n}$ )]	C.I =	
									Lower Bound	Upper Bound
Frequency	H03: Customers don't get frequency satisfaction	2.683333	1.112208	0.414487	-2.20542	1.6711	Accepted	0.239946	2.443388	2.923279
Customer Care	H02: Customers don't get the customer care satisfaction	3.716667	1.290009	0.34709	4.303283	1.6711	Rejected	0.278304	3.438363	3.994971
Convenience	H01: Customers don't get convenience satisfaction	3.466667	1.466769	0.42311	2.464453	1.6711	Rejected	0.316438	3.150229	3.783105

Safety measures	H04: Customers don't get safety satisfaction	1.866667	1.30795	0.700688	-10.0207	1.6711	Accepted	0.282175	1.58449	2.148841

*Source: Author's own tabulation*

## Observations

On the basis of the result of the one sample T-test and confidence interval we can state that in case of convenience the result is similar for both the operators-WBSTC & HNJPSS Ltd. In both cases the T statistic  $_{(59, 0.05)}$  values  $[(\bar{x}-\mu)/(s/\sqrt{n})]= 3.084822$  &  $2.464453$  respectively (level of significance=0.05 & degree of freedom= 59) are greater than the Tabulated value observed from the T distribution= 1.6711, so the null hypothesis is rejected here in favor of the alternative hypothesis that represents customers get the convenience satisfaction in relation to the service provided by both WBSTC & HNJPSS Ltd. ( $\mu > 3$ ).

Again, to estimate the average level of convenience satisfaction of population from sample statistic we use the approach of confidence interval. The above table depicts that both in case of WBSTC & HNJPSS Ltd. level of convenience satisfaction of the population is ranged from 3.229142 to 3.770858 & 3.150229 to 3.783105 respectively which also represent that the population is quite satisfied as the range of average level of convenience satisfaction of population is more than neutral value i.e. 3 in both the cases.

The result of one sample T test relating to the customer care services reveals a similar picture like the convenience. Here also both in case of WBSTC & HNJPSS Ltd. the T statistic  $_{(59, 0.05)}$  values  $[(\bar{x}-\mu)/(s/\sqrt{n})]= 7.393257$  &  $4.303283$  respectively (level of significance=0.05 & degree of freedom= 59) are greater than the Tabulated value observed from the T distribution= 1.6711, so again null hypothesis is rejected here in favor of the alternative hypothesis that represents customers get the customer care satisfaction in relation to the service provided by both WBSTC & HNJPSS Ltd. ( $\mu > 3$ ). Additionally the result of the confidence interval delimitates that both in case of WBSTC & HNJPSS Ltd. level of customer care satisfaction of the population derived from the sample statistic ranged from 3.890065 to 4.409935 & 3.438363 to 3.994971 respectively which illustrates that the population is quite satisfied as the range of average level of customer care satisfaction of population is more than neutral value i.e. 3 in both the cases.

However, in case of the frequency we can see a contradictory picture. According to the one sample T test result of WBSTC the T statistic  $_{(59, 0.05)} \left[ \frac{(\bar{x} - \mu)}{(s/\sqrt{n})} \right] = 2.09366$  is greater than the tabulated Value observed from the T distribution = 1.6711, so null hypothesis is rejected and alternative hypothesis is accepted here which defines that passengers get the frequency satisfaction from the service provided by WBSTC ( $\mu > 3$ ).

Whereas the one sample T test result of HNJPSS Ltd. elicits that the T statistic value  $_{(59, 0.05)} \left[ \frac{(\bar{x} - \mu)}{(s/\sqrt{n})} \right] = -2.20542$  is less than Tabulated value = 1.6711. Therefore, as a result null hypothesis is accepted here against alternative hypothesis which signifies that passengers do not get the frequency satisfaction from the ferry service provided by HNJPSS Ltd.

Besides that, also from the result of the confidence interval we get an antagonistic view. The result of interval estimation of WBSTC is ranged between 3.063912 & 3.569421 which defines that the passengers are more or less satisfied with frequency services. On the contrary, in case of HNJPSS Ltd. the interval estimation is ranged from 2.443388 to 2.923279 which convey that the passengers are dissatisfied with these services provided by HNJPSS Ltd. as the value of the range is less than the neutral value i.e. 3.

Lastly in regard to the Safety measures we can observe a more or less similar negative outcome. Both in case of WBSTC & HNJPSS Ltd. the T statistic values  $_{(59, 0.05)} \left[ \frac{(\bar{x} - \mu)}{(s/\sqrt{n})} \right] = -3.08635$  &  $-10.0207$  respectively are lower than tabulated value observed from T distribution i.e. 1.6711. Therefore, null hypothesis is accepted here which represent that passengers do not get the safety satisfaction from the service provided by WBSTC & HNJPSS Ltd.

Even the results of the interval estimation also portray that the passengers are displeased with safety measures provided by both the service providers as on the basis of interval estimation the average level of safety satisfaction of population of WBSTC & HNJPSS Ltd. ranged from 2.280657 to 2.78601 & 1.58449 to 2.148841 respectively which is less than the neutral value i.e.3.

**Table 13: Ranking of Various Services Provided under these 4 Variables on the Basis of the % of Satisfied Respondents**

**Variable 1: Convenience**

No. of Respondents	Services	WBSTC				HNJPSS Ltd.			
		Satisfied In % (Rank-4/5)	Neutral In % Rank- 3	Dissatisfied in % (Rank- 1/2)	Rank	Satisfied In % (Rank- 4/5)	Neutral In % (Rank-3)	Dissatisfied In % (Rank-1/2)	Rank
60	Seat Sufficiency	46.7%	0%	53.3%	3	53.33%	6.67%	40%	3
60	Comfortability of seats	43.3%	10%	46.7%	4	35%	8.33%	56.67%	4
60	Jetty and vessels	80%	5%	15%	2	60%	0%	40%	2
60	Connection with other mode transport	90%	5%	5%	1	95%	3.33%	1.67%	1

**Variable 2: Customer care**

No. of Respondents	Services	WBSTC				HNJPSS Ltd.			
		Satisfied In % (Rank-4/5)	Neutral In % Rank- 3	Dissatisfied in % (Rank- 1/2)	Rank	Satisfied In % (Rank- 4/5)	Neutral In % (Rank-3)	Dissatisfied In % (Rank-1/2)	Rank
60	Cleanliness of vessels	68.33%	3.33%	28.34%	2	70%	0%	30%	2
60	Behaviour of staffs	85%	1.67%	13.33%	1	90%	0%	10%	1

**Variable 3: Frequency**

No. of Respondents	Services	WBSTC				HNJPSS Ltd.			
		Satisfied In % (Rank-4/5)	Neutral In % Rank- 3	Dissatisfied in % (Rank- 1/2)	Rank	Satisfied In % (Rank- 4/5)	Neutral In % (Rank-3)	Dissatisfied In % (Rank-1/2)	Rank
60	Availability of ferry during office time	55%	0%	45%	2	31.67%	0%	68.33%	2



60	Availability of ferry during weekend	10%	10%	80%	3	20%	10%	70%	3
60	Punctuality regarding ferry service	90%	5%	5%	1	58.33%	8.33%	33.33%	1

#### Variable 4: Safety Measures

No. of Respondents	Services	WBSTC				HNJPSS Ltd.			
		Satisfied In % (Rank-4/5)	Neutral In % Rank-3	Dissatisfied in % (Rank-1/2)	Rank	Satisfied In % (Rank-4/5)	Neutral In % (Rank-3)	Dissatisfied In % (Rank-1/2)	Rank
60	Safety satisfaction equipment e.g. life jackets	45%	0%	55%	1	13.33%	5%	81.67%	2
60	Guards and workers service	40%	0%	60%	2	28.33%	5%	66.67%	1

Source: Author's own tabulation

#### Measuring overall Satisfaction

To test the overall satisfaction level of the passengers from the service provided by WBSTC & HNJPSS Ltd we carried out the one sample T test for each service providers on the basis of the related data collected.

$H_0$ : Customers do not get the overall satisfaction from ferry service ( $\mu <= 3$ )

$H_1$ : Customers get overall satisfaction from ferry service ( $\mu > 3$ )

Table 14: Calculations and Result of One Sample T-Test and Confidence Interval (d.f = 59;  $\alpha = 0.05$ ) [where, n = 60]

Service Providers	Mean (x)	Stdev (s)	C.V [s/x]	T statistic	Tabulated Value (T.V)	Result	Margin of error [m.e= T.V*(s/ $\sqrt{n}$ )]	C.I.= [x $\pm$ m.e]	
								Lower Bound	Upper Bound
WBSTC	4.18333	0.596364	0.142557	15.36992	1.6711	Rejected	0.128658	4.05	4.31
HNJPSS Ltd.	2.633333	1.495379	0.567865	-1.89931	1.6711	Accepted	0.32261	2.31	2.95

Source: Author's own tabulation

**Observation:** From this above table we can get a contradictory view. According to the result of the one sample T test the T statistic  $_{(59, 0.05)} \left[ \frac{(\bar{x} - \mu)}{(s/\sqrt{n})} \right] = 15.36992$  is greater than tabulated value i.e. 1.6711 therefore null hypothesis is rejected here in favor of alternative hypothesis which represent that passengers get the overall satisfaction from the service provided by WBSTC. Whereas in case of HNJPSS Ltd. the T statistic  $_{(59, 0.05)} \left[ \frac{(\bar{x} - \mu)}{(s/\sqrt{n})} \right] = -1.89931$  is less than the tabulated value i.e. 1.6711 therefore null hypothesis is accepted here against the alternative hypothesis which represent that passengers didn't get the overall satisfaction from the service provided by HNJPSS Ltd.

Even the result of the interval estimation shows that the average level of overall satisfaction of the population is ranged from 4.054675 to 4.311992 which is greater than 3 (neutral value). This result signifies that passengers are quite satisfied with the service provided by WBSTC on an overall basis. But in case of HNJPSS Ltd. it is ranged between 2.310723 & 2.955944 which is less than 3. So, we can conclude from this result that passengers are dissatisfied with the service provided by HNJPSS Ltd. on an overall basis.

## VII. CONCLUSION

Ferry service is a very convenient mode of transport due to various reasons. Presently two service providers- WBSTC & HNJPSS Ltd. provide the ferry service on Hooghly River between Howrah & Kolkata. On the basis of this study we can see that most of the passengers are office goers and according to them they avail this service mainly because of two reasons- Firstly, they can avoid the traffic and reach their destination on time and secondly, the convenient location of the ferry Ghats connects the busy area of Kolkata like- Esplanade, Dalhousie etc. with Howrah within a very short time. Passengers are also very satisfied regarding the fare charged. Even according to this data if the price is increased then also more than 60% of the passengers on an overall basis will be satisfied in the same way. Moreover, more than 90% of the passengers on an overall basis will like to pay more if they are able to attain more secure, faster and comfortable ferry service.

Based on the analysis of this research we can conclude that passengers get the satisfaction relating to convenience and customer care from both the service providers whereas in case of satisfaction relating to frequency and safety measures we can see a completely different picture. Relating to frequency, passengers are satisfied with the service provided by WBSTC but they are not satisfied with the service provided by HNJPSS Ltd. In case of safety measures, we can see a negative result for both the service providers which indicate that

passengers are dissatisfied with the service relating to safety measures provided by both of them. Lastly, regarding the overall satisfaction we also can see a contradictory picture which exhibits that customers are satisfied with service provided by WBSTC on an overall basis but they are not overall satisfied with the service provided by HNJPSS Ltd.

**Table 15: Comparisons between WBSTC and HNJPSS Ltd.**

BASIS	WBSTC	HNJPSS Ltd.
Fare Charged	Satisfied	Satisfied
Convenience Satisfaction	Satisfied	Satisfied
Customer care Satisfaction	Satisfied	Satisfied
Frequency Satisfaction	Satisfied	Dissatisfied
Safety Satisfaction	Dissatisfied	Dissatisfied
Overall Satisfaction	Satisfied	Dissatisfied

*Source: Author's own tabulation*

### **Suggestions:**

The following suggestions can be recommended to improve the ferry service on Hooghly River between Howrah and Kolkata.

First of all both of the service provider have to improve their safety security measures as this is very much essential for water transport. They have to look whether all the gates are properly locked or not and restrict the passengers strictly from standing at the edge or near the gate of the ferry. The guard of the ferry has to always keep an eye on all of these issues and always has to be prepared to deal with any accident at any time. With this he has to make sure that the principals of SOP regarding ferry service is complying properly.

The service providers should have to arrange such system in the ferry so that they can contact with disaster management group if they are needed.

After that in case of HNJPSS Ltd., the service provider has to look at the frequency satisfaction of the passengers. To improve this satisfaction level service provider should has to increase the frequency of ferry during the weekend as well as during the office time as many office passengers avail this ferry service while going to the office.

Besides these service providers also can think about launching the double-decker ferries in these routes so that more passengers can be travel at a time.

Last of all, as environmental pollution is creating a panic in every moment

so Govt. and the service providers should think about the launch of new generation smoke free and environmentally friendly ferry to provide a better experience to the customer like- E ferry which is a hybrid vehicle. It uses both the electricity and fossil fuels as fully electric ferries are scarce. This type of ferry service is available in Hong Kong which was started by 'Star' ferry and co-funded by Pilot green Transport Fund of the environmental Protection Department.

## References

- 1) Agarwal, R. (2008). Public Transportation and Customer Satisfaction: The Case of Indian Railways. *Global Business Review*, 9(2), 257-272.
- 2) Bag, S. & Sen, S.S. (2012). Kolkata Metro Railway and Customer satisfaction: An empirical study. *International Journal of Multidisciplinary Research*, 2(3), 165-176.
- 3) Chan, S. (2017). Assessing Service Quality of Passenger Ferry Services in Sabang Zone. *European Journal of Business and Management*, 9(5), 22-34.
- 4) Friman, M. & Budiono, A.O. (2009). Customer Satisfaction in Public Bus Transport – A study of traveler's perception in Indonesia. *Service Science Program*, 1-49.
- 5) Joseph, Y. (2012). A Study on Inland Water Transportation in Kochi City Region. *Centre for Public Policy Research, Kochi*, 1-56. DOI: 10.13140/RG.2.1.4361.0085.
- 6) Kumar, S. & Jeyaprabha, B. (2018). An Empirical Study on Commuters Satisfaction Towards Chennai Metro Rail Limited. *International Journal of Engineering and Technology*, 7(4.39), 783-788.
- 7) Kumar, M., Anand, V. & Srivastava, A. (2016). Public Transport Service Quality and Passenger Satisfaction: A Case of UPSRTC, Agra, India. *Pacific Business Review International*, 8(11), 82-92.
- 8) Lierop, D., Badami, G.M. & Geneidy, A. (2018). What influences satisfaction and loyalty in public transport? A review of the literature. *Transport Reviews*, 38(1), 52-72.
- 9) Nagabhatia, N. & Jain, P. (2013). Assessing the Potential Role of Inland Water Navigation for Green Economy. *Journal of Environmental Professionals Sri Lanka*, 2(1), 25-37.
- 10) Zakaria, A., Fawwaz, M., Nasir, F. & Nasir, A.F. (2019). Service Operated at Kuala Perlis, Malaysia. *Frontiers in Marine Science*, 9(1), 16-20.

# Impact of Capital Structure on the Profitability of the Pharmaceutical Industry in India: An Empirical Study

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## ABSTRACT

Capital structure plays a significant role in determining the profitability of firms. The study has been conducted to empirically examine the impact of capital structure on the profitability of top five pharmaceutical companies in India. Data from 2004 to 2018 have been collected from “moneycontrol.com”. Short term debt to total assets (STDTA) and Long-term debt to total assets (LTDTA) have been used as a proxy for capital structure, Firm size (FS) and Growth (G) have been used as control variables. Return on Capital Employed (ROCE) has been used as a proxy for profitability. Descriptive Statistics, Correlation and Regression have been used to analyse the data. The result showed that the LTDTA and FS have statistically significant negative impact on profitability.

**Key words:** *Capital Structure, Profitability, Return on Capital Employed.*

## I. INTRODUCTION

Capital structure is one of the important concerns in modern business world. It is defined as the specific mix of debt and equity a firm uses to finance its operations. In other words, Capital Structure is a combination of equity shares, preference shares and long-term debts. A Company's capital structure

largely affects company-specific factors such as the probability of bankruptcy, profitability, and structure of assets. The company may fail or suffer from losses if capital structure and utilization of funds are not planned in proper way.

The modern theory of capital structure began with the introduction of *Irrelevance theory* of Modigliani and Miller (1958), which argues that Debt-Equity mix do not affect Firms value, and optimum Capital Structure do not exist. After the establishment of Modigliani and Miller's theory three conflicting theories of capital structure have been developed such as Agency Cost Theory, Trade-off Theory, and Pecking Order Theory. According to these theories, Capital structure affects Cost of capital, Net profit, Earning per Share, Dividend pay-out Ratio, and liquidity position of the firm.

In India, capital structure patterns are similar to specific industries. They vary from industry to industry but follows a homogenous pattern in the same Industry. For example, Utilities, transportation companies and capital-intensive manufacturing firms have high debt- equity ratios as compared to service firms, mining companies and technology-based manufacturing firms which employ very little long-term debt.

Profitability is the profit earning capacity which is crucial factor contributing to the survival of the firms. Profitability can be measured in terms of profit shown as a percentage of sales.

This study focuses to know and understand the "Impact of Capital Structure on the Profitability of Pharmaceutical Industry in India". A sample made of five (5) Pharmaceutical Companies for the period of fifteen (15) years is taken to compute the result. Though Capital Structure plays a vital role in Profitability of a company but there are many other factors accept capital structure that affects the profitability of the company.

## **II. INDIAN PHARMACEUTICAL INDUSTRY**

Indian Pharmaceutical Industry has an important position in the global pharmaceuticals sector. In the FY2016-17, India was the largest provider of generic drugs globally and export 20 percent (%) of global exports in terms of volume. In the FY2016-17 India exported pharmaceutical products worth \$16.89 billion (USD) and the industry was valued at \$33billion(USD). India is the only country to have the highest number of United States FDA-approved plants for generic drug manufacturing outside the North American country.

According to the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, domestic pharmaceutical market turnover reached Rs. 129 crores (US\$ 18.53 Million) in FY2017-18, growing 9.4% year-on-year and exports

revenue was Rs. 123 crores in FY2017-18 and Rs 137 crores in FY2018-19.

As Government's support FDI, The Department of Pharmaceuticals recently approved many FDI proposals. The proposal by Recipharma Participation of the Netherlands to increase FDI from 74% to 100% in Nitin Life Sciences has been approved, while VMG Pharmaceuticals has also received fresh investment. The department has also approved the proposal for acquiring the entire 20% equity of Otsuka Pharmaceutical India held by Claris Otsuka.

### **III. LITERATURE REVIEW**

The Researchers around the world, have been conducted researches to measure the relationship between capital structure and profitability. In the studies, researchers revealed mixed results, some revealed positive relationship between variables, and others came up with negative relationships. Such contradicting results shows that the topic is still quite debatable.

Sarkar & Choudhary (2018) have the study based on the movement of shareholders return in the context of capital structure composition. By using pooled regression and panel regression, the study found that equity and short-term debt affects return on equity (ROE) and both are highly statistically significant. The study is highly significant as it proved that, ROE is fairly explained by Capital Structure composition.

Chavali & Rosario (2018) have carried out their research work on 23 Non-Banking Financial Companies listed on National Stock Exchange (NSE) for 10 years (2006-16). For the purpose of analysis, Capital Structure ratios such as debt-equity, long-term debt to assets, short-term debt to assets and total debt to assets were gathered from financial reports. ROA, ROE, ROCE, Net profit and Interest coverage were considered as performance indicators. Serial correlation analysis was applied for data analysis and based on the results it was concluded that debt funding improves profitability.

Acquash, P; Freeman, E; and Ellis, E (2017) has studied the relationship between capital structure and profitability of oil marketing companies listed on Ghana Stock Exchange. Various factors for this study like firm's capital structure, short term debt to total capital, long term debt to total capital, return on assets, return on equity and net profit margin has been considered. Using multiple regressions, it demonstrates that increments in short term debts and long-term debt influences the execution of oil marketing companies. The results of analysis show that capital structure has negative effect on profitability as measured on return on assets, return on equity and net profit margin of oil marketing companies.

Kumar, (2015) made a study entitled “Capital Structure and its Impact on Profitability”. The study has made with the objectives of identifying the relationship between profitability and capital structure of SME, finding an optimal capital structure that would be associated with the best performance, and finding out the impact of capital structure on the profitability. Data collected from some secondary sources studied from 2008 to 2013 and it is concluded that the debt/ equity composition varies substantially among the SME and there is significant relationship between Debt to total funds and ROE. There is no relation or there is insignificance between debt to total funds and ROCE.

A.M. Goya (2013) attempts to study the impact of capital structure on profitability of public sector banks in India listed on National Stock Exchange during 2008 to 2012. For the Analysis of capital structure-profitability association Regression Analysis has been used for establishing relationship between Return on Equity, Return on Assets & EPS with capital structure. Results reveal positive relationship of short-term debt with profitability as measured by ROE, ROA & EPS.

Tailab (2014) used 30 American energy firms as sample for a period of nine years ranging from 2005 to 2013 to test the impact of capital structure on Profitability of energy American firms and found negative association between debt ratio and ROE (Return on Equity) and ROA (Return on Assets) as proxy for profitability, while company size in terms of sales shown a negative effect only on ROE. The researcher used multiple regression method to analyse his data set, where 10% of ROE and 34% of ROA were predicted by independent variables of short-term debt, long term debt, total debt to equity ratios and firm size as measured by company sales.

#### **IV. RESEARCH OBJECTIVES**

Based on the published literatures on the topic and the problem as defined in the previous sections, the following objectives have been set:

- To have a descriptive account of Indian Pharmaceutical Industry, with special reference to ROCE and capital structure Composition.
- To know the degree of association among the ROCE and capital structure variables of Indian Pharmaceutical Industry.
- To understand the movement of ROCE in the context of capital structure composition through appropriate Panel Data Model.



## V. RESEARCH METHODOLOGY

To investigate the Capital Structure and its impact on Profitability of Pharmaceutical Industry in India, the study adopted the methodology used in earlier research work on the issue. Analysis of data in this research is proposed to be done through Descriptive Statistics, Correlation matrix and OLS regression method.

### **Data and Sample**

This research is a quantitative research in which secondary data is used. The data for the research is collected mainly from Financial Statements available in “moneycontrol.com” and various other reliable sources.

For the study Top 5 Pharmaceutical Companies have been selected based on their market capitalization. The data from 2004 to 2018 have been collected, that means the study is based on past 15 years data.

### **Study Variables**

To see the Impact of Capital Structure on Profitability, some capital structure variables have been identified and used in the study. Short-Term Debt to Total Assets (STDTA) and Long-Term Debt to Total Assets (LTDTA) are used as Proxy for Capital Structure. On the other hand, Return on Capital Employed (ROCE) have been used as proxy for Profitability.

In this study ROCE used as a dependent variable. On the other hand, STDTA and LTDTA used as independent variables. Other than the dependent and independent variables, Some Control Variables have been identified and used in the study i.e. Firm Size (FS) and Growth (G).

#### **1) Return on Capital Employed (ROCE)**

ROCE is one of the measurements of financial performance ratios. In this study, it shows as a proxy of Profitability, work as a dependent variable. It shows the net income generated by the capital employed. In other words, the ratio measures how well a company is generating profits from its capital. ROCE is expressed as a percentage and calculated as:

$$\text{ROCE} = \text{EBIT} / \text{Capital Employed}$$

#### **2) Short-Term Debt to Total Assets (STDTA):**

Short-term debt to total assets ratio shows, the percentage of assets financed with loans or other financial obligations that are due within

a 12-month period. The calculation for the short-term debt to total assets ratio is as under:

$$\text{STDTA ratio} = \text{Short-Term Debt} / \text{Total Assets}$$

The ratio provides a general measure of the short-term financial position of a company (more specifically solvency position). So Short-Term debt to Total Assets ratio provides that how much of assets of the firm has been financed through short term debt financing.

### 3) **Long-Term Debt to Total Assets (LTDTA):**

The long-term debt to total assets ratio is a measurement shows the percentage of assets financed with loans or other financial obligations lasting more than one year. The calculation for the long-term debt to total assets ratio is:

$$\text{LTDTA ratio} = \text{Long-Term Debt} / \text{Total Assets}$$

If a business has a high long-term debt to asset ratio, it suggests the business has a relatively high degree of risk, and eventually, it may not be able to repay its debts. On the other hand, if a business has a low long-term debt to asset ratio, it can signify the relative strength of the business.

### 4) **Firm Size (FS):**

In the study, to look at the impact of capital structure on profitability, firm size is used as a control variable. The value of firm size of an enterprise is obtain from the value of its total assets. It is the log value of Total Asset (value shown in the balance sheet). For a company in a year, firm size shows the log value of the total assets of the firm on this financial year.

$$\text{Firm Size (FS)} = \log (\text{Total Assets})$$

### 5) **Growth (G):**

In this research 'Growth' denotes the growth in sales of the company's year after the year. It is calculated by comparing the one year's sales data with the sales data of a year before. It is represented by using percentage (%) figure.

$$\text{Growth (G)} = \frac{\text{TS}_1 - \text{TS}_0}{\text{TS}_0} * 100$$

The equation of calculating growth is made for the seventy-five (75) observations. Here, 'TS<sub>0</sub>' denoted as total sales of previous year of the calculating year; and 'TS<sub>1</sub>' denoted as total sales of year on which growth is calculated.

## Data Analysis – Tools and Techniques

In this study for analysis the data based on Panel Data, is made by using Descriptive Statistics. The values of Mean, Median, Standard Deviation, Maximum, Minimum, and Count are taken for those variables.

To find the relation between these variables, Correlation Matrix is used. The Correlation Analysis shows the relationship between two variables either as fractional number between  $-1.0$  &  $1.0$  or '0'. The value close to '1' shows a strong level of correlation either positive or negative and Value close to '0' shows a weak level of correlation between two variables.

To know the movement of profitability in the context of capital structure composition, the Regression analysis is made. In this study *Pooled OLS Regression* or *Constant Coefficient Model* is applied. Among these variables ROCE (proxy for profitability) is taken as Dependent variable; LTDTA & STDTA are taken as Independent variable; and Firm Size & Growth taken as controlled variables. The regression equation will be,

$$ROCE_{it} = B_1 + B_2 * STDTA_{it} + B_3 * LTDTA_{it} + B_4 * FS_{it} + B_5 * G_{it} + u_{it}$$

$$i = 1,2,3,4,5$$

$$t = 1,2,\dots,15$$

where, 'i' is the  $i^{\text{th}}$  company and t is the time period for the variables defined in the previous section of this chapter. 'B<sub>1</sub>' is denoted as the constant and 'u<sub>it</sub>' is defined as error.

## VI. RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

**Table 1: Descriptive Statistics**

	ROCE	STDTA	LTDTA	Firm Size	Growth
Mean	18.6201	0.1856	0.2324	3.7007	19.8093
Median	17.7900	0.1719	0.1900	3.7633	18.8700
S.D	11.8192	0.0844	0.1974	0.4336	27.6823
Range	52.2300	0.5387	0.9327	1.9833	241.5600
Minimum	-4.5400	0.0270	0.0049	2.5845	-37.7900
Maximum	47.6900	0.5657	0.9376	4.5678	203.7700
Count	75	75	75	75	75

*Source: Compiled by authors with MS Excel 2010*

Table 1 show the Descriptive statistical analysis on Return on capital employed (ROCE), Short term debt to total assets Ratio (STDTA), and Long

term debt to total assets Ratio (LTDTA), Firm- Size and Growth of firms. The result is made on analysis the data of five selected Pharmaceutical Companies over the data of last fifteen years.

The average ROCE of the firms is 18.62 (mean), might be similar to this industries' ROCE. The maximum value i.e. the highest value of ROCE is 47.69, is more than 2.5 times of the firm's average. The lowest value is -4.57 that represent some abnormal situation affected over a year. So that makes the variance higher and it is supported by the Standard Deviation of 11.82.

The mean of STDTA is .1856(18.56%) shows that the industry operates with a tendency to borrow short term debt. The maximum value it provides is 0.5657 (56.57%) shows that the company mostly operate with short term finance that makes a higher risk. Sometime companies bring this situation to escape from the tax burden. The minimum value 0.0269 (2.69%) shows that the companies' reliability on Short term debt is very low. The range of the data shows a difference between the company's managerial decisions. One operates with a higher risk to avoid tax burden and another operates with the help of own finance.

The LTDTA shows a mean value of 0.23235(23.24%). The maximum value is 0.9376(93.76) indicate the company is mostly depends on the long-term debt. 93.76% of their total asset is financed by long-term debt. The minimum value i.e. 0.0049(0.49%) shows that the company have a negligible amount as long term debt. This may arise due to the company's decision to work with own finance, or the profitability of the business is not sufficient to attract the investors.

The Growth rate of this industry replicate by the mean value of the growth rate shown above. A growth rate close to 20% over the past 15 years shows it is a profitable industry. Borrowing fund as debt capital or loan with a lower rate of Cost of capital attract the management to earn profit for the equity holders on excess profits above COC.

For all the variables the number of observations is 75. There are 5 company selected as sample from the pharmaceutical industry and their financial performance of last 15 years is measured to make these 75 observations. There are only 5 companies are selected as it is a time taking work and the data collection period is set as 15 years as it is a relevant time period to masers the future estimation and growth rate scenario.

**Table 2: Correlation Matrix**

	ROCE	STDTA	LTDTA	Firm Size	Growth
ROCE	1				
STDTA	-0.0274	1			
LTDTA	-0.43921	0.12652	1		
Firm Size	-0.59613	-0.23466	0.084256	1	
Growth	-0.04604	0.41936	0.210323	-0.10595	1

*Source: Compiled by authors with MS Excel 2010*

The above table show the correlation matrix of Pharmaceutical Companies of the variables (dependent, independent) computed with the help of MS Excel 2010. The diagonal line with '1' represents correlation of a variable with its own values.

In the above table, it is found that some of the variables are positively associated (i.e. there is a positive correlation between them). STDTA & LTDTA, STDTA & Growth, LTDTA & Firm size, LTDTA & Growth are to be find a positive association as the correlation values are positive. This means an increase in one variable results an increase in another variable. The degree of association i.e. how strong the two variables are associated, measured by correlation coefficients. In the above table the correlation coefficient between STDTA & Growth is 0.4194, which means there is a positive correlation between these two variables.

Whereas some of them are negatively associated. ROCE & STDTA, ROCE & LTDTA, ROCE & Firm size, ROCE & Growth, STDTA & Firm size, Firm size & Growth are negatively associated. That means the two variables moves in opposite direction. If one variable results an increase, another one results a decrease. The degree of association (correlation coefficient) between two variables are measured on above table. It shows the negative correlation between ROCE & Firm size i.e. -0.596, If the firm size increases, ROCE decries by 60% (-0.596) and vice versa.

On the above table ROCE is dependent variable and STDTA & LTDTA are independent variables. Firm size and Growth rate are to be found as control variable as it is constant and unchanged throughout the course of the investigation.

A negative correlation is found between ROCE with the other variables, where correlation Between ROCE & STDTA, ROCE & Growth shows a low

association. On the other hand, ROCE & LTDTA, ROCE & Firm size shows a respectively higher association between variables.

As found in N.G. Das (2016) “the proportion of variation explained by regression is equal to the square of correlation coefficient (r), i.e.

$$r^2 = \text{proportion of variation explained by regression}$$

The value of  $r^2$ , therefore, enables us to state the amount of variation in the dependent variable which can be explained by the regression equation.”

This means STDTA can only explain 0.1% variation in ROCE ( $r^2=0.00075$ ). Similarly, other variables LTDTA, Firm size, Growth can explain 19.3%, 35.54%, 0.2% respectively.

From the above analysis it can be said that the independent variables and control variables helps to predict the dependent variable ROCE to some extent. They may predict 55.14% (i.e. 0.1%+19.3%+35.545+0.2%) variation, but due to some overlapping (i.e. joint interaction) of some variables, the predictability may get reduced. A summary of results of OLS Method is made in table: 3 to analyse the Regression, P-value and T-value.

**Table 3: Regression analysis using OLS Method**

Dependent Variable		ROCE
Method		Panel Least Squares
Variables	Coefficient	P-value
C	86.7265	0.0000
STDTA	-18.0443	0.1721
LTDTA	-22.6538	0.0000
Firm size	-16.1331	0.0000
Growth	0.0106	0.7891
R square		0.5213
F-Statistic		19.0610
Probability of F-Stat.		0.0000

*Source: Compiled by authors with MS Excel 2010*

The above table summaries result for Ordinary Least Square (OLS) method with the dependent variable ROCE. ‘C’ (interceptor) explain as controlled term. The coefficient of ‘C’ is 86.7265 means if all the study variables are taken to be Nil, then ROCE will be 86.73%. The probability value of the coefficient (0.0000) is significant at 1% level (as the P-value<0.01).

The independent variables, LTDTA & STDTA shows a negative impact on the ROCE. LTDTA shows a negative coefficient of -22.6538 with a P-value of 0.0000 signify the variable at 1% level (as the P- value<0.01). STDTA shows a negative impact as the coefficient value comes -18.0443. The P-value of 0.1721 which indicates that the variable is not statistically significant at 5% level. Even it is not satisfying the 10% (P-value<0.1) level at all.

On the other hand, from the controlled variables Firm size shows a negative impact on ROCE. The coefficient of the variable (-16.1331) shows the probability of 0.0000, that means the variable is statistically significant at 1% (P-value<0.01) level.

The Growth variable shows a positive impact (0.0106). The P-value of 0.7891 which indicates that the variable is not statistically significant at 5% level. Even it is not satisfying the 10% (P-value<0.1) level at all.

The R-squared value as the coefficient of determination, is a statistical measure of how well the regression line approximates the real data points. Here R<sup>2</sup> value 0.5213 implies 52.13% variation in ROCE have been accounted for by the independent variables and controlled variables, and the remaining 47.87% variation is still unaccounted for.

The F-Statistics and Probability of F-stat shows whether the overall probability of the model is statistically significant or not. Here the probability of F statistic is statistically significant. Because the P value of F statistic (0.000) is less than 0.01, this means the model is significant even at 1% level.

## **VII. CONCLUSION**

Indian Pharmaceutical Industry has a rapid growth over the years, as the domestic market of this sector grows at the rate more than 9 per cent year-on-year, expected to maintain the similar growth in future. Apart from domestic sector the country exports pharmaceutical products all over the world. A lower cost of production and use of modern technology makes India the largest producer of Vaccines and Serums and one of the largest exporters of Generic Drugs. The Pharmaceutical Industry in India contributes 1.5 per cent on GTP of the country.

The main objective of the study was “To understand the movement of profitability in the context of debt capital composition through Panel Data Model”, which is successfully achieved. The other two objectives, i.e. to have a descriptive account of Indian Pharmaceutical Industry, with special reference to ‘Profitability’ & ‘capital structure’ Composition and the degree of association

among 'profitability' and 'capital structure' variables of Indian Pharmaceutical Industry are achieved in Data Analysis portion.

The main objective has been achieved by using Ordinary Least Square method of regression analysis. From the analysis it has been concluded that yes, capital structure composition (debt capital) do affects profitability in terms of ROCE, and in terms the specific objective we can now conclude that yes, we can understand the movement of return on capital employed in the context of capital structure composition through Fixed Effect Model constructed in this study and the model can account for 52.13% variation in ROCE. So, it can be concluded that "There is a significant relationship between capital structure and profitability".

## References

- 1 Acquash, P., Freeman, E. & Ellis, E. (2017). Relationship between Capital Structure and Profitability of Oil Marketing Companies (OMCs). *International Journal of Multidisciplinary Research and Development*, 4(3), 110-116.
- 2 Chavali, K. & Rosario, S. (2018). Relationship between Capital Structure and Profitability: A Study of Non-Banking Finance Companies in India. *Academy of Accounting and Financial Studies Journal*, 22(1), 1-8.
- 3 Das, N.G. (2016). *Statistical Methods Combined Edition (Volumes I & II)*. New Delhi: Tata McGraw Hill Education Private Limited.
- 4 Goyal, A. M. (2013). Impact of Capital Structure on Performance of Listed Public Sector Banks in India. *International Journal of Business and Management Invention*, 2(10), 35-43.
- 5 Modigliani, F. & Miller, M. (1958). The cost of capital, corporate finance and the theory of investment. *American Economic Review*, 48(2), 61-97.
- 6 Sarkar, R. & Choudhary, R. P. (2018). Impact of Capital Structure on Financial Performance: A Study of Select Automobile Companies in India. *MUDRA: Journal of Finance and Accounting*, 5(2), 70-84.
- 7 Srivastava, M. K. & Tiwari, A. K. (2015). A Study of Consumer Behaviour with Reference to Brand Lay's. *Pacific Business Review International*, 6(11), 56-71.
- 8 Tailab, M. M. K. (2014). The Effect of Capital Structure on Profitability of Energy American Firms. *International Journal of Business and Management Invention*, 3(12), 54-61.



# A Study on Marketing Mix in Context of Dynamic Marketing Concept

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## **ABSTRACT**

**A** traditional or normal business organization generally engages with the activities of purchasing or selling of goods and services in terms of money to earn profit. Until or unless the traditional marketing era entered into the era of e-commerce marketing through dynamic changes of different marketing concept, the four P's of marketing mix and its extended activities played sufficient role to achieve the goal of the organization. Advancement of internet based marketing mix demands new extended e-marketing mix. Traditional concept of marketing began with emphasizing on production and product and gradually it has changed with dynamic marketing environment. The four p's marketing mix is not confined within the limited activities. There are several extended Ps in marketing mix adopted by business organization to achieve the objectives in technology oriented competitive market. This study seeks to identify the changes of marketing mix in respect of dynamic concept of marketing and it also has tried to identify the needs of e-commerce marketing mix in modern e-commerce marketing era. To achieve the above objectives a descriptive analytical methodology has taken with the help of literature review. This study identified evolution of four basic Ps of marketing mix in respect of paradigm shift in marketing concept. It also identifies the necessity of e-commerce marketing mix in this e-commerce marketing era. This study is based on in depth survey of literature in context of evolution of marketing mix due to paradigm shift in marketing concept. It provides the new thinking of extended marketing mix element in light of e-commerce as well as digital marketing era.

**Key words:** *Marketing Concept, Marketing Mix, E-Commerce Marketing Era, E-Commerce Marketing Mix.*

## **I. INTRODUCTION**

In the traditional or classical approach of marketing emphasis was given on profit-earning motive but modern or neo-classical approach of marketing has shifted towards concept of value generation. Any organization can fulfill its short term objectives only by earning profit but to discharge long term responsibilities and to bring long term success it is necessary to maximize its value. To provide superior value to customer a wide range of activities are required which only can be possible by making proper infrastructure supported by effective marketing strategies. Traditional marketing strategy is followed by traditional marketing mix i.e. combination of four basic elements product, price, place and promotion. These are identified by McCarthy (1960) and his managerial approach shows that the mixes cover the tasks of analysis and planning of consumer behaviors, market research, and market segmentations. The 4Ps comprise sub-mixes. Marketing paradigm has shifted from earlier production concept to modern e-commerce marketing era.

All over the world marketing paradigm of today is greatly influenced by digital technologies and Until or unless the traditional business has entered into the era of digital business the four Ps of marketing mix and its extended activities played sufficient role to achieve the goal of the organization but entering digital technology in Indian business houses demand more and more new element in e- marketing mix to cope up with dynamism of environment.

## **II. LITERATURE REVIEW**

The journey of traditional marketing began with the production concept and the business organization used to believe that when goods are produced in large scale, the cost would be reduced and product would be sold at low price (Kotler, 2000). But in reality it was also not true that consumer only feel attraction to purchase cheap and easily available goods and services (Kotler, 2000). This crisis brings product concept in light. Organization started to believe in product concept; they thought if the quality of goods or services were good then customer would purchase it and they expanded their marketing efforts to increase the standard of goods and services. But after some times to overcome certain limitation of product concept selling concept comes into the picture. At that time marketing activities were structured to full the objectives of business organization based on contemporary marketing concept. McCarthy (1960) introduced 4Ps of marketing mix product, price, place and promotion which would be able to cover the requirement of marketing activities based on traditional concept. Borden, was renowned to highlight the concept of marketing mix and mentioned use of marketing mix to meet the challenges of business

organization and has also identified separate marketing mix of manufacturer which includes product planning, pricing, Branding, channel of distribution, personal selling advertising, promotion, packaging,. He has also given twelve managerial policies for each of these 4Ps. These marketing mix and their sub-mixes simplify serves proxy for managerial marketing activity (Kalyanam & McIntyre, 2002). The structure of marketing mix has an evolution with that of the business and marketing. The 4Ps' mix has gone through evolution of 7Ps (next three Ps are people, process and physical evidence).....to18Ps (next eleven Ps are profile, participation, performance, privacy, personalization, positioning, plan, priorities, practical, presence and platform).

The modern era of marketing philosophy pooled our attraction towards consumer satisfaction (Kotler, 2000). Changes in promotional mix is one of the evidence of evolution of marketing mix with dynamic marketing concept (Shannon, 1996).Belch & Belch (1993) and Dommermuth (1989) identified different components such as advertising, direct marketing, sales promotion, publicity, personal selling, mass selling, public relation, reseller support (trade promotion), point of purchase communication and event marketing of the promotion mix. He has also discussed different sales promotional which are mainly in consumer sales promotion (like coupon, refund, rebate etc.), trade sales promotion (display, trade, shows etc.) and reseller sales promotion (promotional allowances, contest etc.) These distinct ways of marketing communication process one act as primary component and other acts as supportive component and he has shown a new paradigm which strengthens the marketing communication system by keeping strong impact on target audience. Marketing concept only thought to bring satisfaction to the consumers by providing qualitative goods and services at reasonable price but that would not bring the mere satisfaction and welfare of the whole society. To achieve the long-term objectives for creation of brand, goodwill and reputation it was important for firms to emphasize on consumer welfare as well as societal welfare. As a result, the societal concept takes birth.

After that the organizations are strongly concentrating on the exchange of relationship and the relationship value of customers. This suggest for interrelationship between the variables of marketing mix at the different business levels (Singh, 2012). It may merely appear as an add-on to the traditional marketing, but Gummesson (1997) has strongly showed a paradigm shift towards the relationship marketing. Using of the social media and mobile technologies are now common ways to interact and to enhance relationship with the customers (Nguyen & Mutum, 2012). Moretti & Tuan

(2014) have considered social media marketing as a part of relationship marketing, especially as an evolutionary factor. Social media channels can be effectively combined with the traditional customer relationship marketing (CRM) channels (Elfving & Lemoine, 2012). An inclusion of social media communication channels along with the existing relationship management ones provides several advantages like more customer satisfaction, increasing loyalty, and high-quality relationship.

Focusing on the benefits of the consumers; journey of traditional marketing gradually converted into relationship marketing by focusing in to bring up loyalty of customers by providing ideal goods and services. Relationship marketing is associated with maximize the value of the relationship for the customers, retention of customers and increase the satisfaction of customers. On relationship management and marketing mix of customer value and brand image, their customer trust and business service may have positive relation between relationship marketing and marketing mix.

The contemporary literature also establish paradigm shifts in the marketing mix from the traditional marketing concept to the relationship marketing concept (Grönroos, 1994), from the relationship marketing concept to the e-commerce marketing concept (Darby et. al., 2003) and amongst the different marketing paradigms of the e-commerce marketing (Mukhopadhyay & Mishra, 2011). The marketing academics have continuously been offering additional Ps to the list, but it becomes obsolete at rapid innovations in business organizations. (Grönroos, 1994).

Entering internet technology in business world has significant impact. This technology has pulled global companies into in the online marketing business (Mirescu, 2010). Increasing trend in online consumers' consumption patterns along with faster technological development support the firm for to adopt online commerce as a business model (Rodríguez-Ardura & Meseguer-Artola, 2010). Online marketing, therefore, has strengthen the existing relationship marketing. The marketing voyage is presently going through the ecommerce marketing era and the same is approaching towards the digital marketing era (Kaur & Sharma, 2009; Leeflang et. al., 2014; and Parsons, et. al., 1998). As a result in the era of 1990s' e-commerce started to take an important place in business field with the help of internet technology try to reach the target customer by means of different market activities which has given the birth of the concept of e-marketing and gradually with the advancement of internet based marketing system this e-marketing mix demands new extended e-marketing mix..

Further advancements in the information technologies have changed the business strategies and have disrupted many established business value chains (Evans, 2003; el Ata & Drucbert, 2017). The customer-centric approach (about product designs or pricing etc.), collaborative web content, globalization and the big data analysis are some examples of the emerging paradigms in the present days' e-commerce business (Balaraman & Chandrasekar, 2016).

In competitive business environments, the organization always try to establish itself faster and smarter ones (Cakmak, 2014). The paradigm of e-commerce has, thus, its origin constructed once the web is considered to make communication on a "many to many basis" (Donna & Novak, 1997).). The e-services to business have also gone through phases of introduction of elementary software programs, the creation of customer service centers via telephone-based call centers and thirdly and the development of customer interaction centers through e-mail, fax etc. (Damanpour & Damanpour, 2001). The paradigm shift in business channels has also observed in the growing interest to use smartphones by the peoples (Shankar et. al., 2010).. In adapting to the different e-commerce models by the present days' business, paradigm shifts in e-commerce strategic marketing policies, business approaches, marketing mix, and objectives etc. are needed.

### **III. FINDINGS**

At the initial stage four basic elements of marketing mix met effectively and efficiently the demand of traditional marketing concept. Evolution of marketing concept induced to add additional Ps in marketing mix. As a result the 4Ps' mix has gone through evolution of the 7Ps (while the next 3Ps are people, process and physical evidence) to the 18Ps (where the next 11Ps are profile, participation, performance, privacy, personalization, positioning, plan, priorities, practical, presence and platform). There are also evidence of addition of new elements of marketing mix with the existing marketing mix element to meet the demand of dynamic marketing concept.

New changes in promotional mix such as advertising, direct marketing, sales promotion (e.g. coupon, refund, rebate, trade shows, display, contest etc.), publicity, personal selling, mass selling, public relation, reseller support (trade promotion), point of purchase communication and event marketing of the promotion mix. Promotion (promotional allowances, contest etc.) acted sometimes as primary component or supportive component to cope up with the changes in marketing concept

Essentially, the literature of e-commerce marketing mix is highly influenced

by these Ps and some additional Ps as per the requirement of the business paradigm shift. The journey of physical to digital brings changes in the product or service sold, process, delivery agent or intermediaries and whatever be the form of e-commerce. On the basis of relationship pattern between business and consumer five models in e-commerce exist in marketplace such as Business to Consumer (B2C) model, Business to Business model (B2B), Business to Government (B2G) model, Consumer to Consumer model (C2C) model and Consumer2Business model (C2B). Marketing mix of each such market place is also changing to meet day to day new demand, new thinking and new technology.

#### **IV. CONCLUSION**

This study provides a clear picture of evolution of marketing mix in accordance with dynamism of marketing concept. Though this study is only based on theoretical analysis of paradigm shift in marketing mix in context of dynamic marketing concept. But it revealed the fact that marketing mix of business organization in any particular time is determined by cotemporary marketing concept. This study is failed to identify separately the changes of each element of marketing mix under individual marketing concept. In this e-commerce marketing era there are several model in e-commerce market place. There is also a scope of further study to identify individual elements of marketing mix and its changes in each category of e-commerce market place in depth.

