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Research Article

Towards Smart Health Care

K. Manimekalai

Head & Assistant Professor, Department of Computer Applications,
Sri GVG Visalakshi College For Women, Udumalpet, Tiruppur Dt, Tamil Nadu, India
Correspondence should be addressed to K. Manimekalai: gvgmanimekalai@gmail.com

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Abstract

The concept of smart healthcare has progressively gained traction as information technology advances. Smart healthcare makes use of a new generation of information technologies, such as the Internet of Things (IoT) and Artificial Intelligence, to completely revolutionize the existing medical system, making it more efficient, easy, and personalized. A hospital setting can be quite stressful, particularly for seniors and children. The traditional patient- doctor appointment has lost its usefulness as the world population grows. As a result, smart healthcare becomes extremely crucial. With the goal of introducing the concept of smart healthcare, the essential technologies were listed that support smart healthcare and discuss the current state of smart healthcare in various key fields in this review. The aim of this paper is to identify some of the challenges that need to be addressed to accelerate the deployment and adoption of smart health technologies for ubiquitous healthcare access. The paper also explores how the key technologies can be combined with smart health to provide better healthcare solutions.

Keywords: Artificial Intelligence, IoT, Mobile Internet, Smart health, Wearables.

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1.1 Introduction

Due to the massive rise in population, traditional healthcare is unable to meet everyone's demands. Medical services are not accessible or inexpensive to everyone, despite having superb infrastructure and cutting-edge technologies. One of the purposes of smart healthcare is to assist consumers by informing them about their medical conditions and keeping them informed about their health. Users with smart healthcare can self-manage some emergency circumstances according to Mohanty et al [1]. It focuses on increasing the user's quality of life and experience. Smart healthcare enables the most efficient use of available resources.

Today's era is one of digitization. Traditional medicine, which has biotechnology at its foundation, has begun to digital and informationize as technology and scientific theory have advanced. In addition, smart healthcare has emerged, embracing a new generation of information technology. According to Liu et al[2018], Smart healthcare is more than just a technological improvement; it is a multi-level transformation. Medical model changes, informatization construction changes, changes in medical management, and changes in the prevention and treatment concept are all examples of this change.