#### **References**

- 1) Balaraman, P. & Chandrasekar, S. (2016). E-Commerce Trends and Future Analytics Tools. *Indian Journal of Science and Technology*, 9(32), 1-9, DOI: 10.17485/ijst/2016/v9i32/98653.
- 2) Cakmak, T. (2014). Escaping the Red Queen Effect through Technology Intelligence: A Review of the Literature and Recommendations. *Economics and Management*, 19(2), 202-211.
- 3) Damanpour, F. & Damanpour, J. A. (2001). E-Business E-commerce Evolution: Perspective and Strategy. *Managerial Finance*, 27(7), 16-33.
- 4) Darby, R., Jones, T. & Madani, G. A. (2003). E-commerce Marketing: Fad or Fiction? Management Competency in Mastering Emerging Technology. An International Case Analysis in the USA. *Logistics Information Management*, 16(2), 106-113.
- 5) Dommermuth, W. P. (1989). *Promotion: Analysis, Creativity, and Strategy*, PWS-Kent Publishing Company.
- 6) Donna, L. & Novak, H. T. P. (1997). *A New Marketing Paradigm for Electronic*

- Commerce. *The Information Society*, 13(1), 43-54.
- 】 el Ata, N. A. & Drucbert, A. (2017). Identifying the Cure for Dynamic Complexity: Improve, Transform or Disrupt? Leading from Under the Sword of Damocles, Berlin, Heidelberg: Springer Vieweg, 83-92.
  - 】 Elfving, J. & Lemoine, K. (2012). Exploring the Concept of Customer Relationship Management: Emphasizing Social. Uppsala University. <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A535496&dsid=831>
  - 】 Evans N. D. (2003). *Business Innovation and Disruptive Technology: Harnessing the Power of Breakthrough Technology...for Competitive Advantage*. FT Press.
  - 】 Grönroos, C. (1994). From Marketing Mix to Relationship Marketing: Towards a Paradigm Shift in Marketing. *Management Decision*, 32(2), 4-20.
  - 】 Grönroos, C. (1997). Keynote Paper from Marketing Mix to Relationship Marketing- Towards a Paradigm Shift in Marketing. *Management Decision*, 35(4), 322-339.
  - 】 Gummesson, E. (1997). Relationship Marketing as a Paradigm Shift: Some Conclusions from the 30R Approach. *Management Decision*, 35(4), 267-272.
  - 】 Harvey, M. G., Lusch, R. F. & Cavarkapa, B. (1996). A Marketing Mix for the 21st Century. *Journal of Marketing Theory and Practice*, 4(4), 1-15.
  - 】 Kalva, R. S. (2017). A Model for Strategic Marketing Sustainability (Marketing Mix to Marketing Matrix). In *National Conference on Marketing and Sustainable Development*, 13, 14.
  - 】 Kalyanam, K. & McIntyre, S. (2002). The E-marketing Mix: A Contribution of the E-Tailing Wars. *Journal of the Academy of Marketing Science*, 30(4), 487-499.
  - 】 Kaur, G. & Sharma, R. D. (2009). Voyage of Marketing Thought from a Barter System to a Customer Centric One. *Marketing Intelligence and Planning*, 27(5), 567-614.
  - 】 Kotler, P. (2000). *Marketing Management*, Upper Saddle River, NJ: Prentice Hall.
  - 】 Leeftang, P. S., Verhoef, P. C., Dahlström, P. & Freundt, T. (2014). Challenges and Solutions for Marketing in a Digital Era. *European Management Journal*, 32(1), 1-12.
  - 】 McCarthy, E. J. (1960). *Basic Marketing - A Managerial Approach*, Indiana: R. D. Irwin.
  - 】 Mirescu, S. V. (2010). The Premises and the Evolution of Electronic Commerce. *Journal of Knowledge Management, Economics and Information Technology*, 1(1), 1-5.
  - 】 Moretti, A. & Tuan, A. (2014). Social Media Marketing and Relationship Marketing: Revolution or Evolution? A First Step Analysis. <https://arpi.unipi.it/handle/11568/777197#.XBdekWgzbDc>; DOI: 10.7433/ s93.2014.08

- 】 Mukhopadhyay, D. & Mishra, S. (2011). Strategic Issues for A successful E-commerce. arXiv preprint arXiv:1102.0706.
- 】 Nguyen, B. & Mutum, D. S. (2012). Customer Relationship Management: Advances, Dark Sides, Exploitation and Unfairness. *International Journal of Electronic Customer Relationship Management*, 6(1), 1-19.
- 】 Parsons, A., Zeisser, M. & Waitman, R. (1998). Organizing Today for the Digital Marketing of Tomorrow. *Journal of Interactive Marketing*, 12(1), 31-46.
- 】 Shankar, S., Kalbarga, S. & Maity, S. (2010). Concurrent Execution of a Smartphone Operating System and a Desktop Operating System, U.S. Patent Application 12/706,392, filed August 19, 2010; Retrieved From- Google Patents, PDF Download link: <https://patentimages.storage.googleapis.com/e4/1c/bc/98adea0e56679e/US20100211769A1.pdf>
- 】 Shannon, R. J. (1996). The New Promotions Mix: A Proposed Paradigm, Process, and Application. *Journal of Marketing Theory and Practice*, 4(1), 56-68.
- 】 Singh, M. (2012). Marketing Mix of 4P's for Competitive Advantage. *IOSR Journal of Business and Management*, 3(6), 40-45.



# Online Teaching during the Pandemic -A Study with reference to the Undergraduate Students

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## **ABSTRACT**

The Corona virus pandemic and an unprecedented isolation have hit us hard socially, financially and economically. Doctors across the world are fighting to save the lives of the patients from corona virus disease (COVID 19) by using supporting life saving devices. On the other side faculty members at different Higher Educational Institutions (hereinafter, HEIs), are contributing with the effort of dissemination of knowledge to the students through various digital method of learning. University Grants Commission on 21<sup>st</sup> March 2020 communicated through a notice, that in order to provide safety and security of the faculty members they should be allowed to work from home and shall disburse the academic learning to students through various online innovative methods of learning. Teachers are faced with an entirely different array and level of stress during the phase of complete confinement caused by the pandemic situation. Continuous endeavors by the teachers in the learning process during this phase for the beneficial interest of the students may be considered to be highly appreciable. The basic objective of the paper is to consider how the faculty members of different HEIs are trying to reach their students through various types of online study materials with the object of covering the syllabus of the ongoing semester. The study shall also consider the analysis of the responses of the students under CBCS system as collected through a structured questionnaire circulated to students to know the level of satisfaction of the online materials that they are being provided by their institutions. Statistical software shall be used to analyze the responses of the students under different streams of study. Teachers are definitely contributing in the development of the

economy and their effort can scale up the knowledge of the students that can again lead to the potential growth of the HEI during this turbulent times.

**Key words:** *Digital Learning, Higher Education Institutions, Online Material, Stress.*

## I. INTRODUCTION

The Corona virus pandemic and an unprecedented isolation have hit us hard socially, financially and economically. Doctors across the world are fighting to save the lives of the patients from corona virus disease (COVID 19) by using supporting life saving devices. On the other side faculty members at different Higher Educational Institutions (hereinafter, HEIs), are contributing with the effort of dissemination of knowledge to the students through various digital method of learning. University Grants Commission on 21<sup>st</sup> March 2020 communicated through a notice, that in order to provide safety and security of the faculty members they should be allowed to work from home and shall disburse the academic learning to students through various online innovative methods of learning. On 24<sup>th</sup> March 2020, the Government of India specified complete isolation for 21 days that limited the movement of the population of the country which is considered to be only one of the remedies against the present COVID-19 pandemic. Such a decision was taken by the Government of India after the 14 hour public curfew as declared on 22<sup>nd</sup> March 2020 which was followed by series of regulations as enforced by the Government. Following the regulations and declarations of the Government, the State Government also specified complete restriction of movement of the people of the respective states. On 14<sup>th</sup> April Government of India extended the period to 3<sup>rd</sup> May 2020 with a conditional relaxation after 20<sup>th</sup> April for the regions where the spread has been controlled. The Union Government has declared and implemented new lockdown guidelines from May 4, 2020. The article shall be discussing the contribution of the teachers in HEIs of Kolkata towards teaching the students through online materials. The study shall also find that level of satisfaction that the students are getting from the study materials which are uploaded in the college websites or provided by their college teachers during this phase. Teachers who are working in different designations during these phases are undergoing different levels of stresses but in spite of all constraints they are working continuously for serving the interest of their students and the institutions to which they are belonging. Stress management strategies like reframing problems, positive attitudes, establishing connections with others, engaging in activities to enjoy life, exercising regularly, eating healthy,

getting enough sleep and other measures can help the teachers to overcome the dystrophic sufferings as faced by themselves and the society. Stress relief is necessary during the phase of complete isolation which can help in generating better resource materials for students.

## **II. NEED AND SCOPE OF THE STUDY**

The basic need of the study is to find that the teachers at HEIs are working to serve their students and their continuous endeavors are helping the students to learn and cover their syllabus during this phase. The semester based education system by the University Grants Commission followed by the University of Calcutta has made the education system half yearly. The new semesters for commerce, arts and science which started by the end of December or January has been interrupted by the Corona Virus 2019. The HEIs got closed from 16<sup>th</sup> March 2020 and is expected to remain closed up to 10<sup>th</sup> June 2020. This decision has been taken as a precautionary measure to check the spread of COVID-19 based on the government notification No.86/1(3)-SSE/20 dated 14.03.2020. From then onwards learning modules are been provided to students in order to cover up the syllabus which remained uncovered due to the world pandemic situation.

## **III. LITERATURE REVIEW**

Rapid developments in technology have made distance education easy (McBrien et al., 2009). “Most of the terms (online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning, for ex.) have in common the ability to use a computer connected to a network, that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means” (Cojocariu et al., 2014). Online learning can be termed as a tool that can make the teaching-learning process more student-centered, more innovative, and even more flexible. Online learning is defined as “learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students” (Singh & Thurman, 2019).

## **IV. OBJECTIVES OF THE STUDY**

### **Objectives of the study are to find:**

The degree of association between the variables under study in order to find that the materials prepared by the teachers as per convenience of the students has any correlation with the satisfaction level of the students for the materials

as provided during the lockdown period.

The frequencies of the responses of the students for the multiple types of materials accessed by them during lockdown and the online materials as provided by their teachers during this period.

A study on the multiple responses as provided by the students on the use of the type of the materials used by them during pandemic.

## **V. DATA AND METHODOLOGY**

The study is an empirical work which has considered the responses of five hundred and thirteen students (513), as sample of the study who are undergoing their graduation degree under CBCS system from different colleges of Kolkata affiliated to the University of Calcutta. The responses have been given by the students of both sponsored and non sponsored or self financed colleges. A structured questionnaire has been prepared for collecting responses of the students. The questionnaire was circulated through Google forms and the period for collecting the responses was for a time span of one week from 20<sup>th</sup> April 2020 to 27<sup>th</sup> April 2020. The questionnaire has been responded by students of ten colleges of Kolkata. The sample responses have been analyzed by using statistical SPSS software 19.

Google Link: <https://docs.google.com/forms/d/1YZ4BLFk71GeCprerMxnGUasLu1umnw50Iu2nD8lLag/edit?usp=sharing>

## **VI. ANALYSIS OF THE STUDY**

### **1. Reliability Test by using the Cronbach alpha**

Cronbach's alpha measures the internal consistency of a group of items by measuring the homogeneity of the group of items. "It is an indication of how well the different items complement each other in their measurement of different aspects of the same variable or quality" (Litwin, 2003, p. 22). Cronbach's alpha ranges in value between zero and one. Values closer to one indicate a higher internal consistency; values closer to zero indicate a lower internal consistency. From the data set by using the reliability test it could be seen that the result of five point scale for five items of the scale is showing the result 0.890 which indicates Cronbach's Alpha based on standardized item. Inter item correlation matrix, displays that how each item correlates to all of the other items. The result has indicated that the correlation is perfect ( $r=1$ ). All the items are correlated well together. None of the item represents low correlation so the items of the questions may not be removed.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.890	.890	5

	Covering of syllabus	Quantity of materials provided	Content of material prepared by teachers	Question Banks Provided	Materials as per convenience of the students
Covering of syllabus	1.000	.658	.628	.559	.602
Quantity Of Materials provided	.658	1.000	.784	.552	.591
Content of materials prepared by teachers	.628	.784	1.000	.609	.616
Question Banks provided	.559	.552	.609	1.000	.592
Materials as per convenience of the students	.602	.591	.616	.592	1.000

*Source: Primary Data; computed SPSS 19*

		N	%
Cases	Valid	512	100.0
	Excluded <sup>a</sup>	0	.0
	Total	512	100.0

a. Listwise deletion based on all variables in the procedure.

## 2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Onlinematerial	512	1	2	1.22	.414
Onlineclass	512	0	8	1.90	1.598
Textbooks	512	1	2	1.57	.496
Youtubevedio	512	1	3	1.73	.449
Etextbooks	512	1	2	1.88	.329
resourcesfrominternet	512	1	2	1.79	.407
Onlinelibrary	512	1	2	1.94	.246
Weblinkfromugc	512	1	2	1.93	.256
coveringofsyllabus	512	0	5	2.03	.799
qtyofmaterial	512	1	5	1.99	.797
Valid N (listwise)	512				

*Sources: Computed using SPSS 19*

	N	Minimum	Maximum	Mean	Std. Deviation
contentofmaterial	512	1	5	1.93	.772
questionbank	512	1	5	2.24	.817
convofstu	512	1	5	2.09	.783
powerpoint	512	1	2	1.69	.463
googleclass	512	1	2	1.39	.488
audiolec	512	1	2	1.65	.478
mcqques	512	1	2	1.70	.461
studymat	512	0	2	1.54	.503
youtubelink	512	1	2	1.82	.381
Rating	512	1	5	2.30	1.308
Valid N (listwise)	512				

*Sources: Computed using SPSS 19*

**Interpretation:** From the descriptive statistics it could be seen that for each variable the maximum and minimum value lies mostly from one to five but for only online classes the value lies from zero to eight. The mean and standard deviation is close to each other only for rating of materials by students the mean and standard deviation is higher. The standard deviation of online

classes are higher than other variables. For rating of materials both the value of the mean and the standard deviation is higher which indicates that the value of the data set is clustered round the mean and for online classes also the mean and standard are higher which shows the concentration of the variables.

### 3. Test of Normality of the Data

Bi variate data are data in which two variables are measured on an individual. The data set from the responses of the students are quantified and the relationship is been described between them. While analysis of data is conducted, dependent and independent variable is to be determined. Dependent variable is a variable that may depend on other factors. For example in the data set “Rating of the teacher and their institution by their students” is a dependent on the independent variable the “stream” to which the student is belonging and “Materials as per the convenience of the student” is dependent on the independent variable that is “gender” of the students. And independent variable is a variable that does not depend on other factors.

The following numerical and visual outputs must be investigated for testing the Normality of the variables:

- Skewness & Kurtosis Z-Values
- (should be somewhere in the span of -1.96 to+1.96)
- The Shapiro –Wilk test p-value
- (should be above 0.05)
- Histogram, Norma Q-Qplots and Box Plots
- (should visually indicate that out data are approximately normally distributed)
- In the present study normality test has been done using SPSS.

A Shapiro-Wilk’s test has been done and the result is  $p < 0.05$ ; which indicated that the results are not normally distributed tested at 95% confidence level. Skewness of the scores between “rating” and “stream of the students” are (3.4,4.5,1.7); (S.E=0.131,0.195,0.337), and Skewness of the scores between “Materials as per convenience of the students” and “Gender” are (2.7, 3.12) (S.E= 0.218, 0.433). As the population is not bivariate normal and the sample size exceeds 10, a non-parametric statistic, Spearman rho test and Kendells Tau Test , is usually used to measure the association between two variables when no transformation for the data can be found to approximate a bivariate normal distribution. The range for Spearman’s statistic,  $r$  is between -1 and 1, inclusive.

#### 4. Correlation has been established between

- Materials prepared as per convenience of the students and students satisfaction on covering of the syllabus (MAPCS-COS)
- Materials prepared as per convenience of the students and students satisfaction on the quantity of the materials as supplied during lockdown period(MAPCS-QOM)
- Materials prepared as per convenience of the students and students satisfaction on the content of the materials prepared by the teachers (MAPCS-COM)
- Materials prepared as per convenience of the students and students satisfaction on question bank as provided to the students by the teachers (MAPCS-QB)
- Materials prepared as per convenience of the students and the rating given by the students for their teachers and the Institutions (MAPCS-RBS)
- Materials prepared as per convenience of the students and the gender of the student(MAPCS-GOS)
- Materials prepared as per convenience of the students and stream to which the students belong(MAPCS-SOS)

#### Non Parametric Test:

As the data set is not normal so Spearman's rho test and Kendall's Tau test has been used for the study. The variables are tested at 99% of significance level.

**Spearman's rho Test:** is a non-parametric test used to measure the strength of association between two variables, where the value  $r = 1$  means a perfect positive correlation and the value  $r = -1$  means a perfect negative correlation.

**Table 6: Non-Parametric Correlation Test 1**

Correlation of students satisfaction with one major factor and along with two independent factor	Value of coefficient of correlation
(MAPCS-SSCOS)	.583**
(MAPCS-SSQOM)	.572**
(MAPCS-SSCOM)	.612**
(MAPCS-SSQB)	.584**



(MAPCS-RBS)	.356**
(MAPCS-GOS)	.799
(MAPCS-SOS)	.016
Significant at 1% level of significance	

*Source: Primary Data; tested by using SPSS 19*

**Interpretation:** From the study it could be seen that there exists a strong degree of association between all the sub variables and the student satisfaction level towards the materials as provided during lockdown. It means that the students are highly satisfied by the methods of teaching and learning as provided through online during the world pandemic. But the degree of correlation between (MAPCS-RBS) is lower with respect to others. It is showing 0.356\*\* that is there is only 35% of association between satisfaction of the students and the rating given towards their institution and their teachers. Student's satisfaction is not only dependent on the types of materials as provided to them during this crisis but it also depends on student teacher interactions, class communication, extra curricular activities, and student perception towards their institution. Similarly, the association between (MAPCS-GOS) and (MAPCS-SOS) is lower as because the value of codification increases the value of correlation coefficient reduces. "Male" and "Female" is coded as 1 and 2 respectively. And for Streams of students for Commerce, arts and science the codifications are 1,2,3 respectively.

**Kendall's tau\_b Test:** is a non-parametric measure of relationships. The **Tau** correlation coefficient returns a value of 0 to 1, where: 0 is no relationship, 1 is a perfect relationship.

**Table 7: Non-Parametric Correlation Test 2**

Correlation of the five sub factors with one major factor along with independent factor	Value of coefficient of correlation
(MAPCS-SSCOS)	.543**
(MAPCS-SSQOM)	.534**
(MAPCS-SSCOM)	.572**
(MAPCS-SSQB)	.545**
(MAPCS-RBS)	.304**
(MAPCS-GOS)	.011
(MAPCS-SOS)	.014

Significant at 1% level of significance
-----------------------------------------

Source: Computed values by using SPSS 19.

**Interpretation:** From the study it could be seen that there exists a strong degree of association between all the sub variables and the student satisfaction level towards the materials as provided during lockdown. It means that the students are highly satisfied by the methods of teaching and learning as provided through online during the world pandemic. But the degree of correlation between (MAPCS-RBS) is lower with respect to others. It is showing .304\*\* that is there is only 30% of association between satisfaction of the students and the rating given towards their institution and their teachers. Student’s satisfaction is not only dependent on the performance of their institution during this crisis but it also depends on many other factors. Similarly, the association between (MAPCS-GOS) and (MAPCS-SOS) is lower as because the value of codification increases the value of correlation coefficient reduces. “Male” and “Female” is coded as 1 and 2 respectively. And for Streams of students for Commerce, arts and science the codifications are 1, 2, 3 respectively.

### 5. Frequencies: Descriptive Statistics for Online Material types during lockdown

**Table 8: Frequency Distribution**

	Yes (number)	Yes (percentage)	No (number)	No (percentage)	Total
Online materials	400	78.1	112	21.9	512
Online classes	187	36.5	276	53.9	463 49(missing)
Text books	222	43.4	290	56.6	512
You tube vedio	139	27.1	372	72.7	511 (1 missing)
Etext books	63	12.3	449	87.7	512
Rosiurces from internet	107	20.9	405	79.1	512
Online library	33	6.4	479	93.6	512

Source: Computed using SPSS 19

### Multiple Responses:

Table 9: Study through Online Material types during lockdowna - Case Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Study through online material types during lockdowna	511	99.8%	1	.2%	512	100.0%

a. Dichotomy group tabulated at value 1.

**Table 10: Study through Online Material types provided by Teachers during lockdowna Frequencies**

	N	Responses			Percent of Cases
		Percent			
Study through online material types during lockdowna	Online materials provided by colleges to students	400	33.7%	78.3%	
	Online classes from college authorities to students	187	15.8%	36.6%	
	Textbooks of their courses	222	18.7%	43.4%	
	Youtube vedios	139	11.7%	27.2%	
	e- textbooks	63	5.3%	12.3%	
	Resources from internet	107	9.0%	20.9%	
	Online library	33	2.8%	6.5%	
	Weblink from UGC	36	3.0%	7.0%	
Total		1187	100.0%	232.3%	

a. Dichotomy group tabulated at value 1.

*Source: Computed using SPSS 19*

**Interpretation:** From the analysis it could be seen that about 33.7% of students are studying from online materials as provided by their colleges and 15.8% of students are availing the benefit of online classes from their colleges. And the multiple responses of each variables are considered as dichotomous and for “Yes” it the coded as “1”. Percentage of responses is considering the values which has been coded as “Yes” for that particular variable and percentage of cases includes multiple responses of the students who are accessing those materials. From the study it could be seen that maximum students are accessing online materials. So the results indicate that the contribution of the teachers and their institutions are immensely benefitting the students during this phase.

## 6. Frequencies: Descriptive Statistics for Online Material as provided by Teachers of the Colleges

**Table 11: Frequency Distribution**

	Yes (number)	Yes (percentage)	No (number)	No (percentage)	Total
Power point presentation	159	31.1	353	68.9	512
Google classrooms	313	61.1	199	38.9	512
Audio lectures of teachers	180	35.2	332	64.8	512
MCQ Questions prepared by teachers	156	30.5	356	69.5	512
Study materials as prepared by teachers	236	46.1	275	53.7	511 1 (missing)
Youtube link by teachers of your college	90	17.6	422	82.4	512

*Source: Computed using SPSS 19*

### Multiple Responses:

**Table 12: Online Material as provided by Teachers during Lockdown-Case Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
\$online materials as provided by teachers during lockdowna	511	99.8%	1	.2%	512	100.0%
a. Dichotomy group tabulated at value 1.						

*Source: Computed using SPSS 19*

**Table 13: Online Material as provided by Teachers of the Colleges during lockdown- Frequencies**

N		Responses		Percent of Cases
		Percent		
\$Online materials as provided by teachers of the collegesa	Power point presentation	159	14.0%	31.1%
	Google classrooms	313	27.6%	61.3%
	Audio lectures of teachers	180	15.9%	35.2%
	MCQ Questions prepared by teachers	156	13.8%	30.5%
	Study materials as prepared by teachers	236	20.8%	46.2%
	Youtube link by teachers of your college	90	7.9%	17.6%
Total		1134	100.0%	221.9%

a. Dichotomy group tabulated at value 1.

*Source: Computed by using SPSS 19*

**Interpretation:** From the analysis it could be seen that about 27.6% of students are studying by accessing Google classrooms of their colleges and their teachers. And 20.8% of students are availing the benefit of the study materials as prepared by their teachers. 15.9% and 13.8 % of students as studying from audio lectures of their teachers and practicing MCQ questions as prepared by their teachers. The multiple responses of each variables are considered as dichotomous and for “Yes” it the coded as “1”. Percentage of responses is considering the value which has been coded as “Yes” for that particular variable and percentage of cases includes multiple responses who are accessing those materials. The results are indicating that the contributions of the teachers are immensely benefitting the students during this phase.

## VI. CONCLUSION

From the study it can be concluded that students from different colleges are studying from the online materials. From the multiple responses it could be seen that the mostly the students are accessing online materials are provided

to them by their college and those types of materials and on line classes that are provided by their teachers. The analysis shows that the students are dependent on their college teachers for enhancing their learning and facing the upcoming examinations after the closure of the lockdown period. A continuous endeavor of the teachers shall definitely help to overcome the crisis as faced by the students and the institutions. The system of learning has changed during pandemic and the students of any educational institutions are able to access only online materials that are provided to them by their college teachers. The mode of teaching has also changed a lot and from the analysis it could be seen that the students are highly dependent on the materials that are provided by the teachers while teaching in their online classes. Students are able to identify the extent of learning required from the teachers' class lectures. The study shows that the students of undergraduate colleges are dependent of the learning system as provided by their educational institutes.

## References

- 】 Cojocariu, V.M., Lazar, I., Nedeff, V. & Lazar, G. (2014). SWOT analysis of e-learning educational services from the perspective of their beneficiaries. *Procedia-Social and Behavioral Sciences*, 116, 1999–2003.
- 】 Litwin, M. S. (2003). *How to assess and interpret survey psychometrics*, 2nd edition. Thousand Oaks, CA: Sage Publications, Inc.
- 】 McBrien, J. L., Cheng, R. & Jones, P. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *The International Review of Research in Open and Distributed Learning*, 10(3), 1–17.
- 】 Preventive measure to achieve social distancing–permission to Teaching and Non-Teaching staff to work from home” F.No.1-14/2020 (website); dated 21<sup>st</sup> March 2020; [https://www.ugc.ac.in/pdfnews/7248697\\_UGC-Advisory---Permission-to-work-from-home-in-view-of-COVID-19.pdf](https://www.ugc.ac.in/pdfnews/7248697_UGC-Advisory---Permission-to-work-from-home-in-view-of-COVID-19.pdf)
- 】 Singh, V. & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *American Journal of Distance Education*, 33(4), 289–306.

# Digital Banking in India: The Way Ahead

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## ABSTRACT

The banking sector is the backbone of every economy. It plans and implements the economic reforms and all other sectors are largely depend on it. Any small change in that particular sector has a large impact on all over the economy. By digitalisation of banking system through the adoption of technology have an extensive impact on the growth of an economy. Nowadays, banks are seeking unconventional ways to provide and differentiate amongst their diverse services. Both corporate as well as retail customers are no longer willing to queue in banks for the basic banking services. They want a facility to conduct banking activities at any time and any place. Unified Payments Interface (UPI), Plastic money (Credit Cards, Debit Cards and Smart Cards), Point of Sale, electronic fund transfer and clearing services, online trading accounts, telephone banking, Internet Banking, Immediate Payment Service (IMPS), Mobile Banking are some of the recent products offered by the bank. Digital Banking system will reduce cash related robbery thereby reducing risk of carrying cash and cash related corruption. That reforms help in modernization of payment system, Reduction in high security and safety risk, Reduction in the cost of banking service and also curb banking related corruption. The proposed study focuses on the emergence of digital banking system in Indian economy and digital banking trends in India and also try to find out the opportunities and challenges of going digital in the Indian banking sector.

**Keywords:** Digital Banking, Demonetisation, Information Technology, Financial Literacy, Cyber Security.

## I. INTRODUCTION

Digital Banking is a generic term for delivery of banking/ financial services and products through electronic channels, such as the Automated Teller

Machines (ATMs), the telephone, the internet, the social media, the mobile phone, etc. The banking industry in India is progressively expanding. The liberalization of the economy has created a competitive culture that has taken the service sector, particularly the banking sector by storm. The banking sector has been the backbone of every emerging economy. It plans and implements the economic reforms. Any change in this sector through the adoption of technology will have a sweeping impact on an economies growth. The advancement of information collection, storage, processing and transmission technologies have impacted all aspects of the banking activity.

The post liberalization competitive culture in India has forced all banks realize that in order to remain competitive and provide the most excellent services to their customers, they need to encompass the most recent technology in place. This cutting-edge competition, rapid changes in technology and the hectic lifestyles have changed the facade of banking. Nowadays, banks are seeking unconventional ways to provide and differentiate amongst their diverse services. Both corporate as well as retail customers are no longer willing to queue in banks, or wait on the phone, for the basic banking services. They require and expect a facility to conduct their banking activities at any time and place. Irrespective of being a public sector or private sector bank, almost all of them have given maximum significance to technological development and deployment. To illustrate, ATMs, plastic money (Credit Cards, Debit Cards and Smart Cards), online collection and payment services, online investments (Deposits and Mutual Funds), online De-mat and Trading accounts, Electronic Funds Transfer (ETF) and clearing services, branch networking, telephone banking, mobile applications and wallet, and internet banking are the outcomes of their initiative towards technological up gradation.

## **II. LITERATURE REVIEW**

Mr. Vijay Prakash Gupta & Dr. P.K. Agarwal (2013) - In their research paper "Comparative Study of Customer Satisfaction in Public Sector and Private Sector Banks in India". This paper gives with the introduction of liberalization policy and RBI's easy norms several private and foreign banks have entered in Indian banking sector which has given birth to cut throat competition amongst banks for acquiring large customer base and market share. Banks have to deal with many customers and render various types of services to its customers and if the customers are not satisfied with the services provided by the banks then they will defect which will impact economy as a whole since banking system plays an important role in the economy of a country, also it is very costly and difficult to recover a dissatisfied customer.



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Malhotra and Singh (2010) conducted an exploratory study and make effort to present the current status of Internet banking in India and the extent of Internet banking services offered by Internet banks.

Vijay M. Kumbhar (2011)- In his research paper "Factors Affecting the Customers satisfaction In E-Banking: Some evidences Form Indian Banks". This study evaluates major factors (i.e. service quality, brand perception and perceived value) affecting on customers' satisfaction in e-banking service settings. This study also evaluates influence of service quality on brand perception, perceived value and satisfaction in e-banking

Kumbhar (2011) evaluates major factors (i.e. service quality, brand perception and perceived value) affecting on customers satisfaction in e-banking service settings. This study also evaluates influence of service quality on brand perception, perceived value and satisfaction in e-banking.

Pooja Malhotra & Balwinder SINGH (2009) - In their research paper "The Impact of Internet Banking on Bank Performance and Risk: The Indian Experience". The paper describes the current state of Internet banking in India and discusses its implications for the Indian banking industry. Particularly, it seeks to examine the impact of Internet banking on banks' performance and risk. Using information drawn from the survey of 85 scheduled commercial bank's websites, during the period of June 2007, the results show that nearly 57 percent of the Indian commercial banks are providing transactional Internet banking services Nanda (2016) states that, we will be a piece of our not really far off future when we anticipate driverless autos and robots; it ought to be similarly immediate for us to envision a future banking framework with its own type of artificial intelligence (AI).

Yadav (2017) highlights that digitalization is enhancing customer

experience and making it easy for the customer to do business with the Bank and vice-versa, by effective use of technology.

Golani (2017) says that the banking and financial services sector in India has undergone through disruptive changes in the last decade as far as adoption of technology is concerned. With the government providing incentives for digitalization of the economy, it is definitely the success mantra for the banks.

Rathee (2017) says that revolutionary technological transformation that includes the features like anytime anywhere banking, ultra-fast response time, the usage of digital channels by avoiding or bringing down the paper-based transactions has changed the face of Indian banks.

Giri and Paria (2018) in their study “A Literature Review on Impact of Digitalization on Indian Rural Banking System and Rural Economy” found that, digital banking is having enormous potential to change the landscape of financial inclusion. The study also found that, with the features as low cost, ease of use digital banking can accelerate the integration of unbanked economy to the mainstream.

Nasim (2019) found that, the business benefit of internet banking is to generate additional revenue, improve customer service, extend marketing, and increase cost savings. In accepting the internet and maximizing its potential, there are several stages that firms evolve through that involve different roles. These different stages of changes are reflected in the many levels that are present when firms go through the adaptation of new technology, including internet banking.

### **III. OBJECTIVES OF THE STUDY**

The objectives of the proposed study are as follows:-

- The concept and evolution of digital banking in India
- Trends and innovations in digital banking
- Opportunities and challenges faced by the users of digital banking services

### **IV. RESEARCH METHODOLOGY AND DATA SOURCE**

The proposed study is descriptive and exploratory in nature and is based on secondary information sources collected from various research papers, reputed journals and magazines, University of Calcutta library, various annual reports published by Government of India and Reserve Bank of India, and other related websites to this matter.

## **V. THE CONCEPT OF DIGITAL BANKING**

Digital Banking means any user with a personal computer and a browser can get connected to his bank's website or mobile application to perform any of the virtual banking functions. Digital banking is the term that signifies and encompasses the entire sphere of technology initiatives that have taken place in the banking industry. E-banking is a generic term making use of electronic channels through telephone, mobile phones, internet etc. for delivery of banking services and products. The concept and scope of e-banking is still in the transitional stage. E-banking has broken the barriers of branch banking.

The term "Digital Banking" covers computer and mobile / telephone banking. The system is updated immediately after every transaction automatically. In other words it is said that it is updated "on-line, real time." The system is updated immediately after every transaction automatically. Digital banking is further defined as delivery of banking products and services to customers through electronic channels. It does not involve any physical exchange of money as all transactions are done electronically from one account to another through internet. Digital banking includes the systems that enable financial institution customers, individuals or businesses to access accounts any time and from any part of world and do so when you have time and not when the bank is open.

Digital Banking is also known as Electronic Banking, Cyber Banking, Home Banking, or Virtual Banking and includes various banking activities that can be conducted from anywhere. A perusal of the concept of e-banking as described in the literature reveals that the term e-banking, is an upper construct that encompasses an array of banking services delivered through electronic media, be it through phone, PC, TV or internet. Thus the term E-banking includes RTGS, NEFT, ECS, Credit cards and debit cards, Cheque truncation, ATM, Tele banking, Internet banking and Mobile banking.

## **VI. EVOLUTION OF DIGITAL BANKING IN INDIA – MAJOR LANDMARKS**

The traditional system of banking in India has been the branch banking. The Magnetic Ink Character Recognition (MICR) based cheque processing was introduced during the period 1986-88. The late eighties marked the emergence of computerisation of banks' branches with the introduction of Ledger Posting Machines (LPMs), Advanced Ledger Posting Machines

(ALPMs), followed by network based systems and the latest core banking solutions. Computerisation of Government industry from the late nineties in turn facilitated the computerization of all banks branches handling Government business. The Institute for Development and Research in Banking Technology (IDRBT) was set up at Hyderabad as a centre for research and technology in the banking sector. The Indian financial system was commissioned as a closed user group based network in 1991 with state-of-the-art safety and security, for the use of the banking sector exclusively. IDRBT commenced its Certification Authority (CA) functions for ensuring the requisite legal protection for the electronic banking transactions under the Information Technology Act, 2000. Formulation of Information Systems Audit (IS Audit) guidelines for ensuring such audit in the banks and establishment of National Financial Switch (NFS) for inter-connectivity of shared ATMs and to facilitate payment settlement across banks. This is now managed by National Payments Corporation of India (NPCI). Implementation of the Electronic Payment and Settlement Systems (EPSS), Negotiated Dealing System (NDS), Centralised Funds Management System (CFMS) etc. The recent Digital India program was initiated in 2017, with the objective to provide high speed internet, mobile and bank accounts, in order to enable participation in digital and financial space at individual level.

**Table 1: Technological Milestone in Indian Banks**

Sl. No.	1980	1990	2000-2010	2011-2019
1	MICR	ATMs	IMPS	Bio Metrics
2	Standard	Electronic Funds	RTGS	Mobile Banking
3	Cheques	Transfer	NEFT	Cheque Truncation
4	Encoders	Branch Connectivity	NECS	UPI
5	-	Computerization	Online Banking	USSD
6	-	-	Tele Banking	E-Wallet

*Source: www.wikipedia.org*

## VII. DEMONETISATION EFFECT

The story of digital transformation of Indian economy is incomplete without a chapter on demonetization. 8th November 2016 was an eventful day not only for the Indian economy, but for the whole of India. The central government took a very bold step which led to withdrawal of 86 percent of Indian currency. There was an immediate ban on highest denomination bills of Rs 500 and Rs 1000. Due to this sudden move, there was immediate shortage of cash in the market. As a result retail sales went down, wholesale markets tumbled. Indian

economy is one of the largest economies in the world. But there are millions of businesses and hundreds of millions of people having either no access to banks or don't have bank accounts. These businesses use cash for their day to day dealings and the individuals need cash to pay for everything from groceries to hospital stays to land purchases. Then there is a shadow economy which exists alongside the main economy comprising of countless hidden transactions, which are almost impossible to trace. This shadow economy, which is believed to be about a quarter of the country's Gross Domestic Product, operates in cash. The current demonetization exercise is not the first one in India. A similar attempt was made in 1970s to curb the corruption, but eventually it failed in its purpose. Since then, the shadow economy or the underground economy has grown immensely. The main objective behind the whole demonetization exercise was to curb the menace of black money and weeding out the counterfeit currencies out of circulation. However, it went out to serve another useful purpose. It pushed people towards digital money as they searched for alternatives of cash. The government set a target of Rs. 25 billion cashless transactions for the fiscal year ending March 2018. According to a report, by the end of March 2018 digital initiatives such as digital wallet payments, electronic toll payments, Aadhaar-based and bank-to-bank electronic money transfers accounted for about Rs. 20 billion worth of transactions, but fell short of the target. The performance of private sector banks was better than the public sector banks primarily on account of the concentration of their operations in urban areas. Even though the target was not achieved, the standalone figures indicate that the achievement is commendable.

## VIII. NEED FOR DIGITAL BANKING IN INDIA

**Customer Service:** With internet freely available everywhere, all a customer needs to access his account is a device & internet Connectivity. It saves time & expenses as he no longer has to travel to a bank to carry out transaction. Online services make it possible for him to sit in the comfort of his home or office, or in fact even in a vehicle while travelling, & carry out transaction without having to wait for anything.

**24\*7 Availability :** The customer is able to check his bank records anytime he wishes & a number of banking services are available to him round the clock. Transferring money is easier, quicker & safer.

**Time Constraint:** A number of services required waiting for considerable periods. Banks had boards put up at their branches specifying the time required for different services. Even simply cashing a cheque took time. But digital Banking is instant, with no time constraint.

**Online Bill payments:** This is a feature that saves customers a lot of time & expenses. Customers do not have to carry cash & queue up to pay their utility bills or other bills.

**Lower Overheads:** Digital Banking has drastically reduced the operating costs of banks. This has made it possible for banks to charge lower fees for services & also offer higher interest rates for deposits. Lower operating costs have meant more profits for the banks.

**Banking Benefits:** With the increased convenience of anytime, anywhere banking, the number of customer has increased for banks. Human error in calculations & record keeping is reduced, if not eliminated. With records of every transaction being maintained electronically, it is possible to generate reports & analyze data at any point, & for different purpose.

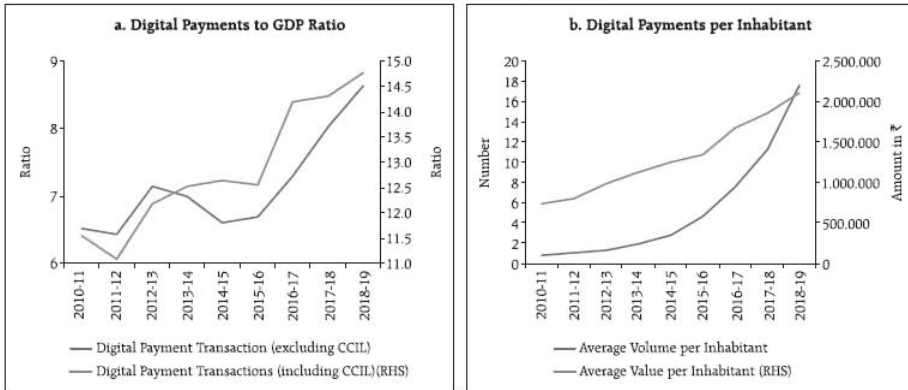
## **IX. DIGITAL MODE OF TRANSACTION**

To build a successful cashless economy the Government of India introduce a large number of alternatives for digital transactions. Which are enumerated below –

- Banking cards
- Aadhaar Enabled Payment System (AEPS)
- Micro ATMS
- Unified Payments Interface (UPI)
- Mobile Wallets
- Banks Pre-Paid Cards
- Point of Sale
- Internet Banking
- National Electronic Fund Transfer (NEFT)
- Real Time Gross Settlement (RTGS)
- Immediate Payment Service (IMPS)
- Mobile Banking

## X. DIGITAL BANKING TRENDS IN INDIA

**Figure 1: Digital Payments in India**

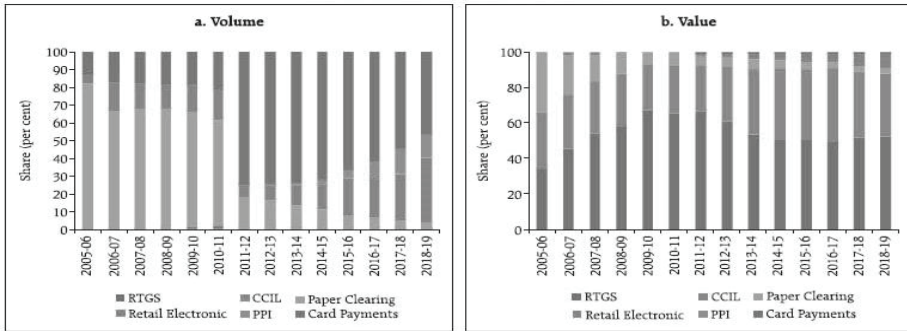


Source: RBI ([www.rbi.org.in](http://www.rbi.org.in))

Digital payments to GDP ratio in India has been traditionally low, in the last few years. Although it has increase significantly with the introduction and promotion of various cashless payments instruments which have resulted in a significant increase in digital payment transactions and that change taken place especially after demonetisation on 2016-17(Figure 1a).

Figure 1b depicts that the per person digital payments, both in terms of value and volume, also increased significantly. The share of retail electronic payments in total payments in terms of both volume and value is consistently rising since 2011-12 and reach high in 2018-19. This increase may be due to the introduction of some new modes of retail payments such as Prepaid Payment Instruments (PPI), Unified Payments Interface (UPI) etc.

**Figure 2: Digital Payment System Indicators**

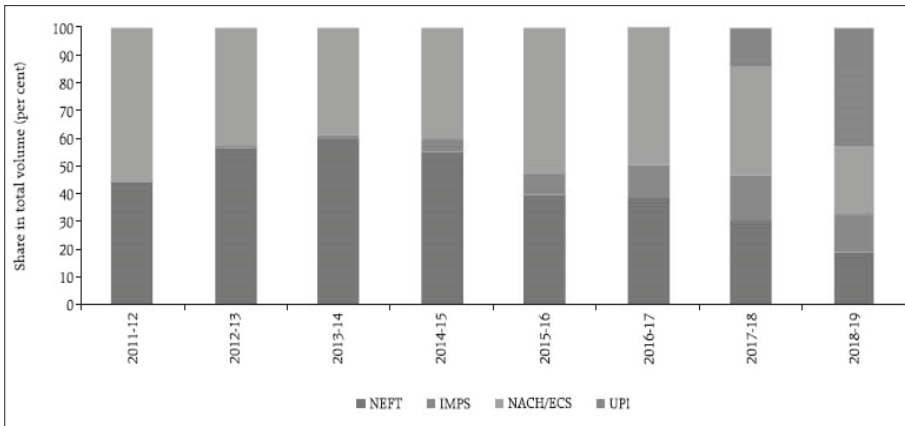


Source: RBI (www.rbi.org.in)

Figure 2 depicts that, the share of card payments in terms of volume has been declining, although it continues to be the most important component. Card payments increase hugely from 2011-12 but starts to continuously declining from 2015-16. This may happen due to the switching of customers to other innovative digital payment mode of transactions. Share of retail electronic decline in 2011-12 but after that it starts increasing and takes a good position in 2018-19.

In terms of value, highest transactions taken place in payments through Real Time Gross Settlement (RTGS). Here, RTGS and Clearing Corporation of India Ltd. (CCIL) dominate the digital transaction system. The share of paper clearing is in a declining trend, both in terms of volume and value during and its existence is very narrow in 2018-19.

**Figure 3: Retail Electronic Payment**

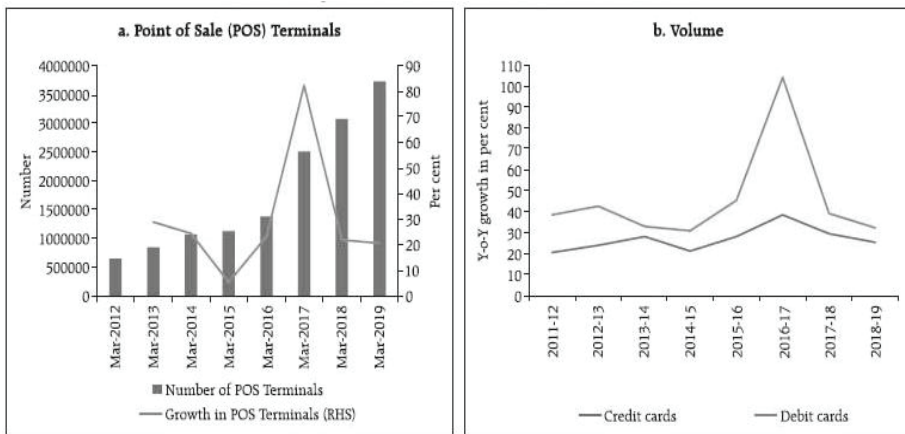


Source: RBI (www.rbi.org.in)



Above figure depicts that, retail electronic payment system has been dominated by NEFT upto 2014-15. The introduction of UPI in 2016-17 changed the landscape of retail electronic payment system. The UPI's share in it increased to 43 per cent within a span of three years. NACH/ECS has also played a big role in digital payment system.

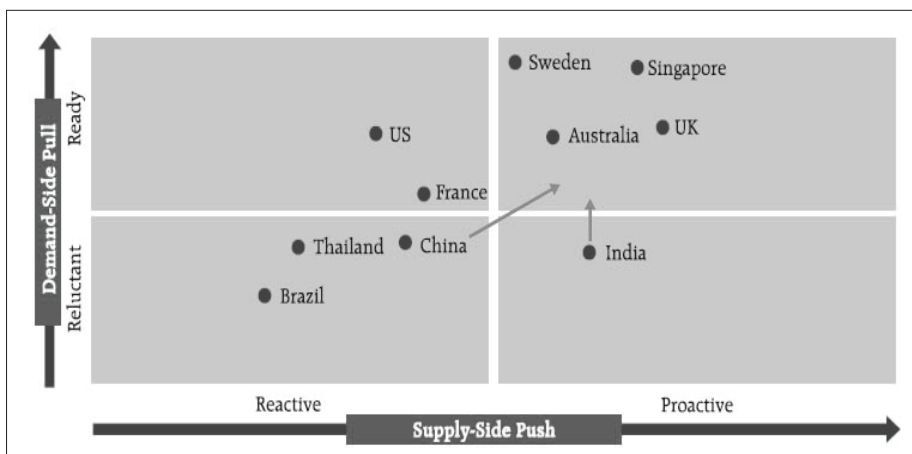
**Figure 4: Usage of Debit and Credit Cards at POS Terminals**



Source: RBI ([www.rbi.org.in](http://www.rbi.org.in))

Figure 4 depicts that, on account of demonetisation the number of POS terminals and usage of debit and credit cards increased significantly during 2016-17. Though growth in usage of debit and credit cards at POS terminals declined in the post-demonetisation period. The usage of debit cards at point of sale (POS) terminals has witnessed a sharp rising in the recent years. In terms of volume, their share rose near 110% in 2016-17 but end with 31% in 2018-19. In case of growth in usage at POS terminals debit cards has generally been higher than that of credit cards. The tremendous growth in use of debit cards may be due to the push provided through the RuPay cards under the Pradhan Mantri Jan Dhan Yojana (PMJDY), increase in the number of POS terminals and various incentives provided by the Government of India and the merchants for digital payments.

**Figure 5: Demand Side and Supply Side Factors affecting Digital Payments**

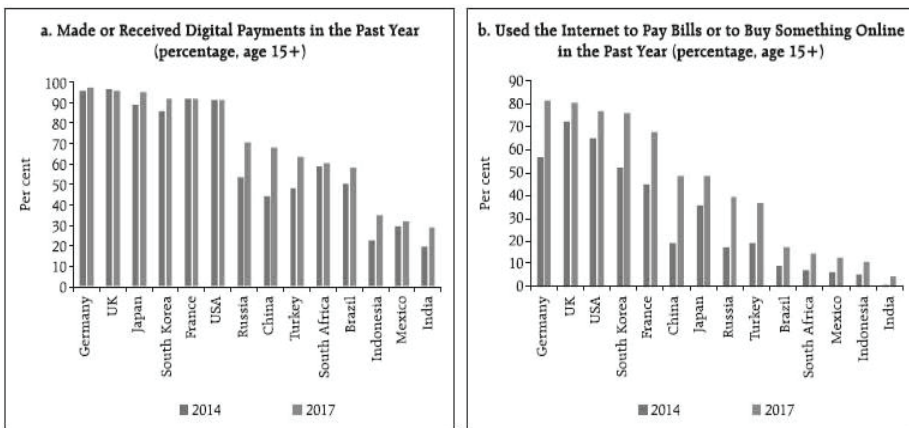


Source: RBI ([www.rbi.org.in](http://www.rbi.org.in))

The wider adoption of digital payments depends on both the supply side push and demand side push. Supply side factors consist of robust payments system infrastructure, minimum cost of e-payments, push to greater financial literacy and bank accounts, introduction of new and innovative schemes to attract consumers. On the other hand demand side factors are strong consumer demand for e-payments, safety, add-on benefits etc. The World Payments Report, 2018 shows that the UK, Australia, Singapore and Sweden are the leaders in terms of both regulatory supply-side push and demand-side pull. In India, people are not so much connected with the digital transaction. In spite of sound proactive supply side push, due to insufficiency in demand side pull India does not belong a good position in digital payment system. The

government and the Reserve Bank have taken various initiatives which have helped in popularising and inculcating the habit of digital payments. Initiatives such as UPI, PPI, significant expansion in access to RuPay debit card through Jan-Dhan Accounts and Aadhar based direct benefit transfers (DBTs) have helped in popularising and increasing the usage and penetration of digital payment system. The Reserve Bank’s ‘Payment and Settlement Systems in India: Vision 2019-2021’ endeavours to ensure increased efficiency, uninterrupted availability of safe, secure, accessible and affordable payment system as also to serve segments of the population which are hitherto untouched by the payment system.

**Figure 6: Cross- Country Spread of Digital Banking**



Source: RBI ([www.rbi.org.in](http://www.rbi.org.in))

Although Government of India have taken various initiatives for increasing the usage and penetration of digital payments system, the usage of digital medium remains much lower than major advanced and emerging economies. In terms of various indicators of payment system infrastructure and usage such as number of cards per inhabitant, number of cashless payments per inhabitant and value of cashless payments per inhabitant, India lags behind the AEs and other EMEs. Above Chart depicts that Germany, UK and Japan are the top three countries in respect of made or received digital payments in the past few years (Figure 6a). Germany, UK, USA and South Korea are dominates on used the internet to pay bills or to buy something online in the past years (Figure 6b).

## XI. HURDLES IN DIGITAL BANKING SYSTEM

**1. Internet Penetration:** As per a report titled “Internet in India 2017” by Internet and Mobile Association of India (IAMAI) and Kantar IMRB, the number of Internet users stood at 481 million in December 2017, which is second highest in the world. Urban India with an estimated population of 455 million has 295 million internet users whereas rural India, with an estimated population of 918 million as per 2011 census, has only 186 million internet users leaving out potential 732 million users in rural India. This indicates a very low internet penetration, which is a major obstacle in the path of digital banking.

**2. Internet Shutdowns:** Internet shutdowns are one of the major hindrances in seamless connectivity which is required for digital banking. In the current year, India has already witnessed 95 internet shutdowns as against 79 such cases in the whole year of 2017, as per the data compiled by Software Freedom Law Centre (SFLC), a legal services organization. Although the problem of shutdown exists across many states, Jammu & Kashmir and Rajasthan are leading states. Frequent internet shutdowns result in serious disruptions and tremendous loss to individuals and businesses, and may prevent the nation from realizing the benefits of digital economy.

**3. Inadequate Infrastructure** India is having the highest number of bank branches in the world, but people in rural areas still have to travel miles to access banking interface. Although India is a huge country, it has only 2.3 lakh ATMs and 14 lakh Point of Sale (PoS) terminals. Though digital channels like apps, websites, SMS/Text, ATM, video teller machines (VTMs) and e-kiosks are narrowing the gap between banks and customers, rural Indians are more comfortable with physical channels. A 2015 Ernst and Young report said there were only 693 machines per million of India’s population, compared to similar emerging countries such as Brazil, which has 32,995 terminals per million people and China and Russia, each of which has around 4000 terminals per million people. Number of ATMs per million population has been growing in almost every country. There are countries with 1,000-plus ATMs per million population —South Korea (2423 ATMs), Canada (1859), France (1745), Russia (1537) and Australia (1338) — while the number is 180 for India, which is lower than China (538) and South Africa (516).

**4. Financial Literacy:** A survey was conducted by Standard & Poor’s Financial Services LLC, where it was found that 76 percent of Indian adults are unable to understand key financial concepts, which is seven percentile points lower than the worldwide index. With better financial literacy will help these individuals in the selection of products that best suits their requirements. A

financially aware individual is more likely to adopt the digital banking services and channels.

**5. Cyber Crime and Security:** Digital banking has brought in comfort, convenience and flexibility in banking services. The flip side is that it has increased the risk of cybercrimes. Most banking and financial applications are subject to cyber-attacks. With so much money at stake, there is always a risk involved. There are hackers who employ innovative techniques to siphon funds, either as large amounts in a single shot, or minuscule amounts from hundreds and thousands of accounts, over a long period of time. Also, there is always the threat of valuable personal data being compromised. Banks need to ensure that their system is well maintained and upgraded to counter any threats from cybercrimes.

## **XII. CONCLUSION**

There is no doubt that the Banking Sector in India has become more competitive with the advent of digitization and the Digital India Program for ensuring better customer service, thereby attaining the goal of a cash-less economy. From the study it can be concluded that the digital innovations are creating a new picture of banking services all together. The digitization in banking has started shifting the paradigm of cash and paper based banking to cashless and paperless banking. However, there is still a long way to cover by encountering the challenges with possible solutions and encashing the available opportunities.

## **References**

- 1 Aladwani, A. M. (2001). Online Banking: A Field Study of Drivers, Development Challenges, and Expectations. *International Journal of Information Management*, 21 (2001), 213 – 225.
- 2 Avasthi, G. P. M. (2001). Information Technology in Banking: Challenges for Regulators. *Prajnan*, XXIX(4), 3 – 17.
- 3 Bitner, M. J., Brown, S. W. & Meuter, M. L. (2000). Technology Infusion in Service Encounters. *Journal of the Academy of Marketing Science*, 28(1), 138 – 149.
- 4 Boston Consultancy Group & Facebook (2017). Digital: Financial Services by 2020. [http://image-src.bcg.com/Images/BCG-Facebook-Encashing-on-digital-Jun-2017\\_tcm21-163357.pdf](http://image-src.bcg.com/Images/BCG-Facebook-Encashing-on-digital-Jun-2017_tcm21-163357.pdf)
- 5 Byers, R. E. & Lederer, P. L. (2001). Retail Banking Service Strategy: A Model of Traditional, Electronic, and Mixed Distribution Choices. *Journal of Management Information Systems*, 18(2), 133 – 156.
- 6 Chavan, J. (2013). Internet Banking - Benefits and Challenges in an Emerging

- Economy. *International Journal of Research in Business Management (IJRBM)*, 1(1), 19 – 26.
- 】 Daniel, E. (1999). Provision of Electronic Banking in the UK and the Republic of Ireland. *International Journal of Bank Marketing*, 17(2), 72 – 82.
  - 】 Dheenadhayalan, V. (2010). Automation of Banking Sector in India. *Yojana*, 32 – 40.
  - 】 Jamaluddin, N. (2013). E-Banking: Challenges and Opportunities in India. Proceedings of 23rd International Business Research Conference (1-15), Melbourne, Australia.
  - 】 Kamel, S (2005). The Use of Information Technology to Transform the Banking Sector in Developing Nations. *Information Technology Development*, 11(4), 305 – 312.
  - 】 Khorshid, S. & Ghane, H. (2009). Ranking the Challenges of e-banking with the help of AHP Model. *Journal of Modiriyate Sanati Azad University of Sanandaj*, 4(9), 89 - 106.
  - 】 Lal, R. & Saluja, R. (2012). E-Banking: The Indian Scenario. *Asia Pacific Journal of Marketing & Management Review*, 1(4), 16 – 25.
  - 】 Malik, S. (2014). Technological Innovations in Indian Banking Sector: Changed Face of Banking. *International Journal of Advance Research in Computer Science and Management Studies*, 2(6), 122 – 128.
  - 】 Masocha, R., Chiliya, N. & Zindiye, S. (2011). E Banking adoption by Customers in The Rural Milieus of South Africa: A Case of Alice, Eastern Cape, South Africa. *African Journal of Business Management*, 5(5), 1857 – 1863.
  - 】 Mohan, K. (2006). Information Technology on Indian Banking. *SCMS Journal of Indian Management*, July - Sept Issue, 18 - 24.

# ‘Childless’ to ‘Not to Yet Pregnant’: An Exploratory Study on the Urban Women of Kolkata Fighting the odds of Rejection

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## ABSTRACT

In the Indian society child-birth after a marriage is still considered a completion of a family cycle. This interference of the family members and the society gets so severe that a woman tends to completely lose her importance until she proves herself to be fertile even if she possesses other qualities in her. The objectives of this study are whether the women feel that child-bearing is an important task of their marriage, whether the women face any social stigma for not having a baby and whether the women give their consent to adopt the advanced techno-medical means like egg-freezing or IVF for having a baby after marriage. 20 married women of Kolkata over 27 years of age were interviewed through an in-depth open-ended questionnaire and snowball non-probability sampling was adopted to conduct the study. The study revealed how the women themselves have chosen to visit doctors to know about their gynaecological status after prolonged agony for delay in child-birth. The respondents have succumbed to the expected gender roles in the society after marriage. The common reason behind this attitude was their gender socialization. Indian women are aware how infertility develops a stigma for them and how her womanhood is questioned in the in-laws, at her neighbourhood and elsewhere. The advanced medical technologies today make them aspire to become mothers and they readily do not want to accept the rejection.

**Key words:** *Family-Cycle, Infertility, Social Stigma, Motherhood, Childlessness.*

## I. INTRODUCTION

A woman is deeply devalued and discredited if she is unable to give birth to a child. It is felt as if she is deviating from the natural course of her life which for ages the society has set for her. Infertility is often treated as a disability of the women and usually this 'unsuccessful' tale is revealed after marriages in India which leads them to several societal stigmas. The advanced technological and medical applications have increased the possibilities of childbirth making the women challenge the social demand of having 'babies'. Studies show that reproductive technology was introduced through artificial insemination in as early as 1900s. This shows that the requirement for biological child has always been there and the crisis with infertility because of several natural causes have been persistent too. Through ages the rituals, the rites have made motherhood a very important social identity for the women and childbearing is still commonly considered pro-natal attribute for many societies. So, infertility creates a stress on many women across the country. It has been argued that to Goffman stigma is something where an individual in a social context is not fully accepted by the rest in the family. (as cited by Jane et al., 2007) When an individual is not fully accepted by the other members in the family and society it refers to Goffman's understanding of stigma. It is important to note that when we refer to deviance from the culturally and socially learnt behavioural patterns, it actually means the 'differences' which notifies about the highly accepted certain social concepts. They refer to rewards, punishments, status and roles and difference from these connects to Goffman's understanding of mental illness (Pescosolido, 2015). Goffman specifies that when these differences start to earn an individual a negative value concept, it focuses on the stigma that the individual starts to encounter from his/her surroundings. He / she gradually start feeling left out and devalued.

It can be concluded that women's situation year back was even worse because infertility kept them away from many things in the society barring their encounter with other women who were mothers. They were left homeless and their spouses were righteously married to the second wife because childlessness was solely considered the incapability of the woman.

With time the attitude might have changed with the influx of power. Access to high income and education has started to empower women and studies show how this stigma has changed to stress for infertility.

There is an unimaginable, untold and undisguised situation where the women succumb to the gender roles and that is especially because of the master role that a woman is expected to perform of motherhood. So, when



a woman is unable to cherish motherhood she is put in distress and isolated. She is questioned and held responsible for her incapacity to prove herself fertile and refrain from getting excluded from the mainstream which refers to the maximum women who has surpassed the stage of motherhood. It is very important to understand that workplace entry might have become easier today for the women but the gender expectations hold them back subtly and the gender equality is hard to attain for the women. In this regard, Rudman and Phellan in 2010 (as cited by Crawley, 2014) has mentioned that the gendered roles created the gendered consequences for the women. Today crossing the borders amidst the occupations have taken place but the gendered expectations persist. The gendered consequences extend up to their work field as well and this forces them give up against their will, their aspirations and ambitions for nurturing their gender roles and this motherhood shadows their other capabilities.

With this backdrop, it is easy to understand how from rigorous hormonal treatments to chemical ovulation and other procedures like surrogacy, women have been experimented with. Their bodies have been applied one after the other with several reproductive technological spree. This has created a ray of hope amongst many women who desire of biological child but are unable to have any. This has indulged them into sole discipline only with the locus of having a child. This makes them unavailable at work as well tagging them 'irresponsible'. This subtly forces them to adopt those reproductive technologies upon their bodies' in spite of uncertainties of success and lowering the chances of spontaneity in pregnancy.

This urge is quite social to have a biological child and the treatment is heavily demanding on the regular schedule of life because it involves very frequent doctor visits, quite a 'patterned life'. This makes the psychological and physical health very distressing for the women.

"Children, career, marriage and education- have it all," Salchert mentions in 2012. This is a common idea which touches most of the people in the society. The generic make of a woman's body cannot justify the ideal mothering skills expected from the women. It is solely because child birth is not a procedure only or it does not only mean the cuddle, it means busy hours, loss of self-appreciation and in many cases dual responsibilities if she still chooses to work even after the child birth. It might be that self-love is important to a woman and she might find mothering as a tough and tiring task and quits to prove herself as a 'perfect mom' as expected by the society.

Women are stuck in the vicious loop of performance and adherence of the

gender roles which socializes them to feel that motherhood is too innate to them and highly cherished and desired. This reinforces the gender roles and consequently, childlessness in any instance becomes a real concern.

The emphasis on biological motherhood is so strong in varied cultures across the world that women feel discredited, start to develop negative ideas about their self-esteem and efficacy. With this stigma, she either feels she is arrested by the public stigma and sometimes she feels the stigma herself. The women start feeling rejected and ignored from their own groups. They start feeling marginalized and this compels them to even compromise with their physical health as they incur pain through treatments with the hope of a biological child.

The mental stress for infertility leads them into prolonged depression and then social isolation and consequently health hazards. This mental stress is often the off-route of the visible and invisible stigma which differently encounters the women from the upper and the lower class.

## **II. OBJECTIVES OF THE STUDY**

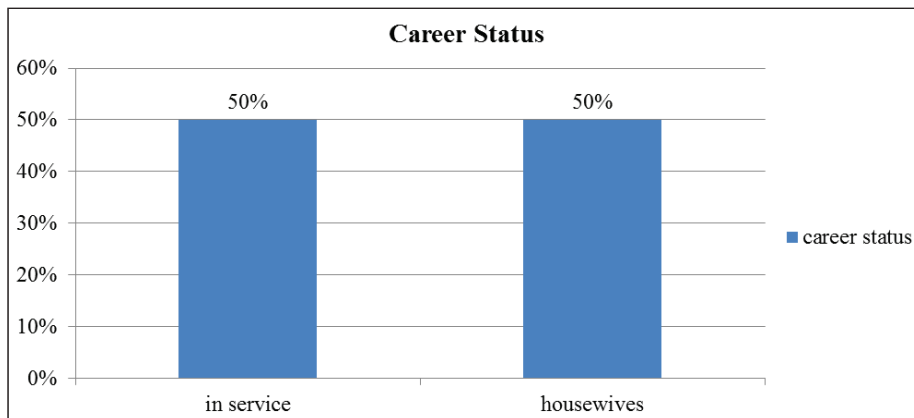
- Whether the women feel that child-bearing is an important task of their marriage
- Whether the women face any social stigma for not having a baby
- Whether the women give their consent to adopt the advanced techno-medical means like egg-freezing or IVF for having a baby after marriage.

## **III. METHODOLOGY**

20 married women of Kolkata over 27 years of age were interviewed through an in-depth open-ended questionnaire and snowball non-probability sampling was adopted to conduct the study. The respondents were all married and married over two years. Urban Kolkata women tend to show reluctance towards parenthood immediately after marriage and after two years at least of their marriage; couples show an inclination towards growing their family. The respondents were all educated and they married after the completion of their studies and settling in their career because most of the respondents worked or studied before they got married and left working after their marriage upon their own choice.

#### IV. ANALYSIS OF THE DATA AND DISCUSSION

Figure 1: Career Status



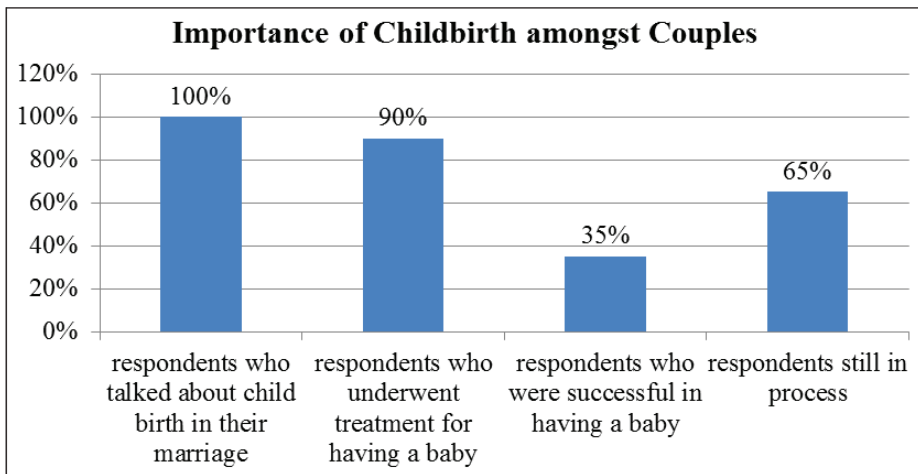
The above data shows that half of the respondents were homemakers whereas the other half were into service or into business. This shows that the population unit was a well distributed one. The responses said that women from both of these divisions desired for babies. The desire for having the babies is equally present in both the groups. 10 respondents were into some occupation and showed disturbance in their work profile. Frequent doctor appointments have disrupted their work momentum and they have declared to take advantage of organizations that support the women employees in meeting their needs set by the society. Working for three years in the same company, a respondent aging 37 years said, "I don't want to venture my other openings and that is because this is a very women friendly company. I can take flexible shifts and visit the doctor as and when wanted. I am planning for a baby and undergoing several treatments." The women are believed to be responsible for not conceiving. Today even if the educated families do check with the men's potency as a medical requirement even then the social upbringing of a woman or even the social expectation perturbs the women more for the delay in pregnancy and so her visit to the doctors for the consultation is higher. Consequently, her attempts curb the professional growth and she is exempted from promotional recommendations like the narrative from a teacher of an eminent school, in New Town confirms that. She said, "I am married for few years and the management does not want to give us any increment or promotion just because they feel we are bound to take frequent leaves before and after the childbirth whereas I am not planning my kid right away. I cannot even make a shift because I am married and yet not have a kid. The new school would not want to grant me any maternal leave.

They would not appoint candidates like me. I have stopped giving interviews after I realized this. I shall change when I have my baby.” This narrative shows how the management or to be holistic, the society generalizes and decides for all contemporary women that is, when they would marry and have children when this is a complete personal choice of a couple.

In instances where the respondents are working in corporate organizations, said, they had to opt for a break in their career else the treatment is not possible to take. This shows the involvement of the views from their parents and in-laws which compels them to prioritize their forth-coming role of motherhood and often at expense of their career. The women are made to feel her womanhood remains incomplete and this incapacity is ruinous to her future irrespective of her other capabilities. This makes her take up excuses to get free earlier to her work hours and this makes the women lose her career growth as well.

This affects the inter-personal relationship between the couples.

**Figure 2: Importance of Childbirth amongst Couples**



100 percent of the respondents agreed how they have talked about childbirth in their marriage. Most of them started to expect a child in the family after one of their marriage and any delay concerned them. Narrative from a home maker of 34 years of age said after three years of marriage said, “I am otherwise fine but seeing a doctor to know if I am all okay inside my body. This will help me take up any medical help if required before time.” This shows how the focus is gradually tilted towards her health only for a healthy child birth.

In the data collected, it was found that 90 percent of the respondents

underwent treatment for having a baby. 35 percent of the respondents were successful in having a baby but the rest still are under the process. The success rates might not seem appalling but that percentage works as a ray of hope to the others. They have been found referring to doctors who have helped them in having a biological child.

The massive side effects for these treatments affect the women and it is a compulsion for them to undergo this agony. The fear of pain, injections in private places of the body has diminished in comparison to the social pressure she encounters as her 'body shame' if she is unable to give birth to a biological child with her 'faulty' bodies.

The value of a woman is realized with her ability to give birth to a son in many countries like India. The problem is rooted with the structured pressure upon the Indian women where immediately after their marriage they are expected to realize their motherhood. The additional pressure is to have sons which kinds of act like a blessing to the Indian women.

So, the women at their discretion are compelled to choose the advanced techno-medical means to adopt motherhood incurring health hazards. These forms of treatments incur heavy financial involvement which is not affordable to many couples who desire to have their biological children. So when the family is unable to opt for it in order to fulfil the social aspiration of a marriage, they tend to misbehave and harm the women. The Indian families have taken resort to several religious practices to believe that they are trying out means to accomplish their dreams of having an ideal family which has kids. Narratives show from a 32 year old homemaker, "My mom-in-law makes me do several vrats/fasts and I try to do all puja paths however is said, I feel incomplete now without a kid. Life is too long, how will I live?" This is a common practice and outcome of the belief that God would relive from this pain of childlessness sooner or later for all women across all but the option of treatment is affordable to all the respondents chosen for this study.

The techno-medical means of treatment for childbirth lead to several maternal deaths. The maternal deaths are primarily due to haemorrhage, infection, embolism, anaesthesia, and undiagnosed ectopic pregnancies. In spite of knowing about the health hazard the problem is with the mental set up of several Indian families motivated by the age-old cultural practices, where the women are forced to undergo several treatment procedures to not fall out of the mainstream. Even the cultural ways put a negative impact upon their lives. They are gradually considered inauspicious for any good occasion.

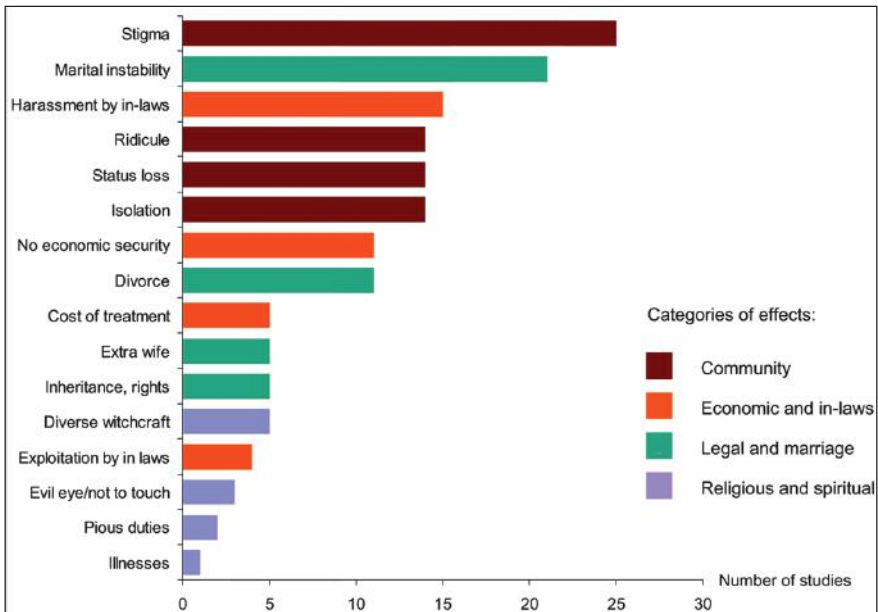
Unprotected sexual intercourse over a year of marriage marks as infertility. The effect of infertility is far-reaching in developing countries. It affects the life of the men as well as the women where the men are made to feel that they are not “man” enough and the women tend to not being able to conform to their most important social identity if they are termed as ‘infertile’. Studies show that infertility creates a sense of shame, disgust, depression and worthlessness and challenges the social status of the women. Families tend to experience financial burden because of the expensive treatments to fight out infertility and tend to lose their social stability and break their marriages. There is a huge impact upon the women on how she handles her social encounter everyday regarding her childlessness. Their economic status often gives them a different experience depending on their class. Affluent, educated and urban women do not feel that stigmatised. They might even choose to prioritise her occupational identity over her motherhood but a poor, rural woman in India and in the other developing countries fear the queries about their infertility. In this regard, one of the respondents presently residing in Bangaluru aging 35 and working in a high profile corporate house like Delloitte said, “it’s not that I didn’t try for our baby, we did. I started falling sick every now and then. I was even supposed to undergo an operation which would supposedly confirm my passage where the ovulation would take place but I started to have tremendous breathing trouble, I and my husband decided that we would not get fetish about it anymore. We need each other’s company and have several other things to be busy and happy about. We no longer wish for a baby. But, yes, I tend to avoid old people in my in-laws because they have one single thing to ask about me even if they are meeting after days and that is about my baby. I have started avoiding such people.” So, the fact is, a woman is expected to be a mother irrespective of their class but they can ignore the social pressure depending on their other identity and class. Another narrative from a Government banker similarly shows, “I prefer to be busy with my clients, customers at office more than half of the day and then prefer to read, cook and enjoy my leisure. I might feel lonely at times for the monotony in life but that does not mean only because the people want, I shall leave my job to dedicatedly visit the gynaecologists.” This implies that the urban Kolkata, educated and economically independent women uphold their desire and prioritize their well-being over the social pressure to have children.

It is a common picture everywhere at all junctures of the society irrespective of one’s status, educational qualification, class, caste or location. The women have always been perceived as a mother first. The women who are affluent and educated and live in the cities seem to find their value in their occupational identity and other skills in them which were always ignored after one’s marriage.

Their new acquired status, difference in upbringing and reasoning has liberated the women and freed them from the social stigma of childlessness in many instances in urban Kolkata.

In the Indian culture, women are often blamed for not having a child and the family without an offspring is considered desolate and unfortunate. So, women opt for medical support to nullify the social attack upon them.

**Figure 3: No. of Studies in which Diverse Effects are Mentioned (Bos & Balen, 2009)**

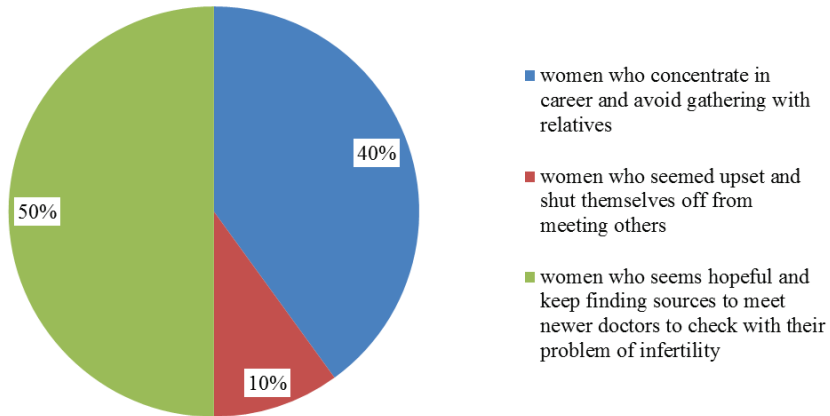


The above chart upholds the situation of the married women without children worldwide. It explained why the young respondents of the study do not want to tag themselves as ‘childless’; and keep inflicting medical pain upon themselves in the name of treatment for having a biological child. It very well exhibits the crisis and agony the women meet for not having a child and these modern ‘hopeful’ treatments undermine their healthy and happy life. A narrator who is a start-up entrepreneur said with grief, “My in-laws are forcing me to give him divorce because they feel they have spent enough upon my treatment for having a child and now they do not want to spend unnecessarily anymore. They want my husband to get married again. He agreed but I am still living with him. How would I manage with my business, parlour rent, and other expenses? I have just started my parlour. It is very painful for me.” This narrative shows

how she is dwelling in an unstable marriage where her ten years to togetherness and care for the partner is negligible because she is biologically incapable to have child. There are instances where there are physical shortcomings in a man and which is never revealed as that would hurt their masculinity.

**Figure 4: Mental State of Women Aspiring for a Child**

**Mental State of Women Aspiring for a Child**



40 percent of the women prefer to concentrate in their career and avoid gathering where they can meet their relatives.

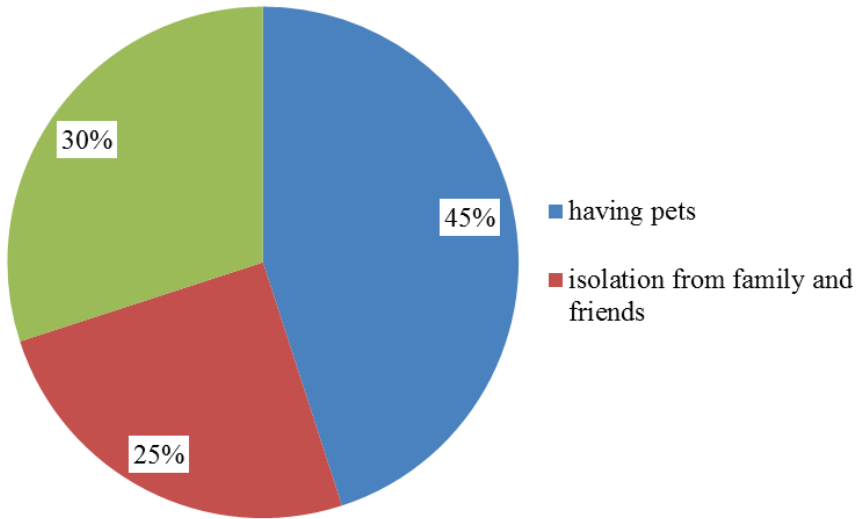
10 percent seemed upset and has completely left going out and meeting others apart from their immediate families.

50 percent seems hopeful and keep finding sources to meet newer doctors to check with their problem of infertility. (This includes the percentage who have had positive reports of having babies)

The above chart shows how the relatives and neighbours instigate the married Indian women to be concerned about their fertility. Respondent (no.4) stated in her narrative, “I have heard from my neighbours of my in-laws that what I shall do with high pay of company because I have no one to use them. I still cannot understand why do I have to be reminded by the ‘no-ones’ of my life what I shall do with my high pay. It should be the understanding of me and my husband only.” The realization might be exclusive to every individual in this regard but ways to deal with it might be different for every woman. Their financial and family status, their upbringing and their education helps them handle the comments differently but in many instances the woman themselves consider it to be their own shortcoming.



**Figure 5: Alternatives to Not Being Able to be a Mother**  
**Alternatives to Not Being Able to be a Mother**



45 percent of the couples have pets

25 percent of them been found isolating themselves

30 percent of them of the women are engaged in nurturing their hobbies

Women without children showed an inclination towards nurturing their creativity in many instances. They seemingly develop their sense of aesthetics and create art. They tend to paint, draw, stitch, sing, and dance and do other forms of activities which they like to do in their leisure. They keep pets and treat them with lot of affection as their family member. In this regard it seems to be their way to exhale their tenderness which could have been exhibited if they would have attained motherhood. Respondents in many cases have called themselves 'mothers' of their pets. Studies show that many couples prefer pets over their kids. One reason is the amount of money involved in rearing the two and apart from that they have referred to returning to fluffy bundle of joy than to duties to clean, cook and do homeworks of their 'demanding' children. They feel freer with pets than their routine tasks after the tiring day (Balčiauskas, 2019). It might be an easy resort to many women who are awaiting their motherhood too and feel they could show their 'love' towards the baby pet.

## V. CONCLUSION

The sufferings for the women for being childless can be categorised with the community effects upon them which mentions about loss of social status, stigma and ridicule. Apart from this, the women suffer from the economic insecurity which might even head towards a divorce, second marriage of their husbands and rejection and isolation from their in-laws and husbands. There can be religious and legal impact upon the women as well. It includes expulsion from the homes, marital instability and loss of inheritance rights which perpetuates the verbal and physical abuse from their partners. They are commonly tagged with attributes of 'witchcrafts' whom one should not readily touch while performing religious rituals to the one who are often held responsible for bringing disasters to their families and community (Bos & Balen, 2009). Resembling with this understanding the data has been used to categorise the experience of misery from the respondents of the study.

It is very important to understand that the stigma demoralizes the women and hurts their self-esteem because of their infertility. They prefer to discuss about her effort to seek a child but later the failures related to the infertility treatment compels them to hide or lie in social gatherings and later they start to skip the gatherings. The medical interventions have made a special place in the society for the couples who are at the verge of losing all of their energy and effort to tag themselves as 'not yet pregnant' than 'childless.' This money making has consequently become very easy for the pathologists and medical practitioners. They tend to make the realistic expectations to certain promises so that the couples and especially the women do not undergo the verbal accusations of not having the children. In many countries the primary responsibility of a marriage is still child bearing but the women who are performing dual responsibilities at home and at workplace tend to forgo or ignore their work for their adherence to child bearing. The couples easily become big targets to fetch money in the name of infertility treatment which involves not only financial stress but all physical pain and agony. It is only because there is direct connection between womanhood and motherhood.

It is an easy way for the patriarchy to dominate and domesticate the women at home. This motherhood is nurtured as one's identity and fulfilment. This is what a woman is reared with through this gender socialization over the centuries. This gradually forces a woman to succumb to the needs of the society bestowed upon them. Dorothy E. Roberts is referred here in this context where she said that motherhood plays an important role in subordination of the women. She further says that motherhood is often treated as a woman's

identity and however tiring and exhausting she might find it; she cannot really reveal it. It is because that is how the patriarchy grants an untold elevation to the woman on achieving motherhood (Heavner, 2017). This diminishes the chances of professional growth for all women irrespective of any profession. The women are repeatedly put in the fore-front to fulfil the queries of not having a child even after at least one year of marriage or more only because women have been socialized to be a 'mother' after marriage and there are taboos on not having them.

## References

- 】 Balciauskas, M. (2019). People Who Prefer Pets Over Kids Are Creating Funny Memes That Explain Their Choice. Bored Panda. Retrieved from [https://www.boredpanda.com/funny-pets-over-kids-memes/?utm\\_source=google&utm\\_medium=organic&utm\\_campaign=organic](https://www.boredpanda.com/funny-pets-over-kids-memes/?utm_source=google&utm_medium=organic&utm_campaign=organic)
- 】 Balen, F. & Bos, H. M. (2009). The Social and Cultural Consequences of being Childless in Poor-resource Areas. *Facts, Views & Vision in ObGyn*, 1(2), 106–121.
- 】 Crawley, D. (2014). Gender and Perceptions of Occupational Prestige: Changes Over 20 Years. *Sage Open*, 4(1).
- 】 Donkor, E. & Sandall, J. (2007). The Impact of Perceived Stigma and Mediating Social Factors on Infertility-Related Stress among Women Seeking Infertility Treatment in Southern Ghana. *Social Science & Medicine*, 65(8), 1683-1694.
- 】 Jansen, N. & Saint, O. J. (2015). An Internet Forum Analysis of Stigma Power Perceptions among Women Seeking Fertility Treatment in the United States. *Social Science & Medicine*, 147, 184-189.
- 】 Pescosolido, B. A. (2015). Erving Goffman: The Moral Career of Stigma and Mental Illness. *The Palgrave Social Theory in Health, Illness and Medicine*, 273-286, Retrieved from [https://link.springer.com/chapter/10.1057/9781137355621\\_18](https://link.springer.com/chapter/10.1057/9781137355621_18) on 2 July 2020.
- 】 Remennick, L. (2004). Childless in the Land of Imperative Motherhood: Stigma and Coping among Infertile Israeli Women. *Sex Roles*, 43(12), 821-841.
- 】 Rouchou, B. (2013). Consequences of Infertility in Developing Countries. *Perspectives in Public Health: Formerly Journal of the Royal Society for the Promotion of Health*, 133(3), 174-179.
- 】 Salchert, A. (2012). The Social Pressure of Experiencing Motherhood. HUFFPOST.

# Gender in Education: Its Pros and Cons

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## ABSTRACT

Although historically 'sex' and 'gender' were used interchangeably, but now-a-day's people are becoming aware regarding its usage. 'Sex' is inborn while 'Gender' is a collection of socially and culturally constructed roles. Gender equality is a much discussed topic of today's society. Basically the concept 'women empowerment' is associated with it. When the women will be empowered and able to partake in all the activities and decision making processes along with man; subsequently gender equality can be ensured. In this context, education is the way forward for promoting gender equality. Since time immemorial various efforts have been taken for attaining gender equality through education in India, and luckily it has worked too. Nevertheless, 100% gender equality is a far cry owing to multifarious issues. This article provides an overall discussion on the role of education in gender by analysing its pros and cons in brief. The article is written by reviewing some of the existing literature related to the topic.

**Keywords:** *Gender, Education, Empowerment, Equality, Women.*

## I. INTRODUCTION

Historically, the words 'gender' and 'sex' have been used synonymously; but presently they are not replaceable. Sex refers to the physiological differences between males and females. On the contrary, gender is the socio cultural differences constructed for males and females. According to Milton Diamond (2002), "Gender is a term that refers to social or cultural distinctions associated with being male and female. Gender identity is the extent to which one identifies as being masculine or feminine." The socially constructed gender roles often deprive women from being the opportunist along with man. Since the time of Savitribai Phule constant efforts have been made for gender equality

and women empowerment through various policies and programmes but it has not been achieved up to 100%. “UNESCO recognizes gender equality and the empowerment of women and girls as one of its global priorities. The organisation is mainstreaming gender equality in all of its programmes to support the implementation of the 2030 Agenda.” (UNESCO, 2017). Gender equality can be ensured with equal participation of women in education, economics, politics, science, medical, engineering, sports, etc and participation of women in decision making at all levels along with man. Intriguingly, only the former one i. e. education paves the way for all the rest. Education is the assured instrument of promoting gender equality and women empowerment, hitherto the system has demerits also.

## **II. CONCEPT OF GENDER EQUALITY**

According to UNICEF, “Gender equality means that women and men or girls and boys, enjoy the same rights, resources, opportunities and protections. It does not require that girls and boys or women and men, be the same, or they be treated exactly.” It is the absence of prejudice and equal sharing of resources. In a gender equal society there is no any kind of separated roles for the populace on the basis of their sex which for the most part help the girls in materialising their dreams. Article 14 of the Indian Constitution ensures to women the right to equality. Article 15(1) specially prohibits discrimination on the basis of sex.

## **III. GENDER IN THE CONTEXT OF INDIAN EDUCATION: IT’S POSITIVE AND NEGATIVE ASPECTS**

The history of Indian education provides a comprehensible picture of the varied initiatives that have been taken at times in policies to expedite gender equality. Education for woman’s equality was one of the salient features of National Policy on Education (NPE) 1986 and Programme of Action (POA) 1992. It was mentioned in the policy that sex stereo-typing in the vocational and professional courses will be eliminated and women’s participation in non-traditional occupations, and emergent technologies would be encouraged. National Curriculum Framework 1975, 1988, 2000 and 2005 have made efforts to focus attention in gender disparities on education. According to NCF(2005), ‘Gender’, ‘Equality’ and ‘Empowerment’ of girls have been used as key words in educational documents for long. National Policy on Empowerment of Women 2001 also focused on promoting gender sensitive curriculum for addressing gender discrimination at all levels of education. The CABE Committee on Universalization of Secondary Education (2005) stated that high quality secondary education would be provided to all adolescent girls and boys up to the age of 16 by 2015 and up to the age of 18 by 2020 (Srivastava). An

MHRD report showed that since 2006 girls' participation in secondary level have been increasing but gender disparities still exists. In order bring gender parity and achieve universalization of secondary education various initiatives have been taken. A National Scheme of Incentive to Girls for Secondary Education was launched in 2008. It covers all SC/ST girls who pass Class VII and girls who pass Class VIII from Kasturba Gandhi Balika Vidyalayas and enrol for Class IX in State/UT Government, Government-aided or local body schools in the academic year 2008-09 onwards. Rastriya Madhyamik Shiksha Abhiyan (RMSA) 2009 aimed at removing gender biasness. The scheme emphasizes not only on universalization of secondary education for classes IX and X but also on gender disparities in education and promoting education of girls from varying socio-economic backgrounds. National Policy on education, 2019 emphasizes on "Equitable and inclusive Education". There are different scheme for elementary education programme by Central Govt. such as- Mahila Samakhya, Shiksha Karmi, Samagra Shiksha Abhiyan(SSA), Mid-day Meal, Ladali Scheme, Padhe Bitiya Badhe Bitiya, National Programme for Education for Girls at Elementary level (NPEGEL). There are other schemes which promote Secondary education of girls such as- Integrated Education for disabled Children(IEDC), ICT in Schools, Access & Equality, Quality Improvement in School (QIS), Vocational Courses of Education etc.

Although the contribution of education is enormous in comparison with its demerits, still it is worth of discussion to achieve it up to 100%. 2011 census revealed that the male literacy rate in India was 81.14% while the female literacy rate was 65.46%. It clears the gender disparity in education. Knowingly or unknowingly the school promotes gender biasness in one or the other way. It starts right from the lining up of children during morning assembly to bullying a boy for crying or a girl for behaving like a boy. Many a time, the teachers are not even aware of the fact that they are promoting gender biasness due to lack of awareness. Most of the teachers are unaware about gender equality while presenting the content in the classroom. (Fosiya et al. 2016) Sometimes in group activities teachers give more importance to boys and therefore they try to dominate girls in those activities. (Jacobi, 1991; Fransis, 2000; Fosiya, 2016). National Curriculum Framework (NCF) 2005 recommended rewriting the textbooks to remove gender biasness and only the state of Kerala followed that. Various research studies reveal that textbooks promote gender biasness among students. Erinosh (1997) analyzed 76 science textbooks and reported great disparity in gender representation. Of the 2995 pictorial illustrations 63.2% were of male while 36.8% were of female. Of the A total of 13,506 generic words (noun/pronoun) found in the textbooks, (10211, 75.6%) were male and

(3296, 24.4%) were female. 37 percent secondary school students in the study of Fosiya et al agreed that textbooks depict men as Engineers, Doctors, Pilots, and Lawyers, whereas women are represented as Teachers, Housewives, Nurse etc. Some studies have showed that teachers also promote gender biasness by entrusting different responsibilities and work on students on the basis of their gender. For example, girls are asked to prepare tea, join mehendi, dance, drama etc., whereas boys are encouraged for boxing, karate, gymnastics etc. (Fosiya et al 2016).

#### **IV. INCLUSION OF GENDER IN TEACHER EDUCATION AND ITS SOCIAL IMPACT**

The teachers are the main person who builds a society. Hence, if they are made aware of the gender differences, it may lead to a very positive effect on the children who are the future citizens of the country.

Inclusion of 'Gender' as a course in different teacher education programme has a positive influence in making the teacher aware on the different aspects of gender. As a result these teachers who are the torch bearers in the society are able to address the different gender related prejudice present in the educational system. This in return will have positive impact on removal of gender related differences which are prevalent in the society.

Hence educating the teachers on gender related aspects play a very important role in removal of evil prejudices in the society.

#### **V. CONCLUSION**

There are a number of factors associated with gender inequality in Education. According to UNESCO, poverty and cultural beliefs that cause discrimination against girls are some of the major factors behind gender inequality in education throughout India. Lack of sanitation, lack of parental education etc., are also responsible for unequal participation of girls in education. Promotion of gender inequality (biasness) in the education system itself is deleterious. Therefore the academicians, researchers, Governments and all other stakeholders should be cautious on the issue to bring entirely impartial education system.

#### **References**

- 1) Bhakta, K. (2018). Women education in the 21<sup>st</sup> century in India: women empowerment, gender equality and economic development. *International Journal of Basic and Applied Research*, 8(12), 694-698.
- 1) Bhat, R. A. (2015). Role of education in the empowerment of women in India. *Journal of Education and Practice*, 6(10), 188-191.

- 】 Bhattacharjee, B. (2015). Impact of education on women empowerment. *EPRAI International Journal of Economic and Business Review*, 3(10), 169-173.
- 】 Fosiya, P., Alias, M. & Musthafa, M.N. (2016). Gender bias in school curriculum curbs girls' career aspirations. *IOSR Journal of Humanities and Social Science*, 21(3), 19-22.
- 】 Ministry of Human Resource Development (2018). Draft National Education Policy 2019.
- 】 Srivastava, G. Gender concerns in education. Retrieved from [http://www.ncert.nic.in/departments/nie/dse/activities/advisory\\_board/PDF/GenderconcernsPdf](http://www.ncert.nic.in/departments/nie/dse/activities/advisory_board/PDF/GenderconcernsPdf).
- 】 UNESCO moving forward the 2030 agenda for sustainable development. Retrieved from <https://en.unesco.org/creativity/sites/creativity/files/247785en.pdf>.



# Perception of Adolescence's Parents on Sex Education

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## ABSTRACT

**A**dolescent is the phase of rapid and multidimensional growth causing physical and psychological changes. The research questions for this study is very much controversial in nature, most of the parents believe sex-education as an essential part and it should be given with a collaborative approach between families and institutions. The present study has conducted to find out the perception of parents on sex-education of adolescences. This investigation is a descriptive survey research and conducted in Nadia district of West Bengal, India. By using purposive sampling technique, the researcher has taken 180 parents whose children read in 9th standard. The self-constructed questionnaire concerning 12 questions was used for collection of data. In this study, non-parametric Chi-square test has been used for statistical analysis of data.

**Key words:** *Adolescences, Parents, Perception, Sex-Education.*

## I. INTRODUCTION

Sex-education of adolescences in educational institutions and in families continues to be plagued with anxiety and controversies. Sex education is high quality of education on a wider kind of aspects concerned to sex, gender personality, sexuality, eroticism, delights, inwardness, reproduction, pursue values and acquire the skills that are necessary to negative relationships and operate own sexual health. Sex education may accept place in educational institutions in community settings, or on line. It is realized and revealed in thoughts, imagination, pleasure, believes, feelings, attitudes, moral values, behavior, practices, roles and relationships. It is influenced by the interaction of biological, psychological, social, cultural, economic, political, ethical, legal, moral

values and spiritual factors. Sexual rights are also acknowledged in national laws, international human rights. This includes the right of all persons, free of enforce, discrimination and violence to standard of health. Sex education program can be school-based that are guided by instructors, teachers, guiders social workers, health servants, or peer groups; community-based; or family-based. Formal structured curriculum will be more effective and necessary to meet challenges posed to growing children in today's scenario.

## II. OBJECTIVE AND HYPOTHESES OF THE STUDY

The main objective of this study is:

To assess parents' perceptions about behavior of adolescents and sex-education.

### Hypotheses

For the present study, based on the objective, the investigator formulated the following hypotheses-

**Ho1:** There is no significant difference between attitude of male and female parents towards Indian culture as compare to western culture.

**Ho2:** There is no significant difference between attitude of male and female parents towards changes happening in puberty make them happy.

**Ho3:** There is no significant difference between attitude of male and female parents towards providing the 'human reproduction system' education.

**Ho4:** There is no significant difference between attitude of male and female parents towards 'identity as a human is more important than as a male or female'.

**Ho5:** There is no significant difference between attitude of male and female parents towards changes in behavior of their child because of pubertal age.

**Ho6:** There is no significant difference between attitude of male and female parents towards behavioral pattern of pubertal age changes occur and how to deal with them.

**Ho7:** There is no significant difference between attitude of male and female parents towards discussion on development of sex-organs with their child.

**Ho8:** There is no significant difference between attitude of male and female parents towards thinking patter regarding opposite sex.

**Ho9:** There is no significant difference between attitude of male and female

parents towards menstruation miss-conception.

**Ho10:**There is no significant difference between attitude of male and female parents towards knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude.

**Ho11:**There is no significant difference between attitude of male and female parents towards better to share adolescents' secrets with peers as they understand us better than parents or elders.

**Ho12:**There is no significant difference between attitude of male and female parents towards sexuality.

### **III. METHODOLOGY**

Research methodology gives a details description of the research procedures that are followed during the investigation. The research methodology followed for the present investigation is discussed in detail in this unit.

#### **Research Design**

The research design helps the researcher in the selection of subjects for observation, and in determination of the type of analysis to be used for interpretation of the data. The selection of the research design depends upon the purpose of the study and the conditions under which the study is conducted. For the present study, the researcher adopted Descriptive Survey research design.

#### **Sample**

Sampling technique is defined as the method used in drawing samples from population usually in such a manner that the sample will facilitate determination of some hypotheses concerning the population. In the present study, the sample is drawn from the population of 180 parents of ninth pass adolescence. The sample was drawn by non-probability purposive sampling technique.

#### **Tool used**

Data collection relies on instruments. The present study is aimed to assess the perception of parents towards sexual education. For this purpose, the researcher developed and used a self-constructed questionnaire that included closed ended 12 questions. For the study the attitude scale was prepared by researcher followed by Likert scale.

### Statistical Technique

The non-parametric statistics was used for statistical analysis of data. Chi-square test was applied to check significant association between different attributes.

#### IV. ANALYSIS AND INTERPRETATION

After collection of data with the help of relevant tools and technique, the next logical step is to analyze and interpret data. This unit focuses on the analysis and interpretation of data collected for this study.

**Q1: Indian culture is very old fashioned as compared to western culture.**

**Table1: Difference between Perception of Male and Females and Chi-square Test for Question No. 1**

Attributes	Male			Female			Total	%	df	$\chi^2$
	fo	Fe	Individual $\chi^2$	fo	Fe	Individual $\chi^2$				
Strongly Agree	19	18.0	0.06	17	18.0	0.06	36	20.00	4	1.7#
Agree	32	31.0	0.03	30	31.0	0.03	62	34.44		
Don't know	13	14.5	0.35	16	14.5	0.35	29	16.11		
Disagree	16	17.5	0.30	19	17.5	0.30	35	19.44		
Strongly Disagree	10	9	0.11	8	9	0.11	18	10.00		
Total	90	90		90	90		180	100		

*#No Significance at 0.05 level*

In table 1, Chi-square test indicate that calculated Chi-square value 1.70 is less than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence, the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards Indian culture is very old fashioned as compared to western culture stands accepted. On the other hand, this study displays that 34.44% parents agree with Indian culture is very old fashioned as compared to western culture.

**Q2: Changing happening in puberty make me happy.**

**Table 2: Difference between Perception of Male and Females and Chi-square Test for Question No. 2**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	Fe	Individual $\chi^2$	(fo)	Fe	Individual $\chi^2$				
Strongly Agree	26	27.0	0.04	28	27.0	0.04	54	30.00	4	3.86#
Agree	35	39.5	0.51	44	39.5	0.51	79	43.89		
Don't know	8	6.00	0.67	4	6.00	0.67	12	6.67		
Disagree	14	11.5	0.54	9	11.5	0.54	23	12.78		
Strongly Disagree	7	6.0	0.17	5	6.0	0.17	12	6.67		
Total	90	90		90	90		180	100		

*#No Significance at 0.05 level*

In table 2, Chi-square test result indicate that calculated Chi-square value 3.86 is less than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards changing happening in puberty make them happy stands accepted. On the other hand, this study displays that 43.89% parents agree with changing happening in puberty make them happy.

**Q3: Who should provide 'human reproduction system' education?**

**Table 3: Difference between Perception of Male and Females and Chi-square Test for Question No. 3**

Attributes	Male			Female			Total	%	df	$\chi^2$
	fo	fe	Individual $\chi^2$	fo	fe	Individual $\chi^2$				
Parents	7	12.50	2.42	18	12.5	2.42	25	12.22	3	11.12*
Teachers	35	31.00	0.52	27	31.0	0.52	62	35.56		
Third party experts	9	5.50	2.23	2	5.5	2.23	11	4.44		
Only medical professionals	39	41.00	0.39	43	41.0	0.39	82	47.78		
Total	90	90		90	90		180	100		

*\*Significance at 0.05 level*

In table 3, Chi-square test result indicate that calculated Chi-square value 11.12 is greater than critical Chi-square table value 9.837 at 0.05 level of significance with degree of freedom 3. Hence the results are statistically significant. The hypothesis is rejected. So, there exists significant difference between attitude of male and female parents towards should provide 'human reproduction system' education. On the other hand, this study displays that 47.78% parents agree with only medical professionals should provide human reproduction system education.

**Q4: Our identity as a human is more important than as a male or female.**

**Table 4: Difference between Perception of Male and Females and Chi-square Test for Question No. 4**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	Fe	Individual $\chi^2$	(fo)	fe	Individual $\chi^2$				
Yes	62	64	0.06	66	64	0.06	128	71.11	1	0.42#
No	28	26	0.15	24	26	0.15	52	28.89		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 4, Chi-square test result indicate that calculated Chi-square value 0.42 is less than critical Chi-square table value 3.841 at 0.05 level of significance with degree of freedom 1. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards identity as a human is more important than as a male or female stand accepted. On the other hand, this study displays that 71.11% parents agree with identity as a human is more important than as a male or female.

**Q5: Noticed any changes in behavior of your child because of pubertal age.**

**Table 5: Difference between Perception of Male and Females and Chi-square Test for Question No. 5**

Attributes	Male			Female			Total	%	df	$\chi^2$
	Fo	fe	Individual $\chi^2$	fo	Fe	Individual $\chi^2$				

Yes	63	66.5	0.18	70	66.5	0.18	133	73.89	1	1.4#
No	27	23.5	0.52	20	23.5	0.52	47	26.11		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 5, Chi-square test result indicate that calculated Chi-square value 1.40 is less than critical Chi-square table value 3.841 at 0.05 level of significance with degree of freedom 1. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards noticed any changes in behavior of their child because of pubertal age stand accepted. On the other hand, this study displays that 73.89% parents agree with noticed any changes in behavior of their child because of pubertal age.

**Q6: Feeling about behavioral changes.**

**Table 6: Difference between Perception of Male and Females and Chi-square Test for Question No. 6**

Attributes	Male			Female			Total	%	Df	$\chi^2$
	fo	fe	Individual $\chi^2$	fo	Fe	Individual $\chi^2$				
Shame	15	16	0.06	17	16	0.06	32	17.78	6	4.84#
Fear	12	14	0.29	16	14	0.29	28	15.56		
Disgust	6	7	0.14	8	7	0.14	14	7.78		
Anger	4	3	0.33	2	3	0.33	6	3.33		
Curious	19	20	0.05	21	20	0.05	40	22.22		
Happy	12	13	0.08	14	13	0.08	26	14.44		
Not able to identify	22	17	1.47	12	17	1.47	34	18.89		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 6, Chi-square test result indicate that calculated Chi-square value 4.84 is less than critical Chi-square table value 12.592 at 0.05 level of significance with degree of freedom 6. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards feeling about changes in behaviors tend accepted. On the other hand, this study displays that 73.89% parents agree with feeling about changes in behavior.

**Q7: Have you discussed sexual development with your child?**

**Table 7: Difference between Perception of Male and Females and Chi-square Test for Question No. 7**

Attributes	Male			Female			Total	%	df	$\chi^2$
	fo	fe	Individual $\chi^2$	Fo	Fe	Individual $\chi^2$				
Yes	27	31	0.52	35	31	0.52	62	34.44	1	1.58#
No	63	59	0.27	55	59	0.27	118	65.56		
Total	90	90		90	90		180	100		

# No Significance at 0.05 level

In table 7, Chi-square test result indicate that calculated Chi-square value 1.58 is less than critical Chi-square table value 3.841 at 0.05 level of significance with degree of freedom 1. Hence the results are statistically no significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards sexual development discussion with their child stand accepted. On the other hand, this study displays that 65.56% parents did not discuss sexual development with their child.

**Q8: Thinking of opposite sex is natural part of sexual development and should not be prevented.**

**Table 8: Difference between Perception of Male and Females and Chi-square Test for Question No. 8**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	fe	Individual $\chi^2$	(fo)	fe	Individual $\chi^2$				
Strongly Agree	21	23.5	0.27	26	23.5	0.27	47	26.11	4	12.18*
Agree	35	38.0	0.24	41	38.0	0.24	76	42.22		
Don't know	5	8.50	1.44	12	9.5	1.44	17	10.56		
Disagree	16	11.5	1.76	7	11.5	1.76	23	12.78		
Strongly Disagree	13	8.50	2.38	4	6.00	2.38	17	6.67		
Total	90	90		90	90		180	100		

\*Significance at 0.05 level

In table 8, Chi-square test result indicate that calculated Chi-square value 12.18 is greater than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically



significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards thinking of opposite sex is natural part of sexual development and should not be prevent, stands rejected. On the other hand, this study displays that 42.22% parents agree with thinking of opposite sex is natural part of sexual development and should not be prevent.

**Q9: Menstruation makes body of a female impure.**

**Table 9: Difference between Perception of Male and Females and Chi-square Test for Question No. 9**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	fe	Individual $\chi^2$	(fo)	Fe	Individual $\chi^2$				
Strongly Agree	6	8.0	0.5	10	8.0	0.5	16	8.89	4	4.92#
Agree	12	13.5	0.17	15	13.5	0.17	27	15.00		
Don't know	11	7.5	1.63	4	7.5	1.63	15	8.33		
Disagree	38	39.5	0.06	41	39.5	0.06	79	43.89		
Strongly Disagree	23	21.5	0.10	20	21.5	0.10	43	23.89		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 9, Chi-square test result indicate that calculated Chi-square value 4.92 is less than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically no significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards menstruation makes body of a female impure stand accepted. On the other hand, this study displays that 43.89% parents did not agree with menstruation makes body of a female impure.

**Q10: Knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude.**

**Table 10: Difference between Perception of Male and Females and Chi-square Test for Question No. 10**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	fe	Individual $\chi^2$	(fo)	Fe	Individual $\chi^2$				
Strongly Agree	25	23	0.17	21	23	0.17	46	25.56	4	2.58#
Agree	40	46	0.78	52	46	0.78	92	51.11		
Don't know	5	4.5	0.06	4	4.5	0.06	9	5.00		
Disagree	7	7.5	0.03	8	7.5	0.03	15	8.33		
Strongly Disagree	3	4.0	0.25	5	4.0	0.25	8	4.44		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 10, Chi-square test result indicate that calculated Chi-square value 2.58 is less than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude stand accepted. On the other hand, this study displays that 51.11% parents agree with knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude.

**Q11: It is better to share our secrets with peers as they understand us better than parents or elders.**

**Table 11: Difference between Perception of Male and Females and Chi-square Test for Question No. 11**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	fe	Individual $\chi^2$	(fo)	Fe	Individual $\chi^2$				
Strongly Agree	18	19	0.05	20	19	0.05	38	21.11	4	1.50#
Agree	33	34.5	0.07	36	34.5	0.07	69	38.33		
Don't know	4	3	0.33	2	3	0.33	6	3.33		
Disagree	26	24	0.17	22	24	0.17	48	26.67		
Strongly Disagree	9	9.5	0.03	10	9.5	0.03	19	10.56		
Total	90	90		90	90		180	100		

#No Significance at 0.05 level

In table 11, Chi-square test result indicate that calculated Chi-square value 1.50 is less than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically not significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards it is better to share adolescence secrets with peers as they understand us better than parents or elders stand accepted.

**Q12: Sexuality is**

**Table 12: Difference between Perception of Male and Females and Chi-square Test for Question No. 12**

Attributes	Male			Female			Total	%	df	$\chi^2$
	(fo)	fe	Individual $\chi^2$	(fo)	Fe	Individual $\chi^2$				
Attraction between a male and a female	29	23	1.57	17	23	1.57	46	25.56	4	10.66*
Combination of biological sex, gender and sexual orientation	35	42.5	1.32	50	42.5	1.32	85	47.22		
Experiencing pubertal changer	17	19	0.21	21	19	0.21	38	21.11		
A word not to be discussed publicly	9	5.5	2.23	2	5.5	2.23	11	6.11		
Total	90	90		90	90		180	100		

\*Significance at 0.05 level

In table 12, Chi-square test result indicate that calculated Chi-square value 10.66 is greater than critical Chi-square table value 9.488 at 0.05 level of significance with degree of freedom 4. Hence the results are statistically significant. So, the hypothesis framed earlier i.e. there is no significant difference between attitude of male and female parents towards sexuality stands rejected. On the other hand, this study displays that 47.22% parents agree with sexuality is combination of biological sex, gender and sexual orientation.

**V. FINDINGS**

On the basis of data analysis, it was finding that-

It is observed from analysis; there is no significant difference between attitude of male and female parents towards Indian culture as compared to western culture. This study displays that 34.44% parents agree with Indian

culture is very old fashioned as compared to western culture.

It is concluded that, there is no significant difference between attitude of male and female parents towards changes happened in puberty make them happy. This study displays that 43.89% parents agree with changing happening in puberty make them happy.

The results regarding hypothesis (Ho3) are statistically significant. So, there exists significant difference between attitude of male and female parents towards should provide 'human reproduction system' education. It is concluded that, this study displays that 47.78% parents agree with only medical professionals should provide human reproduction system education.

It is observed from analysis, there is no significant difference between attitude of male and female parents towards identity as a human is more important than as a male or female. This study displays that 71.11% parents agree with identity as a human is more important than as a male or female.

There is no significant difference between attitude of male and female parents towards noticed any changes in behavior of their child because of pubertal age. This study displays that 73.89% parents agree with noticed any changes in behavior of their child because of pubertal age.

There exists significant difference between attitude of male and female parents towards why behavior of pubertal age changes occurs and how to deal with them. This study display that 65% parents agree with why behavior of pubertal age changes occur and how to deal with them.

There is no significant difference between attitude of male and female parents towards sexual development discussion with their child. This study displays that 65.56% parents did not discuss sexual development with their child.

There exists significant difference between attitude of male and female parents towards thinking of opposite sex is natural part of sexual development and should not be prevented. This study displays that 42.22% parents agree with thinking of opposite sex is natural part of sexual development and should not be prevented.

There is no significant difference between attitude of male and female parents towards menstruation makes body of a female impure. This study displays that 43.89% parents did not agree with menstruation makes body of a female impure.

There is no significant difference between attitude of male and female parents towards knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude. This study display that 51.11% parents agree with knowing changing occurring in each other's bodies is helpful for girls and boys to develop healthy attitude.

There is no significant difference between attitude of male and female parents towards 'it is better to share secrets with peers' as they understand better than parents or elders.

There exists significant difference between attitude of male and female parents towards sexuality. This study display that 47.22% parents agree with sexuality is combination of biological sex, gender and sexual orientation.

## **VI. DELIMITATION OF THE STUDY**

Due to suppress of time and available resource the recent study is delimited to the-

- The study is confined to the parents of 9th pass adolescences only.
- The study is delimited to 180 parents in Nadia district only.
- The samples were selected purposively. The qualification of parents was not considered.

## **VII. CONCLUSION**

Schools need to provide parents with more information about the sex education curriculum and pedagogical approaches to teaching sex education to child. Doing so should involve the development of a pamphlet that outlines why it is important to address sex education with children, what the curriculum entails for different year groups, and providing other information about frequently asked questions. Inviting parents to an information session to discuss the sex education of their children would provide the opportunity to address any concerns they may have. There also needs to be greater consistency of the implementation and monitoring of a national comprehensive sex education curriculum across states and territories in India to ensure access and equity for all students. This needs to comprise a focus on building respectful and ethical relationships in the early years of school, including addressing gender, gender expression and sexuality diversity.

## **References**

- 1) Aggarwal, J. C. (2010). *Essentials of Educational Psychology*, 2<sup>nd</sup> Ed. Noida: Vikas Publishing House Pvt. Ltd.

- 】 Creswell, J. W. (2014). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*, 4<sup>th</sup> Ed., Delhi: PHI Learning Pvt. Ltd.
- 】 Haberland, N. & Rogow, D. (2015). Sexuality Education: Emerging Trends in Evidence and Practice. *Journal of Adolescent Health*, 56(1), S15-S21.
- 】 Koul, L. (2008). *Methodology of Educational Research*, 3<sup>rd</sup> Ed., Noida: Vikas Publishing House Pvt. Ltd.
- 】 Leung, H., Shek, D. T. L. & Shek, Y. W. (2019). Development of contextually-relevant sexuality education: Lessons from a comprehensive review of adolescent sexuality education across cultures. *International Journal of Environmental Research and Public Health*, 16(4), 621.
- 】 Mangal, S. K. (2012). *Statistics in Psychology and Education*, 2<sup>nd</sup> Ed. New Delhi: PHI Learning Private Limited.
- 】 Robinson, K. H. & Smith, E. (2017). Responsibilities, tensions and ways forward: Parents' perspectives on children's sexuality education. *Sex Education*, Routledge Taylor & Francis group, 17(3), 333-347.
- 】 Shiradkar, S. (2016). Addressing contemporary issues in sexuality education with holistic approach. Submitted to MGM Medical College and Hospital, Aurangabad.
- 】 Singh, A. K. (2008). *Test, Measurement and Research Methods in Behavioral Science*, New Delhi: Bharati Bhawan Publication and Distributors.
- 】 UNESCO (2018). *International Technical Guidance on Sexuality Education*, France.

# Exploring Territories of Algorithmic Fairness in Machine Learning

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## ABSTRACT

**A**lgorithmic bias portrays orderly and repeatable blunders in a PC framework that make unfair results, for example, privileging one discretionary gathering of clients over others. Bias can develop because of numerous components, including however not constrained to the structure of the algorithm or the unintended or unforeseen use or choices identifying with the manner in which information is coded, gathered, chose or used to prepare the algorithm. Algorithmic bias is spans across various stages, including however not restricted to web crawler results and web based life stages, and has effect running from unintentional security infringement to fortifying societal biases of race, sex, sexuality, and ethnicity. The investigation of algorithmic bias is generally worried about algorithms that reflect “orderly and unfair” separation. This bias has as of late been tended to in lawful systems, for example, the 2018 European Union’s General Data Protection Regulation. As algorithms extend their capacity to arrange society, governmental issues, foundations, and conduct, sociologists have gotten worried about the manners by which unforeseen yield and control of information can affect the physical world. Since algorithms are frequently viewed as impartial and unbiased, they can mistakenly extend more prominent authority than human aptitude, and now and again, dependence on algorithms can uproot human duty regarding their results. Bias can go into algorithmic frameworks because of prior

social, social, or institutional desires; in light of specialized restrictions of their plan; or by being utilized in unforeseen settings or by crowds who are not considered in the product's underlying structure.

**Key words:** *Fairness, Bias, Algorithms, Machine Learning, Decision Making.*

## I. INTRODUCTION

Machine algorithms have infiltrated each part of our day by day life. Algorithms make motion picture suggestions, propose items to purchase, and are progressively utilized in high-stakes choices in advance applications, dating and contracting. There are clear advantages to algorithmic dynamic; in contrast to individuals, machines don't become worn out or exhausted and can consider requests of extent a bigger number of variables than individuals can. Be that as it may, similar to individuals, algorithms are defenseless against inclinations that render their choices "out of line". With regards to dynamic, reasonableness is the nonattendance of any preference or partiality toward an individual or a gathering dependent on their natural or procured qualities. Thus, an unfair algorithm is one whose decisions are biased toward a particular group of people.

With the notoriety of AI and AI over the previous decades, and their pandemic spread in various applications, wellbeing and reasonableness imperatives have become a gigantic issue for specialists and engineers. AI is utilized in courts to evaluate the likelihood that a respondent commits once again a wrongdoing. It is utilized in various clinical fields, in youth government assistance frameworks, and self-ruling vehicles. These applications have an immediate impact in our lives and can hurt our general public if not structured and designed effectively, with contemplations to reasonableness. It has a rundown of the applications what's more, the manners in which these AI frameworks influence our day by day lives with their intrinsic biases, for example, the presence of bias in AI chatbots, business coordinating, flight steering, and robotized legitimate guide for movement algorithms, and search and publicizing arrangement algorithms. It has been likewise examined how a few instances of bias in reality can crawl into AI and mechanical frameworks, for example, bias in face acknowledgment applications, voice acknowledgment, and web search tools. Consequently, it is significant for scientists and architects to be worried about the downstream applications and their potential hurtful impacts when displaying an algorithm or a framework. A notable model is COMPAS, which is a broadly utilized business hazard evaluation programming that was contrasted with typical human judgment in an investigation furthermore, was later found to be no superior to a typical human .It is likewise intriguing to note that in spite of



the fact that COMPAS utilizes 137 features, just 7 of those were introduced to the individuals in the investigation. In a study it was found, creators likewise contended that COMPAS isn't any superior to anything a basic calculated relapse model when deciding. We should think capably, and perceive that these devices are utilized in courts and are really settling on choices which influence people groups' lives; in this manner, thinking about reasonableness requirements is a pivotal assignment while structuring and building these kinds of delicate instruments. In another comparable examination, while exploring wellsprings of gathering shameful (injustice across various gatherings is characterized later), the creators looked at SAVRY, a device utilized in hazard appraisal systems that remembers human mediation for its procedure, with programmed AI techniques all together to see which one is progressively precise and reasonable. Directing these sorts of studies ought to be accomplished more every now and again, yet before discharging the devices so as to abstain from doing hurt. Another fascinating bearing that analysts have taken is presenting devices that can evaluate the measure of decency in an apparatus or framework. For instance, Aequitas is a toolbox that lets clients to test models with respect to a few bias and reasonableness measurements for various populace subgroups. Aequitas produces reports from the acquired information that enables information researchers, to AI scientists, and policymakers to settle on cognizant choices and stay away from mischief and harm toward specific populaces. Artificial intelligence Reasonableness 360 (AIF360) is another toolbox created at IBM so as to help moving decency look into algorithms into a mechanical setting and to make a benchmark for decency algorithms to get assessed also, a domain for reasonableness specialists to share their thoughts. These kinds of toolboxes can be accommodating for students, analysts, and individuals working in the business to move towards creating reasonable AI application away from biased conduct. Notwithstanding COMPAS, oppressive conduct was likewise apparent in an algorithm that would convey commercials advancing employments in Science, Technology, Engineering, and Math (STEM) fields. This commercial was intended to convey ads in a gender impartial manner. Be that as it may, less ladies contrasted with men saw the commercial because of sexual orientation irregularity which would bring about more youthful ladies being considered as a significant subgroup and progressively costly to demonstrate commercials to. This streamlining algorithm would convey advertisements in an oppressive manner in spite of the fact that its unique and unadulterated expectation was to be gender impartial. Bias in facial acknowledgment frameworks and recommender frameworks have likewise been to a great extent examined and assessed and by and large demonstrated to be discriminative towards certain

populaces and subgroups. So as to have the option to address the bias issue in these applications, it is significant for us to know where these biases are coming from and what we can do to forestall them.

## II. CONCEPTUAL FRAMEWORK FOR FAIRNESS IN ALGORITHMS

Fairness definitions fall under different types as follows:

- Individual Fairness. Give similar predictions to similar individuals
- Group Fairness. Treat different groups equally
- Subgroup Fairness. Subgroup fairness tries to get the best features of the group and individual notions of fairness. It is different than these notions but utilises them get gather better outcomes. It selects a group fairness constraint say equalizing false positive and asks whether this constraint is true for a large collection of subgroups.

Definition 1. (Equalized Odds) This implies the likelihood of an individual in the constructive class being effectively appointed a constructive result and the likelihood of an individual in a negative class being incorrectly allocated a positive result should both be the equivalent for the ensured and unprotected (male and female) bunch individuals. At the end of the day, the equalized odds definition expresses that the ensured and unprotected gatherings ought to have equal rates for genuine positives and false positives.

Definition 2. (Equal Opportunity) This implies the likelihood of an individual in a positive class being allocated to a positive result ought to be equal for both secured and unprotected (female and male) bunch individuals. At the end of the day, the equal opportunity definition expresses that the ensured and unprotected gatherings ought to have equal genuine positive rates.

Definition 3. (Demographic Parity) The probability of a constructive result ought to be the equivalent whether or not the individual is in the secured (e.g., female) gathering.

Definition 4. (Fairness through Awareness) “A calculation is reasonable in the event that it gives comparative forecasts to comparative individuals”. In different words, any two individuals who are comparative regarding a similarity (inverse distance) metric defined for a specific assignment ought to get a comparative result.

Definition 5. (Fairness through Unawareness) “A calculation is reasonable as long as any ensured traits An are not unequivocally utilized in the dynamic procedure”.

Definition 6. (Treatment Equality) “Treatment equality is accomplished when the proportion of false negatives and false positives is the equivalent for both secured bunch classes”

Definition 7. (Test Fairness) As it were, the test fairness definition expresses that for any anticipated likelihood score, individuals in both secured and unprotected (female and male) bunches must have equal likelihood of effectively belonging to the positive class.

Definition 8. (Counterfactual Fairness) The counterfactual fairness definitions depend on the “intuition that a choice is reasonable towards an individual on the off chance that it is the equivalent in both the genuine world and a counterfactual existence where the individual had a place with an alternate demographic gathering”.

Definition 9. (Fairness in Relational Domains) “A thought of fairness that can catch the relational structure in a domain—not just by taking traits of individuals into thought however by taking into account the social, authoritative, and different associations between individuals”.

Definition 10. (Conditional Statistical Parity) Conditional statistical parity expresses that individuals in both ensured and unprotected (female and male) gatherings ought to have equal likelihood of being appointed to a positive result given a lot of legitimate factors.

### **III. EFFECTS OF BIASES IN MACHINE LEARNING ALGORITHMS**

Bias in information can exist in numerous shapes and structures, some of which can prompt shamefulness in various downstream learning assignments. In an investigation scientists talk about wellsprings of bias in AI with their arrangements and portrayals so as to rouse future answers for every one of the wellsprings of bias presented in the chapter. In another perception, creators set up a total rundown of various sorts of biases with their comparing definitions that exist in various cycles from information starting points to its assortment and its preparing. Here we will emphasize probably the broadest and significant wellsprings of bias presented in this chapter and furthermore include some work from other existing exploration chapters. Furthermore, we will likewise present an alternate order and gathering of these definitions later in the chapter.

(1) Historical Bias: Historical bias is the previously existing bias and socio-specialized issues on the planet and can saturate from the information age process even given an ideal examining and highlight choice .A case of this sort of bias can be found in a 2018 picture query item where scanning for

ladies CEOs eventually brought about less female CEO pictures because of the way that solitary 5% of Fortune 500 CEOs were lady—which would cause the indexed lists to be biased towards male CEOs .These list items were obviously mirroring the truth, yet whether the pursuit calculations ought to mirror this the truth is an issue worth considering.

(2) Representation Bias: Representation bias happens from the way we characterize and sample from a population .Lacking geographical decent variety in datasets like Image Net is an example for this kind of bias .This demonstrates a bias towards Western nations.

(3) Measurement Bias: Measurement bias happens from the way we pick, use, and measure a particular feature. An example of this kind of bias was seen in the recidivism hazard forecast apparatus COMPAS, where earlier arrests and companion/family arrests were utilized as intermediary variables to measure level of “danger” or “wrongdoing”- which all alone can be seen as mismeasured intermediaries. This is because of the fact that minority networks are controlled and policed all the more much of the time, so they have higher arrest rates. Notwithstanding, one ought not infer that because individuals originating from minority bunches have higher arrest rates in this way, they are increasingly dangerous as there is a distinction in how these gatherings are assessed and controlled.

(4) Evaluation Bias: Evaluation bias happens during model evaluation. This incorporates the utilization of inappropriate and disproportionate benchmarks for evaluation of applications, for example, Adience and IJB-A benchmarks. These benchmarks are utilized in the evaluation of facial acknowledgment frameworks that were biased toward skin shading and sex, and can fill in as examples for evaluation bias.

(5) Aggregation Bias: Aggregation bias exists in case of false determinations which are made for a subgroup based on watching other various subgroups or when false assumptions about a population effect the model’s result and definition .An example of this sort of bias can be seen in clinical aid devices. Consider diabetes patients who have apparent contrasts across ethnicities and sexes, or all the more specifically, HbA1c levels that are generally utilized in diagnosis and checking of diabetes are distinctive in complicated ways across sexual orientations and ethnicities. Hence, because of these factors and their various meanings and importance across various sub-gatherings and populations, a solitary model would most probably not be most appropriate for all gatherings in a population. This is genuine in any event, when they are spoken to equally in the training data. Any general assumptions about various populations can bring about aggregation bias.

(6) Population Bias: Population bias arises when statistics, demographics, representatives, and client characteristics are diverse in the client population spoke to in the dataset or platform from the original target population. An example of such type of bias can arise from various client demographics on various social platforms, for example, ladies being bound to utilize Pinterest, Facebook, Instagram, while men being progressively active in online gatherings like Reddit or Twitter. A greater amount of such examples and statistics related to usage of social media among youthful adults according to sexual orientation, race, ethnicity, and parental educational background can be found.

(7) Simpson's Paradox: Simpson's paradox can introduce deep bias during the analysis of heterogeneous data that is made up of small groups or individuals with multiple behaviours. As per Simpson's paradox, a pattern, association, or highlight quality observed in subgroups under study might be very not quite the same as association or highlight trait observed when these subgroups are consolidated.

One of the better-known examples of this kind of paradox arose during the sexual orientation bias lawsuit in college admissions against UC Berkeley. After analysing graduate school admissions data, it appeared as though there was bias toward ladies, a smaller percentage of whom were being selected for graduate programs compared to their male counterparts. Notwithstanding, when admissions data was separated and analyzed over the departments, ladies applicants had equality and at times even a small advantage over men. The paradox happened as ladies would in general apply to departments with lower admission rates for the two sexual orientations. Simpson's paradox has been seen in a variety of domains, including science , brain research , astronomy , and computational data sciences .

(8) Longitudinal Data Fallacy: Few examinations frequently treat cross-sectional data as in the event that it were longitudinal, which may create biases because of Simpson's paradox. As an example, analysis of mass Reddit data revealed that remark length decreased after some time on average. Notwithstanding, many data scientists spoke to a cross-sectional snapshot of the population, which in reality contained various accomplices who joined Reddit in various years. At the point when data was disaggregated by accomplices, the remark length inside each partner was found to increase after some time.

(9) Sampling Bias: Sampling bias happens due to the main reason when non-random sampling of subgroups is performed. As a result of sampling bias, the patterns estimated for one population may not generalize to data gathered from another population. Assume whenever the examination is led, one of

the subgroups is sampled more much of the time than the rest. The positive pattern found by the relapse model in the primary examination almost totally disappears, although the subgroup patterns are unaffected.

(10) Behavioral Bias: Behavioral bias arises from various client behavior across platforms, settings, or diverse datasets. An example of this kind of bias can be seen in, where authors show how contrasts in emoticon representations among platforms can bring about various reactions and behavior from individuals and now and again in any event, leading to communication blunders.

(11) Content Production Bias: Content Production bias arises from structural, lexical, semantic, and syntactic contrasts in the contents generated by clients. An example of this sort of bias can be found in where the distinction being used of language across genders and age bunches is talked about. The distinctions being used of language can also be seen across and inside nations and populations.

(12) Linking Bias: Linking bias arises when system attributes obtained from client connections, activities, or interactions vary and distort the genuine behaviour of the clients. In authors show how social systems can be biased toward low-degree hubs when just thinking about the connections in the system and not thinking about the content and behavior of clients in the system. An investigation also shows that client interactions are significantly unique in relation to social connection patterns that are based on features, for example, technique for interaction or time. The distinctions and biases in the systems can be an after effect of many factors, for example, arrange sampling, as appeared in which can change the system measures and cause various kinds of issues.

(13) Temporal Bias: Temporal bias emerges from contrasts in populaces and practices after some time. A model can be seen in Twitter where individuals discussing a specific subject beginning utilizing a hashtag sooner or later to catch consideration, at that point proceed with the conversation about the occasion without utilizing the hashtag.

(14) Popularity Bias: Things that are progressively famous will in general be uncovered more. In any case, popularity measurements are dependent upon control—for instance, by counterfeit audits or social bots. As an occasion, this kind of bias can be found in web indexes or proposal frameworks where well known items would be introduced more to people in general. Be that as it may, this presentation may not be a consequence of good quality; rather, it might be because of other biased components.

(15) **Algorithmic Bias:** Algorithmic bias is the point at which the bias is absent in the info information and is included absolutely by the calculation.

(16) **User Interaction Bias:** User Interaction bias is a kind of bias that cannot exclusively be perceptible on the Web yet additionally get activated from two sources—the user interface and through the user itself by forcing his/her self-chosen biased conduct and interaction. This kind of bias can be impacted by different sorts and subtypes, for example, Presentation and Ranking biases.

(17) **Presentation Bias:** Presentation bias is an after effect of how data is introduced. For instance, on the Web users can just tap on content that they see, so such content gets clicks, while everything else gets no snap. What's more, the reality of the situation could prove that the user doesn't see all the data on the Web.

(18) **Ranking Bias:** The possibility that top-positioned results are the most significant and significant will bring about fascination of a bigger number of snaps than others. This bias influences web crawlers and crowd sourcing applications.

(19) **Social Bias:** Social bias happens when others' activities or substance originating from them influence our judgment. A case of this kind of bias can be where we need to rate or audit a thing with a low score, however when affected by other high evaluations, we change our scoring imagining that maybe we are by and large excessively unforgiving.

(20) **Emergent Bias:** New bias occurs because of utilization and interaction with genuine users. This bias emerges because of progress in populace, social qualities, or cultural information typically some time after the fruition of structure. This type of bias is bound to be seen in user interfaces, since interfaces will in general mirror the limits, attributes, and propensities for forthcoming users by structure. This kind of bias would itself be able to be separated into more subtypes.

(21) **Self-Selection Bias:** Self-selection bias is a subtype of the selection or testing bias wherein subjects of the exploration select themselves. A case of this type of bias can be seen in circumstances where review takers conclude that they can fittingly take part in an examination themselves. For example, in a study learn about brilliant or fruitful understudies, some less effective understudies may believe that they are effective to take the overview—which would then bias the result of the examination. Truth be told, the odds of this circumstance happening is high, as the more fruitful understudies likely would not invest energy rounding out studies that would expand the danger of self-selection bias.



(22) Omitted Variable Bias: Omitted variable bias<sup>4</sup> happens when at least one significant variable is kept separate from the model. A model for this case would be the point at which somebody plans a model to foresee, with generally high exactness, the yearly rate at which clients will quit buying in to a help, yet before long sees that most of clients are dropping their membership without accepting any notice from the planned model. Presently envision that the explanation behind dropping the memberships is appearance of another solid rival in the market which offers a similar arrangement, however for a large portion of the cost. The presence of the contender was something that the model was not prepared for; in this way, it is viewed as an omitted variable.

(23) Cause-Effect Bias: Cause-effect bias can occur because of the misrepresentation that relationship infers causation. A case of this kind of bias can be seen in a circumstance where an information expert in an organization needs to break down how fruitful another unwaveringness program is. The examiner sees that clients who pursued the dedication program are going through more cash in the organization's web based business store than the individuals who didn't. It will be risky if the examiner quickly bounces to the end that the steadfastness program is effective, since the reality of the situation might prove that lone increasingly dedicated or faithful clients, who may have intended to go through more cash at any rate, are keen on the unwaveringness program in any case. This type of bias can have genuine outcomes because of its inclination and the jobs it can play in delicate dynamic strategies.

(24) Observer Bias: Observer bias happens when scientists intuitively venture their desires onto the exploration. This kind of bias can happen when specialists (unexpectedly) impact members (during meetings and studies) or when they filter out members or insights that will support their exploration.

(25) Funding Bias: Funding bias emerges when biased outcomes are accounted for so as to help or fulfil the funding organization or budgetary supporter of the exploration study. For instance, these shows when representatives of an organization report biased outcomes in their information and insights so as to keep the funding offices or different gatherings fulfilled.

#### **IV. FUTURE CHALLENGES TO DEVELOP FAIR ALGORITHMS**

There are several remaining challenges to be addressed in the fairness literature of machine learning. Among them are:

(1) Synthesizing a definition of fairness. Several definitions of what would constitute fairness from a machine learning perspective have been proposed in the literature. These definitions cover a wide range of use cases, and as a



result are somewhat disparate in their view of fairness. Because of this, it is nearly impossible to understand how one fairness solution would fare under a different definition of fairness. Synthesizing these definitions into one remains an open research problem.

(2) From Equality to Equity. The definitions presented in the literature mostly focus on equality, ensuring that each individual or group is given the same amount of resources, attention or outcome. However, no concern has been paid to equity, which is the concept that each individual or group is given the resources they need to succeed. Operationalizing this definition and studying how it augments or contradicts existing definitions of fairness remains an exciting future direction.

(3) Searching for Unfairness. Given a definition of fairness, it should be possible to identify instances of this unfairness in a particular dataset. Inroads toward this problem have been made in the areas of data bias by detecting instances of Simpson's Paradox in arbitrary data sets; however, unfairness may require more consideration due to the variety of definitions and the nuances in detecting each one.

Research on fairness in machine learning still faces many challenges. In the formalization of fairness, we face the problem that different definitions are useful in different contexts. These definitions cannot be unified in one generic framework as we face tradeoffs between individual definitions. We manage these tradeoffs by installing the fairness parts of choices that we need to address algorithmically in cultural, institutional, legitimate and moral systems dependent upon the situation. We need to acknowledge that there is no broad once-size-fits-all answer for fairness in calculations. Along these lines, the engineers should work together with area specialists. For this reason, ADM systems likewise must be logical. There are two promising approaches to keep away from unfairness because of one-sided information. One is to fully understand the data used. The other is to improve the quality of the data used. Methods of causal inference will become more relevant in order to understand the underlying mechanisms of a decision process as well as identify sources of bias in data. This goes in line with improving the knowledge of researchers on the data used as well as increasing awareness for the importance of understanding the data-generating process. In addition, a focus on data diversity is crucial to address problems of discrimination against minorities. Implementing dynamic feedback and equilibrium effects into models of decision making is necessary to understand the consequences of changing decision. Further research on real world applications of ADM systems is necessary to understand how

human decision makers interact with machine support. This additionally implies calculations should experience visit revaluations. No calculation can be reasonable perpetually without rearrangements. Once more, expanded decent variety becomes critical with regards to inconspicuous illustrative damages.

## V.CONCLUSION

Right now presented issues that can unfavourably influence AI frameworks as far as bias and unfairness. The issues were seen essentially from two measurements: information and algorithms. We delineated a portion of the issues and indicated why considering fairness is a significant issue, along with giving a portion of the potential genuine damage that unfairness can have on society, for example, applications in legal frameworks, face acknowledgment, and advancing algorithms. We at that point went over the meanings of fairness and bias that have been proposed by specialists. To additionally invigorate the enthusiasm of perusers, we gave a portion of the work done in various regions as far as tending to the biases that may influence AI frameworks and various strategies and domains in AI, for example, general machine learning, profound learning and normal language handling. We at that point additionally subdivided the fields into a all the more fine-grained investigation of each subdomain and the work being done to address fairness constraints in each. The expectation is to extend the skylines of the per users to think profoundly while taking a shot at a framework or on the other hand a technique to guarantee that it has a low chance of causing potential damage or bias toward a specific gathering. With the development of AI use in our reality, it is significant that specialists take this issue truly and extend their insight right now. Right now arranged and made a scientific classification of what has been done as such far to address various issues in various domains in regards to the fairness issue. Other conceivable future work and headings can be taken to address the contemporary challenges and biases in AI.

## References

- 1) Angwin, J., Larson, J., Mattu, S. & Kirchner, L. (2016). ProPublica: Machine Bias. <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>.
- 2) Angwin, J., Larson, J., Mattu, S. & Kirchner, L. (2016). ProPublica: How We Analyzed the COMPAS Recidivism Algorithm. <https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm>
- 3) Alipourfard, N., Fennell, P.G. & Lerman, K. (2018). Using Simpson's Paradox to Discover Interesting Patterns in Behavioral Data. Twelfth International AAAI

Conference on Web and Social Media.

- 】 Amini, A., Soleimany, A., Swarting, W., Bhatia, S. & Rus, D. (2019). Uncovering and Mitigating Algorithmic Bias through Learned Latent Structure. [https://dspace.mit.edu/bitstream/handle/1721.1/121101/AIES\\_2019\\_Algorithmic\\_Bias.pdf?sequence=1&isAllowed=y](https://dspace.mit.edu/bitstream/handle/1721.1/121101/AIES_2019_Algorithmic_Bias.pdf?sequence=1&isAllowed=y)
- 】 Angwin, J., Larson, J., Mattu, S., & Kirchner, L. (2016). ProPublica: Machine Bias: the software used across the country to predict future criminals. And its biased against blacks. *ProPublica* 23.
- 】 Asuncion, A. & Newman, D.J. (2007). UCI Machine Learning Repository. <http://www.ics.uci.edu/~lmsim/mllearn/>
- 】 Backurs, A., Indyk, P., Onak, K., Schieber, B., Vakilian, A. & Wagner, T. (2019). Scalable Fair Clustering. 36th International Conference on Machine Learning. PMLR, Long Beach, California, USA, 97, 405–413. <http://proceedings.mlr.press/v97/backurs19a.html>
- 】 Baeza-Yates, R. (2018). Bias on the Web. *Communication of the ACM* 61, 54–61. <https://doi.org/10.1145/3209581>
- 】 Barbosa, S., Cosley, D., Sharma, A., & Roberto M. (2016). Averaging Gone Wrong: Using Time-Aware Analyses to Better Understand Behavior. In Proceedings of the 25th International Conference on World Wide Web, 829–841.

# A Study on the Prevalence of Anaemia Among Pregnant Women and Their Perinatal Outcomes

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## ABSTRACT

According to National Family Health Survey (NFHS-4) (2015-16) reports, maternal anaemia continues to be a major public health problem in India not because more than 50% of pregnant women suffer from it, but also it has been responsible for the highest incidence of maternal deaths (40%) in our country which accounts for 80% of maternal global deaths among South Asian countries. Maternal anaemia negatively affects the outcomes of pregnancy increasing chances of miscarriages, stillbirths, prematurity, low birth weight etc. The objective of this non-invasive, purposive study was to estimate the prevalence of anaemia and observe the perinatal outcomes of 129 pregnant women (20 to 45 years), attending an antenatal clinic of a hospital based in Kolkata serving mainly people from the low socio-economic background. The subjects were selected on basis of inclusion and exclusion criteria and prior content was taken. The collection of socio-demographic and dietary information was done through interview using a questionnaire whereas the medical and health status data were collected from the antenatal clinic medical card. The information related to perinatal outcomes were collected from the record section of the clinic. Results: Out of 129 pregnant women (all in their third trimester), 47% (n=61) were found to be anaemic and their new-borns exhibited complications like Low birth weight (LBW) 66%, premature babies 65% and respiratory distress 79%. Irregular intake of iron-folic acid (IFA) supplementation was reported by almost 45% of the total study subjects of which 60% were anaemic subjects. The vegetarian diet was consumed by 16% of the total participants

of which 62% had anaemia. Other participants who consumed mixed diet admitted to not being able to include animal food sources rich in iron and protein for e.g. eggs, meat, fish etc on regular basis. It could be concluded that lack of awareness regarding increased nutritional demands during pregnancy, ignorance regarding the importance of IFA supplementation, low purchasing capability, strong dislikes were contributory factors for low haemoglobin status among the anaemic subjects.

**Keywords:** *Pregnant woman, Anaemia, Perinatal outcomes, Iron- Folic Acid (IFA).*

## I. INTRODUCTION

Anaemia is defined “as a condition in which the number of red blood cells and their oxygen carrying capacity is insufficient to meet the body’s physiologic needs”, as stated by World Health Organisation (WHO,2007).It is a life-threatening condition during pregnancy and a public health issue worldwide (WHO,2008).According to WHO (2011),a haemoglobin(Hb) value <110g/L grades a pregnant woman to be anaemic and almost 40% of pregnant women all over the world suffer from anaemia (World Health Assembly,WHA, 2025)(Kalaivani,2009).The scenario is quite grave in India because anaemia contributes to nearly 80% of maternal deaths alone among the South Asian countries(Ezzati,Lopus, Dogers,Vander,& Murray,2002).

Various health surveys were conducted in our country to get a clear picture of the health status of its population of which the latest National Family Health Survey (NFHS)-4 (2015-16) reported more than 50% of pregnant women in India had anaemia and not much improvement had been achieved from the previous health surveys.Anaemia poses greater risk of maternal mortality and morbidity(WHO,1993)(Brabin, Hakimi,&Pelletier,2001) and negatively impacts foetal outcomes by increasing the risk of life threatening complications such as still births, intra uterine growth retardation, low birth weight babies, premature delivery etc in many folds and is also responsible for 40% maternal deaths in India, which is the highest in the world according to Kalaivani (2009).As per Indian Council for Medical Research (ICMR,2010), the daily iron requirement of an Indian pregnant woman is 35 mg/day(Recommended Dietary Allowance,RDA-2010), and low dietary iron intake is suggested to be the primary cause of anaemia (NFHS-4) other factors being— low socio- economic condition(Lokare, Karanjekar,Gattani,&Kulkarni,2012) poor absorption,dietary deficiencies of folate, vitamin B12, vitamin C, parasite infestation etc(Noronha,

Khasawneh, Seshan, Ramasubramaniam, & Raman, 2012) less of iron enhancers like vitamin C and more of inhibitors like tea and coffee are included in diet along with unhygienic living conditions and unsafe drinking water increase the problem (Barclay & Tiwari, 2002). Looking at the prevalence rate of anaemia in our country, the Ministry of Health & Family Welfare (MoHFW), Govt. of India, expanded the National Nutritional Anaemia Control Programme (NNACP) and renamed it as the National Iron Plus Initiative (NIPI) Programme (2013) which revised the previous recommendation of Iron and Folic Acid (IFA) supplements for pregnant women (MoHFW) (Kapil & Bhadoria, 2013) to a daily intake of 100mg elemental iron and 500mcg of folic acid for at least 100 days starting after first trimester of gestation.

## **II. OBJECTIVE**

The Objective of the present study was to estimate the prevalence of anaemia among pregnant women belonging to low socio-economic background and determine effect on maternal and foetal outcomes. To assess the IFA supplementation awareness of subjects and type of diet consumed. Providing nutrition education to both the anaemic as well as the non-anaemic pregnant women to improve their health status within their limited resources.

## **III. MATERIALS & METHODS**

This observational study was conducted with view of estimating the prevalence of anaemia among 200 pregnant women (20-45 years) attending the ante-natal clinic of a Kolkata based charitable hospital serving people from low socio-economic background. Most were residents of Kolkata city and few came from suburban areas, all were married, mostly Hindus and majority lived in joint / extended families.

On basis of inclusion and exclusion criteria only 129 subjects all in their third trimester could be included. A prior written consent was obtained from the hospital authorities as well as the subjects before collection of any data. To study the anaemia status of pregnant women their haemoglobin (Hb) values were recorded from their antenatal clinic medical card (no blood sample was collected from subjects).

The socio-demographic and diet related information were collected through personal interview using a questionnaire containing questions pertaining to the present study. Other information apart from haemoglobin level such as medical status and perinatal outcomes were recorded from medical cards as well as the record section of the hospital. On basis of participation and study convenience, subjects were grouped into three age categories i.e. 20 to 24 years, 25 to 30 years

and more than 30 years.No subjects were found to be above the age of 35 years.

Inclusion criteria: pregnant woman between age group of 20 to 30 and more than 30 - 45 years and in third trimester (to record perinatal outcomes)

Exclusion criteria: Presence of any chronic medical disease/ condition, blood loss, malaria in recent time, recent delivery.

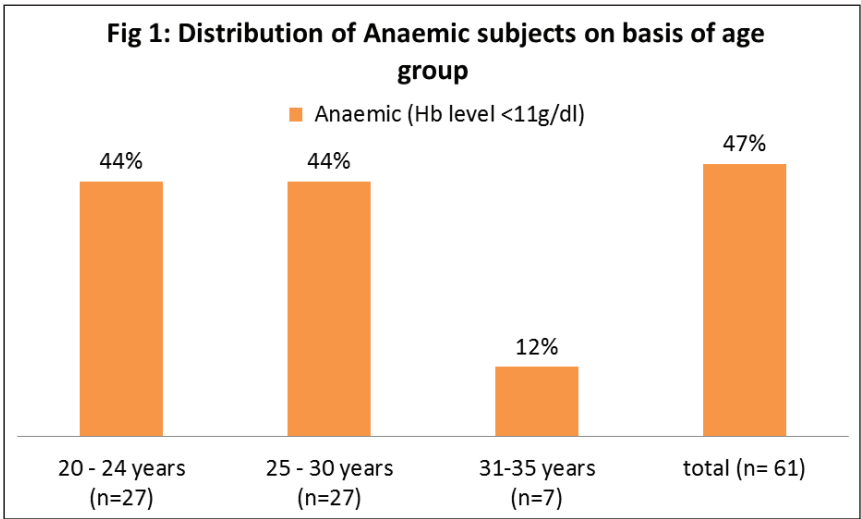
The pregnant women were counselled about their Hb status, dietary benefits of consumption of locally available iron rich foods like green leafy vegetables, seasonal fruits, eggsetc,increased nutritional requirements during pregnancy, regular intake of IFA supplements, reducing tea or coffee in diet, regular antenatal check-ups etc.

Grading of Anaemia: Anaemia was classified according to WHO guidelines; where Hb concentration of <11g/dl was considered as anaemia. Hb conc. Of 10.9 to 10 g/dl, 9.9 to 7g/dl and <7g/dl was graded as mild, moderate and severe anaemia respectively (WHO,2011).

Note: The haemoglobin (Hb) concentration of these pregnant women was measured using Cyanmethaemoglobin method by hospital laboratory which is considered to be the most accurate method by WHO to detect anaemia in a population.

#### **IV. RESULTS**

From fig 1, it can be reported that out of 129 pregnant women almost 47% (n=61) subjects were found to be anaemic as per WHO guidelines. Anaemia was present amongall the three age groups, but was more prevalent among 20-24 years and 25 to 30years groups i.e.44% and least i.e.12% among >30 years subjects.



**Fig 2 :Distribution of subjects on basis of grades of anaemia (W.H.O)**

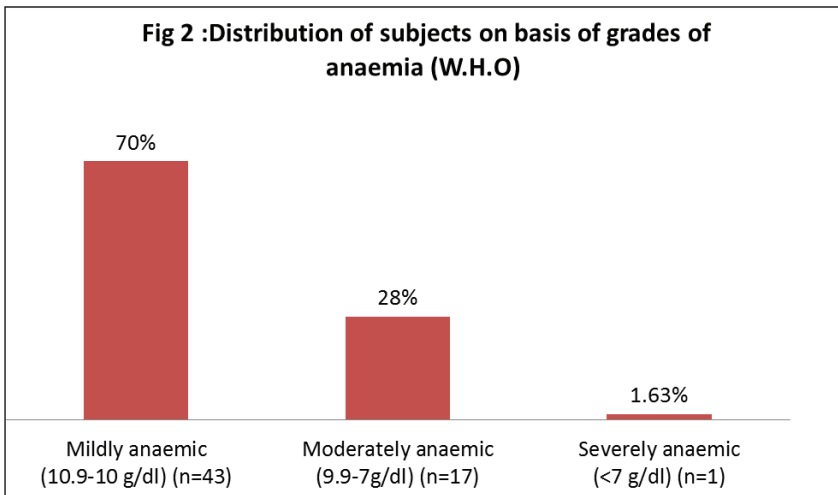


Fig 2: Mild anaemia (70%) was the commonest form observed among all age groups of anaemic subjects followed by moderate anaemia(28%) and severe anaemia was least (1.63%) as only one subject had it in 25 to 30 years age group.



**Table 1: Statistical Analysis of Haemoglobin Levels of the three age groups of Pregnant subjects**

<b>20 TO 24 YEARS (n=57)</b>	<b>MILD ANAEMIA</b>	<b>MODERATE ANAEMIA</b>	<b>SEVERE ANAEMIA</b>	<b>NON- ANAEMIC</b>
TOTAL	200.7	74.2	-	352.2
<b>MEAN</b>	<b>10.563</b>	<b>9.275</b>	-	<b>11.74</b>
STANDARD DEVIATION	0.3095	0.4528	-	0.5673
<b>STANDARD ERROR</b>	<b>0.071</b>	<b>0.1601</b>	-	<b>0.1036</b>
<b>25 TO 30 YEARS (n=60)</b>				
TOTAL	196.4	63.6	6.7	392.3
<b>MEAN</b>	<b>10.3368</b>	<b>9.0857</b>	<b>6.7</b>	<b>11.8879</b>
STD DEVIATION	0.291	0.701		0.6214
<b>STD ERROR</b>	<b>0.0668</b>	<b>0.265</b>		0.1082
<b>MORE THAN 30 YEARS (n=12)</b>				
TOTAL	50.4	18		59.9
<b>MEAN</b>	<b>10.08</b>	<b>9.0</b>		<b>11.9</b>
STD DEV	0.1304	1.1314		0.6042
<b>STD ERROR</b>	<b>0.0583</b>	<b>0.8</b>		0.2702

According to table 1, it was analysed that the standard error of mean (SEM) for haemoglobin (Hb) value of 20-24 years group pregnant subjects for mild and moderate anaemia range were  $10.56 \pm 0.07$  and  $9.27 \pm 0.16$  respectively. Similarly, standard error of mean for Hb value of 25 to 30 years group for mild and moderate anaemia range were  $10.33 \pm 0.06$  and  $9.08 \pm 0.26$ . For more than 30 years age group standard error of mean for Hb value for mild and moderate anaemia range were  $10.08 \pm 0.05$  and  $9.0 \pm 0.8$ . There was only one severe anaemic subject in age group 25 to 30 years so SEM could not be generated.

**Fig 3 :Distribution of anaemic subjects on basis of their occupation**

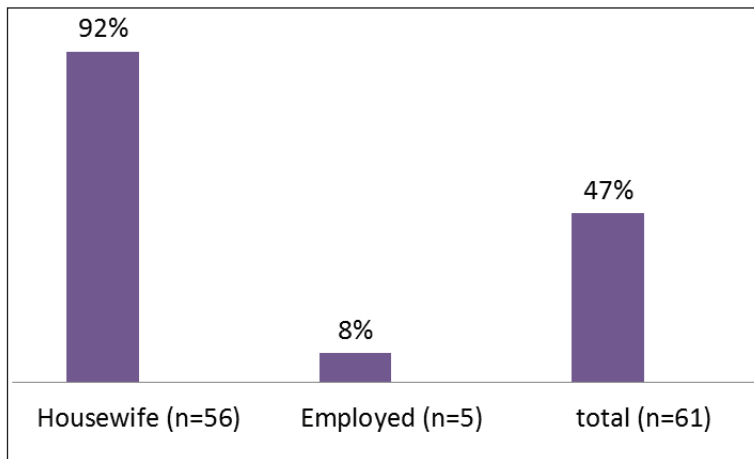


Figure3: Among the 61 (47%) anaemic pregnant subject, majority i.e.92% (n=56)were housewives and only 8%(n=5)wereengaged in some kind of job like, domestic helper, cook,papad making etc.

**Fig 4: Distribution of anaemic subjects on basis of their education**

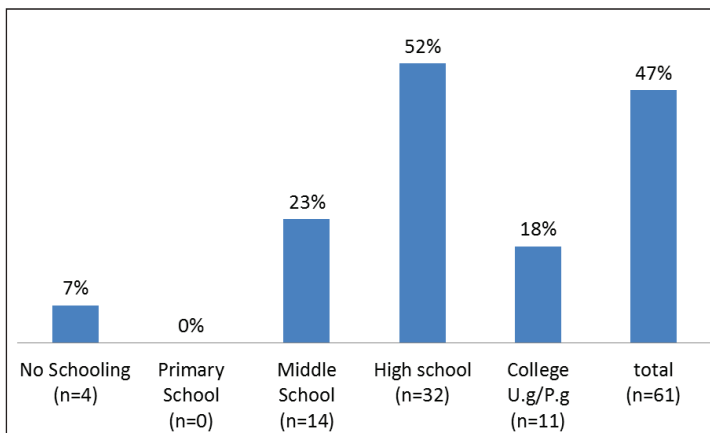


Figure 4: It was observed 52% anaemic subjects had attendedhigh school (standard IX TO XII) , 23% middle school (standard V TO VIII) , 18% had attended college for their under graduation (U.G-B.Sc./B.A/B.Com) or post-graduation (P.G-M.Sc./M.A/M.Com) and 7% had never been to school (no formal education received). Primary school attended subjects were none.

**Fig 5 :Distribution of anaemic subjects on basis of gravida**

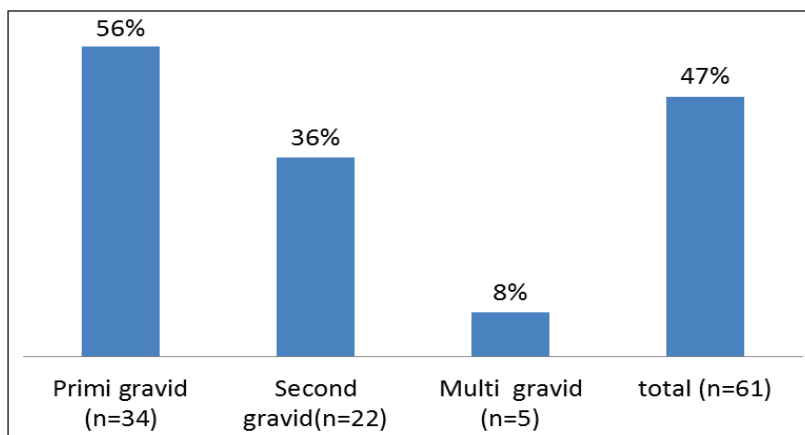


Figure 5: Majority of the anaemic pregnant women were primi- gravid (56%) followed by 36% second-gravid and 8% were multi-gravid. They mainly suffered from mild and moderate anaemia. The single severe anaemic subject belonged to multi-gravid category.

**Fig 6 (a): Maternal Complications associated with anaemia**

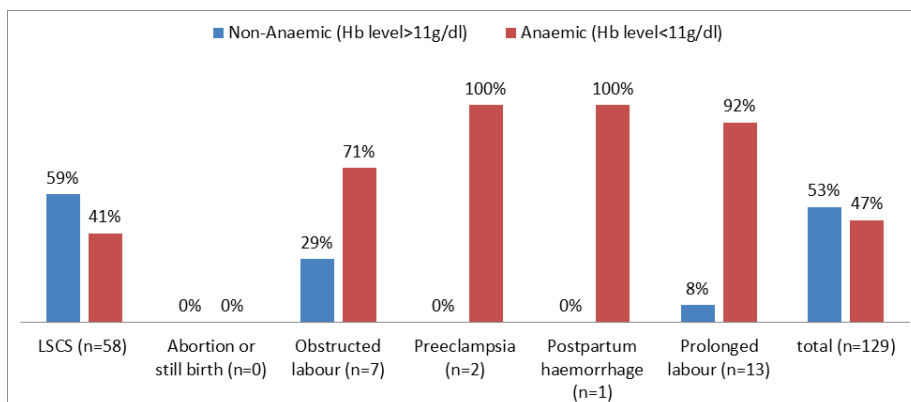


Figure 6(a): depicts the maternal complications experienced by all the 129 participants of this study - including both the non-anaemic(53%) as well as the anaemic (47%) pregnant women.

Most of the LSCS among non- anaemic group subjects was mainly done by choice of the subject/family consent. Therate of prevalence of other complications was lesser among non-anaemic subjects when compared to anaemic women as seen in fig 6 (a). No case of stillbirth was reported.

**Fig 6 (b): Distribution of anaemic subjects on basis of maternal complications**

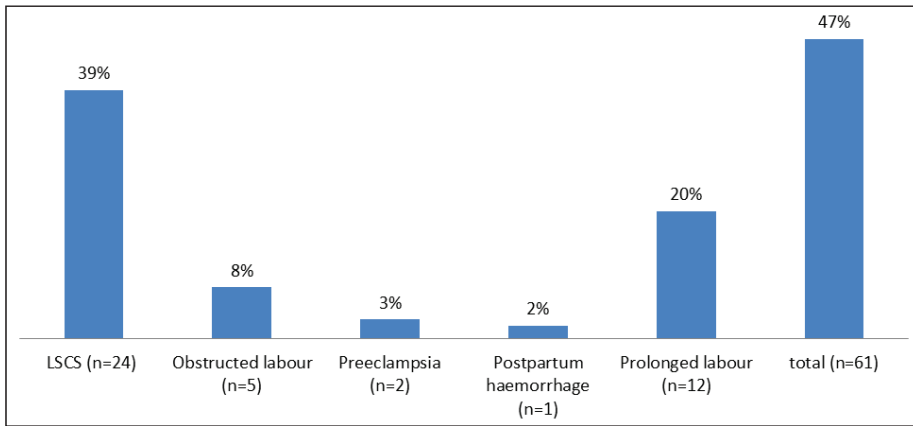


Fig 6 (b) shows that among the 47% (n=61) anaemic subjects maternal complications included obstructive labour (8%), prolonged labour (20%) preeclampsia (3%), postpartum haemorrhage(2%) and lower segment caesarean section (LSCS) 39%.These are some of the major complications commonly experienced by anaemic pregnant women during delivery which can prove fatal for life of both the new-born as well as the mother. Such new-borns are sent to Neonatal Intensive Care Units (NICU) for observation and to prevent any further deterioration in their health.

**Fig 7:Perinatal Complications associated with anaemia**

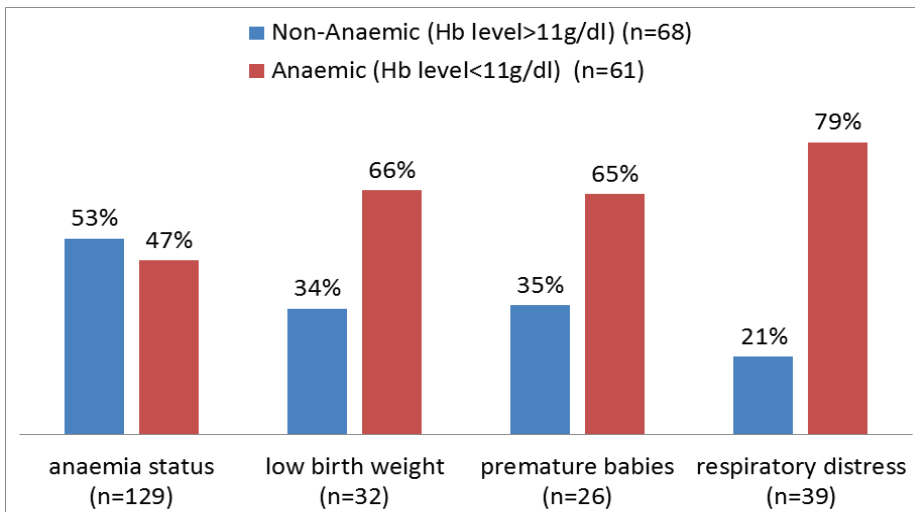


Figure 7: The perinatal outcomes of all the subjects (n=129) of the present study were recorded which included complications like low birth weight (LBW) babies (25%; n=32) followed by premature babies (20%; n=26) and respiratory distress (30%; n=39) of which 66% LBW (n=21), 65% premature babies (n=17) and 79% (n=31) respiratory distress incidence was observed among new-borns of anaemic mothers. Similar complications were observed to be comparatively less among new-borns of non-anaemic mothers.

**Fig 8: Consumption pattern of Iron Folic Acid (IFA) supplement by subjects**

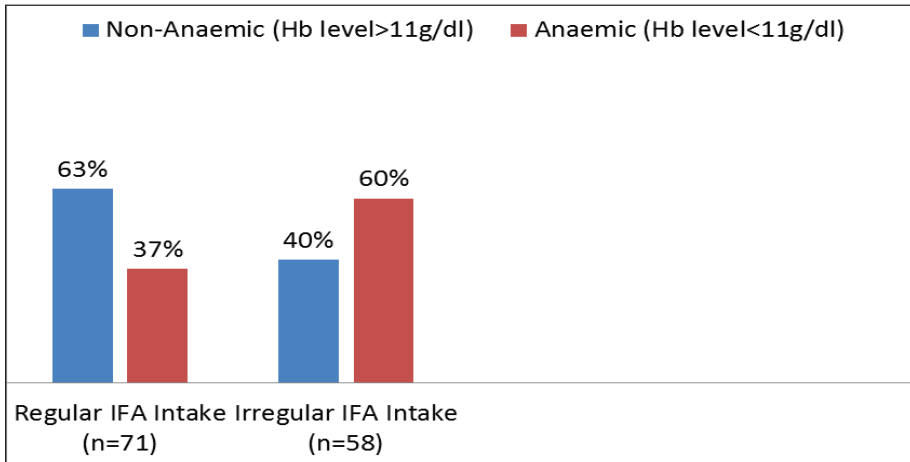


Fig 8: Almost 45% (n=58) of the present study subjects reported irregular intake of iron-folic acid tablets during gestation, of which 60% had anaemia (n=35) as they were unaware regarding the importance of iron-folic acid (IFA) supplementation during pregnancy and perinatal outcomes. Metallic taste, constipation, low purchasing power since 92% of the subjects were housewives and were financially dependent on their husband, ignorance were some common factors found among subjects.

**Table 2: TYPE OF DIET CONSUMED BY PREGNANT WOMEN SUBJECTS**

DIET OF THE PREGNANT WOMEN	NON- ANAEMIC	ANAEMIC
VEGETARIAN 16% (n=20)	8 (40%)	12 (60%)
MIXED DIET 84% (n=109)	60 (55%)	49 (45%)
Consumption of Tea/ Coffee	23 (34%)	35 (57%)
TOTAL (n=129)	68 (53%)	61 (47%)

Table 2: Out of 129 total subjects, it was found that 20 subjects (16%) consumed vegetarian diet as suggested by their religion and rest 109 subjects (84%) consumed mixed diet. i.e. non-vegetarian items were included. Of these 16 % vegetarian subjects almost 60% (n=12) were anaemic i.e. had various degrees of mild, moderate or severe haemoglobin levels. It was also observed that 45% (n=49) of the subjects who confirmed to have mixed diets were also suffering from mild to moderate forms of anaemia. The primary reason attributed to this observation was low purchasing capability as most of the subjects belonged to weaker section of the society and were financially dependent on their husbands, as a result rich sources of animal food like eggs, meat, fish, liver etc, milk and milk products and fruits could not be included in daily diet on a regular basis and if it was, the amount was quite small which probably failed to meet the increased requirements of these pregnant subjects. Lack of awareness regarding increased nutritional demands during pregnancy was widely observed. Consumption of tea / coffee with breakfast or before and/ after consuming meals without sufficient gap of time (minimum 2 hours) was a common practice found among 57% (n=35) of anaemic subjects and only 34 % (n=23) by non- anaemic subjects. Fruits consumption was almost negligent among all the subjects.

## V. DISCUSSION

The NFHS reports highlighted that India is still struggling to reduce the burden of maternal anaemia which still persists to be more than 50% (NFHS-4). From fig.2 of the present study, similar prevalence rate of 47% was observed among the pregnant women. Studies conducted by ICMR reported a much higher prevalence rate of 70% (Kalaivani, 2009) and 84.9% by reported by Toteja et.al (2006).

Anaemia was found to be present among all the age groups of study subjects, but 20-24 years (44%) and 25 -30 years (44%) age groups had highest incidence of anaemia (44%). The studies conducted by Suryanarayana, Chandrappa, Santhuram, Prathima, & Sheela (2017) reported 66% and Rajamouli, Ravinder, Reddy & Pambi (2016) as 72%, attributing 20-30 years as the age group when maximum women in India get married and complete their family. The fig.1 of the present study confirms the statement given by Rajamouli and his team mates.

As per fig.2 mild anaemia (70%) was observed to be the commonest form among the present study subjects followed by 28% moderate and 1.6% severe anaemia. Kalaivani & Ramachandran (2018) too found mild anaemia to be the commonest grade of anaemia with decline in prevalence of severe anaemia in various Indian states which provided better antenatal care facility to pregnant

women in their study. Kalaivani (2009) attributed prevalence of anaemia among pregnant women to inadequate intake of iron and folic acid food sources in daily diet, poor bioavailability of nutrients, blood loss, infection etc whereas low socio-economic condition, high parity as well as Vitamin B12 deficiency was suggested by Noronha, Khasawneh, Seshan, Ramasubramaniam, & Raman (2012). They also advocated that a lack in stringent implementation of Iron-folic acid supplementation (IFA) along with primarily iron deficiency were considered to be key cause of anaemia in South Asian countries.

Housewives were found to be more prone to anaemia (92%) in comparison to working women (8%) in the study (fig.3) which was found to be quite similar to the study done by Rajamouli, Ravinder, Reddy & Pambi (2016) i.e. 96.7%, which could indicate lack of awareness, indifference towards available health care facility providing IFA supplementation and antenatal care as per Agarwal et.al (2006). A study conducted by Lokare, Karanjekar, Gattani, & Kulkarni (2012) as well as Maka, Tondare & Tondare (2017) found socio-economic condition to be associated with anaemia during pregnancy. Majority of the subjects in the present study belonged to low socio-economic group (no scale was applied) which limited their purchasing power as admitted by them during interview. This was one of the primary reasons they could not include rich sources of animal food items such as meat, poultry, fish, liver, eggs etc on a regular basis. In joint or extended families every member shares the same food so cooking of flesh food or non-vegetarian food for all was not possible due to limited resources neither it could be cooked for oneself without sharing with others.

Most of the anaemic subjects of the present study (fig.4) were high school educated (52%) followed by 23% middle school, 18% college educated and only 7% subjects had never been to school. In contrast, studies by Agarwal et.al (2006) revealed illiterate pregnant women suffered the most (68%) in a study conducted in Madhya Pradesh. According to NFHS-4 the prevalence of anaemia decreases with schooling. Lack of nutrition education could be attributed to the anaemic status of these subjects.

More than half of the anaemic pregnant women (56%) were primi gravid, 36% second and 8% multi gravid (fig.5) respectively whereas Rajamouli, Ravinder, Reddy & Pambi (2016) reported high prevalence in second gravid (43.9%) in their study.

Maternal anaemia is associated with higher rates of morbidity and mortality for both the mother and foetus/new-born according to Kalaivani (2009) and Singh, Chauhan, Nandan, Singh, Gupta, & Bhatnagar (2012). Maternal complications like LSCS (39%), obstructed labour (8%), prolonged labour

(20%), preeclampsia(3%), postpartum haemorrhage (2%)were experienced by the anaemic subjects of this study and no still birth was registered as seen in fig.6(a).The study done by Maka,Tondare&Tondare(2017) observed 16% had maternal complications.In the present study neonatal complications included LBW babies66% LBW(n=21), 65% premature babies(n=17) and 79%(n=31) respiratory distress incidence among new-borns of anaemic mothers(fig.7).Low incidence of LBW (25%), premature delivery(0.2%) and birth asphyxia(0.5%) were reported by Suryanarayana, Chandrappa, Santhuram, Prathima, & Sheela (2017).National Health Portal (NHP) India, reported higher prevalence of intra-uterine growth retardation, LBW, maternal & neonatal mortality due to maternal anaemia.Study by Allen(2000)exhibited a close association betweenmaternal anaemia and resultant LBW of foetus and their subsequent before term birth thereby endangering the lives of both.

Indiaspend (November, 2017), reported “despite 50 years of implementation of National Nutritional Anaemia Prophylaxis Programme (NNAPP), the beneficiaries of the programme suffered from anaemia as it was not consumed by all”. Similar observations were made in this study where 45% of the total study subjects admitted irregular intake of IFA supplementation during pregnancy of which 60% were anaemic subjects as seen in fig.8. The reasons cited for not taking IFA tablets regularly was attributed to its typical medicinal taste, constipation, nausea, forgetfulness etc thus necessitating nutrition education of women folk regarding increased nutritional requirements of iron and folic acid during pregnancy and lactation along with other nutrients. According to Kalaivani& Ramachandran (2017) severe form of anaemia could be controlled by provision of better IFA supplementation coverage and antenatal care along with improved dietary intake, reducing malaria, and hookworm infestation.

Non-vegetarian food items are expensive but green leafy vegetables are good source of iron and can be included in daily diet to prevent anaemia but its consumption too has reduced from 64% to 48%in the last decade reported NFHS-4(2015-16).Indiaspend reported (May,2018) that,“70% of women in India,consumed fish, eggs, meat occasionally, less than 50% of them did so even weekly”. In the present study, table2 showsthat 16% of total study population consumed vegetarian diet of which 60 % had anaemia. Even though rest of the study subjects reported to have consumed mixed diet (including both plant and animal food sources) but animal food sourceslike egg, fish, meat etc (rich in protein & haem iron)could not be included on a daily basis due to monetary constraints, large family, nutritional unawareness etc. Rajamouli, Ravinder, Reddy &Pambi (2016) reported 40.14% anaemic subjects to be vegetarian in their study. Thus, vegetarian diet is an important implication for maternal iron deficiency in India as per Rammohan, Awofeso& Robitaille (2012)



which was found to be common with the present study subjects. The mixed diets were predominantly vegetarian in nature lacking animal food sources in daily diet and in adequate amounts. Fruits are rich in vitamin C and help in better absorption of iron but it was seen majority of the subjects including both anaemic as well as the non- anaemic subjects, did not consume them citing dislike, expensive item , ignorance about nutritional importance in diet. Consumption of tea / coffee with breakfast or before and/ after consuming meals without sufficient gap of time (minimum 2 hours) was a common practice found among 57% (n=35) of anaemic subjects and only 34 % (n=23) by non- anaemic subjects as seen in table 2 could act as one of the contributory factor of maternal anaemia of the present study.

## VI. CONCLUSION

Maternal anaemia and its associated complications are still widely prevalent in our country even after several years of continuous implementation of National Initiatives to control anaemia therefore, the Ministry of Health and Family Welfare (MoHFW), Govt. of India has launched the Anaemia Mukta Bharat (AMB) Program with intension of accelerating reduction in maternal anaemia from 50% (NFHS-4; 2015-16) to 32% in upcoming 2022 by 3 percentage points per year. Women needs to be educated so that they can be financially strong enough to improve the over all health of their as well as their family members. Nutrition education is very much needed to impart correct knowledge regarding various food groups and increased nutritional requirements during pregnancy, lactation, infancy and other important phases of life to reduce the morbidity and mortality rates along with health and hygiene. The IFA supplementation coverage should be further strengthened so that it reaches women of all strata of the society, availability of better nutritional and health facilities to women of reproductive age can help to combat the occurrence of anaemia not only among pregnant women of our country but all the sub-groups too.

## References

- 1) Agarwal, K.N., Agarwal, D.K., Sharma, A.K., Prasad, K., Kalita, M.C., Khetarpaul, N., Kapoor, A.C., Vijayalakshmi, L., Govilla, A.K., Panda, S.M., Kumari, P. (2006). Prevalence of Anaemia in Pregnant and Lactating Women in India. *Indian Journal of Medical Research*, 124, 173-184.
- 2) Allen, L.H. (2000). Anaemia and Iron Deficiency: Effects on Pregnancy Outcome. *American Journal of Clinical Nutrition*, 7, 1280-4.
- 3) Anaemia Mukta Bharat (AMB) Programme. Retrieved on- 8<sup>th</sup> May, 2020. website:
- 4) <https://anaemiamukt Bharat.info>
- 5) Brabin, B.J., Hakimi, M., & Pelletier, D. (2001). An Analysis of Anaemia and

- Pregnancyrelated Maternal Mortality,*Journal of Nutrition*,131(2S-2),604S-15S.
- 】 Barclay, E.G.,&Tiwari, K.(2002).*Prevention and Control of Nutritional Anaemia. A SouthAsian Priority. United Nations Children's Fund- Regional office for South Asia.* Retrieved on -7<sup>th</sup> April,2020. website: anaemia-pc.pdf.
  - 】 Ezzati, M., Lopus, A.D., Dogers, A., Vander, H.S.,& Murray, C.(2002). Selected Major RiskFactors and Global and Regional Burden of Disease. *Lancet*,360,1347-60.
  - 】 International Institute of Population Sciences(IIPS).National Family Health Survey(NFHS-4)(2015-16).Fact sheets.Retrieved on- 3rd April, 2020.website: [https://www.rchiips.org/nfhs/factsheet\\_NFHS-4.shtml](https://www.rchiips.org/nfhs/factsheet_NFHS-4.shtml).
  - 】 International Institute of Population Sciences(IIPS). National Family Health Survey (NFHS-3)(2005-06). Fact sheets.Retrieved on -3rd April, 2020.website: <https://rchiips.org/NFHS/nfhs3.shtml>.
  - 】 Indiaspend.com. Retrieved on -4<sup>th</sup>May,2020.
  - 】 Kalaivani, K.(2009).Prevalence and Consequences of Anaemia in Pregnancy. *Indian Journal of Medical Research*,130,627-633.
  - 】 Kalaivani, K.,& Ramachandran, P.(2017). Combating Triple Burden of Malnutrition: World Health Assembly Targets for 2025.
  - 】 Kalaivani, K.,& Ramachandran, P.(2018). Time Trends in Prevalence of Anaemia inPregnancy. *Indian Journal of Medical Research*,147(3),268-77.
  - 】 Kapil, U.,&Bhadoria, A.S. (2014).National Iron Plus Initiative Guidelines for Control ofIron Deficiency Anaemia in India,2013. *The National Medical Journal of India*,27(1),27-29.
  - 】 Lokare, P.O., Karanjekar, V.D., Gattani, P.L.,& Kulkarni, A.P. (2012). A Study ofPrevalence of Anaemia and Sociodemographic Factors Associated with Anaemiaamong Pregnant Women in Aurangabad City, India. *Annals of Nigerian Medicine*,6(1),30-34.
  - 】 Ministry of Health and Family Welfare(MoHFW),Govt. of India,New Delhi. Guidelines for Control of Iron Deficiency Anaemia. Retrieved on -13th April, 2020.website:[https://www.pbnrh.org/does/iron\\_plus\\_guidelines.pdf](https://www.pbnrh.org/does/iron_plus_guidelines.pdf).
  - 】 Maka, S.S., Tondare, S.B., &Tondare, M.B. (2017).Study on Impact of Anaemia on Pregnancy.*International Journal of Reproduction, Conception, Obstetrics and Gynecology*,6(11).
  - 】 Noronha, J.A., Khasawneh, E. A., Seshan,V., Ramasubramaniam, S.,&Raman, S.(2012).Anaemia in Pregnancy-Consequences and Challenges: A Review of Literature.*Journal of SAFOG*,4(1),64-70.
  - 】 National Health Portal (NHP) India. Anaemia during pregnancy. Retrieved on 5<sup>th</sup> May,2020.
  - 】 website: [www.nph.gov.in](http://www.nph.gov.in)

- 1) Revised RDA for Indians -2010: Report of the Expert Group of ICMR, New Delhi. Retrieved on- 7<sup>th</sup> April,2020. website: health\_01\_02(2).pdf.
- 2) Rajamouli, J., Ravinder, A., Reddy, S.C.K., & Pambi, S. (2016). Study on Prevalence of Anaemia among Pregnant Women Attending Antenatal Clinic at Rural Health Training Centres (RHTC) and Calmed Anand Rao Institute of Medical Sciences Teaching Hospital, Karimnagar, Telangana, India. *International Journal of Contemporary Medical Research*, 3(8), 2388-91.
- 3) Rammohan, A., Awofeso, N., & Robitaille, M.C. (2012). Addressing Female Iron-Deficiency Anaemia in India: Is Vegetarianism the Major Obstacle? Addressing Female Iron-Deficiency Anaemia in India: Is Vegetarianism the Major Obstacle?. *ISRN Public Health*. 2012, 1-8.
- 4) Suryanarayana, R., Chandrappa, M., Santhuram, A.N., Prathima, S., & Sheela, S.R. (2017). Prospective Study on Prevalence of Anaemia of Pregnant Women and its Outcome: A community- based study. *Journal of Family Medicine and Primary Care*, 6(4), 739-743.
- 5) Singh, R., Chauhan, R., Nandan, D., Singh, H., Gupta, S.C., & Bhatnagar, M. (2012). Morbidity Profile of Women during Pregnancy: A Hospital Record Based Study in Western U.P. *Indian Journal of Community Health*, 24, 342-6.
- 6) Toteja, G.S., Singh, P., Dhillon, B.S., Saxena, B.N., Ahmed, F.U., Singh, R.P., Prakash, B., Vijayaraghavan, K., Singh, Y., Rauf, A., Sarma, U. C., Gandhi, S., Behl, L., Mukherjee, K., Swami, S. S., Meru, V., Chandra, P., Chandrawati, & Mohan, U. (2006). Prevalence of Anaemia among Pregnant Women and Adolescent Girls in 16 districts of India. *Food and Nutrition Bulletin*, 27, 311-15.
- 7) World Health Organisation. (2008). *Worldwide Prevalence of Anaemia 1993-2005*. WHO Global Database on Anaemia. Retrieved on -3<sup>rd</sup> April, 2020. website: [https://www.who.int/nutrition/publications/micronutrients/anaemia\\_iron\\_deficiency/9789241596657/en/](https://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/9789241596657/en/).
- 8) World Health Organisation. (2007). *Assessing the Iron Status of Populations: Report of a Joint World Health Organisation/Centres for Disease Control and Prevention Technical Consultation on the Assessment of Iron Status at the Population level*, 2<sup>nd</sup> ed, Geneva, World Health Organisation, 2007. Retrieved on -3<sup>rd</sup> April, 2020. website: [https://www.who.int/nutrition/publications/micronutrients/anaemia\\_iron\\_deficiency/9789241596107/en/](https://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/9789241596107/en/).
- 9) World Health Organisation. (2011). *Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Vitamin and Mineral Nutrition Information System*. Geneva, World Health Organisation. Retrieved on -4<sup>th</sup> April, 2020. website: <https://www.who.int/vmnis/indicators/haemoglobin.pdf>.
- 10) World Health Assembly Global Nutrition Targets 2025: Anaemia Policy Brief. Retrieved on -5<sup>th</sup> April, 2020. website: [globaltargets\\_anaemia\\_policybrief.pdf](https://www.who.int/nutrition/publications/globaltargets_anaemia_policybrief.pdf).
- 11) World Health Organisation. (1993). *Prevention and Management of Anaemia in Pregnancy*. WHO/FHE/MSM/93.5. Geneva.

# Astounding Properties of *Glycyrrhiza glabra*

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## ABSTRACT

**G***lycyrrhiza glabra* is a phenomenal gift given by nature that can be utilised in several ways and can impart diverse benefits to health. The bioactive components present in this sweet tasting root (liquorice/ licorice) of *Glycyrrhiza glabra* have been found to possess antidiabetic, antioxidant, hepatoprotective, antimicrobial, anti-inflammatory and antiulcer activities. It also has a noteworthy impact on cognitive function and pigmentation of epidermis. The chemical constituents present in it can influence physiological, metabolic and biochemical processes in the body via numerous mechanisms. Its root is also known as licorice or Yashtimadhu and it can be incorporated in many recipes and food products to extract multiple benefits. It can also lead to toxicity and adverse reactions when consumed with certain drugs.

**Keywords:** *Glycyrrhiza glabra, Antioxidant, Benefits, Toxicity, Physiological.*

## I. INTRODUCTION

Usage of plants and plant products has been carried out from time immemorial in all cultures due to their meditative properties. Traditional knowledge acquired through the investigation and analysis of Indigenous plants from ancient time can be used in the diagnosis, prevention and eradication of acute and chronic diseases. The demand of herbal medicines and pharmaceuticals has increased tremendously due to their efficacy and lesser side effects in comparison to that of synthetic drugs. Plants can be used as therapeutic agent for alienating human ailments specially the disorders associated with modern life style (Kamboj, 2000).

According to World Health Organization (WHO) about an 80% population in developing countries depends upon traditional medications that constitute plant products for their primary health care needs. Raw plant products as well as some concoction of Ayurvedic medicines are used widely in rural area due to its cheap availability and effectiveness (Dubey et al., 2012).

Several lifesaving drugs have been produced from the natural products which is a significant part of modern medicine. However, only 6 % of the estimated 250,000-400,000 plant species have been investigated for biological properties and 15% have been studied phytochemically. It suggests that a huge proportion of flora remained unexplored and steps should be taken for the evaluation of the phyto-pharmacological characteristics of herbal drugs (Shibata, 1994).

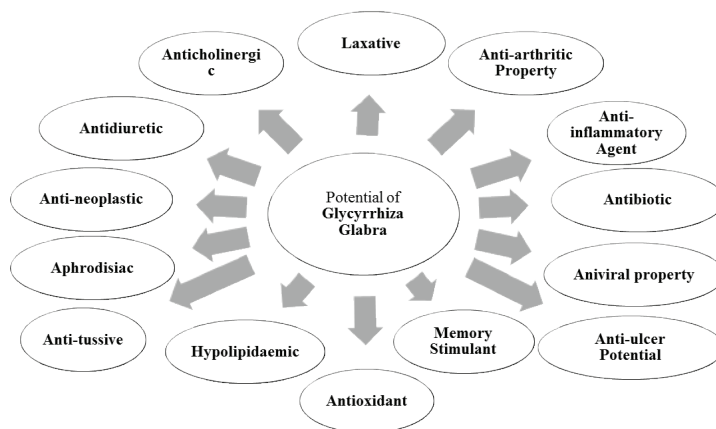
*Glycyrrhiza glabra* Linn. (Family: Fabaceae) is a traditional medicinal plant used since time immemorial throughout the world to cure numerous health disorders and diseases. Glycyrrhizin is the bioactive constituents obtained from liquorice roots which are used in herbal preparations for the treatment and management of long term diseases (Thakur and Rao, 2017).

**Table 1: Vernacular Names of *Glycyrrhiza glabra* Linn.  
(Reference: Lakshmi et al., 2011).**

<i>Sanskrit:</i> Yashti-madhuh, Madhuka
<i>Kannada:</i> Yastimadhuka, atimaddhura
<i>Hindi:</i> Jothi-madh, Mulhatti
<i>Malayalam:</i> Iratimadhuram
<i>Tamil:</i> Atimaduram
<i>Telugu:</i> Atimadhuranu, Yashtimadhukam
<i>English:</i> Licorice, Liquorice, Sweet wood

*Glycyrrhiza glabra* possesses multiple benefits which have been represented diagrammatically.

**Figure1: Potential of *Glycyrrhiza Glabra* as a medicine (Lakshmi et al., 2011; Tian et al., 2008).**



**Table2: Botanical Classification (Reference: <https://plants.usda.gov/>)**

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Fabales
Family	Fabaceae
Genus	<i>Glycyrrhiza</i>
Species	<i>Glycyrrhiza glabra</i>

*Glycyrrhiza glabra* is popularly known as Yashtimadhu that has been found to impart magical curative properties (Vispute et al., 2011).

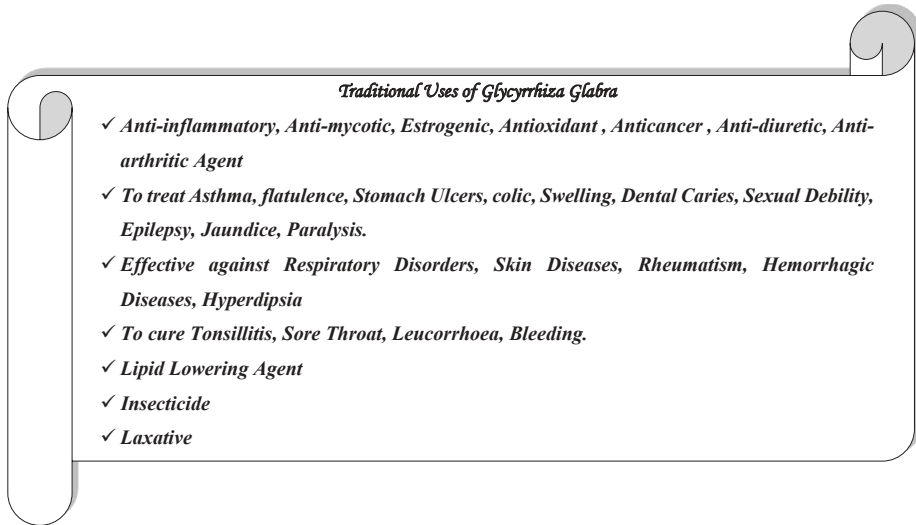
### **Edible parts of *Glycyrrhiza Glabra* and its Uses**

Fresh root of *Glycyrrhiza glabra* is bright yellowish-brown in colour and can be chewed fresh or dried as a mouth freshener, tooth cleaner. It is also used by brewers to flavour beverages and beers.

It is used as flavouring and sweetening agent in sweets, candies, baked

goods, chewing gums, ice cream, cakes, sauces, pickles, soft drinks, tooth paste, herbal tea, tobacco etc. The leaves are used as a tea substitute in Mongolia (Lim, 2015).

**Figure 2: Ethnomedicinal Uses of *Glycyrrhiza Glabra* (Batihuet.al, 2020).**



## II. REVIEW OF LITERATURE

Ayurveda is actually the knowledge of life that encompasses use of plant based medication for the detection and treatment of diseases. *Glycyrrhiza Glabra* is called yashtimadhu in Sanskrit and mulathi in common parlance which means the sweet healer (Sharma and Sthana, 2001). Pandit Bhavamishra reported liquorice to improve the complexion, relieve ocular problems (Jackson and Derek, 1992) and acts as spermatogenic agent (Monier, 1993).

**Figure 3: (a) Licorice plant, (b) Fruits of licorice plant, (c) Roots of licorice plant (Vibha et al., 2009).**



**Table 3: Bioactive Compounds Responsible for Curative Properties (Reference: Vibha et al., 2009).**

Acetic-acid, Acetoin, Acetol, Acetophenone, Alphaterpineol, Aluminum, Anethole, Apigenin, Ascorbic-acid, Asparagine
Benzaldehyde, Benzoic-acid, Benzyl-alcohol, Beta-sitosterol, Butan-1-ol-2-one, Butan-1-ol-3-one, Butane-2,3-diol, Butanoic-acid, Butylphthalate, Butyricanhydride
Calcium, Camphor, Caproic-acid, Carvacrol, Choline, Chromium, Cobalt, Cumic-alcohol
Decane, Decanoic-acid, Difurfuryl-ether, Dihydro-5,5-dimethyl-2(3h)-furanone, Dimethyl-phenylethyl-alcohol, Docosane, Dodecane, Dodecanoic-acid
Eicosane, Estragole, Estriol, Ethyl-linoleate, Ethyl-linolenate, Ethyl-palmitate, Ethyl-phenol, Ethylphenylacetate, Eugenol
Fenchone, Formononetin, Fructose, Furfural, Furfuryl-acetate, Furfuryl-alcohol, Furfuryl-butyrate, Furfurylformate, Furfuryl-propionate, Furyl-methyl-ketone



Gammabutyrolactone, Gamma-heptalactone, Gamma-hexalactone, Gammanonalactone, Gamma-octalactone, Geraniol, Glabrene, Glabric-acid, Glabridin, Glabrol, Glabrolide, Glabrone, Glucose, Glycocoumarin, Glycyrin, Glycyrol, Glycyrram, Glycyrrhetic-acid, Glycyrrhetic-acid, Glycyrrhetol, Glycyrrhisoflavanone, lycyrrhisoflavone, Glycyrrhizic-acid, Glycyrrhizin, Glyzaglabrin, Glyzarin, Guaiaco
Hederasaponin-c, Henicosane, Heptadecane, Heptane-1,2-diol, Heptanoic-acid, Heranol, Herniarin, Hextrans-3-en-ol, Hexadecane, Hexadecanoic-acid, Hexadecylacetate, Hexan-1-ol, Hexanoic-acid, Hexanol, Hexyl-formate, Hispaglabridin-a, Hispaglabridin-b
Indole, Iron, Isobutyladipate, Isoglabrolide, soglycyrol, Isoliquiritin, Isomucronulatol, Isoneliquiritin, Isoschaftoside, Isoviolanthin
Kumatakenin
Lavandolol, Licochalcone-a, Licochalcone-b, Licoflavonol, Licoisoflavanone, Licoisoflavones, Licoric-acid, Licuraside, Licuroside, Lignin, Linalool, Linalool-oxides, Liqcoumarin, Liquirazide, Liquiritic-acid, Liquiritigenin, Liquoric-acid
Magnesium, Maltose, Manganese, Methyl-ethyl-ketone, Methyl-hexadecanoate, Methyl-hexanoate, Myrtenal
N-methyl-2-pyrrolidone, N-nonacosane, N-tetradecane, Neoliquiritin, Neosoliquiritin, Nonadecane, Nonanoic-acid
O-acetylsalicylic-acid, O-cresol, O-methoxy-phenol, O-tolunitrile, Octacosan-1-ol, Octadecane, Octanoic-acid
P-cymenol, P-methoxy-phenol, Palmitic-acid, Pentadecane, Pentadecanoic-acid, Pentan-1-ol, Pentanoic-acid, Phaseollinisoflavan, Phenethyl-alcohol, Phenol, Phenylacetaldehyde, Phenylpropionic-acid, Phosphorus, Propionic-acid, Pyrazole
Rhamnoisoliquiritin, Rhamnoliquiritin
Salicylic-acid, Schaftoside, Silicon, Stigmasterol, Sucrose, Sugar
Terpin-1-en-4-ol, Tetracosan-1-ol, Tetracosane, Tetradecanoic-acid, Tetramethyl-pyrazine, Thiamine, Thujone, Thymol, Tiglaldehyde, Tin, Tricosane, Tridecane, Tridecanoic-acid, Trimethyl-pyrazine
Umbelliferone, Undecane, Undecanoic-acid
Zinc

## Geographical Distribution

Licorice or Yasthimadhu prefers a temperate, warm and sub-tropical climate to grow. *Glycyrrhiza glabra* is native to Eurasia, in central and south-western Asia and the Mediterranean region. *G. glabra* is documented to be cultivated in South Europe (Spain, Italy), Iran, Turkey, Iraq, Central Asia and the north-western part of China. The Countries that are the major producers of licorice include Iran, Afghanistan, China, Pakistan, Iraq, Azerbaijan, Uzbekistan, Turkmenistan and Turkey (Lim, 2015).

## Physiological & Therapeutic Significance of *Glycyrrhiza Glabra*:

### 1. Antioxidant Potential

Ethanollic extract of licorice (*Glycyrrhiza glabra* L.) has been found to contain higher quantity of phenols which accounts for its powerful antioxidant properties due to its substantial free radical scavenging. It has metal ion sequestering, reducing properties and also prevents lipid peroxidation (Visavadiya et al., 2009).

Licorice flavonoids have been found to act remarkably as a strong antioxidant agent. Licorice flavonoids were found to be 100 times more potent than Vitamin E as far as antioxidant ability is concerned. Ju, H.S. reported that flavonoids obtained from licorice are currently the strongest natural antioxidants identified (Ju HS et al., 1989).

Thus, licorice extract can be utilised to formulate cosmetic and beautifying products for the protection of skin and hair against oxidative damage (Alonso, 2004).

### 2. Antidiabetic Activity of licorice

Licorice possesses hypoglycaemic properties and its consumption can aid in lowering blood glucose levels. Experimentations showed licorice to inhibit the activity of  $\alpha$ -glucosidase and  $\alpha$ -amylase enzyme appreciably that caused reduction in disaccharide hydrolysis which in turn lowered the glycaemic Index. Alpha amylase method is used to assess the Antidiabetic activity of licorice. Licorice has been found to lower the incidence of post prandial hyperglycaemia; thus it can be employed in the treatment of Diabetes Mellitus (Karthikeson and Lakshmi, 2017).

### 3. Hepatoprotective activity

Glycyrrhizin at a concentration of 25–200  $\mu\text{g}/\text{mL}$  has been found to significantly act against the Carbon Tetrachloride ( $\text{CCl}_4$ ) - induced

hepatotoxicity by lowering the release of enzymes like AST (Aspartate Transaminase) and LDH (Lactate dehydrogenase). Glycyrrhizin altered membrane fluidity and inhibited CCl<sub>4</sub>-induced membrane lipid peroxidation. 18- $\beta$ -glycyrrhetic acid (an aglycone of glycyrrhizic acid) extracted from liquorice also demonstrated to exert hepatoprotective activity by hindering both free radical generation and lipid peroxidation (Jeong et al., 2002).

Glycyrrhizin has been also effective in treating acetaminophen-induced hepatotoxicity (Xu-ying et al., 2009).

Liquorice extract has been proved to show hepatoprotective activity against diclofenac-induced hepatotoxicity in rats (Alaaeldin, 2007).

#### **4. Antiulcer activity of *Glycyrrhiza glabra***

It is used in folk medicine for the treatment of abdominal disorders like peptic ulcer. The hydroalcoholic extract of *Glycyrrhiza glabra* L. (HEGG) was assessed for antiulcerogenic activity and acute toxicity profile in mice. Various doses of HEGG (50-200 mg/kg Body Weight of mice) were administered to animals of different groups by oral route. Omeprazole and cimetidine at doses of 30 and 100 mg/kg were used as positive controls, respectively.

The ulceration index was determined by examining the inner lining of stomach by opening it along the greater curvature. A significant reduction in ulcer index was observed in HCl/Ethanol-induced ulcer when HEGG was administered at a dose of 50-200 mg/kg.

*G. glabra* extract (50-150 mg/kg) was found to be effective in antiulcer activity against indomethacin-induced gastric lesions dose dependently. The extract inhibited formation of gastric lesions induced by ethanol. The HEGG extract of *Glycyrrhiza glabra* L. (200 mg/kg) was found to impart greater potency than omeprazole (30 mg/kg). In hypothermic stress induced gastric ulcer model in mice the HEGG was found to reduce the ulcer index and its effectiveness as antiulcer agent was comparable to that of cimetidine. The results indicated that *G. glabra* hydroalcoholic extract exerted an antiulcerogenic effect by enhancing the gastric mucosal defensive factors (Jalilzadeh et al., 2015).

The effect of licorice extract was studied on Peptic Ulcer Disease. A study was carried out where 45 patients with confirmed gastric ulcer were administered 10 g/day of powdered licorice extract. The ulcer completely disappeared in 17 of the cases, diminished in 22 cases and the ulcer among 5 patients remained unchanged. It was not very effective among the patients with duodenal ulcers. Approximately 20% of the patients were found to develop oedema along

with complications like severe headache, dizziness, upper right quadrant pain, compression in the chest and hypertension. A reduction of the dosage to 3 g/day reduced the occurrence of oedema, although not in all cases. Crude fractionation of the liquorice extract revealed that glycyrrhizin was the probable agent responsible for the oedematous effect and an unknown component was recognised to be the potent anti-ulcerogenic agent (Van Rossum et al., 2001).

## 5. Antimicrobial Activity

### Antibacterial Properties

In an experiment Glabridin which is one of the active component of *Glycyrrhiza glabra* exhibited antimicrobial activity against both Gram-positive and Gram negative bacteria as well as mycobacteria. The antimycobacterial activity of *Glycyrrhiza glabra* was found at 500 microgram/mL concentration. The results indicated that licorice can be used as potential antitubercular agent. Glabridin, the active constituent of ethanolic extract from the roots of *Glycyrrhiza glabra* was used against Mycobacterium tuberculosis in this study. The antimycobacterial activity was observed against Mycobacterium tuberculosis H37Ra and H37Rv strains through BACTEC assay. The findings of this study have established glabridin as an active molecule for antimycobacterial property (Gupta et al., 2008).

### Antifungal properties

The ethanolic extract of *Glycyrrhiza glabra* was found to be a very good antimycotic activity against *Candida albicans*. Active component of *Glycyrrhiza glabra* i.e., 18-beta glycyrrhetic acid (18-beta GA) was found to decrease the in-vitro growth of the *C. albicans* strains in a pH dependent manner (Pellati et al., 2009).

A study was conducted to estimate the antifungal activity of Glabridin and licochalcone A of *Glycyrrhiza glabra*. The yeast-hyphal transition in *C. albicans* was prevented by both licochalcone A and glabridin. These studies corroborate the therapeutic usage of licochalcone A and glabridin against oral infections caused due to *C. albicans* (Messier and Grenier, 2011).

In an investigation carried out by M.S. Gopal, the extracts and fractions of *Glycyrrhiza glabra* were employed to evaluate the susceptibility against *Candida albicans* and *Trichophyton rubrum*. Both the fungi showed susceptibility to *Glycyrrhiza glabra* with MICs (Minimum Inhibitory Concentration) ranging from 0.8 to 200 mg/mL (Gopal M.S., 2009).

### **Antiviral Effect**

Liquorice extract was found to inhibit the growth of viruses, including herpes simplex, Varicella zoster, Japanese encephalitis, influenza virus, vesicular stomatitis virus, type A influenza virus (Alonso, 2004; Adam, 1997; Pompei, 1980; Pompei, 1979).

Glycyrrhizin does not allow the virus to attach to the cells. Thus, it is found to have a profound antiviral activity. It has been previously employed in the treatment of HIV-1 and chronic hepatitis C. The anti-viral activity of glycyrrhizin was studied on two clinical isolates of SARS virus (Severe Acute Respiratory Syndrome virus) [FFM-1 and FFM-2] and significant observations were found. The study was carried out on patients with SARS who were admitted to Clinical Center of Frankfurt University, Germany. This analysis on antiviral activities of ribavirin, 6-azauridine, pyrazofurin, mycophenolic acid and glycyrrhizin proved that glycyrrhizin was the most efficient in controlling viral replication. Thus, it can be used as an effective prophylactic measure (Adam, 1997; De-Clercq, 2000; Cinatl, 2003; Aadam, 1994).

### **Anti-malarial activity**

Licochalcone A (a chalcone) extracted from liquorice has been revealed to possess antimalarial activity. All *Glycyrrhiza* species have this compound in different amounts and it can be isolated from them. *In vivo* studies against *P. yoelii* in mice with oral doses of 1000 mg/kg body weight have been shown to eradicate malarial parasite completely (Sianne and Fanie, 2002).

## **6. Anti-tussive and Expectorant activity**

The anti-tussive activity of combination of herbal drugs as formulations in sulphur dioxide (SO<sub>2</sub>) -induced cough model in mice was assessed. Both male and female albino mice weighing 25-30 grams were taken and divided in to eight groups. Each group constituted 6 mice. Group I served as normal control, group II mice were given distilled water, group III was positive control and received codeine sulphate (10 mg/kg body weight) and group IV, V, VI, VII received coded I formulations 1, 2, 3 and 4 respectively at a dose of 0.3 ml/mice, orally, while group VIII was the vehicle control. After 30 minutes the mice were exposed to sulphur dioxide again for 45 sec. The mice were then placed in an observation chamber for counting of cough bouts by two independent observers, for five minutes.

The formulations used in the experiment showed noteworthy and significant antitussive activity in sulphur dioxide induced cough model in

albino mice. Thus, these formulations can prove to be useful for alleviating cough. Glycyrrhethic acid from licorice was present in those formulations (Anderson and Smith, 1961).

Ethanollic extract of *G. glabra* was found to be responsible for inhibition of 35.62% SO<sub>2</sub> gas induced cough in experimental animals (Jahan et al., 2012).

## 7. Effect on Intelligence and Memory

An experiment was undertaken to evaluate the effect of oral supplementation of Yashtimadhu (*Glycyrrhiza Glabra*) on memory and mental intelligence of the male students. Tablets were prepared from the crude powder of the root and the subjected to dose standardization process. NVIT (Non Verbal Intelligence Test) and memory test were carried out to evaluate the improvement or change before the start of treatment and end to the treatment period. The score of the tests were expressed in percentage and graded them accordingly into poor, moderate, good and very good. The overall NVIT results indicated oral consumption of Yashtimadhu tablets to improve the intelligence level among the student when compared to students who received placebo treatment. In both the groups that were treated with Yashtimadhu showed mild memory improvement in comparison to that of the students belonging to control group. The improvement was more evident in NVIT as compared to memory tests. The study concluded Yashtimadhu consumption improves the general intelligence rather than STM (short term memory) (Teltumbde et al., 2013).

The effects of *Glycyrrhiza glabra* investigated in mice where elevated plus-maze and passive avoidance paradigm were used to test learning and memory. A study was conducted for 7 successive days in different groups of animals and three doses of aqueous extract of liquorice were administered [75, 150 and 300 mg/kg body weight] to see the effectiveness. Appreciable improvement in learning and memory of mice was reported at the dose of 150 mg/kg but the exact mechanism of action behind this is unknown and needs further analysis (Dhingra et al., 2004).

Evidences suggested the root extract of *Glycyrrhiza glabra* to possess antidepressant and anti-stress activity in rodents. Antidepressant-like effect of liquorice extract is attributed to its ability to restore of brain monoamines, like norepinephrine and dopamine levels. Glycyrrhizin has been found to be the chief constituent of liquorice that showed MAO (Monoamine Oxidase) inhibiting activity (Dhingra and Sharma, 2006).

## 8. Hair growth stimulatory activity

The hydro-alcoholic extract of liquorice exhibited stimulatory effect on hair growth. A study was undertaken to compare between liquorice extract and the standard hair growth promoting drug (Minoxidil 2%) and the results indicated 2% concentration of liquorice extract to show better hair growth promoting activities than 2% Minoxidil. Efficacy and safety analysis experiments were conducted and it has been concluded that liquorice extracts can be safely used in herbal formulations for the treatment of various types of Alopecia (Roy and Karmakar, 2014).

## 9. Skin Lightening Activity

The liquorice extract is reported to be an effective pigment lightening agent. It is the safest pigment-reducing agent known with minimum side effects. Glabridin is the hydrophobic fraction of liquorice extract which inhibits tyrosinase activity in cultured B16 murine melanoma cells without affecting DNA synthesis. Some other active compounds in liquorice extract like glabrene, Licochalcone A, Isoliquiritin are also found to be accountable for inhibition of tyrosinase activity. Liquiritin present in liquorice extract disperse melanin, thereby inducing skin lightening (Cronin and Draeos, 2010).

The role of *Glycyrrhiza glabra* extract on skin is mainly attributed to its antioxidant activity particularly to its potent antioxidants i.e., triterpene saponins and flavonoids (Michael, 2004).

It possess skin whitening (Lee et al., 1996), skin depigmenting (Thorel, 1996), skin lightening (Nohata and Yasuhiro, 2007; Harish et al., 2007), antiaging, anti-erythemic (Donald et al., 1998), emollient (Chatterjee et al., 2005) and anti-acne properties (Nam et al., 2003). Ethanolic extract of *Glycyrrhiza glabra* has been evidenced to show improvement in the viscoelastic and hydration properties of the skin. Synergistic effect of UV protective, antioxidant and anti-inflammatory properties of liquorice extract might be the cause behind imparting beneficial effects on skin (Ahshawat and Saraf, 2008).

## 10. Anticoagulant

Glycyrrhizin was found to be the first natural plant based thrombin inhibitor. Glycyrrhizin has been reported to prolong the thrombin and fibrinogen clotting time. It also increases plasma recalcification duration. Glycyrrhizin causes inhibition in thrombin induced platelet aggregation. But there was no effect of glycyrrhizin on Platelet Aggregating Factor (PAF) and Collagen induced agglutination (Mauricio et al., 1997; Mendes et al., 2003).



## **Mechanism of action**

The favourable effects of licorice in body can be attributed to a number of mechanisms. Glycyrrhizin and glycyrrhizic acid have been shown to inhibit growth and cytopathology of numerous RNA(Ribonucleic acid) and DNA(Deoxy-Ribonucleic Acid) viruses, including hepatitis A (Crance et al., 1990)and C(Van et al.,1999; Su et al., 1984), herpes zoster (Baba and Shigeta, 1987), HIV (Human Immunodeficiency Virus) (Hattori et al., 1986;Ito et al., 1988), Herpes simplex (Pompeiet al., 1979; Partridge and Poswillo, 1984), and CMV(Cytomegalovirus) (Numazaki et al., 1994). The structural similarity of glycyrrhizic acid and the hormones secreted by the adrenal cortex accounts for the mineralocorticoid and glucocorticoid activity of glycyrrhizic acid (Armanini, 1983). Licorice constituents also exhibit steroid-like anti-inflammatory activity, similar to the action of hydrocortisone by inhibiting phospholipase A2 activity that plays a critical role in numerous inflammatory processes (Okimasu et al., 1983).In vitro research has also showed glycyrrhizic acid to inhibit cyclo-oxygenase activity and prostaglandin formation as well as indirectly inhibits platelet aggregation which is believed to be the chief factors in the inflammatory process (Okimasu et al., 1983; Ohuchi and Tsurufuji, 1982).

Licorice constituents impart significant antioxidant and hepatoprotective properties. Glycyrrhizin and glabridin inhibits the generation of reactive oxygen species (ROS) by neutrophils at the site of inflammation (Akamatsu et al., 1991; Wang and Nixon, 2001).

In vitro studies have demonstrated licorice isoflavones, hispaglabridin A and B inhibits mitochondrial lipid peroxidation. Other research indicates glycyrrhizin lowers lipid peroxide values in animal models of liver injury caused by ischemia reperfusion (Nagai et al., 1991). Licorice constituents also exhibit hepatoprotective activity by lowering serum liver enzyme levels and improving tissue pathology in hepatitis patients (Van et al., 2001).

Glycyrrhizin and glabridin inhibit the generation of reactive oxygen species (ROS) produced as a result of inflammation and thus exerts antiproliferative action (Akamatsu et al., 1991; Wang and Nixon, 2001).

## **Side Effects and Toxicity**

Liquorice affects the renin-angiotensin-aldosterone system of the body and its supplementation can cause an elevation in blood pressure. It has been reported that saponins in the liquorice can bind to the mineralocorticoid receptors in the kidneys are capable of potentiating aldosterone action. The



phenomenon is known as “pseudoaldosteronism”. The hypertensive patients may experience hazardous consequences like hypokalemia (potassium loss) and sodium retention, causing oedema. All symptoms usually subside with discontinuation of the therapy. Several studies reported to have no side effects during the course of treatment due to liquorice consumption (Tsubota et al., 1999; Lino et al., 2001).

The dose and duration of liquorice intake determines the onset and severity of symptoms as well as individual susceptibility. Patients with delayed gastrointestinal transit time may be more vulnerable to these side effects, due to enterohepatic cycling and reabsorption of liquorice metabolites (Stormer et al., 1993).

### **Drug Botanical Interactions**

Consumption of liquorice in combination with digoxin increased chances of cardiac arrhythmias, particularly in individuals with ischemic heart disease (Hoes et al., 1994).

It is presumed that Estrogen-based oral contraceptives may enhance the mineralocorticoid side effects of liquorice in susceptible individuals that may be the outcome of estrogens reacting with mineralocorticoid receptors or inhibition of 11-[beta]-hydroxysteroid dehydrogenase (Clyburn and DiPette, 1995). Patients with essential benign hypertension when consume diuretics and liquorice together may suffer from hypokalemia commonly associated with metabolic acidosis (Olukoga and Donaldson, 2000).

### **III. DISCUSSION & CONCLUSION**

*Glycyrrhiza glabra* is a perennial herbaceous plant and its root is called liquorice which has a sweet taste. It contains several phytochemicals, among which Glycyrrhizin is the most potent one that is also responsible for its miraculous properties. It has got antioxidant, hypoglycaemic, hypolipidemic, hepatoprotective and anticoagulant properties; and as a result it can be used as a remedy in the prevention of modern lifestyle related diseases. It can be used as a panacea if used cautiously. It helps to improve memory and brain acuity so it can be advantageous in the prevention of dementia, Alzheimer’s disease and other such neurological & degenerative ailments by restoring brain monoamines, like norepinephrine and dopamine levels due to its MAO inhibiting activity. It can be used to treat alopecia and improve skin health; so, it can be a boon for cosmetic industries. More experimentation is needed to reveal its unknown and wondrous properties. Exploration of the pharmacological potential and its incorporation in our daily lives can be very beneficial.

## References

- 1 Aadam, L. (1994). *In vitro* studies on the effect of glycyrrhizin from *Glycyrrhiza glabra* on some RNA and DNA viruses. *Indian Journal Pharmacology*, 26, 194-199.
- 2 Adam, L. (1997). *In vitro* antiviral activity of indigenous glycyrrhizin, licorice and glycyrrhizic acid (Sigma) on Japanese encephalitis virus. *The Journal of Communicable Diseases.*, 29(2), 91-99.
- 3 Ahshawat, M. S., Saraf, S. and, Saraf, S. (2008). Preparation and characterization of herbal creams for improvement of skin viscoelastic properties. *International Journal of Cosmetic Science* , 30(3), 183-193.
- 4 Akamatsu, H., Komura, J., Asada, Y. and Niwa, Y. (1991) Mechanism of anti-inflammatory action of glycyrrhizin: effect on neutrophil functions including reactive oxygen species generation. *Planta Medica*, 57, 119-121.
- 5 Alaaeldin, A.H. (2007). *Curcuma longa*, *Glycyrrhiza glabra* Linn and *Moringa oleifera* Ameliorate Diclofenac-induced Hepatotoxicity in Rats. *American Journal of Pharmacology and Toxicology*, 2(2), 80-88.
- 6 Alonso, J. (2004). *Tratado de Fitofármacos y Nutraceuticos*. www.fitoterapia.net. Barcelona: Corpus, 905-911.
- 7 Anderson, D.M., Smith, W.G. (1961). The antitussive activity of glycyrrhetic acid and its derivatives. *Journal of Pharmacy and Pharmacology*, 13, 396-404.
- 8 Armanini, D., Karbowiak, I., Funder, J. W. (1983). Affinity of liquorice derivatives for mineralocorticoid and glucocorticoid receptors. *Clinical Endocrinology (Oxf)*, 19, 609-612.
- 9 Baba, M., Shigeta, S. (1987). Antiviral activity of glycyrrhizin against Varicella-zoster virus in vitro. *Antiviral Research*, 7, 99-107.
- 10 Batiha, G. E. , Beshbishy, A.M. , El-Mleeh, A., Abdel-Daim, M.M. and Devkota, H.P.(2020). Traditional Uses, Bioactive Chemical Constituents, and Pharmacological and Toxicological Activities of *Glycyrrhiza glabra* L. (Fabaceae). *Biomolecules*, 10(3), 352. doi: 10.3390/biom10030352
- 11 Chatterjee, S., Datta, R. N., Bhattacharyya, D., Bandopadhyay, Y.S.K. (2005). Emollient and antipruritic effect of Itch cream in dermatological disorders: A randomized controlled trial. *Indian Journal of Pharmacology*, 37 (4), 253-254.
- 12 Cinatl, J., Morgenstern, B., Bauer, G., Chandra, P., Rabenau, H., Doerr, H.W. (2003) Glycyrrhizin, an active component of liquorice roots, and replication of SARS-associated coronavirus. *The Lancet*, 361(9374), 2045-2046.
- 13 Clyburn, E.B., DiPette, D.J. (1995). Hypertension induced by drugs and other substances. *Seminars in Nephrology*, 15, 72-86
- 14 Crance, J.M., Biziagos, E., Passagot, J. et al. (1990). Inhibition of hepatitis A virus replication in vitro by antiviral compounds. *Journal of Medical Virology*, 31, 155-160.
- 15 Cronin, H., Draeos, Z.D. (2010). Top 10 botanical ingredients in 2010 anti-aging creams. *Journal of Cosmetic Dermatology*, 9(3), 218-225.

- 】 De Clercq, E. (2000). Current lead natural products for the chemotherapy of human immunodeficiency virus (HIV) infection, *Medicinal Research Reviews*, 20(5), 323-349.
- 】 Dhingra, D., Parle, M., Kulkarni, S. K. (2004). Memory enhancing activity of *Glycyrrhiza glabra* Linn in mice. *Journal of Ethnopharmacology*, 91(2-3), 361-365.
- 】 Dhingra, D., Sharma, A. (2006). Antidepressant-like activity of *Glycyrrhiza glabra* L. in mouse models of immobility tests. *Progress in Neuro-psychopharmacology & Biological Psychiatry*, 30(3), 449-454.
- 】 Donald, J., Brown, N.D. and Alan M. Dattner. (1998). Phytotherapeutic Approaches to Common Dermatologic Conditions. *Archives of Dermatology*, 134, 1401-1404.
- 】 Dubey, D., Sahu, M. C., Rath, S., Bimoch, P. P., Nagen, K. D., Rabindra, N.P. (2012). Antimicrobial activity of medicinal plants used by aborigines of Kalahandi, Orissa, India against multidrug resistant bacteria. *Asian Pacific Journal of Tropical Biomedicine*, 2(2), 846-854.
- 】 Gopal, M. S. (2009). In Vitro Antifungal and Antibacterial Activities of Root Extract of *Glycyrrhiza Glabra*. *Journal of Applied Sciences Research*, 5(10), 1436-1439.
- 】 Gupta, V.K., Fatima, A., Faridi, U., Negi, A.S., Shanker, K., Kumar, J.K., Rahuja, N., Luqman, S., Sisodia, B.S., Saikia, D., Darokar, M.P., Khanuja, S. P. (2008). Antimicrobial potential of *Glycyrrhiza glabra* roots. *Journal of Ethnopharmacology*, 116, 377-380.
- 】 Harish, M., Jones, Brian C., McCain, Nicole. Limtrakul., Pornngarm. (2007). *United States Patent: 7189419*
- 】 Hattori, T., Ikematsu, S., Koito, A. et al. (1989). Preliminary evidence for inhibitory effect of glycyrrhizin on HIV replication in patients with AIDS. *Antiviral Research*, 11, 255-261.
- 】 Hoes, A.W., Grobbee, D.E., Peet, T.M., Lubsen, J. (1994) Do non-potassium sparing Diuretics increase the risk of sudden cardiac death in hypertensive patients? Recent evidence. *Drugs*, 47, 711-73; <https://plants.usda.gov/java/ClassificationServlet?source=display&classid=GLGL>
- 】 Ito, M., Sato, A., Hirabayashi, K. et al (1988). Mechanism of inhibitory effect of glycyrrhizin on replication of human immunodeficiency virus (HIV). *Antiviral Research*, 10, 289-298.
- 】 Jackson, B.P. and Derek, W. (1992). *Snowdon Atlas of Microscopy of Medicinal Plants*. 1st ed. *CBS Publishers and Distributors (P) Ltd.*
- 】 Jahan, Y., Siddique, H.H. (2012). Study of antitussive potential of *Glycyrrhiza glabra* & *Adhatodavasica* using a cough model induced by SO<sub>2</sub> gas in mice. *International Journal of Pharmaceutical Sciences & Research*, 3, 1668-74.
- 】 Jalilzadeh-Amina, G., Najarnezhada, V., Anassoria, E., Mostafavi, M., and Keshipour, H. (2015). Antiulcer Properties of *Glycyrrhiza Glabra* L. Extract on Experimental Models of Gastric Ulcer in Mice. *Iranian Journal of Pharmaceutical*

- Research*, 14 (4), 1163-1170.
- 】 Jeong, H.G., You, H.J., Park, S.J., Moon, A.R., Chung, Y.C., Kang, S.K.*et al.* (2002). Hepatoprotective effects of 18 $\beta$ - glycyrrhetic acid on carbon tetrachloride-induced liver injury: inhibition of cytochrome P450 2E1 expression. *Pharmacological Research*. 46, 221-227.
  - 】 Ju, H.S., Li, X.J., Zhao, B.L., Han, Z.W., Xin, W.J. (1989). Effects of Glycyrrhiza Flavonoids on lipid peroxidation and active oxygen radicals. *Acta Pharmaceutica Sinica*, 24(11), 807-812.
  - 】 Kamboj, V.P. (2000). Herbal Medicine. *Current Science*, 78, 35-51.
  - 】 Karthikeson, P.S., Lakshmi, T. (2017) Anti-Diabetic Activity of *Glycyrrhiza glabra* - An *In vitro* Study. *International Journal of Pharmaceutical Sciences Review and Research*, 44(1), 80-81.
  - 】 Lakshmi, T., Geetha, R. (2011). *Glycyrrhiza Glabra* Linn. Commonly known as Licorice: A Therapeutic Review. *International Journal of Pharmacy and Pharmaceutical Sciences*, 3(4), 20-25.
  - 】 Lee, K.T., Kim, B.J., Korea, J. H., Heo, M. (1996). Biological screening of 100 plant extracts for cosmetic use (I): inhibitory activities of tyrosinase and DOPA auto-oxidation. Presented at the 19<sup>th</sup> IFSCC Congress. Sydney, Australia.
  - 】 Lim, T.K. (2015). *Glycyrrhiza glabra*. *Edible Medicinal and Non-Medicinal Plants*, 22, 354-457. doi: 10.1007/978-94-017-7276-1\_18
  - 】 Lino, S., Tango, T., Matsushima, T. et al. (2001). Therapeutic effects of stronger neominophagen C at different doses on chronic hepatitis and liver cirrhosis. *Hepatology Research*, 19, 31-40.
  - 】 Mauricio, I., Francischett, B., Monterio, R.Q., Guimaraes, J.A. (1997). Identification of *Glycyrrhizin* as thrombin inhibitor. *Biochemical and Biophysical Research Communication*, 235, 259-263.
  - 】 Mendes-Silva, W., Assafim, M., Ruta, B., Monteiro, R.Q., Guimaraes, J.A., Zingali, R.B.*et al.* (2003). Antithrombotic effect of *Glycyrrhizin*, a plant-derived thrombin inhibitor. *Thrombosis Research*; 112, 93-98.
  - 】 Messier, C., Grenier, D. (2011). Effect of licorice compounds licochalcone A, glabridin and glycyrrhizic acid on growth and virulence properties of *Candida albicans*. *Mycoses*, 54(6), 801-806.
  - 】 Michael, A. (2004). International Congress Series, Atherosclerosis XIII. Proceedings of the 13<sup>th</sup> International Atherosclerosis Symposium. 1262.
  - 】 Monier-Williams, M. (1993). A Sanskrit English Dictionary. 1st ed. K.C.I.E *Sbri Saiguru Publication* a division of Indian books centre, Delhi.
  - 】 Nagai, T., Egashira, T., Yamanaka, Y., Kohno, M. (1991). The protective effect of glycyrrhizin against injury of the liver caused by ischemia-reperfusion. *Archives of Environmental Contamination Toxicology*, 20, 432-436.
  - 】 Nam, C., Kim, S., Sim, Y., Chang, I. (2003). Anti-acne effects of oriental herb extracts: a novel screening method to select anti-acne agents. *Skin Pharmacology*

- and Physiology. 16(2), 84–90. doi: 10.1159/000069030.
- 】 Nohata, Yasuhiro K., Tomomi. (2005). *Japan Patent: 2002029929*.
  - 】 Numazaki, K., Umetsu, M., Chiba, S. (1994). Effect of glycyrrhizin in children with liver dysfunction associated with cytomegalovirus infection. *The Tohoku Journal of Experimental Medicine*, 172, 147- 153.
  - 】 Ohuchi, K., Tsurufuji, A. (1982). A study of the anti-inflammatory mechanism of glycyrrhizin. *Mini Reviews in Medicinal Chemistry*, 27, 188-193.
  - 】 Okimasu, E., Moromizato, Y., Watanabe, S. et al. (1983). Inhibition of phospholipase A2 and platelet aggregation by glycyrrhizin, an anti-inflammation drug. *Acta Medica Okayama*, 37, 385-391.
  - 】 Olukoga, A., Donaldson, D. (2000). Licorice and its health implications. *Journal of the Royal Society for the Promotion of Health*, 120, 83-89.
  - 】 Partridge, M., Poswillo, D.E. (1984). Topical carbenoxolone sodium in the management of herpes simplex infection. *British Journal of Oral and Maxillofacial Surgery*, 22, 138-145.
  - 】 Pellati, D., Fiore, C., Armanini, D., Rassu, M., Bertoloni, G. (2009). In vitro effects of glycyrrhetic acid on the growth of clinical isolates of *Candida albicans*. *Phytotherapy Research*, 3 (4): 572-574.
  - 】 Pompei, R., Flore, O., Marcialis, M.A., Pani, A., Loddo, B. (1979). Glycyrrhizic acid inhibits virus growth and inactivates virus particles. *Nature*, 281(5733), 689-90.
  - 】 Pompei, R., Pani, A., Flore, O., Marcialis, M.A., Loddo, B. (1980). Antiviral activity of glycyrrhizic acid. *Experientia*, 36, 304.
  - 】 Roy, S.D., Karmakar, P.R., Dash, S., Chakraborty, J., Das, B. (2014). Hair growth stimulating effect and phytochemical evaluation of hydro-alcoholic extract of *Glycyrrhiza glabra*. *Global Journal of research on Medicinal Plants & Indigenous Medicine*, 3(2), 40-47.
  - 】 Sharma, A.R. (2001). Sutra Sthana. Sushruta Samhita of Maharshi Sushruta Varanasi. *Chaukhamba Surbharati Prakashan*, 42 (5), 45.
  - 】 Shibata, S. (2002). Antitumor promoting and anti-inflammatory activities of licorice principles and their modified compounds. *Food Phytochemicals for Cancer Prevention II: Teas, Spices and Herbs*, 308-321.
  - 】 Sianne, S., Fanie, R.V.H. (2002). Antimalarial activity of plant metabolites. *Natural Product Reports*, 19:675-692.
  - 】 Stormer, F.C., Reistad, R., Alexander, J. (1993). Glycyrrhizic acid in licorice-evaluation of health hazard. *Food and Chemical Toxicology*, 31, 303-312.
  - 】 Su, X.S., Chen, H.M., Wang, L.H. et al. (1984). Clinical and laboratory observation on the effect of glycyrrhizin in acute and chronic viral hepatitis. *Journal of Traditional Chinese Medicine*, 4:127-132.
  - 】 Teltumbde, A.K., Wahurwagh, A.K., Lonare, M.K., Nesari, T.M. (2013). Effect of Yashtimadhu (*Glycyrrhiza Glabra*) on Intelligence and Memory Function in Male

- Adolescents. *Journal of Applied Medical Sciences*, 1(2):90-95.
- 】 Thakur, A.K., Rao, P. (2017). Pharmacological Perspective of Glycyrrhiza glabra Linn.: a Mini-Review. *Journal of Analytical & Pharmaceutical Research*, 5(5), 156.
  - 】 Thorel., Jean N., (1996). *French Patent: 2723316*
  - 】 Tian, M., Yan, H., and Row, K.H. (2008). Extraction of Glycyrrhizic Acid and Glabridin from Licorice. *International Journal of Molecular Sciences*, 9, 7.
  - 】 Tsubota, A., Kumada, H., Arase, Y. et al. (1999). Combined ursodeoxycholic acid and glycyrrhizin therapy for chronic hepatitis C virus infection: a randomized controlled trial in 170 patients. *European Journal of Gastroenterology and Hepatology.*, 11, 1077-1083.
  - 】 Van-Rossum, T.G., Vulto, A.G., Hop, W.C. et al. (1999). Intravenous glycyrrhizin for the treatment of chronic hepatitis C: a doubleblind, randomized, placebo-controlled phase I/II trial. *Journal of Gastroenterology and Hepatology.*, 14, 1093-1099.
  - 】 Van-Rossum, T.G., Vulto, A.G., Hop, W.C., Schalm, S.W. (2001). Glycyrrhizin-induced reduction of ALT in European patients with chronic hepatitis C. *American Journal of Gastroenterology*, 96, 2432-2437.
  - 】 Vibha, J.B., Choudhary, K., Singh, M. (2009). A Study on Pharmacokinetics and Therapeutic Efficacy of Glycyrrhiza glabra: A Miracle Medicinal Herb. *Botany Research International*, 2 (3): 157-163.
  - 】 Visavadiya, N.P., Soni, B., Dalwadi, N. (2009). Evaluation of antioxidant and anti-atherogenic properties of *Glycyrrhizaglabra* root using *In vitro* models. *International Journal of Food Sciences and Nutrition*, 60 (2):135-149.
  - 】 Vispute, S., Khopade, A. (2011). Glycyrrhiza Glabra Linn. –“Klitaka”: A review. *International Journal of Pharma and Bio Sciences*, 2(3), 42-51.
  - 】 Wang, Z.Y., Nixon, D.W. (2001) Licorice and cancer. *Nutrition and Cancer*, 39, 1-11.
  - 】 Xu-ying, W., Ming, L., Xiao-dong, L. and Ping, H. (2009). Hepatoprotective and anti hepatocarcinogenic effects of glycyrrhizin and matrine. *Journal of Chemico-Biological Interactions*, 181(1), 15-19.

# Dietary Transition, Physical Inactivity And Their Effect On Lifestyle Diseases In India: A Review

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## **ABSTRACT**

**L**ifestyle diseases are the non communicable diseases (NCDs) which have developed through the choice of living our daily lives and this style of spending our daily routine has been greatly influenced by the globalization, urbanization, industrialization and modernization of society. And these all have made a remarkable transition in every aspect of life which includes social, economical, cultural, behavioural, demographical and epidemiological transition. Rapidly growing economy of developing countries like in India, helps to raise the standard of living of people on one hand whereas thrusts the people towards NCDs on the other. Adaptation of 'western diet', low intake of traditional fibre rich foods and high consumption of processed or semi processed foods, fast foods, junk foods, sweetened beverages accompanied with leisure lifestyle are the strong determinants for developing risk factors (obesity, hypertension, raised blood sugar level or dyslipidemia) of lifestyle diseases like cardio and cerebro vascular diseases, diabetes, cancer, chronic respiratory diseases and so on. Thus the aim of this review is to determine the adverse effect of our changed food habit and sedentary activity on the development of lifestyle diseases in our country and modification of these two factors would not only decrease the burden of mortality or disabilities due to lifestyle



diseases but also play a pivotal role to get healthy, active and productive India in future.

**Key Words:** *Diet, Physical activity, Lifestyle, Obesity and Lifestyle diseases.*

## I. INTRODUCTION

Since the late nineteenth century the pattern of diseases and the cause of mortality of the then developed countries had started to take a shift from communicable infectious diseases to chronic diseases which were not infectious or transmissible (Mackeown, 2009). This epidemiological transition was the outcome of 'complex modernization' of those societies which also have had social, technological, economical and demographical transition leading to increase in life expectancy and simultaneous decrease in death rate. In 1971, Omran developed the 'epidemiological transition theory' that explains how the pattern of mortality and diseases which were predominantly infectious pandemic or epidemics in the pre-modern era, were slowly displaced by man-made, chronic and degenerative diseases of modern era. Like the other low or middle income countries, India is also a witness of such transition. Rapid modernization, urbanization, industrialization, fast progression of technology and medical science, improved hygiene and sanitation all boost up the socio-economic level, upraise the standard of living, pull the mortality down, take the life expectancy up and change the demography. And all these led to the development of 'Lifestyle Diseases' (Yadav & Arokiasamy, 2014).

Thus lifestyle diseases are the diseases of fast paced modern lifestyle, the way people choose to live their day to day lives, adopt habits those detract them from healthy living and direct towards a sedentary daily routine leading to the development of different chronic medical problems which can be detrimental for their later lives. Faulty human habits or lifestyle, individuals' genetic makeup, ones' physiology and the environment where they are living in (physical environment/ home/occupational) are the risk factors which interact with each other and provide the complex aetiology behind the onset of such diseases (Lin et al., 2017; Tabish, 2017). Lifestyle diseases are also called 'non communicable diseases' (NCDs) or 'disease of the civilization'. Such diseases slowly progress over years and are the major reasons of adult deaths, diseases and functional impairments or disabilities worldwide in the present era. Most often NCDs cause 'premature deaths' (death within 30-69 years of age). World Health Organisation (WHO) grouped such diseases as 'Group-II Diseases', a bucket which is filled with following medical conditions or diseases results from lifestyle and/or environment [Egger & Dixon, 2014; WHO, 2018]:



1. Cardio and cerebro-vascular diseases
2. Cancer
3. Type II diabetes
4. Chronic Respiratory diseases
5. Endocrine / metabolic disorders
6. Mental health
7. Gastrointestinal diseases
8. Kidney diseases
9. Musculoskeletal diseases
10. Reproductive problems
11. Dermatological problems

**Prevalence:** According to WHO report (2018) NCDs are the major disease burden across the world and presumed that this burden would increase by 17% over the coming decade. Every year 41 million (71%) people die globally due to NCDs and cause 15 million 'premature death'. It is also responsible for the loss of 48% healthy years globally (Disability Adjusted Life Years – DALY). Among the developing countries, Asian and African countries contribute almost 47% and 27% respectively towards the global burden of NCDs. 85% of the total 'premature death' occurs either in low or middle income countries. And 80% of all deaths due to cardio vascular disease (CVD) and diabetes, 90% of total COPD death and 2/3<sup>rd</sup> of all deaths from cancer result from developing countries. Among all the NCDs cardio vascular disease, cancer, respiratory disease and diabetes together make up about 82% of all global deaths from NCDs (Bloom et al., 2011; Islam et al., 2014; and Mark & Peter, 2011).

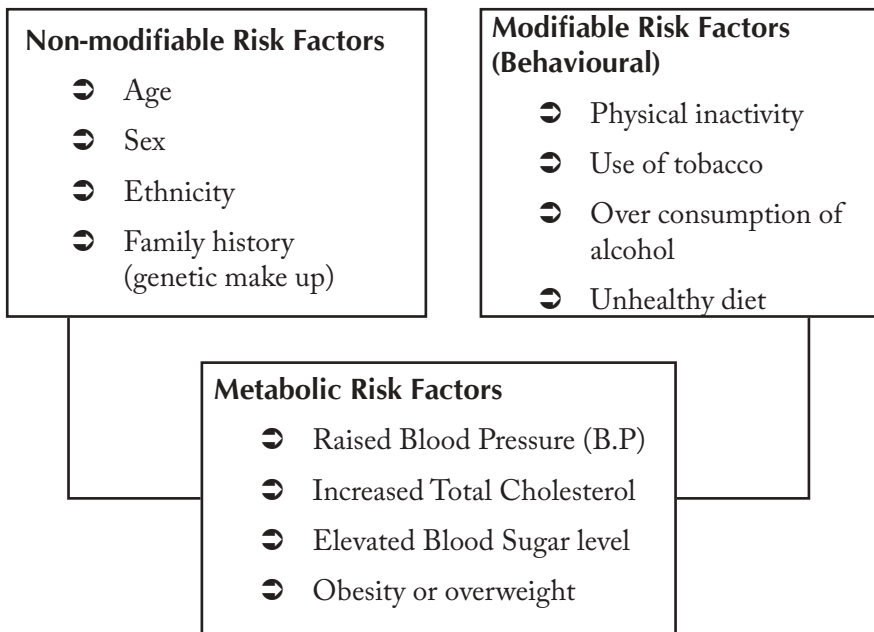
India, a developing country with almost 1.3 billion populations is suffering from the 'double burden of diseases'. On one side it struggles against undernutrition and nutritional deficiency diseases and on the other it has obesity and related lifestyle diseases. Two-third or more deaths due to NCDs in the South-East Asia Region of WHO is the contribution of India (Nethan et al., 2017).

WHO reported (2015) that, every year in India, NCDs take lives of almost 5.8 million people and also predicted that Indians (one among four) have the high chance of losing their lives from NCDs before their 70s. Data from Ministry of Health & Family Welfare, Government of India revealed that disease burden due to NCDs has raised from 30% in 1990 to 55% in 2016 and the related mortality has also elevated in same pace. The most prevalent NCDs related to lifestyle and or environment in India are cardio vascular diseases (CVD), followed by type II diabetes, chronic obstructive pulmonary

disease (COPD) and cancer. Again the study of Global Burden of Diseases (GBD, 2016) stated that based on contribution towards the total mortality burden of India, cardiovascular diseases (mainly Ischemic Heart Disease and stroke-28.1% of total mortality) was the largest, chronic respiratory diseases (mainly COPD & asthma-10.9% of total mortality) was the second largest and diabetes mellitus (3.1% of total mortality) stood as the third largest contributor. This study also noted the hike in the prevalence of those diseases during the study period (1990-2016) and estimated that deaths from CVD raised by 34.3% and the prevalence of incidence of COPD, asthma and diabetes moved up by 29.2%, 8.6% and 29.7% respectively during that study period (Arokiasamay, 2018).

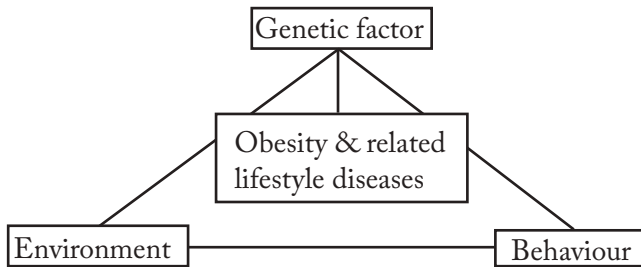
**Risk Factors:**

Risk factors behind the development of lifestyle diseases have been categorized as follows (Tabish, 2017; WHO, 2018):



One’s genetic makeup and associated factors which can’t be modified only increase the chance of having such diseases but behavioural factors (which can be changed) just add fuel into it, resulting commencement of metabolic risks; leading to lifestyle diseases. Now obesity or excessive weight gain is the most predominant factor that brings many other lifestyle related health issues with it.

Individual's genetic background, surrounding environment and the behaviour related to health interacts with each other and plays crucial role in metabolic changes leading to obesity and or other lifestyle related health issues.



Amidst several possibilities of developing lifestyle diseases, heredity or family history of several NCDs (like cancer, hypertension or diabetes etc) predisposes a person to certain diseases. Harnandez& Blazer (2006) stated that genetic substances those are inherited within the families either directly or indirectly contribute to the pathogenesis of various diseases. Deleterious mutation of gene can again elevates the risk of diseases. For e.g. mutation in a single gene which is involved in leptic-melanocortin pathway or a cumulative effect of different gene can promote weight gain in favourable environment or genetic anomalies in neural or other systems or organs may cause severe obesity or other health risks causing obesity (Srilakshmi, 2014;Thaker, 2017). Now environment and the human behaviour or lifestyle interacts with the person's genetic build up and provides the complex aetiology of such diseases. Environment can influence disease progression even before his/her birth i.e. intra-uterine nutritional environment and poor or excess nutrition at this stage often leads to adult obesity and other health risks in later life (Sarr et al., 2012); and after birth person's social, economical, cultural, occupational or even technological surroundings would certainly have some impact on the onset of lifestyle diseases. Geographical location, availability and accessibility to foods, marketing and advertising by different food companies, food policies, influence of globalization, urbanization or adaptation to 'western diet' in food business are observed even in rural areas, have impact on food habits and related health issues. Economical environment also determines obesity and related diseases, as it is seen that prevalence of obesity is lofty in high income countries than the low income countries and it is also frequently observed in the affluent section of the society especially in low or middle income countries. Transition in cultural tradition and food practice is also noted as a result of raised socio-economic

level. Recent educational pressure, social insecurity and others refrain children to play outside or to do extracurricular activities in one hand and on the other hand studying at desk or spending long time on screens bring childhood obesity. Work environment like desk work, working hours or shifting at work affects health of employees as well. And all around technological shift, even in domestic lives, transportation or in occupation and also availability of wide range of modern technology based gadgets welcome obesity and other lifestyle diseases. Behaviour of people also goes hand in hand with their surrounding environment to promote lifestyle diseases like faulty food habits, smoking or chewing tobacco, excess alcohol consumption, wrong or misconception about foods and so on (Affenito et al., 2012; Mckeown, 2009; and Straker et al., 2016). These factors and their cumulative effects on public health were also described by Garry et al. (2014), who in his study also considered environmental, social and economical aspects as the determinants of lifestyle diseases. Environment that has been made by modern men and their by products are behind the development of such chronic diseases and the authors discussed them under 3 headings:

1. Distal- which includes physical, social, cultural, political and economical environment.
2. Medial- this includes stress, anxiety, technology, occupation, human relationship.
3. Proximal- this covers faulty diet, lack of physical activity, inadequate sleep, over or under exposure to various factors like UV rays, sunlight, chemicals or smoke.

All these factors play roles in the commencement of chronic lifestyle diseases by elevating the biomarkers like high B.P, raised fasting blood glucose, glycated haemoglobin (HBA<sub>1</sub>C), LDL-C, C-reactive protein, interleukin-6 or other inflammatory markers. And these all are the common features of obesity as well which often leads to Meta inflammation and resulting degenerative, chronic diseases and increased mortality or functional impairment.

So, from the above discussion, it is clear that faulty nutrition, physical inactivity (behavioural risk factors) and obesity (metabolic risk factor) are the strong determinants of lifestyle diseases. Again these two behavioural factors are the most common cause of weight gain and obesity. Thus the authors here tried to focus the food habits and physical activity of Indians, the way it get differed from previous ones and its association with obesity which is the underlying cause of several lifestyle diseases.

## **Diet and Obesity:**

It is well established that good health depends on proper nutrition, balanced diet and good food habits. Most of the developed countries are suffering from childhood to adult obesity and related metabolic and cardio vascular disorders due to over consumption of calorie accompanied with sedentary life lead. Studies from different countries proved strong association between household purchasing or consumption of highly processed foods and obesity or other metabolic diseases among both the children and adult groups. These processed foods are not only calorie dense but also rich in salt and trans fat and also decrease satiety (Poti et al., 2017).

When the waves of globalization, industrialization, urbanization struck the developing countries like India and their subsequent transition had been influencing all steps of societies, it do not spare the dietary habits too. Improved purchasing power, availability of low-cost processed or semi processed foods; ready to eat or cook foods in the market, mushroom growth of restaurants and fast food outlets have shifted the traditional Indian diet towards western diet. A nationwide study was done by Satija et al. (2015) in India to show the dietary shift from 1975 to 1995 and showed a marked transition from high fibre cereal based Indian diet to western diet- rich in sugar, trans fat and animal foods. This study also observed the existence of three types of dietary pattern among Indians- 1. 'Cereal savoury' 2. 'Fruit-vegetable-sweet and snacks' 3. 'Animal food' rich diet. Among which cereal savoury (consists of whole or refined cooked grains, rice or rice based dishes, snacks, nuts and spices) was associated with high body mass index (BMI) but not with central obesity. Second type of food pattern (consists of fruits, vegetables, refined cereals, sweets and sugar, milk or milk products and snacks) was not associated with any kind of obesity due to its high fruits and vegetables content and the last one (rich in red meat, fish, egg, poultry, sea food) was related with higher BMI and increased waist circumference. Another study by Khandelwal & Reddy (2013) also indicated that cereal and pulse consumption by the Indians are going down whereas intake of energy dense foods like fat, oil, dairy, egg and meat are going up since the last few decades both in rural and urban populations. Other studies in India also noted that excessive consumption of processed foods or fast foods, snacks, aerated drinks with added sugar, synthetic fruit juice, sweetened products which provide excess calorie, trans fat, sodium and sugar are highly associated with childhood, adolescent and adult obesity and related chronic diseases (Agarwal, 2005; Bhadoria et al., 2014; Faizi et al., 2018 and Khandelwal & Reddy, 2013). Not only food but portion size, speed of consumption, frequency of consumption

of meals, habit of nibbling between meals, skipping breakfast or other weird dietary habits like binge eating also to be considered (Bhattacharjee et al., 2017; Goyal & Julka, 2014).

On the other hand researchers have also proved that if a diet is rich in dietary fibre, low in fat; simple sugar; sodium and low calorie dense foods are included instead of high calorie dense foods, and then it will be a useful tool for intervening obesity or other metabolic disorders. Various dietary approaches have been made based on it and these are as follows (Makris & Foster, 2011):-

Type of Diet	Description
Very low fat diet	Supplies 10% - 20% energy from fat Mainly based on plant foods Sometimes allows animal foods like lean meat, poultry, egg or low fat dairy products e.g.- Ornish diet
Low fat diet	Supplies 20% -30% energy from fat Recommended for obese and CVD patients [especially DASH (Dietary Approach to Stop Hypertension) diet]
Moderate fat diet	Allows 35% -45% energy from fat
Mediterranean diet	High in fruits and vegetables, low amount of animal foods, inclusion of olive oil (rich in Mono Unsaturated Fatty Acids) and red wine (as antioxidant)
Low carbohydrate diet	Allows low calorie from carbohydrate (10% -50% calorie from carbohydrate) Includes about 60% calorie from fat Excludes simple sugar but not carbohydrate foods which are rich in dietary fibre and other nutrients and also animal protein is allowed. e.g. Atkins diet.
Low Glycaemic Index (GI) foods	Low GI foods include those foods whose Glycaemic Index ranges between 0-55; and this diet is mainly the combination of low carbohydrate and low fat diet

High protein diet	Supplies 25% energy from protein foods It also includes moderate carbohydrate (40% of total calorie) and high fat (60% of total calorie)
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Though there are various conflictions over their advantages, disadvantages or adversity over long term applicability and acceptance but still they are helpful means to shed extra weight and get rid off from obesity and related various medical problems.

**Physical inactivity and Obesity:**

Excess calorie consumption and leisure lives –combination of these two are the most common lifestyle risk factors for modern societies, both in developed and developing countries and in most cases it is behind the prevalence of obesity and related lifestyle diseases.

Energy is required for every person to compensate the expenditure; energy from a healthy diet not only considers expenditure but also makes provision for size and composition of body, the physical activity which is desirable for maintaining good health in long run, for optimum growth and development from infant to adolescent groups and also considers requirements of energy for pregnant and lactating mothers. So energy need varies depending on the age, sex, physical activity level, physiological status and basal metabolism (FAO/WHO/UNU Expert Consultation, 2001).When intake of energy exceeds expenditure, it causes positive energy balance and if this condition persists for prolonged period of time it results overweight, obesity and related NCDs (Hill et al., 2012). Again it’s time to blame modernization!! Overall transition in social, cultural and economical environment have given rise to improved standard of living and a technology based leisure lives both in developed and developing countries. Sedentary occupational activities are escalating, more people are spending their leisure hours on screens, hiring maids for domestic work and all round use of technology has reduced the burden of workloads in many ways both at home or work place and also during transportation. These all are set to abate human labour which in turn give birth to new living style that encompasses little or no physical work; hurried and competitive lives; sedentary work pressure at work place; study burden upon kids, nuclear families; absence of playmates, lack of children’s park or open space for outdoor games or no side walk for increased road traffic; inclined to smart phones, video game or spending more hours on watching T.V. and these are all the causative factors that push children or adults towards obesity. Not only these lifestyle factors but air pollution, social insecurity, violence, moral degradation, social distancing

and many other related social issues also compel people to adopt such style of living, leading to the development of risk factors like hypertension, obesity, raised blood sugar level and ultimately to different chronic diseases (Das Gupta et al., 2019; WHO, 2018)

WHO (February, 2018) reported that in present time across the world about 81% adolescents and 23% adults are physically inactive (based on WHO recommendations of physical activity for good health). The percentage of this inactive population varies from country to country, even within the same country depending on the residence (urban or rural). It has also noted that women are more physically inactive than men within the same populations and people of high income countries live more sedentary lives as compared to people of developing countries.

Various studies in India have been done on determining whether the population is doing sufficient physical activity or not and association of NCDs with it. ICMR(Anjana et al., 2014) published a report on the trend of physical activity and inactivity among Indians and selected four states (Chandigarh, Tamilnadu, Jharkhand and Maharashtra) representing four regions (north, south, east and west) of the country and showed that among male 13.7%, 31.9% and 54.4% were highly active, active and inactive respectively. Report also noted that prevalence of higher BMI, increased waist circumference; hypertension and dyslipidemia were associated with inactive group when compared with the others. Tripathy et al. (2016), in his study in Punjab, mentioned that there was no significant difference between rural urban populations regarding physical activity, hence males were active in both the sectors whereas urban women had more sedentary lives compared to rural women. Again a study from Tamilnadu showed higher prevalence of physical inactivity in urban populations than rural areas and urban females were the most prevalent group (Devamani et al., 2019). Some other studies also supported that the significant difference exists regarding physical activity between urban and rural sectors even in adolescent groups (Kundapur&Baisil, 2017).

Thus physical activity is a strong measure for both intervening and protecting against ongoing lifestyle diseases like CVD, diabetes, cancer, stroke. It hinders the development of risk factors of such diseases (raised blood pressure and blood glucose; weight gain), releases stress and removes depression hence maintains mental wellbeing.

Now physical activity is any kind of movement of the body involving skeletal muscles. It can be walking, exercise, dancing, playing or could be domestic work and so on. Global recommendation of physical activity by WHO (2018) for



children and youths (5 to 17 years age) is to do at least 60 minutes moderate to vigorous intensity physical activities on each day and for adults it is 150 minutes moderate intensity or 75 minutes vigorous intensity physical activity per week.

Thus improper diet and sedentary behaviour are the duo which plays a significant role on the development of lifestyle related NCDs. Empty calorie or high calorie dense foods with poor physical activity causes positive energy balance and this excess calorie is stored as fat within the body tissues. So the dietary modification and moderate intensity physical activities for 150-250 minutes in a week can be used as effective tool in intervention programmes for lifestyle related diseases (Romieu et al., 2017).

Hence from the above discussion it is clear that dietary shift or change in living style is the result of socio-economical transition and consequent urbanization, industrialization and modernization of developing countries. And the outcome is lifestyle diseases, the major reason of mortality and functional disabilities which also cause economical losses for those countries. So lifestyle intervention through dietary modification and sufficient physical activity can be used as protective measures against those diseases which in turn be economically and socially beneficial and will help to achieve the 2030 Sustainable Developmental Goals (SDGs).

## References

- 1 Affenito, S. G., Franko, D. L., Striegel-Moore, R. H., & Thompson, D. (2012). Behavioral determinants of obesity: research findings and policy implications. *Journal of obesity*, 2012, 150732. doi:10.1155/2012/150732
- 2 Agarwal, P. (2005). Role of Lifestyle and Diet in Emerging Obesity among Indian Women and its Impact upon their Health Status. Paper for the Oral Presentation in the *IUSSP XXV INTERNATIONAL POPULATION CONFERENCE Tours, France 18-23 July 2005*. Retrieved from [http://www.demoscope.ru/weekly/knigi/tours\\_2005/papers/iussp2005s51140.pdf](http://www.demoscope.ru/weekly/knigi/tours_2005/papers/iussp2005s51140.pdf)
- 3 Anjana, R. M., Pradeepa, R., Das, A. K., Deepa, M., Bhansali, A., Joshi, S. R., Joshi, P. P., Dhandhanika, V. K., Rao, P. V., Sudha, V., Subashini, R., Unnikrishnan, R., Madhu, S. V., Kaur, T., Mohan, V., Shukla, D. K., & ICMR- INDIAB Collaborative Study Group (2014). Physical activity and inactivity patterns in India - results from the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-5]. *The international journal of behavioral nutrition and physical activity*, 11(1), 26. doi:10.1186/1479-5868-11-26
- 4 Arokiasamy, P. (2018). India's escalating burden of non-communicable diseases. *The Lancet. Global health*, 6(12), e1262–e1263. doi: 10.1016/S2214-109X (18)30448-0

- 1 Bhadoria, A. S., Kapil, U., & Kaur, S. (2014). Dietary Pattern amongst Obese and Nonobese Children in National Capital Territory of Delhi: A Case Control Study. *Journal of family medicine and primary care*, 3(4), 473–475. doi:10.4103/2249-4863.148157
- 1 Bhattacharjee, P., Mukhopadhyay, S., Joshi, P., & Singh, S. (2017). Food habits and obesity: a study in adolescents. *International Journal of Contemporary Pediatrics*. 4(2),336-340. doi:10.18203/2349-3291.ijcp20170526.
- 1 Bloom, D.E., Cafiero, E.T., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L.R., Fathima, S., Feigl, A.B., Gaziano, T., Mowafi, M., Pandya, A., Prettner, K., Rosenberg, L., Seligman, B., Stein, A.Z., & Weinstein, C. (2011). *The Global Economic Burden of Noncommunicable Diseases*. Geneva: World Economic Forum. Retrieved from: [https://www.world-heart-federation.org/wpcontent/uploads/2017/05/WEF\\_Harvard\\_HE\\_GlobalEconomicBurdenNonCommunicableDiseases\\_2011.pdf](https://www.world-heart-federation.org/wpcontent/uploads/2017/05/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf).
- 1 Das Gupta, R., Haider, S. S., Sutradhar, I., Hashan, M. R., Sajal, I. H., Hasan, M., Haider, M. R., & Sarker, M. (2019). Association of frequency of television watching with overweight and obesity among women of reproductive age in India: Evidence from a nationally representative study. *PloS one*, 14(8), e0221758. doi.org/10.1371/journal.pone.0221758
- 1 Devamani, C.S., Oommen, A., Mini, G., Abraham, V. J., & George, K. (2019). Levels of physical inactivity in rural and urban Tamil Nadu, India: A cross-sectional study. *Journal of Clinical and Preventive Cardiology*, 8(1) 13-17. doi: 10.4103/JCPC.JCPC\_32\_18.
- 1 Egger, G., & Dixon, J. (2014). Beyond obesity and lifestyle: a review of 21st century chronic disease determinants. *BioMed research international*, 2014,731685. doi: 10.1155/2014/731685
- 1 Faizi, N., Shah, M. S., Ahmad, A., Ansari, M. A., Amir, A., & Khaliq, N. (2018). Adverse eating behavior and its association with obesity in Indian adolescents: Evidence from a nonmetropolitan city in India. *Journal of family medicine and primary care*, 7(1), 198–204. doi:10.4103/jfmpc.jfmpc\_139\_17
- 1 Goyal, R., & Julka, S. (2014). Impact of breakfast skipping on the health status of the population. *Indian journal of endocrinology and metabolism*, 18(5), 683–687. doi.org/10.4103/2230-8210.139233
- 1 Hernandez, L. & Blazer, D. G. (2006). *Genes, Behavior, and the Social Environment: Moving Beyond the Nature/Nurture Debate*. Washington DC: National Academies Press
- 1 Hill, J.O., Wyatt, H.R., & Peters, J.C. (2012). Energy balance and obesity. *Circulation*, 126(1), 126–132. doi.org/10.1161/CIRCULATIONAHA.111.087213
- 1 Islam, S. M., Purnat, T. D., Phuong, N. T., Mwingira, U., Schacht, K., & Fröschl, G. (2014). Non-communicable diseases (NCDs) in developing countries: a symposium report. *Globalization and health*, 10, 81. doi: 10.1186/s12992-014-0081-9

- 】 Joint FAO/WHO/UNU Expert Consultation. Food and Agricultural Organization. (October, 2001). *Human energy requirements*. [Food and Nutrition Technical Report Series]. Retrieved from <http://www.fao.org/3/a-y5686e.pdf>
- 】 Khandelwal, S., & Reddy, K. S. (2013). Eliciting a policy response for the rising epidemic of overweight-obesity in India. *Obesity reviews: an official journal of the International Association for the Study of Obesity*, 14(2), 114–125. doi: 10.1111/obr.12097
- 】 Kundapur. R., & Baisil, S. (2017). Assessment of difference in physical activities in urban and rural adolescents of Mangalore. *Indian Journal of Community Health*, 29(1), 75-80.
- 】 Lin, Y., Chen, J., & Shen, B. (2017). Interactions between Genetics, Lifestyle, and Environmental Factors for Healthcare. *Advances in experimental medicine and biology*, 1005, 167–191. doi: 10.1007/978-981-10-5717-5\_8
- 】 Makris, A., & Foster, G. D. (2011). Dietary approaches to the treatment of obesity. *The Psychiatric clinics of North America*, 34(4), 813–827. doi.org/10.1016/j.psc.2011.08.004
- 】 Mark, H., & Peter, G. (2011). Developmental origins of noncommunicable disease: population and public health implications. *The American Journal of Clinical Nutrition*, 94(6), 1754S–1758S, doi:10.3945/ajcn.110.001206
- 】 Mckeown, R. E. (2009). The Epidemiologic Transition: Changing Patterns of Mortality and Population Dynamics. *American Journal of Lifestyle Medicine*, 3(1), 19S–26S. doi: 10.1177/1559827609335350
- 】 National Health Portal, Government of India. (2019). *Non communicable diseases* (Published on Nov 5, 2019). Retrieved from: [www.nhp.gov.in/healthyliving/ncd/2019](http://www.nhp.gov.in/healthyliving/ncd/2019)
- 】 Nethan, S., Sinha, D., & Mehrotra, R. (2017). Non Communicable Disease Risk Factors and their Trends in India. *Asian Pacific journal of cancer prevention*, 18(7), 2005–2010. doi: 10.22034/APJCP.2017.18.7.2005
- 】 Omran, A.R. (2005). The epidemiologic transition: A theory of the epidemiology of population change. 1971. *The Milbank Quarterly*, 83(4), 731-757. doi: 10.1111/j.1468-0009.2005.00398.x
- 】 Poti, J. M., Braga, B., & Qin, B. (2017). Ultra-processed Food Intake and Obesity: What Really Matters for Health-Processing or Nutrient Content? *Current obesity reports*, 6(4), 420–431. doi: 10.1007/s13679-017-0285-4
- 】 Romieu, I., Dossus, L., Barquera, S., Blotière, H. M., Franks, P. W., Gunter, M., Hwalla, N., Hursting, S. D., Leitzmann, M., Margetts, B., Nishida, C., Potischman, N., Seidell, J., Stepien, M., Wang, Y., Westerterp, K., Winichagoon, P., Wiseman, M., Willett, W. C., & IARC working group on Energy Balance and Obesity (2017). Energy balance and obesity: what are the main drivers? *Cancer causes & control: CCC*, 28(3), 247–258. doi: 10.1007/s10552-017-0869-z.
- 】 Sarr, O., Yang, K., & Regnault, T. R. H. (2012). In Utero Programming of Later

Adiposity: The Role of Fetal Growth Restriction. *Journal of Pregnancy*, 2012. doi:10.1155/2012/134758

- 】 Satija, A., Hu, F. B., Bowen, L., Bharathi, A. V., Vaz, M., Prabhakaran, D., Reddy, K. S., Ben-Shlomo, Y., Davey Smith, G., Kinra, S., & Ebrahim, S. (2015). Dietary patterns in India and their association with obesity and central obesity. *Public health nutrition*, 18(16), 3031–3041. doi: 10.1017/S1368980015000312.
- 】 Srilakshmi, B. (2014). *Dietetics* (7<sup>th</sup> ed.). New Delhi: New Age International (P) Limited.
- 】 Straker, L., Coenen, P., Dunstan, D., Gilson, N., & Healy, G. (2016), *Sedentary Work –Evidence on an Emergent Work Health and Safety Issue –Final Report, Canberra: Safe Work Australia*. Retrieved from <https://www.safeworkaustralia.gov.au/system/files/documents/1702/literature-review-of-the-hazards-of-sedentary-work.pdf>
- 】 Tabish, S. A. (2017). Lifestyle Diseases: Consequences, Characteristics, Causes and Control. *Journal of Cardiology & Current Research*, 9(3), 00326. doi: 10.15406/jccr.2017.09.00326
- 】 Thaker, V. V. (2017). Genetic and Epigenetic Causes of Obesity. *Adolescent medicine: state of the art reviews*, 28(2), 379–405.
- 】 Tripathy, J., Thakur, J., Jeet, G., Chawla, S., Jain, S., & Prasad, R. (2016). Urban rural differences in diet, physical activity and obesity in India: are we witnessing the great Indian equalisation? Results from a cross-sectional STEPS survey. *BMC Public Health*. 16. 816. doi:10.1186/s12889-016-3489-8.
- 】 World Health Organization.(2018). *Non communicable diseases and their risk factors*. Retrieved from <https://www.who.int/ncds/prevention/physical-activity/inactivity-global-health-problem/en/>
- 】 World Health Organization. (2018). *Non communicable diseases*. [Fact sheets] Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- 】 World Health Organization. (2018). *Physical Activity*. [Fact sheet] Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/physical-activity>
- 】 Yadav, S. & Arokiasamy, P. (2014). Understanding epidemiological transition in India. *Global Health Action*, 7(1). doi: 10.3402/gha.v7.23248

# Effect of Green Tea on Health: A Review

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## ABSTRACT

**M**odern lifestyle makes people susceptible to various metabolic disorders which increase morbidity. With the recent advancement in nutritional science, scientists have led to the recognition of functional foods and nutraceuticals that work as both food and medicine and protect mankind against lifestyle diseases. Green tea is one such food/drink rich in nutraceuticals and has the potential in the treatment of various illnesses. Tea is one of the major globally accepted drinks in the world, only after water for enjoyment and wellbeing and green tea is more beneficial than black tea compared to the health benefits. The advantageous effect of green tea is mainly because of the presence of some bioactive compounds mainly (-) - epigallocatechin gallate (EGCG) which possesses high antioxidant activity. Green tea contains some other phenolic compounds mainly flavonoids, polysaccharides, B-vitamins, and some minerals. The prospective health benefits of green tea comprise of cancer prevention, weight reduction, cardiovascular health promotion, antioxidant activity, skin protection, fighting against infection and impaired immune function, diarrhoea, and fatigue. Green tea has demonstrated anti-obesity property. Liver, intestine, adipose tissue and skeletal muscles are the main target organs of green tea by which it controls its anti-obesity effect. Although green tea is mainly consumed for its beneficial health effects but there are several adverse health effects of green tea consumption. Thus, this paper attempts to summarize all the available literature on the beneficial and adverse effects of green tea.

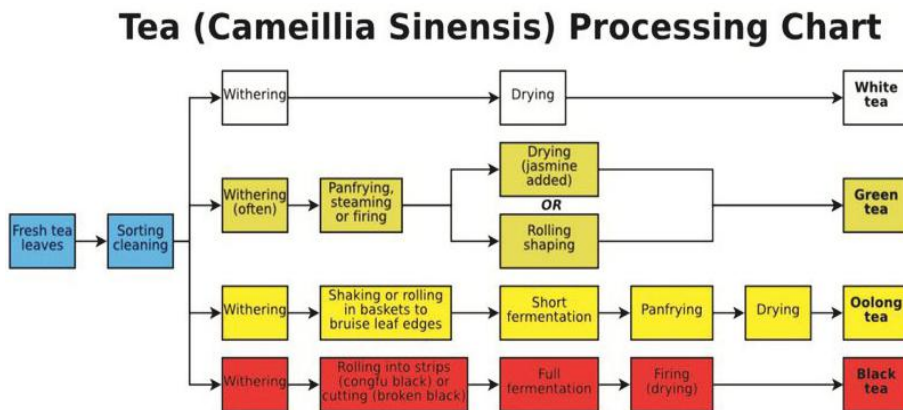
**Keywords:** *Functional Foods, Nutraceuticals, Lifestyle Disease, Flavonoids, Anti-Obesity.*

## I. INTRODUCTION

Tea is the most consumed beverage in the world only after water. Tea is obtained from the leaves of the plant *Camellia sinensis* L. which is an evergreen, angiosperm, dicot shrub native to Southeast Asia mainly China, Japan, Myanmar, Cambodia and India (Gomikawa et al., 2008; Gupta et al., 2014). It is believed that tea was introduced to the world by Shen Nung, the Chinese Emperor in 2737 years B.C. Commercial cultivation of tea was started in India after the arrival of British East India Company. Now India is the second-largest manufacturer of tea only after China (Verma et al., 2018).

Four basic types of tea are prepared from the same plant *Camellia sinensis* that are white tea, green tea, black tea, and oolong tea. Every year about 3 billion kg of tea is produced and consumed around the world. The main consumers of green tea are China, India and Japan. Western countries mainly consumed black tea which comprises 78% of total tea production. Asian countries consumed 20% tea as green tea variety and 2% is oolong tea is produced by partial fermentation of tea leaves in South China (Hicks, 2001; Milind et al., 2011). Steaming procedure is applied to the young, freshly harvested tea leaves to prevent fermentation for the production of green tea. Tea catechins are oxidized by the enzyme Polyphenolic oxidase to oligomeric and polymeric derivatives and the enzyme is deactivated by steaming. Though, young leaves processed for fully enzymatic oxidation (full-fermentation), in which catechins are converted into theaflavins and the thearubigins is known to be a feature of the black tea, while limited enzymatic oxidation (semi-fermentation) is known to produce Oolong tea (Cabrera et al., 2006).

**Fig 1: Processing of different types of tea (Retrieved from [https://commons.wikimedia.org/wiki/File:Tea\\_processing\\_chart.svg](https://commons.wikimedia.org/wiki/File:Tea_processing_chart.svg))**



**Table 1: Taxonomic Classification of Plant**

Kingdom	Plantae- Plant
Subkingdom	Tracheobionta- Vascular Plant
Superdivision	Spermatophyta- Seed Plant
Division	Magnoliopsida- Flowering Plant
Class	Magnoliopsida- Dicotyledons
Subclass	Dilleniidea
Order	Theales
Family	Theaceae
Genus	Camellia L. Camellia
Species	Camellia sinensis (L.) Kunt- tea

Source: Kaur, 2019

### Composition of Green Tea

Green tea is a popular beverage prepared from the leaves of *Camellia sinensis* var. *sinensis* and *Camellia sinensis* var. *assamica* plant (family- Theaceae). Historical documents indicated that green tea has medicinal values and drinking of green tea can prevent diseases and associated with longevity. At present, several studies have confirmed the physiological properties of green tea in the promotion of health and prevention and the healing of chronic diseases. Catechin and epigallocatechin gallate (EGCG) present in green tea possess hypolipidemic, hypoglycaemic, anticancer and antioxidant activities and protect against cardiovascular diseases. The anti-obesity effect of green tea can be credited to the presence of caffeine, EGCG and catechins which are linked with the expenditure of energy, oxidation of fat and weight reduction in obese individuals (Nayor, 2007).

### Chemical Composition

There are several factors that influence the chemical composition of green tea and the factors include the generic strain of the tea, condition of the climate, plucking season, properties of soil, processing and storage of tea leaves.

The health-promoting characteristics of the tea leaves are due to the presence of active constituents that comprise polyphenols (Butt et al., 2009). Tea flavanols are a collection of natural polyphenols [epicatechins] present in green and black tea. There are four flavanol derivatives found in tea: Epicatechin [EC], epigallocatechin [EGC], epicatechin gallate [ECG], and epigallocatechin gallate [EGCG] (Cooper et al., 2005). According to Verma et al. (2008), other chemical constituents present in green tea are:



**Catechins or Flavan-3-ols:** 30% of the total dry weight of tea leaves comprises of catechin or Flavan-3-ols. Catechin is largely present in non-fermented tea leaves such as green tea. Studies showed that the metabolisms of the cells are greatly influenced by catechin.

**Tannins:** The astringent taste of tea is due to the presence of tannin, a polyphenolic compound. Puckering and dryness of mouth after drinking of tea are caused by this astringent property of tannins. Ripening and aging of the plant are greatly influenced by tannins.

**Theaflavin:** Enzymatic oxidation of tea leaves produce an antioxidant polyphenols called theaflavins. During black and oolong tea production, most theaflavins (dimers) and/or thearubigins (polymers) is produced from the conversion of catechins as a result of oxidation. Theaflavins gives the astringent taste to the tea. The dark or reddish-brown coloured tea liquor is also due to the presence of theaflavins.

**Thearubigins :**Enzymatic oxidation of tea leaves results in the production of thearubigins which are the most abundantly found polyphenols in tea. Thearubigins are water-soluble and account for 30-60% of compounds in an oxidized tea. The actual colour of thearubigins is red but it gives the tea a colour ranging from amber to dark brown depending on their concentration in the tea.

**Vitamins:** Vitamins confer health benefits to the body and regular consumption of green tea is beneficial to the body as it is full of vitamins. The vitamin content is higher in green tea compared to other foods which makes it a superior beverage. Commercially available black tea and oolong tea contain less amount of vitamin C compared to green tea (100 gm dried leaves contain about 280 mg of Vitamin C) because they undergo fermentation during processing (Nishant et al., 2012).

**Saponin :**Frothing of teas occurs due to the presence of saponins. Around 0.1% saponins are present in tea leaves which are responsible for astringency and strong bitterness of the tea. Saponins have several beneficial properties such as anti-inflammatory, anti-allergic and antifungal properties and have been shown to reduce blood pressure, obesity and influenza. (According to studies by the ITO EN Central Research Center).

**$\gamma$ -aminobutyric acid (GABA):** When raw tea leaves are left in the absence of the oxygen, it produces GABA. GABA is known to reduce blood pressure.

**Minerals:** Minerals are important for regulating various bodily functions.



About 5-7 % of minerals are present in tea leaves that include calcium, magnesium, potassium, phosphorus and small quantities of zinc, copper and manganese.

**Caffeine:** Green tea contains around 11 mg of caffeine per 100 mg of tea leaves but the content also varies with the brewing of tea. Caffeine is a potent stimulant.

**Carbohydrates :**About 40% of carbohydrate and cellulosic fibre is present in green tea which comprises 1/3 of the leaves.

**Lipid:** Green tea contains 4% oil by weight and the oil is non-drying. The solidifying temperature of the oil is -5 to 15°C.

**Table 2: Chemical Composition of Green tea**

Constituent	% weight of extract solids
Catechins	30-42
Flavonols	5-10
Other flavonoids	2-4
Other depsides	1
Theogallin	2-3
Ascorbic Acid	1-2
Gallic Acid	0.5
Quinic Acid	2
Other organic acids	4-5
Other amino acids	4-6
Theanine	4-6
Methylxanthines	7-9
Carbohydrates	10-15
Minerals	6-8
Volatiles	0.02

*Source: Graham, 1992*

### **Beneficial Properties of Green tea**

Green tea has several health benefits which are discussed below:

**Effects on antioxidant markers and oxidative stress:** Green tea is considered as a nutraceutical as it functions as an antioxidant. The antioxidant property of green tea is primarily due to the presence of the polyphenols catechin, especially EGCG. Antioxidants can be defined as compounds that protect the cells against the harmful action of reactive oxygen species, such as

singlet oxygen, superoxide, peroxy radicals, hydroxyl radicals, and peroxynitrite. Cellular damage occurs due to oxidative stress resulting from an imbalance between reactive oxygen species and antioxidants (Halliwell et al., 1985). The body's total antioxidant defence system is maintained with the collaboration of antioxidant vitamins (i.e., vitamin C and E), enzymes (i.e., superoxide dismutase and catalase) and catechins which help the body to protect against various diseases (Meki et al., 2009). Plasma antioxidant activity increases with increased consumption of catechins (Yokozawa et al., 2002; Skrzydlewska et al., 2002). Cellular enzymes known as antioxidant enzymes such as serum superoxide dismutase and catalase in the aorta increases their activity in the presence of catechins in green tea extract and protects the body against reactive oxygen species (Skrzydlewska et al., 2002; Negishi et al., 2004). Another oxygen stress marker enzyme Malonaldehyde is also reduced after the intake of green tea (Yokozawa et al., 2002; Yokozawa et al., 1999). In vivo studies suggested that catechins acted as antioxidants directly or indirectly by increasing the activity or expression. Another study reported that the concentration of Vitamin E was increased by catechin which in turn prevented the peroxidation of low-density lipoproteins (Tijburg et al., 1997).

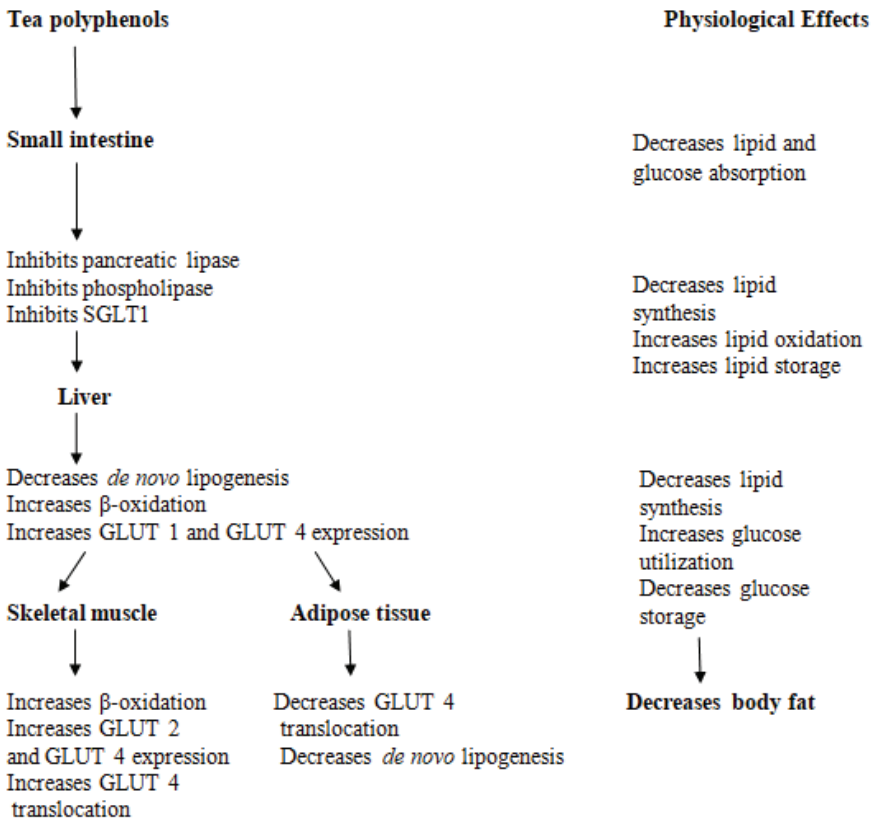
**Anticancer activity:** Cancer is a global problem and the rate of mortality is very high in cancer. The main reason for cancer is associated with the quick growth and invasive behaviour of cancer cells and metastasis. Currently, the use of natural products preventing cancer is very popular. In this regard, polyphenols present in foods or beverages have gained much attention, Green tea is loaded in polyphenols particularly EGCG which is believed to have some cancer-preventing properties. The EGCG prevents the action of the enzymes required for the hypertrophy of cancer cells and destroys the cancer cells without affecting the healthy cells of the body (Pastoriza et al., 2017). Studies also indicated that EGCG and tea catechins suppressed the growth of tumour and prevented the release of factor alpha, tumour necrosis factor. It is believed that factor alpha stimulates tumour promotion and progression of initiated cells as well as pre-malignant cells (Fujiki et al., 2003). Catechins also possess anti-mutagenic activities and prevent the development of mutagens i.e. nitrosamines or the appearance of mutagenicity i.e. polycyclic aromatic hydrocarbons. Furthermore, the beneficial effect of EGCG includes a reduction in cellular propagation, anti-inflammatory and antioxidant activities. EGCG is shown to be a protective agent against the development of cancer in different organs such as the duodenum, colon, stomach, pancreas, lung, skin, breast and prostate (Pastoriza et al., 2017).

**Hypoglycemic Effect:** Apart from reducing the cardiovascular risk and obesity, green tea is also beneficial in Type 2 Diabetes Mellitus. A comprehensive review showed that drinking green tea can cause a reduction in fasting blood glucose levels and glycosylated haemoglobin level. Another cohort study in Japan indicated that people who drank six cups or more of green tea everyday had a lower risk of developing diabetes compared to people consuming less than one cup per week (Verma et al., 2018). EGCG, the major polyphenol present in green tea helps to regulate blood glucose level as well as renew the damaged pancreatic cells that secretes insulin. Researchers observed that 1.5 gm green tea extract consumption 20 minutes prior to the oral ingestion of glucose markedly decreased the glucose level in blood. This is believed that catechins of green tea can hinder the activity of the enzymes  $\alpha$ -amylase and  $\alpha$ -glucosidase which can regulate the postprandial blood glucose level (Yilmazer-Musa et al., 2012).

**Effect on glaucoma:** Catechins, the major polyphenols in green tea can help to protect against glaucoma and other eye diseases. A USA based study on rat model found that green tea catechins were absorbed by lens and retina and there was 20% development of eyesight on green tea consumption (Verma et al., 2018).

**Effect on obesity:** Epidemiological studies support the prospect of green tea being a new approach for treatment and prevention of obesity and hyperglycaemia. Regular drinking of green tea helps to reduce weight in obese individuals. Anti-obesity property of green tea has been attributed to the presence of caffeine and catechins particularly (-)-epigallocatechin-3-gallate (EGCG). Several epidemiological studies on humans confirm the usefulness of green tea or green tea catechins especially EGCG in weight reduction and management. Regular intake of green tea increases postprandial thermogenesis, fat oxidation which has a significant effect on body weight, Body Mass Index (BMI) and body fat. It also causes a reduction in cholesterol level (Verma et al., 2018).

**Figure 2: Mechanism of Tea Polyphenols in reducing body fat (Verma et al., 2018)**



**Effect on cardiovascular diseases and blood pressure:** Green tea has the ability to protect the body from cardiovascular disease and high blood pressure. The major predisposing factors for heart disease and hypertension include diet containing high saturated fat, lack of physical exercise and smoking. Green tea is cardio-protective (Thelle, 1995; Cadenas, 1996). The risk of atherosclerosis is also reduced by regular green tea intake. Drinking of grounded green tea reduces the oxidation of plasma LDL, controls cholesterol metabolism and the possibility of atherosclerosis. Green tea significantly lowers LDL cholesterol, triglycerides, fibrinogen and lipid peroxides in blood, improves the ratio of LDL to HDL cholesterol. Antioxidant properties of green tea prevent the oxidation of LDL cholesterol in the arteries which is the major contributing

factor of atherosclerosis (Arab et al., 2009).

Thromboxane reduces the elasticity of arterial walls as a result blood pressure rises. Another factor increasing the blood pressure is the enzyme Angiotensin converting enzyme secreted from the kidneys. Green tea acts as natural inhibitor and prevents the action of thromboxane and ACE therefore reducing hypertension. Therefore regular consumption of green tea decreases the chance of having high blood pressure (Balasuriya et al., 2011).

**Cholesterol reduction:** Various populations based and clinical control studies suggested that green tea could prevent atherosclerosis and coronary artery disease because of its antioxidant property. Another research conducted by Japanese scientists indicated that the ability of green to reduce LDL levels decreased the incidence of coronary artery disease. Regular intake of green tea gives protection against heart disease; research showed that the risk was 36% higher in non-tea drinkers (Hirano-Ohmori et al., 2005).

**Effect on stress:** L-theanine, an amino acid present in green tea, has tranquilizing effects on the brain. A scientific study revealed that L-theanine was associated with relaxation feeling and generation of alpha wave that both relaxes and alerts mental state. This alpha wave reduces cortisol levels so that there is a decrease in physical stress. L-theanine functions as a natural relaxing agent and removes stress, worry and anxiety (Cooper, 2012). On the other hand, EGCG is believed to have a sedative and hypnotic effect on the brain by acting partially on the GABA receptors limiting the reaction of acute stress. A combination of EGCG and L-theanine has a seductive effect. However, drinking green tea does not induce sleep because of its caffeine content which stimulates CNS and promoting wakefulness (Pastoriza et al., 2017).

**Antiviral effect:** EGCG and ECG present in green tea are potent inhibitor of replication of influenza virus in cell culture and equally effective against all influenza subtypes tested, including A/H1N1, A/H3N2 and B virus (Song et al., 2005) and Herpes simplex virus (Pastoriza et al., 2017). By inhibiting the action of reverse transcriptase, EGCG has also been shown to hinder HIV-1. Therefore green tea can be considered as a potential antiviral agent (Song et al., 2005).

**Antibacterial effect:** The usefulness of green tea in any type of diarrhoea has been recognized in Asia since the earliest times. Green tea leaf extract has potent antibacterial activity (Nishant et al., 2012). The green tea polyphenols hinder the growth and multiplication of various bacterial species including *Bacillus* sp, *Salmonella* sp, *Staphylococcus aureus*, *Helicobacter pylori*, *Candida*

*albicans*, *Clostridium perfringens*, *Pseudomonas aeruginosa* (Verma et al., 2018), *Escherichia coli*, *Salmonella typhi*, etc. Green tea polyphenols inhibit the increase of pathogenic bacteria in the gut, but does not affect the friendly intestinal bacteria. Green tea acts as prebiotic as it inhibits the growth of pathogenic bacteria and regulating gut-friendly bacteria (known as probiotics) in the intestine (Archana et al., 2011).

**Effect on oral health:** Japanese and Indian traditional medicine mentioned mouth cleaning and dental disease preventing properties of green tea respectively (Sakanaka et al., 1989; Patel et al., 1988). Due to the fluoride content and bacteriocidal properties of polyphenols present in green tea, it has a defensive action against dental caries. Catechins, the major polyphenols of green tea prevent the formation of tartar which is the main cause of developing halitosis and gingivitis. Catechin also helps to remove carcinogenic bacteria such as *Streptococcus salivaris*, *S. mutans*, *Escherichia*, etc. In addition to that, catechins hinder the action of alpha-amylase present in saliva, therefore, reducing the carcinogenic activity of hydrocarbon foods and prevent caries formation. Various studies revealed that regular drinking of green tea considerably reduced the risk of dental caries and oral cancer. Based on the beneficial activity of green tea, it is widely used in products like toothpaste and mouthwash related to oral hygiene (Pastoriza et al., 2017)

**Protection against skin infection:** Several studies indicated that green tea extract was effective against various fungal and bacterial skin infections such as acne vulgaris and other breakouts in the skin (Verma et al., 2018). It has been established that green tea polyphenols protect the skin from solar damage and prevent the skin from premature aging and skin cancer (Katiyar, 2003).

**Effect on sore throat:** Green tea is a natural remedy for relieving sore throat and colds. This property of green tea can be attributed to its antibacterial properties which prevent harbouring of bacteria in the throat. Gurgling with green tea in CABG patients is effective against sore throat 12 and 24 hours after the removal of endotracheal tubes (Pillai et al., 1999).

**Urinary tract infections:** The most common reason for urinary tract infection is the bacteria *Escherichia coli*. But the evolution of antibiotic resistance in *E.coli* is the most important problem. Tea is a natural non-toxic product and polyphenols present in tea have an antibacterial effect against several pathogenic bacteria particularly *E.coli*. There is a synergistic action of catechins with antibiotics such as sulfamethoxazole, chloramphenicol, gentamycin, amoxicillin, azithromycin, methicillin, levofloxacin, and, especially ciprofloxacin. Therefore, green tea can be an effective agent in treating urinary

tract infections [UTI] (Reygaert, 2014).

**Stomach and Intestinal infections:** There is a growing indication that the pathogenesis of intestinal diseases depends on the gut health and balance of the gut microflora. *Helicobacter pylori* infection is one of the most frequent chronic bacterial infections seen in men and one of the risk factors for gastric carcinoma (Stoicov et al., 2009). Studies conducted by Ankolekar et al. (2011) suggested that all types of tea i. e. green, black, white and oolong were effective against *H. pylori* and regular tea consumption could improve the gut microbiome and colonic environment. Therefore tea could be used as a low- cost remedy for treating the bacterial infection in the gut. Several other in-vitro studies showed that catechins, particularly EGCG had a role in hindering the growth of *H. pylori*. It can be concluded that phenolic compounds in tea can improve the environment of gut microbiota and prevent the growth of *H. pylori* which has a long term effect on health (Ruxton, 2013).

**Effect on liver:** The liver is the main place of metabolism in the body. It is the place of synthesis and breakdown of major organic molecules such as carbohydrates, proteins, fats, etc. At present, the incidence of liver diseases i.e. hepatic cancer, cirrhosis of liver and fatty liver are increasing rapidly. Hepatocellular carcinoma (HCC) is the third major reason for deaths related to cancer and the sixth most common cancer around the world (Li et al., 2011). There are many studies revealed that drinking green tea could reduce the risk of liver diseases (HCC, fatty liver disease, hepatitis, liver cirrhosis and chronic disease) and had a protective effect on the liver (Yin et al., 2015).

**Effect on bone density:** Hegarty et al. (2000) showed from one UK based study that consumption of green tea could significantly increase bone mineral density and reduced the risk of osteoporosis.

**Arthritis:** Animal experiments indicated the anti-inflammatory property of green tea polyphenols. The positive outcome of green tea on collagen induced arthritis in mice was supported by one laboratory experiment. Mice induced with polyphenols had a 33% risk of arthritis compared to the mice who were not given polyphenols have a 50% risk of developing arthritis. Mice fed with green tea polyphenols had shown a reduction in inflammatory mediators such as Cyclooxygenase 2, (TNF)- $\alpha$  (tumour necrosis factor), (IFN)- $\gamma$  (interferon) in the arthritic joints. Another additional advantage was that total IgG and type II collagen-specific IgG levels were found to be lesser in the serum and arthritic joints of the mice treated with polyphenols (Haqqi et al., 1999).

**Prevention of Alzheimer's and Parkinson's disease:** Studies revealed

that green tea could improve brain functions and prevent age-related brain deterioration associated with Alzheimer's and Parkinson's disease (Verma et al., 2018). Green tea has a synergistic effect with the anti-Parkinson drug "rasagiline". A combination therapy with green tea and rasagiline restore the action and replenish the level of the affected neurotransmitter called dopamine. Another study at the University of Newcastle, UK showed the neuroprotective properties of green tea. They bind with two toxic compounds namely, hydrogen peroxide and a protein called beta-amyloid, known to be responsible for Alzheimer's disease (Reznichenko et al., 2010).

**Harmful Effects of Green tea:** Though green tea has numerous health benefits, excessive consumption of green tea has potential side effects. These are:

About 30-60 mg of caffeine is present per 6-8 oz cup of green tea. This amount of caffeine is normal compared to a cup of coffee which contains around 100 mg of caffeine. But persons drink 5 cups or more of green tea for its positive effect in weight reduction ultimately increases the caffeine consumption to an unsafe level. Excessive caffeine may cause problems like restlessness, insomnia, tremors and stomach upset.

Tannin is an integral part of green tea. Tannins bind with non-heme iron present in foodstuffs especially plant-based and fortified foods and render the iron unavailable for the body. There is about a 30-60% reduction in iron absorption from food. This resistance in iron absorption may cause iron deficiency anaemia with symptoms of weakness, irritability, headache, shortness of breath and irregular heartbeats.

American Association for the Cancer Research Study identified the anti-folate activity of EGCG which interferes with the utilization of folate in the cells. The main function of folate is to help the synthesis of DNA and prevent negative changes in DNA which leads to cancers. Folate deficiency also causes megaloblastic anaemia. Therefore, drinking of a large amount of green tea should be avoided.

Green tea is considered as a natural diuretic. So, drinking more than 5 cups of green tea per day can cause too much urination which ultimately leads to dehydration and electrolyte imbalance. Symptoms of dehydration include lethargy, headache, altered heart rate and distress (Kaur, 2019).

Generally, fluoride content and EGCG content is inversely proportional in green tea. Decaffeinated tea has a higher fluoride content compared to the caffeinated tea. Studies revealed that high fluoride content could decrease



the anticancer properties of green tea. Fluoride is associated with the risk of developing cancer and cause damage to the nerves and kidneys, especially in presence of aluminium and cause osteoporosis, arthritis and other bone diseases (Sinija et al., 2008).

## II. CONCLUSION

Green tea acts as nutraceutical and helps to prevent various metabolic diseases. It also acts as a prebiotic that stimulates the functions of probiotic microbes. The major active component of green tea is its polyphenols. Mainly the polyphenols are responsible for the medicinal properties of green tea and its various health benefits. In-vivo studies support the disease preventing properties of green tea. It is useful in the prevention of cancer, diabetes, arthritis etc. More research work is needed to find out the effect of green tea on other metabolic illnesses. Apart from these, work should be done to retain the advantageous properties of the tea polyphenols as they are easily degraded during the processing and environmental situations. Since tea is a natural drink and a popular beverage in society, more research on its beneficial activity will encourage people to drink tea instead of unhealthy drinks.

## References

- 1 Arab, L., Liu, W., & Elashoff, D. (2009). Green and black tea consumption and risk of stroke: a meta-analysis. *Stroke*, *40*(5), 1786-1792.
- 2 Archana, S., & Abraham, J. (2011). Comparative analysis of antimicrobial activity of leaf extracts from fresh green tea, commercial green tea and black tea on pathogens. *Journal of Applied Pharmaceutical Science*, *1*(8), 149.
- 3 Balasuriya, B. N., & Rupasinghe, H. V. (2011). Plant flavonoids as angiotensin converting enzyme inhibitors in regulation of hypertension. *Functional Foods in Health and Disease*, *1*(5), 172-188.
- 4 Butt, M. S., & Sultan, M. T. (2009). Green tea: nature's defence against malignancies. *Critical reviews in food science and nutrition*, *49*(5), 463-473.
- 5 Cabrera, C., Artacho, R., & Giménez, R. (2006). Beneficial effects of green tea—A review. *Journal of the American College of Nutrition*, *25*(2), 79-99.
- 6 Cadenas, E. (1996). Preface. *Handbook of Antioxidants*, Cadenas, E. and Packer, L.(eds), M.
- 7 Cooper, R. (2012). Green tea and theanine: health benefits. *International journal of food sciences and nutrition*, *63*(sup1), 90-97.
- 8 Cooper, R., Morré, D. J., & Morré, D. M. (2005). Medicinal benefits of green tea: part II. Review of anticancer properties. *Journal of Alternative & Complementary Medicine*, *11*(4), 639-652.
- 9 Fujiki, H., Suganuma, M., Kuru, M., Okabe, S., Imayoshi, Y., Taniguchi, S., &

- Yoshida, T. (2003). New TNF- $\alpha$  releasing inhibitors as cancer preventive agents from traditional herbal medicine and combination cancer prevention study with EGCG and sulindac or tamoxifen. *Mutation Research/Fundamental and Molecular Mechanisms of Mutagenesis*, 523, 119-125.
- 】 Gomikawa, S., Ishikawa, Y., Hayase, W., Haratake, Y., Hirano, N., Matuura, H., & Yamamoto, M. (2008). Effect of ground green tea drinking for 2 weeks on the susceptibility of plasma and LDL to the oxidation ex vivo in healthy volunteers. *Kobe Journal of Medical Sciences*, 54(1), 62-72.
  - 】 Graham, H. N. (1992). Green tea composition, consumption, and polyphenol chemistry. *Preventive medicine*, 21(3), 334-350.
  - 】 Gupta, D. A., Bhaskar, D. J., Gupta, R. K., Karim, B., Jain, A., Dalai, D.R. (2014). Green tea: A review on its natural anti-oxidant therapy and cariostatic benefits. *Biological Sciences and Pharmaceutical Research*, 2, 8-12.
  - 】 Halliwell, B., & Gutteridge, J. M. (1985). *Free radicals in biology and medicine*. 331-332
  - 】 Haqqi, T. M., Anthony, D. D., Gupta, S., Ahmad, N., Lee, M. S., Kumar, G. K., & Mukhtar, H. (1999). Prevention of collagen-induced arthritis in mice by a polyphenolic fraction from green tea. *Proceedings of the National Academy of Sciences*, 96(8), 4524-4529.
  - 】 Hegarty, V. M., May, H. M., & Khaw, K. T. (2000). Tea drinking and bone mineral density in older women. *The American journal of clinical nutrition*, 71(4), 1003-1007.
  - 】 Hicks, A. (2001). Review of global tea production and the impact on industry of the Asian economic situation. *AU Journal of Technology*, 5(2).
  - 】 Hirano-Ohmori, R., Takahashi, R., Momiyama, Y., Taniguchi, H., Yonemura, A., Tamai, S. ... & Ohsuzu, F. (2005). Green tea consumption and serum malondialdehyde- modified LDL concentrations in healthy subjects. *Journal of the American College of Nutrition*, 24(5), 342-346.
  - 】 Katiyar, S. K. (2003). Skin photoprotection by green tea: antioxidant and immunomodulatory effects. *Current Drug Targets-Immune, Endocrine & Metabolic Disorders*, 3(3), 234-242.
  - 】 Kaur, J. (2019). Beneficial role of green tea to health: A review. *Journal of Pharmacognosy and Phytochemistry*, 8(2), 1413-1415.
  - 】 Li, Y., Chang, S. C., Goldstein, B. Y., Scheider, W. L., Cai, L., You, N. C. Y., ... & Jiang, Q. (2011). Green tea consumption, inflammation and the risk of primary hepatocellular carcinoma in a Chinese population. *Cancer epidemiology*, 35(4), 362-368.
  - 】 Meki, A. R. M., Hamed, E. A., & Ezam, K. A. (2009). Effect of green tea extract and vitamin C on oxidant or antioxidant status of rheumatoid arthritis rat model. *Indian Journal of Clinical Biochemistry*, 24(3), 280-287.

- 】 Milind, P., Nitin, B., & Seema, B. (2011). Is life-span under our control?? *Int. Res. J. Pharmacy*, 37(1), 40-48.
- 】 Naylor, D. (2007). Natural support for healthy weight control. *LE Magazine*, 1-8.
- 】 Negishi, H., Xu, J. W., Ikeda, K., Njelekela, M., Nara, Y., & Yamori, Y. (2004). Black and green tea polyphenols attenuate blood pressure increases in stroke-prone spontaneously hypertensive rats. *The Journal of nutrition*, 134(1), 38-42.
- 】 Nishant, R., Navin, K., & Pankaj, G. (2012). Green tea: A Magical Herb with Miraculous Outcome. *Internasional Research Journal of Pharmacy*, 3(5).
- 】 Pastoriza, S., Mesías, M., Cabrera, C., & Rufian-Henares, J. A. (2017). Healthy properties of green and white teas: an update. *Food & function*, 8(8), 2650-2662.
- 】 Patel, V. K., & Venkatakrishna-Bhatt, H. (1988). Folklore therapeutic indigenous plants in periodontal disorders in India (review, experimental and clinical approach). *International journal of clinical pharmacology, therapy, and toxicology*, 26(4), 176-184.
- 】 Pillai, S. P., Mitscher, L. A., Menon, S. R., Pillai, C. A., & Shankel, D. M. (1999). Antimutagenic/antioxidant activity of green tea components and related compounds. *Journal of environmental pathology, toxicology and oncology: official organ of the International Society for Environmental Toxicology and Cancer*, 18(3), 147-158.
- 】 Reygaert, W. C. (2014). The antimicrobial possibilities of green tea. *Frontiers in microbiology*, 5, 434.
- 】 Reznichenko, L., Kalfon, L., Amit, T., Youdim, M. B., & Mandel, S. A. (2010). Low dosage of rasagiline and epigallocatechin gallate synergistically restored the nigrostriatal axis in MPTP-induced parkinsonism. *Neurodegenerative Diseases*, 7(4), 219-231.
- 】 Ruxton, C. (2013). Emerging evidence for tea benefits. *Nutrition Bulletin*, 38(3), 287-301.
- 】 Sakanaka, S., Kim, M., Taniguchi, M., & Yamamoto, T. (1989). Antibacterial substances in Japanese green tea extract against *Streptococcus mutans*, a cariogenic bacterium. *Agricultural and biological chemistry*, 53(9), 2307-2311.
- 】 Sinija, V. R., & Mishra, H. N. (2008). Green tea: Health benefits. *Journal of Nutritional & Environmental Medicine*, 17(4), 232-242.
- 】 Skrzydlewska, E., Ostrowska, J., Farbiszewski, R., & Michalak, K. (2002). Protective effect of green tea against lipid peroxidation in the rat liver, blood serum and the brain. *Phytomedicine*, 9(3), 232.
- 】 Song, J. M., Lee, K. H., & Seong, B. L. (2005). Antiviral effect of catechins in green tea on influenza virus. *Antiviral research*, 68(2), 66-74
- 】 Stoicov, C., Saffari, R., & Houghton, J. (2009). Green tea inhibits *Helicobacter* growth in vivo and in vitro. *International journal of antimicrobial agents*, 33(5), 473-478.

- 】 Thelle, D. S. (1995). Coffee, tea and coronary heart disease. *Current opinion in lipidology*, 6(1), 25-27.
- 】 Tijburg, L. B., Wiseman, S. A., Meijer, G. W., & Weststrate, J. A. (1997). Effects of green tea, black tea and dietary lipophilic antioxidants on LDL oxidizability and atherosclerosis in hypercholesterolaemic rabbits. *Atherosclerosis*, 135(1), 37-47.
- 】 Verma, P., Archita, M., Deepali, S., Hemant, G., & Pradesh, M. (2018). A Review On: Green Tea: A Miraculous Drink. *Int. J. Pharm. Sci. Rev. Res*, 51, 26-34.
- 】 Yilmazer-Musa, M., Griffith, A. M., Michels, A. J., Schneider, E., & Frei, B. (2012). Grape seed and tea extracts and catechin 3-gallates are potent inhibitors of  $\alpha$ -amylase and  $\alpha$ -glucosidase activity. *Journal of agricultural and food chemistry*, 60(36), 8924-8929.
- 】 Yin, X., Yang, J., Li, T., Song, L., Han, T., Yang, M., & Zhong, X. (2015). The effect of green tea intake on risk of liver disease: a Meta analysis. *International journal of clinical and experimental medicine*, 8(6), 8339.
- 】 Yokozawa, T., Nakagawa, T., & Kitani, K. (2002). Antioxidative activity of green tea polyphenol in cholesterol-fed rats. *Journal of Agricultural and Food Chemistry*, 50(12), 3549-3552.
- 】 Yokozawa, T., Nakagawa, T., Lee, K. I., Cho, E. J., Terasawa, K., & Tsuchi, S. (1999). Effects of green tea tannin on cisplatin-induced nephropathy in LLC-PK1 cells and rats. *Journal of pharmacy and pharmacology*, 51(11), 1325-1331.
- 】 Retrieved from [https://commons.wikimedia.org/wiki/File:Tea\\_processing\\_chart.svg](https://commons.wikimedia.org/wiki/File:Tea_processing_chart.svg) on 13.04.2020

# Fasting and its outcome on human health: A Review

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## ABSTRACT

**B**ackground: Fasting been practiced since long time in different parts of world as religion ritual. Due to its many health benefits, significance of its are being applied in many clinical aspects as well as preventive measures. Feasible applicability, easy adaptability are some interesting features of Fasting Practice which makes it popular among various nations irrespective of age, sex, religion, socio-economic condition.

**Previous Study:** Many kind of research study conducted regarding the importance and effect of practicing Fasting in numerous forms. Such studies reveal that multiple health benefits found in apparently healthy people and also in certain ill patient suffering from certain disorders.

**Purpose:** The main aim of the review paper is to search out the various health aspects through published papers regarding the role of fasting in promotion of health and its ability of disorders treating capacity and disease prevention capabilities.

**Conclusion:** Based on studying review journals it is been established that Fasting in various form are beneficial in multiple health benefits despite of having few limitation of applicability in certain cases. So it can be an effective way of handling certain disorders and health promotion media.

**Key Words:** *Fasting, Calorie restriction, Health promotion, Metabolism, Ageing.*

## I. INTRODUCTION

Fasting is a practice which is prevailing from ancestral time. Literal meaning of Fasting is abstaining from food generally voluntarily for a certain period. It is a very common practice across different sex, religion, race, culture, geographic areas, and socio-economic status (Trepanowski and Bloomer, 2010). Fasting is practiced for various reasons. It has many cause connection starting from ritual practice to original lack of food availability/purchase power, from self planned practice for health advantages to pre decided fasting instructions to patients for necessary medical procedures. In previous, fasting is generally associated with religion practices and for spiritual endeavor; but day by day it has gained a lot of clinical and health significance. Many researchers have conducted and there are ongoing research for continuous exploration and numerous health benefits of fasting. Through research it also has been proven that fasting is very much reliable for numerous lifestyle related disorders which are very much prevalent in present fast pace life apart from all over health benefits (Anton et al, 2018).

There are different forms of fasting, some are religious day specific, some are weekly or monthly basis. Clinically complete alternate-day fasting, time-restricted feeding, modified fasting regimens, Intermittent Fasting (IF) are various form of Calorie Restriction (CR) are being performed in human being. Along with different form of diet planning Fasting has become a new form of Diet plan which can be termed as 'Fast diet' and proven beneficial in various aspects of health if guided under health experts (Barnosky et al, 2014 ). Study shows that Caloric restriction (CR) in term of intermittent fasting lowers the risk of Cardio vascular Disease (CVD), Vascular dysfunction and mortality by various mechanism e.g. increment of adiponectin, ghrelin, autophagy, Adenosine Monophosphate-Activated Protein Kinase (AMPK) and decrease in Inflammation Cytokines Advanced glycation end products (AGE) / Receptor Advanced glycation end products (RAGE)- Reactive Oxygen Species (ROS). Many studies have proved that scientific practice of fasting influence hormonal changes, autophagy, and changes in metabolism & tissue in a positive direction. Various Studies suggested that Intermittent fasting also benefits from the damage of free oxygen radicals. Thus it has been established that fasting is very effective in leaving beneficial impact on health, ageing, and stress management, physical and cognitive aspects (Moro et al, 2016).

In Clinical aspects, different chronic diseases e.g. Diabetes Mellitus (DM), CVD, Neurodegenerative disorders, certain Cancer are better managed and prevented by implication of proper regimen of Fasting. Better brain health, improved psychiatry, improvement in Blood Pressure (B.P), heart

rate, regulation of glucose etc are more some benefits of exercising fasting (Longo and Mattson, 2014).

Apart from chronic disease aspect immunological capacities, physical and mental performances are also developed. All these effects in turn indicate and enhance the possibility of longer life span with reduced morbidity rate, though individual variables in term of gene, age, sex, diet & lifestyle do mark a difference. Contraindication is also there like certain metabolic condition e.g. in some cases of Diabetic mellitus patient, person having acidity problem are at risk for attaining Fasting (Chaix et al, 2014). Study also show that a community called 'Okinawans' (in Japanese island) consume nutrient rich but energy deficient foods available there and CRON(Calorie restriction with Optimal Nutrition) diet and they having low level of Insulin like growth factor 1, growth hormones along with less number of biomarker for inflammation, oxidative stress and diabetes mellitus (Willcox et al, 2006).

## **II. AIMS & OBJECTIVES**

The aim of the article is to enlighten the positive outcomes of various health related aspects. These aspects cover preventive, promotive and curative parameters of health in human being based on numerous clinical, animal trials, epidemiological studies etc. The specific objectives are:

- Highlighting evidence based health benefits of practicing fasting on health of human being
- Enhancing the power of practicing Fasting as health promoting aspect
- Enhancing the power of practicing Fasting as disease preventive aspect
- Enhancing the power of practicing Fasting as chronic disease treating aspect
- Focusing on formulation of alternate health up gradation practice of the practice of fasting
- Encouraging more future studies on practicing fasting in different aspects of health development

## **III. METHODOLOGY**

A systemic review was done on multiple published literatures since 2005. This review paper was prepared by studying several research studies e.g. animal studies, randomized control clinical trial, epidemiological studies on effect of various form of calorie restriction on different body mechanism e.g. autophagy, ageing, metabolism, stress response and in clinical aspect like obesity, diabetes,

CVD, neurodegenerative disorders. All different views in various studies finally summarized and assembled to prepare the review article.

#### IV. REVIEW OF LITERATURE

**Fasting and Metabolism:** Intermittent fasting has a huge role in controlling and enhancing metabolism. During fasting there is in deriving energy from glucose to ketone bodies (from Fat), peroxisome proliferator-activated receptor coactivator 1 (PGC-1), nicotinamide adenine dinucleotide (NAD<sup>+</sup>), 24 poly(adenosine diphosphate [ADP]-ribose) polymerase 1 (PARP1), sirtuins are few of various protein and molecules of which activities and expression are being regulated by ketone bodies (Browning et al, 2012). These protein and molecules have potentiality of acting as signaling molecule which directly influences the functioning of cell and organism and by such mechanism stimulating metabolism in positive direction of health (Heilbronn et al, 2005).

**Fasting and Circadian Rhythm:** A scientific study demonstrated that circadian rhythms have an impact on metabolism across the day & night basis in humans and these effects are malleable by behavioral intervention. Humans who participated in studies which are designed as Short term in type, had metabolism related consequences due to disturbed circadian rhythm. For example, inducing circadian misalignment in humans by extending the day from a 24-hour to a 28-hour. Cycle causes insulin resistance after only 3 cycles (Eckel-Mahan et al, 2013). Fasting regimens that exclude or dramatically reduce energy intake in the evening and exclude energy intake during the nighttime synchronized food ingestion with the times of optimal postprandial hormonal response. As circadian rhythm synchronizers, it is hypothesized that fasting and time-restricted feeding regimens that actively impose a diurnal rhythm of food intake aligned with the 24-hour light-dark cycle lead to improved oscillations in circadian clock gene expression, the reprogramming of molecular mechanisms of energy metabolism, and improved body weight regulation (Antoni et al, 2016).

**Fasting and Physical & Cognitive aspects:** Calorie Restriction in form of fasting in intermittent way has much control on physical and cognitive aspects. This was established by many animal study and Clinical trials. Improved co-ordination, Balance capacity, endurance were found in animals of which feeding was restricted and or had alternate day feeding regimen. Various aspects of Cognition along with numerous form of memories e.g. spatial memory, working memory, associative memory are developed well by control of fasting pattern. The domain of influence of fasting in cognition of old person with special reference to absence of pharmacological support for their brain



ageing and neurodegenerative diseases progression (Appleton and Baker, 2015; Mattson et al, 2018).

**Fasting and Ageing & Life span:** Fasting has strong direct connection with increased life span with holistic health development which was established by different studies in research filed. Though age, sex, gene, diet practice are those factors which can vary the effect of fasting on increasing life span across different individual. In general, controlled practice of fasting helps in development of healthy ageing and increased longevity (Teng et al, 2013). Both CR and IF plays important role on impacting ageing and life span specifically in a positive direction. CR enhances autophagy by stimulating sirtuin-1 activity and also maintains cellular rejuvenation. Cellular senescence is directly linked with accumulation of malfunctioning constituents and reduced autophagy which is being promoted by IF (Most et al, 2017).

**Fasting and Stress response:** Positive direct influence of fasting on stress resistance also found through numerous research studies. Cell functioning on over all body found improved on intermittent fasting. Defense found against various damages e.g. metabolic stress, oxidative stress, ionic stress, traumatic stress, and proteotoxic stress. Stress induced pathways and increment of transcription of stress induced protein such as HSP or Heat Shock Protein (which have a generic cellular response in a condition like oxidative stress) are some of mechanisms by which fasting got linked positively in stress reduction (Heilbronn et al, 2006). Another two mechanism e.g. autophagy & mitophagy are stimulated when mTOR (mammalian target of rapamycin) protein-synthesis pathway are being inhibited in course of intermittent fasting (Martin et al, 2018).

**Fasting and Disease resistance capacity:** Calorie restriction in terms of fasting in various forms has been linked to resilience with diseased condition and health disorders. Through various mechanisms fasting has the ability to develop disease resistance which is indirectly indicating building up strong immunity. The various mechanisms are increased insulin sensitivity, Increased HRV, Improved lipid metabolism, Healthy gut micro biota, reduced abdominal fat, reduced inflammation, Reduced blood pressure etc (Mattson, 2012).

### **Fasting and Clinical aspects**

#### **Fasting and Obesity/Overweight**

Overweight and obesity are rising as epidemic at different region of world. Obesity and overweight being a disorder itself, also call for other lifestyle disorder for example CVD, diabetes mellitus, and certain cancer are matter of

concern. Though many such cases were reported that self practice of fad diet without any expert supervision actually harm human body and do not provide permanent solution in weight reduction. But pre controlled intermittent fasting under supervision has been proved beneficial as per some research studies. Study proved that adiposity and lifespan are in inversely related. So intermittent fasting helping to increase life span is also influencing reduced adiposity i.e. reduction in weight (obesity/overweight condition). In comparison to CR, IF helps to provide lean body mass with reduced fat mass (Jane et al, 2015; Bhutani et al, 2013).

**Fasting and Diabetes Mellitus:** Many scientific research conducted reveals that intermittent fasting is beneficial for diabetes mellitus condition improves insulin sensitivity. Specifically Calorie Restriction and Intermittent fasting has their own mechanism as being effective in multiple parameters of health and diseases like Insulin resistance, Fasting insulin, visceral fat mass reduction which are directly linked with diabetic condition of a patient. Several mechanism of Calorie restriction are linked with improving condition of DM patients. Reduced intake of Calorie reduces pancreatic cell apoptosis and attenuates beta cell apoptosis (Eshghinia and Mohammadzadeh, 2013). CR and SIRT-1/Sirtuin (silent mating type information regulation 2 homolog) - 1 enhances each other's activity. In presence of CR insulin sensitivity improved which increase the promotion of SIRT-1, which in turn encourage the beneficial effects of CR. Animal study in Mice showed that over expression of SIRT-1 have numerous benefits including reduction in weight, blood cholesterol, fasting blood sugar, insulin levels, adipokines and increase in metabolic rate (Barnosky et al, 2014).

**Fasting and Cardio Vascular Diseases:** Blood pressure, resting heart rate, levels of high-density and low-density lipoprotein (HDL and LDL) cholesterol, triglycerides, glucose and insulin; and insulin resistance are the bio marker of desirable cardiovascular health. Human and animal study shows that these indicators are being improved by intermittent fasting by reduction of systematic inflammation and oxidative stress. Intermittent fasting reduces the probability of atherosclerosis which is a common poor heart disorder. In a study of Verdey et al established that alternate day fasting has been proven as Cardio protective both in overweight and normal weight person (Lefevre et al, 2009).

The CALERIE (Comprehensive Assessment of Long-Term Effects of Reducing Intake of Energy) study showed that CVD risk are being lowered in non obese person by 12% reduction in daily calorie reduction for a long period of 2 years. So through many study it has been well established that CVD

condition is well linked and can be reduced in intermittent fasting practices (Rochon et al, 2011).

**Fasting and Neurodegenerative Diseases:** At present time different form of Neurodegenerative diseases for example Parkinson's disease, Alzheimer's disease are very common across different areas of the world. Pre-clinical studies showed in animal model occurrence and progression of such disease can be made late by implementing alternate day fasting. There are certain mechanism e.g. bolstering mitochondrial function and stimulating autophagy, neurotrophic-factor production, antioxidant defenses, and DNA repair which have control over neuronal stress resistance which in turn can be increased by intermittent fasting. Even seizures and excitotoxicity could be prevented by (Gamma-aminobutyric acid) GABAergic inhibitory neurotransmission (i.e., -amino butyric acid-related inhibitory neurotransmission) can be increased by intermittent fasting (Menzies et al, 2017).

**Fasting and Cancer:** As per animal studies it has been shown that application of calorie restriction in form of Intermittent Fasting there is reduction in onset of spontaneous tumor in normal ageing of rodents. Also it has studied that such treatment of intermittent fasting can suppress growth of those tumors and also in treatment aspect it was reported that sensitivity of tumors can be increased towards treatment chemotherapy and irradiation (O'Flanagan et al, 2017; Martinez-Outschoorn et al, 2017).

**Negative Impact of Fasting:** Almost everything has their own limitations or negative impact along with its advantages. Fasting is not the exception in this case also. Systematic report and study shows that in many cases fasting is practiced for instant or quick weight reduction solution, but in long run it endangers body's mechanism in various ways. Switching off calorie and nutrients for long time regularly without expert consent, will actually call for body's mechanism of storing nutrients in greater quantity in form of fat which actually results in excessive weight gain and ultimate imbalanced metabolism. Post self planned practice of fasting, binge eating at end of fasting is been a common practice which is not a good outcome in overall possible health benefits from fasting. Long term calorie restriction without medical supervision may cause loss of fat and muscle mass which actually results an array of abnormalities of physiologic condition . People having diabetes mellitus if performing fasting for long without medical supervision or consultation can have adverse health outcomes like hypoglycemia, ketoacidosis etc which calls for dizziness, tiredness, loss of conscious and even death. Person performing fasting without health specialist consultations & suffering from heart disorder, hypertension

can have adverse health effect like electrolyte abnormalities to which they are prone already. All such negative impacts can be avoided if fasting performed post health screening by health experts and there of under medical advice in special cases (Havard Health Publishing, 2017; Brandhorst et al, 2015).

#### IV. CONCLUSION

Calorie restriction in form of different way of fasting was experimented in various scientific research studies. Though such more studies will be much beneficial to add up some more evidence linked to fasting outcomes. Based on available studies, this paper enlighten that apart from certain limitations in some case of disorders or rather in some specific cases of disorders, fasting practiced regularly through evidence based controlled way have been proven as having beneficial effect(s) on health and life of human. Fasting being a very integral part of mostly every religion is very easy to implement across different zone and type of people. It is very cost effective way in term of numerous health benefits and treating aspect. Though some limitation is associated with practicing fasting e.g. not every individual especially with some ill metabolic condition/ special medical conditions can perform fasting without specialist supervision, self proclaimed fasting in form of crash dieting can have negative outcomes. If such limitations can be controlled and alternatively managed or eliminated, practicing fasting based on the complete assessment of individual suitability, this can be an effective tool in field of curative, preventive and promotive holistic health aspect.

#### References

- 1 Anton S.D., Moehl K., Donahoo W.T. et al. (2018). Flipping the metabolic switch: understanding and applying the health benefits of fasting. *Obesity Silver Spring Journal*, 26, 254-68.
- 2 Antoni R., Johnston K.L., Collins A.L., Robertson M.D., Panda S. et al. (2016). Fasting, circadian rhythms and time-restricted feeding in healthy lifespan. *Cell Metabolism*, 23, 1048-59.
- 3 Appleton K.M. & Baker S. (2015). Distraction, not hunger, is associated with lower mood and lower perceived work performance on fast compared to non-fast days during intermittent fasting. *Journal of Health Psychology*, 20, 702.
- 4 Barnosky A.R., Hoddy K.K., Unterman T.G., Varady K.A. et al. (2014). Intermittent fasting versus daily calorie. *Nutrition Journal*, 115, 951-59.
- 5 Barnosky A.R., Hoddy K.K., Unterman T.G., Varady K.A. et al. (2014). Intermittent fasting versus daily calorie restriction for type 2 diabetes prevention: a review of human findings. *Transitional Research*, 164, 302-11.
- 6 Bhutani S., Klempel M.C., Kroeger C.M. et al. (2013). Alternate day fasting and

endurance exercise combine to reduce body weight and favorably alter plasma lipids in obese humans. *Obesity*, 21, 1370–79.

- 】 Brandhorst S., Choi I.-Y., Wei M., Cheng C. et al. (2015). A Periodic Diet that Mimics Fasting Promotes Multi-System Regeneration, Enhanced Cognitive Performance, and Health span. *Cell Metabolism*, 22(1), 86–99.
- 】 Browning JD, Baxter J, Satapati S, Burgess S.C. et al. (2012). The effect of short-term fasting on liver and skeletal muscle lipid, glucose and energy metabolism in healthy women and men. *Journal of Lipid Research*, 53, 577–86.
- 】 Chaix A., Zarrinpar A., Miu P., Panda S. et al. (2014). Time-restricted feeding is a preventative and therapeutic intervention against diverse nutritional challenges. *Cell Metabolism*, 20, 991–1005.
- 】 Eckel-Mahan K.L., Patel V.R., de Mateo S., Orozco-Solis R. et al. (2013). Reprogramming of the circadian clock by nutritional challenge. *Cell*, 155, 1464–78.
- 】 Eshghinia S. & Mohammadzadeh F. (2013). The effects of modified alternate-day fasting diet on weight loss and CAD risk factors in overweight and obese women. *Journal of Diabetes, Metabolic Disorder and Control*, 12, 4.
- 】 Heilbronn L.K., de Jonge L., Frisard M.I. et al. (2006). Effect of 6-month calorie restriction on biomarkers of longevity, metabolic adaptation and oxidative stress in overweight individuals: a randomized controlled trial. *Journal of American Medical Association*, 295, 1539–48.
- 】 Heilbronn L.K., Smith S.R., Martin C.K., Anton S.D. et al. (2005). Alternate-day fasting in non obese subjects: effects on body weight, body composition, and energy metabolism. *American Journal of Clinical Nutrition*, 81, 69–73.
- 】 Havard Health Publishing. (2017). Intermittent fasting promises better health and longer life, but does it work?.. Havard Medical School Available from <https://www.health.harvard.edu/heart-health/not-so-fast-pros-and-cons-of-the-newest-diet-trend>
- 】 Jane L., Atkinson G., Jaime V., Hamilton S., Waller G., Harrison S. et al. (2015). Intermittent fasting interventions for the treatment of overweight and obesity in adults aged 18 years and over: a systematic review protocol. *Journal of Biomedical Informatics*. 13, 60–68.
- 】 Lefevre M., Redman L.M., Heilbronn L.K. et al. (2009). Caloric restriction alone and with exercise improves CVD risk in healthy non-obese individuals. *International Journal for Research and Investigation on Atherosclerosis and Related Diseases*, 203, 206–13.
- 】 Longo V.D. & Mattson M.P. (2014). Fasting: molecular mechanisms and clinical applications. *Cell Metabolism*, 19, 181–92.
- 】 Martin C.K., Il'yasova D., Ravussin E. et al. (2018). Metabolic slowing and reduced oxidative damage with sustained caloric restriction support the rate of

- living and oxidative damage theories of aging?. *Cell Metabolism*, 27, 805-815.
- 】 Martinez-Outschoorn U.E., Peiris-Pagés M., Pestell R.G. et al. (2017). Cancer metabolism: a therapeutic perspective. *Nature Reviews Clinical Oncology*, 14, 11-31.
  - 】 Mattson M.P., Moehl K., Ghena N., Schmaedick M. et al. (2018). Intermittent metabolic switching, neuroplasticity and brain health. *Nature Review Neuroscience*, 19, 63-80.
  - 】 Mattson M.P. (2012). Energy intake and exercise as determinants of brain health and vulnerability to injury and disease. *Cell Metabolism*, 16, 706-722.
  - 】 Menzies F.M., Fleming A., Caricasole A. et al. (2017). Autophagy and neurodegeneration: pathogenic mechanisms and therapeutic opportunities. *Neuron*, 93, 1015-34.
  - 】 Moro T., Tinsley G., Bianco A. et al. (2016). Effects of eight weeks of time-restricted feeding (16/8) on basal metabolism, maximal strength, body composition, inflammation, and cardiovascular risk factors in resistance-trained males. *Journal of Translational Medicine*, 14, 290.
  - 】 Most J., Tosti V., Redman L.M., Fontana L. et al. (2017). Calorie restriction in humans: an update. *Ageing Research Review*, 39, 36-45.
  - 】 O'Flanagan C.H., Smith L.A., Mc Donnell S.B. et al. (2017). When less may be more: calorie restriction and response to cancer therapy. *BMC Medicine*, 15, 106.
  - 】 Rochon J., Bales C.W., Ravussin E. et al. (2011). Design and conduct of the CALERIE study: comprehensive assessment of the long term effects of reducing intake of energy. *Journal of Gerontology Series: A Biological Sciences and Medical Science*, 66, 97-108.
  - 】 Teng N.I., Shahar S., Rajab N.F., Manaf Z.A. et al. (2013). Improvement of metabolic parameters in healthy older adult men following a fasting calorie restriction intervention. *Aging Male*, 16, 177-83.
  - 】 Trepanowski J.F. & Bloomer R.J. (2010). The impact of religious fasting on human health. *Nutrition Journal*, 9, 57.
  - 】 Willcox D.C, Willcox B.J., Todoriki H. et al. (2006). Calorie restriction and human longevity: what can we learn from the Okinawans?. *Biogerontology*, 7, 173-7.

# The novel nutraceutical - Insulin plant

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## Abstract

**C***ostus igneus* (or Insulin Plant) is one of the traditionally used medicinal herbs. Insulin plant is native to Southeast Asia. The plant has been recently introduced into India and it is grown as an ornamental plant in South India. Insulin plant contains various phytochemical constituents like steroid, alkaloid, flavonoid, etc. Its leaves are being used as dietary supplement in the treatment of Diabetes. It possesses various pharmacological activities such as, anti-diabetic effect, hypolipidemic activity, anti-toxicity activity, anti-cancer activity, neuroprotective activity, anti-microbial activity, and antioxidant activity. The leaves extract also proved to be beneficial in improving learning and memory. The present review article attempts to explore various medicinal properties of *Costus igneus* (Insulin plant) for further research purposes and its suitable formulation development in the future for the welfare of mankind. Investigation on new oral hypoglycaemic compounds from medicinal plants will set a milestone for the development of pharmaceutical entities or dietary adjunct to existing therapies in the future. No side effects have been reported yet. There are certain marketed products also available. Many plant preparations are used in folklore and traditional system of medicine to manage diabetes mellitus.

**Keywords:** *Costus igneus, Insulin plant, Phytochemical constituents,*



## I. INTRODUCTION

India represents 49 percent of the world's diabetes burden, with an estimated 72 million cases in 2017, a figure is expected to almost double to 134 million by 2025. Prevalence of Diabetes has increased by 64 percent across India over the quarter-century, according to a November 2017 report with an advocacy by the Indian Council for Medical Research, Institute for Health Metrics and Evaluation, and the Public Health Foundation of India. It has been estimated that in 2018 there were more than 500 million prevalent cases of type 2 diabetes worldwide (Kaiser et al., 2018).

Ayurveda is comprised of two Sanskrit terms. "Ayur" means life and "veda" means knowledge. Ayurveda has been extensively used for improving the wellness of the body. Diabetes mellitus is a known metabolic disorder of varied etiology characterized by chronic hyperglycemia due to relative deficiency of insulin or its resistance. Diabetes is associated with disturbances of carbohydrates, fat and protein metabolism. Since oral hypoglycemic agents cause side effects, there is a growing interest in herbal remedies for the treatment of diabetes mellitus. Herbal drugs are considered to be less toxic and free from side effects compared to synthetic drugs (Grover et al., 2002).

In Diabetes, free radicals are formed adversely through the following mechanisms: glucose oxidation, non-profit enzymatic glycation of proteins, and the subsequent oxidative degradation of glycated proteins (Maritim et al., 2003, Mehta et al., 2006). Increased oxidative stress resulting from abnormally high levels of free radicals and the depression of the antioxidant defence system may lead to the damage of enzymes within different cellular organelles (Bartošikova et al., 2003), increased lipid peroxidation, and the development of complications associated with diabetes mellitus. The potent antioxidant activity of flavonoids may provide the best protection against elevated oxidative stress (Kopp et al., 2018, Dias et al., 2005). Active compounds found in *Costus igneus* such as tannins, phobatanin, saponin, steroids, terpenoids was seen in some study to lower the high values back to normal levels (Urooj, 2010, Radha et al., 2015).

The specific goal of this article is to present a structured overview of a scholarly research on *Costus igneus* (or Insulin plant) investigating the impact of the consumption of Insulin plant. Overall the paper summarizes the current state of knowledge of Insulin plant.



## Plant description

The plant *Costus igneus* belongs to the family Costaceae, which is found in tropical Africa, Asia, Australia, and North America, Central America & South America. In India, it is cultivated in coastal area, Uttar Kannada district of Karnataka. In this area, people traditionally take 2-3 leaves of this plant twice a day for the management of diabetes. It grows horizontally with spreading, rooting stems. Its leaves are slender and lance shaped with toothed, scalloped or lobed margins. The greyish green leaves are stained with red purple above and darker purple below. The tiny white flowers grow intermittently throughout the year. The plant flowers are attractive and of beautiful orange colour(Shankarappa et al., 2011). This plant reaches a height of 6 inches and has an indefinite spread(Gupta & Komal., 2018). The picture of an Insulin plant is shown in Figure 1.



Figure 1: Insulin plant (*Costus igneus*) source: West Bengal State University

### 1. Taxonomical classification(Krishna et al., 2017)

The taxonomical classification of *Costus igneus* are:

- Domain : Eukaryota
- Kingdom : Plantae
- Sub kingdom : Viridaeplantae
- Phylum : Tracheophyta
- Sub phylum : Euphyllophytina
- Infraphylum : Radiatopses
- Class : Liliopsida
- Sub class : Commelinidae

- Superorder : Zingiberanae
- Order : Zingiberales
- Family : Costaceae
- Sub family : Asteroideae
- Tribe : Coreopsideae
- Genus : Costus
- Specific epithet : Igneus

**Regional names(Vishalakshi & Urooj, 2008)**

The Insulin plant (*Costus igneus*) is commonly known as Banaba in English, Piasal in Bengali, Banda, Bija-sal, Peisar, Jarul, and Keukand in Hindi, Bijasar, and Dam al akhwain in Urdu and Arabic, Asana, Bandhukapushpa in Sanskrit, Kempu hone in Kannada, Honne, Karintakara, Vengai, and Vennamaram in Malayalam, Honi, Pushkarmula in Marathi, Vengis in Odisha, Neyccarikamaran, Venkai-c-ciray, and Kostam, Peddavesiga, and Yeangesha in Telugu, and Pakarmula in Gujrati.

**Review of Literature**

**Anti-diabetic activity of the whole plant and leaves of Costus igneus**

A lot of research work has been conducted to evaluate the anti-diabetic effect of insulin plant(Krishna et al., 2017,Bhat et al., 2010,Kalailingam et al., 2011,Jayasri et al., 2011,Gireesh et al., 2009,Remya & Daniel, 2012,Chetty et al., 2014). The summary of the animal experimentation done are tabulated in Table 1. In a cross-sectional clinical study, patients consuming either one fresh leaf or 1 teaspoon of shade-dried powder per day of *Costus igneus* in conjunction with other modalities of treatment had effectively produced glycemic control in Diabetes (Chetty et al., 2014). The summary of animal experimentation from the plant *Costus igneus* is in the tabulated form in Table 1.

**Table 1. The summary of animal experimentation from the plant *Costus igneus*.**

Author, Year	Model	Part/Extract	Dosage	Glucose reduction %
Shalini Adiga et al, 2014	STZ induced Wistar rats	Leaves/alcohol	500 mg/kg body weight	75.70% (Chetty et al., 2014)

<b>Author, Year</b>	<b>Model</b>	<b>Part/Extract</b>	<b>Dosage</b>	<b>Glucose reduction %</b>
P Mani et al, 2010	STZ induced Wistar rats	Leaves/ ethanol extract	300 mg/kg body weight	67.86% (Pangal et al., 2010)
Akhila Shetty et al, 2010	Dexamethasone induced (10 mg/kg/day) male Wistar rats	Leaves/ powdered leaves stirred in distilled water	500 mg/kg body weight	26.01% (Shetty et al., 2010)
Vishnu Bhat et al, 2010	Alloxan induced adult albino rats	Leaves/ ethanol extract	500 mg/kg body weight	21.78% (Bhat et al., 2010)
R Arun Kumar et al, 2010	Alloxan induced male Wistar albino rats	Leaves/ methanol extract	200 mg/kg body weight	69.08% (Panagal et al., 2010)
V Palanivel et al, 2013	Dexamethasone induced Wistar rats	Whole plant/ ethanol extract	250 mg/kg body weight	50.46% (Palanivel et al., 2013)
<b>Author, Year</b>	<b>Model</b>	<b>Part/Extract</b>	<b>Dosage</b>	<b>Glucose reduction%</b>
Pazhanichamy Kalailingam et.al, 2011	STZ induced albino Wistar rats	Rhizome/ ethanol extract	200 mg/kg body weight	68.26 % (Kalailingam et al., 2011)
Leena Chimurkar et al, 2008	Alloxan induced	Leaves/crude	250 mg/kg body weight	62.81% (Chimurkar et al., 2008)

### ***Hypolipidemic activity of methanol extract from Costus igneus Rhizome***

In the year 2011, Pazhanichamy Kalailingam et.al., investigated or examined the hypolipidemic activity in streptozotocin (STZ) induced diabetic albino rats. The methanol extract of *Costus igneus* has been given at doses of 100, 200 mg/kg body weight orally as a single dose per day for a period of 30 days. The results indicated a significant decrease in serum total cholesterol, triglyceride, low density lipoprotein(LDL), very low density lipoprotein(VLDL) levels and a significant rise in high density lipoprotein (HDL) level(Kalailingam,

Kaliaperumal, Shanmugam, & Tamilmani, 2011)

### ***Toxicity study from the ethanol extract of Costus igneus leaves***

In the year 2010, Bhat Vishnu et al., carried out the experiment with a selected or examined rats considering the administration of *Costus igneus* ethanolic extract in a stepwise dose from 50mg/kg body weight upto the dose of 5000mg/kg body weight for 3 days which caused no considerable signs of toxicity of tested animals. 5000 mg/kg body weight dosage was found to be safe and no toxicity was observed (Bhat et al., 2010).

### ***Anti cancer activity of methanol extract of Costus igneus leaves***

In the year 2014, Prof.S.Dhanasekaran et.al evaluated the anti-proliferative and apoptotic action of methanolic extract of *Costus igneus* powdered leaves on in vitro MCF 7 (Michigan Cancer Foundation 7) breast cancer cell line. The extract was able to reduce the tumor size without affecting the normal cells. The extract showed cytotoxicity aligned with normal cell lines only at very high concentrations, but it was not apoptotic to the normal cell lines. At the maximum extraction dosage of 200 mg/ml per kg body weight showed potent anti cancer activity that is 97.46 % cytotoxicity. The extract possessed dose dependent cytotoxicity against the MCF 7 cell line (Dhanasekaran et al., 2014).

### ***Effect of ethanol extract of Costus igneus leaves on learning and memory***

In the year 2014, Shalini Adiga et al., has evaluated the effect of *Costus igneus* on learning and memory in normal and diabetic-induced rats using passive avoidance test of ethanolic extract at a dosage of 250mg/kg & 500mg/kg body weight. For the induction of diabetes, a single dose of streptozotocin was injected (35 mg/kg) intra peritoneally. After a study period of 30 days, blood glucose level was measured and rats were subjected to a passive avoidance test. The treatment with ethanolic extract of *Costus igneus* resulted in 75.70% reduction of blood glucose level in a dose-dependent manner for 500mg/kg body weight, in diabetic treated groups when compared to that of the diabetic control group. But no significant effect was obtained with non diabetic rats and it was comparable to the normal control values. Rats were subjected to three acquisition trials. *Costus igneus* treated diabetic rats shown a decrease in the time taken to enter the dark compartment suggesting that they maintained their innate behavior and also showed improvement in learning tendency. Non-treated diabetic rats showed impairment in the passive avoidance test. During their post-shock retention testing at 24 and 48 hours, treatment with *Costus igneus* extract showed a significant increase in the entrance latency and decrease

in the time spent in the dark room. The ethanolic extract of *Costus igneus* was able to produce a significant effect on learning and memory in diabetic rats when treated with a dose of 500mg/kg body weight (Chetty et al., 2014).

### **Neuroprotective activity of melatonin and *Costus igneus* leaves extracts**

In the year 2018, Gupta D, Rai S, Hajam YA et al., investigated the neuroprotective role of exogenous melatonin and insulin plant (*Costus igneus*) extract on the brain in streptozotocin-induced female diabetic rats. The extract showed a significant decrease of lipid peroxidation in brain tissue compared to the control group of rats. Both leaves extract and melatonin together produced a significant reduction in antioxidative enzyme viz. superoxide dismutase (SOD), catalase (CAT), reduced Glutathione (GSH) of the brain. Melatonin as well as plant extract showed tremendous healing to restore the brain worry brought about by hyperglycemic impact, and rescued the brain tissue by restoring the number of astrocytes and glial cells (Gupta et al., 2018).

### **Antimicrobial activity of root powder of *Costus igneus***

In the year 2011, Arun Nagarajan et al. studied the antimicrobial activity of *Costus igneus* using its root powder. Gram negative bacterial cultures were used such as *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Salmonella sp*, *Proteus vulgaris* to determine the antimicrobial activity. About 10 grams of the IBA (Indole butyric acid) and IAA (Indole 3 acetic acid) derived root materials subjected to Soxhlet extraction using 5 ml of acetone, chloroform, and methanol. In the study two growth regulators IBA and IAA in combination were added to MS (Murashige and Skoog) medium for direct root induction. *Klebsiella pneumonia* was found to be more susceptible to both IBA and IAA derived roots using acetone as solvent (Nagarajan et al., 2011).

### **Phytoconstituents of *Costus igneus* leaves**

In the year 2010 and 2015, Urooj A et al. and Ramasubramaniyan et al. respectively had done the phytochemical screening which showed the presence of steroids, triterpenoids, alkaloids, tannins, flavonoids, glycosides, saponins, carbohydrates, and proteins. The methanol extract was found to contain the highest number of phytochemicals. Wild plant and callus (MS and LS medium) extracted with different solvents in preliminary screening indicated the presence of high content of phytochemicals like phenols, alkaloids, flavonoids, and terpenoids in methanolic extracts. And the sequential screening for phytochemicals of *Costus* leaves revealed that it is rich in protein, iron, and antioxidant components such as ascorbic acid,  $\alpha$ -tocopherol,  $\beta$ -carotene, terpenoids, steroids, and flavonoids (Urooj, 2010, Radha et al., 2015). The

nutrient composition of the dehydrated sample of *Costus igneus* is given in Table 2.

**Table 2: Nutrient composition of the dehydrated sample of *Costus igneus* (values expressed as per 100 gm dry basis) (Radha et al., 2015).**

Nutrient / phytochemicals	Composition
Moisture	4.0%
Fat	2.8%
Total Ash	6.3%
Protein	18%
Iron	40 mg
Phosphorus	6.6 mg
Calcium	5.1 mg
Total phenols	4400 mg
Total flavanoids	84 mg
B-carotene	0.667 mg
A tocopherol	149 mg
Ascorbic acid	81 mg
Glutathione	75 mmol

***Antioxidant activity of stem and root extract of Costus igneus***

In the year 2015, Ramya Urs S.K et.al. studied the effect of methanol extract on antioxidant activity against *Enterobacter aerogens*, *Pseudomonas fragi*, *Klebsiella oxytoca* using different concentrations ranging from 0.1 mg/ml - 0.5 mg/ml. The antioxidant and radical scavenging activities of *Costus igneus* were assessed from both stem extract and root extract. In comparison root extract showed high inhibition rate than stem extract. It has been found that root extract possess a high amount of Vitamin E (Ramya et al., 2015).

The summarization of the reported biological activities of different parts of *Costus igneus* is done in Table 3.

**Table 3: Summary of Reported Biological Activities of Different Parts of Costus Igneus**

<b>Plant part</b>	<b>Reported Biological activities</b>	<b>Result</b>	<b>Reference</b>
Leaves	Hypoglycaemic	75.70% reduction of blood glucose	<b>Chetty et.al, 2014</b>
Leaves	Hypolipidemic	Significant reduction in total cholesterol, LDL, VLDL, phospholipids and triglyceride levels and rise in HDL.	<b>Panagal et.al., 2010</b>
Leaves	Antioxidant	The marked rise in enzyme levels such as SOD, CAT, and GSH. Complete recovery of enzyme level shown at the highest dose, 600 mg/kg body wt.	<b>Shivaprakash et al., 2014.</b>
<b>Plant part</b>	<b>Reported Biological activities</b>	<b>Result</b>	<b>Reference</b>
Leaves	Prevent learning and memory deficit.	<i>Costus igneus</i> treated diabetic rats, maintained their innate behaviour indicated an improvement in their learning tendency.	<b>Chetty et al., 2014.</b>
Leaves	Anti proliferative.	The methanolic extract could reduce the tumor size and showed 97.46 % cytotoxicity.	<b>Dhanasekaran et al., 2014.</b>
Stem	Antioxidant.	Showed significant antioxidant activity.	<b>Ramya Urs et al., 2015.</b>

Stem	Antimicrobial.	Methanolic extract showed significant antimicrobial activity.	<b>Kala et al., 2014.</b>
<b>Plant part</b>	<b>Reported Biological activities</b>	<b>Result</b>	<b>Reference</b>
Root	Antibacterial.	Methanolic extract indicated significant activity against for both gram positive and gram negative bacteria.	<b>Kala et al., 2014.</b>
Root	Antioxidant.	Maximum activity due to the presence of highest phenol content.	<b>Ramya Urs et al., 2015.</b>

### **Various marketed products of *Costus igneus***

Nowadays various products of the plant *Costus igneus* are available in the market. The various marketed products are tabulated in Table 4.

**Table 4: Various Marketed Product of *Costus igneus***

<b>Plant Name</b>	<b>Product Name</b>	<b>Category</b>	<b>Manufacturer</b>
<i>Costus igneus</i>	Insulin Plant Leaf Powder 180 gm.	Dietary Supplement	TheInsulinPlant.com <b>(Shetty et al., 2010).</b>
<i>Costus igneus</i>	Insulin plant tea.	-	Ayura Origins. <b>(TN based – Ayura Origins, 2019)</b>

### **Conclusion**

The study on the therapeutic action of *Costus igneus* has been shown in this paper. The results of many experimentation additionally evaluate and revalidated by clinical trials shows up the major differences in hypoglycemic



condition. Though it revealed that this Insulin plant has its effective role in various diseases but specifically it has been witnessed that the leaves of the plant helps in producing insulin. The leaves of Insulin plant contain corosolic acid which helps to generate insulin thereby treating diabetes, specifically type 2 diabetes. It is believed that it increases the sensitivity of the pancreas or stimulates the production of sufficient insulin to 'mop-up' excess blood glucose. Henceforth the name INSULIN PLANT perfectly fits for *Costus igneus* plant. More studies and research work has to be done to determine the mechanism of action of Insulin plant by measuring insulin or 'C' peptide level.

## References

- 1) Bartošikova, L., Nečas, J., Suchý, V., Kubinova, R., Vesela, D., Beneš, L., Illek, J., Šalplachta, J., Florian, T., Frydrych, M. & Klusakova, J. (2003). Antioxidative effects of morine in ischemia-reperfusion of kidneys in the laboratory rat. *Acta Veterinaria Brno*, 72(1), 87-94.
- 2) Bhat, V., Asuti, N., Kamat, A., Sikarwar, M. S., & Patil, M. B. (2010). Antidiabetic activity of insulin plant (*Costus igneus*) leaf extract in diabetic rats. *Journal of Pharmacy Research*, 3(3), 608-611.
- 3) Chetty, S., Adiga, S., & Reddy, S. (2014). Evaluation of the effect of costus igneus on learning and memory in normal and diabetic rats using passive avoidance task. *International Journal of Pharmacy and Pharmaceutical Sciences*, 6(Supl-2), 835-838.
- 4) Chimurkar, L., Kale, R., & Varma, S. (2018). Evaluation of *Costus Igneus* on Lipid Profile Status and Anti-Hyperglycemic Activity in Alloxan Induced Diabetic Rats. *International Journal of Research & Review*, 5, 88-93.
- 5) Dhanasekaran, S., Akshaya, M., & Preethi, S. (2014). In Vitro Anti-Proliferative Potential of Leaves of *Costus Igneus*. *International in Engineering and Technology*, 4(4), 277-83.
- 6) Dias, A. S., Porawski, M., Alonso, M., Marroni, N., Collado, P. S., & Gonzalez-Gallego, J. (2005). Quercetin decreases oxidative stress, NF- $\kappa$ B activation, and iNOS overexpression in liver of streptozotocin-induced diabetic rats. *The Journal of nutrition*, 135(10), 2299-2304.
- 7) Gireesh, G., Thomas, S. K., Joseph, B., & Paulose, C. S. (2009). Antihyperglycemic and insulin secretory activity of *Costus pictus* leaf extract in streptozotocin induced diabetic rats and in in vitro pancreatic islet culture. *Journal of ethnopharmacology*, 123(3), 470-474.
- 8) Grover, J. K., Yadav, S., & Vats, V. (2002). Medicinal plants of India with anti-diabetic potential. *Journal of ethnopharmacology*, 81(1), 81-100.
- 9) Gupta, D., Rai, S., Hajam, Y. A., Ghosh, H., & Basheer, M. (2018). Neuroprotective Role of Exogenous Melatonin and Insulin Plant (*Costus igneus* Nak.) Extract on

Brain in Streptozotocin-Induced Diabetes in Female Rat. *Research & Reviews A Journal of Pharmacognosy*, 5(1), 33-41.

- 】 Gupta, H., & Komal P. (2018). Insulin Plant: Review On Phytochemistry And Pharmacology. *International Journal of Informative & Futuristic Research*. 5 (7), 9163-9178.
- 】 Jayasri, M. A., Gunasekaran, S., Radha, A., & Mathew, T. L. (2008). Anti-diabetic effect of *Costus pictus* leaves in normal and streptozotocin-induced diabetic rats. *Int J Diabetes Metab*, 16(3), 117-22.
- 】 Kaiser, A. B., Zhang, N., & Van Der Pluijm, W. (2018). Global prevalence of type 2 diabetes over the next ten years (2018-2028).
- 】 Kalailingam, P., Kaliaperumal, R., Shanmugam, K., & Tamilmani, E. (2011, February). Efficacy of Methanolic Extract of *Costus igneus* rhizome on hypoglycemic, hypolipidemic activity in streptozotocin (STZ) diabetic rats and HPTLC analysis of its active constituents. In *International Conference on Bioscience, Biochemistry and Bioinformatics* (Vol. 5, pp. 318-321).
- 】 Kalailingam, P., Sekar, A. D., Samuel, J. S. C., Gandhirajan, P., Govindaraju, Y., Kesavan, M., Kaliaperumal, R. & Tamilmani, E. (2011). The efficacy of *Costus igneus* rhizome on carbohydrate metabolic, hepatoprotective and antioxidative enzymes in streptozotocin-induced diabetic rats. *Journal of Health Science*, 57(1), 37-46.
- 】 Kala, S. (2014). Antimicrobial Activity Of *Coleus For Skohlilii*(Wild) Briq And *Costus Igneus* N.E.Br. *IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)*. 9 (5), 1-6.
- 】 Kopp, R., Palíková, M., Papežíková, I., Mareš, J., Navrátil, S., Pikula, J., & Pohanka, M. (2018). Oxidative stress response of rainbow trout (*Oncorhynchus mykiss*) to multiple stressors. *Acta Veterinaria Brno*, 87(1), 55-64.
- 】 Krishna Kumar, N., Kandasamy, CS., Hariprasad, R., Shalavudeen Mohamed Akbar, S Jegadeesh, S. & Venkatanarayanan R. (2017). A review of Insulin leaf activity: potential anti diabetic agent. *European Journal of Biomedical and Pharmaceutical Sciences*. 4 (6), 195-200.
- 】 Maritim, A. C., Sanders, A., & Watkins Iii, J. B. (2003). Diabetes, oxidative stress, and antioxidants: a review. *Journal of biochemical and molecular toxicology*, 17(1), 24-38.
- 】 Mehta, J. L., Rasouli, N., Sinha, A. K., & Molavi, B. (2006). Oxidative stress in diabetes: a mechanistic overview of its effects on atherogenesis and myocardial dysfunction. *The international journal of biochemistry & cell biology*, 38(5-6), 794-803.
- 】 Nagarajan, A., Arivalagan, U., & Rajaguru, P. (2011). In vitro root induction and studies on antibacterial activity of root extract of *Costus igneus* on clinically important human pathogens. *Journal of Microbiology and Biotechnology Research*, 1(4), 67-76.

- 1) Palanivel, V., Mohamed Jihad, E. V., & Senthil Kumar, K. L. (2013). Evaluation of hypoglycemic activity of *Costus igneus* extract (whole plant) on alloxan induced diabetic rats. *International journal of advanced pharmaceutical genuine research*, 1(2), 9-19.
- 1) Panagal, M., Kumar, R. A., Bastin, T. J., Jenifer, S., & Muthuvel, A. (2010). Comparative evaluation of extracts of *C. igneus* (or *C. pictus*) for hypoglycemic and hypolipidemic activity in alloxan diabetic rats. *International Journal of Pharmacy and Technology*, 2(1), 183-195.
- 1) Radha, A., Balasubramanian, K., Shruti, B. S., & Nandhini, S. R. (2015). Studies on Optimization of Medium in Induction and Regeneration of Callus and Shoot from *Costus igneus* and its Phytochemical Profile. *Journal of Academia and Industrial Research (JAIR)*, 4(2), 75.
- 1) Ramya Urs, S.K., & Chauhan, J. B. (2015). Phytochemical screening, Antimicrobial activity and Anti oxidant activity of *Costus igneus*. *European J Molecular Bio and Biochemistry*, 2(2), 93-96.
- 1) Remya, R., & Daniel, M. (2012). Phytochemical and pharmacognostic investigation of antidiabetic *Costus pictus*. D. Don. *Int J Pharm Biomed Res*, 3, 30-39.
- 1) Shankarappa, L., Gopalakrishna, B., Jagadish, N. R., & Siddalingappa, G. S. (2011). Pharmacognostic and phytochemical analysis of *Costus igneus*. *Internationale Pharmaceutica Scientia*, 1(2), 36-41.
- 1) Shetty, A. J., Choudhury, D., Rejeesh, V. N., Kuruvilla, M., & Kotian, S. (2010). Effect of the insulin plant (*Costus igneus*) leaves on dexamethasone-induced hyperglycemia. *International journal of Ayurveda research*, 1(2), 100.
- 1) Shetty, A. J., Parampalli, S. M., Bhandarkar, R., & Kotian, S. (2010). Effect of the insulin plant (*Costus igneus*) leaves on blood glucose levels in diabetic patients: A cross sectional study. *Journal of Clinical and Diagnostic Research*, 4(3), 2617-2621.
- 1) Shivaprakash, G., Thottacherry, E. D., Rai, S., Nandini, M., Kumarachandra, R., & Pallavi, L. C. (2014). Evaluation of Antioxidant potential of *Costus igneus* in ethanol induced peroxidative damage in albino rats. *Journal of Applied Pharmaceutical Science*, 4(8), 52-55.
- 1) TN-based Ayura Origins launches insulin tea powder for diabetics. News Today. Tamil Nadu. Posted on May 29, 2019 by NT Bureau. Retrieved on 10/08/2019, from, <https://newstodaynet.com/index.php/2019/05/29/tn-based-ayura-origins-launches-insulin-tea-powder-for-diabetics/>
- 1) Urooj, A. (2010). Nutrient profile and antioxidant components of *Costus speciosus* Sm. and *Costus igneus* Nak. *Indian Journal of Natural Products and Resources*. 1, 116-118.
- 1) Vishalakshi Devi D., & Urooj, A. 2008. Hypoglycemic Potential Of *Morus Indica* And *Costus Igneus*. Nak.-A Preliminary Study. *Indian Journal Experimental Biology*. 46 (8), 614-616.



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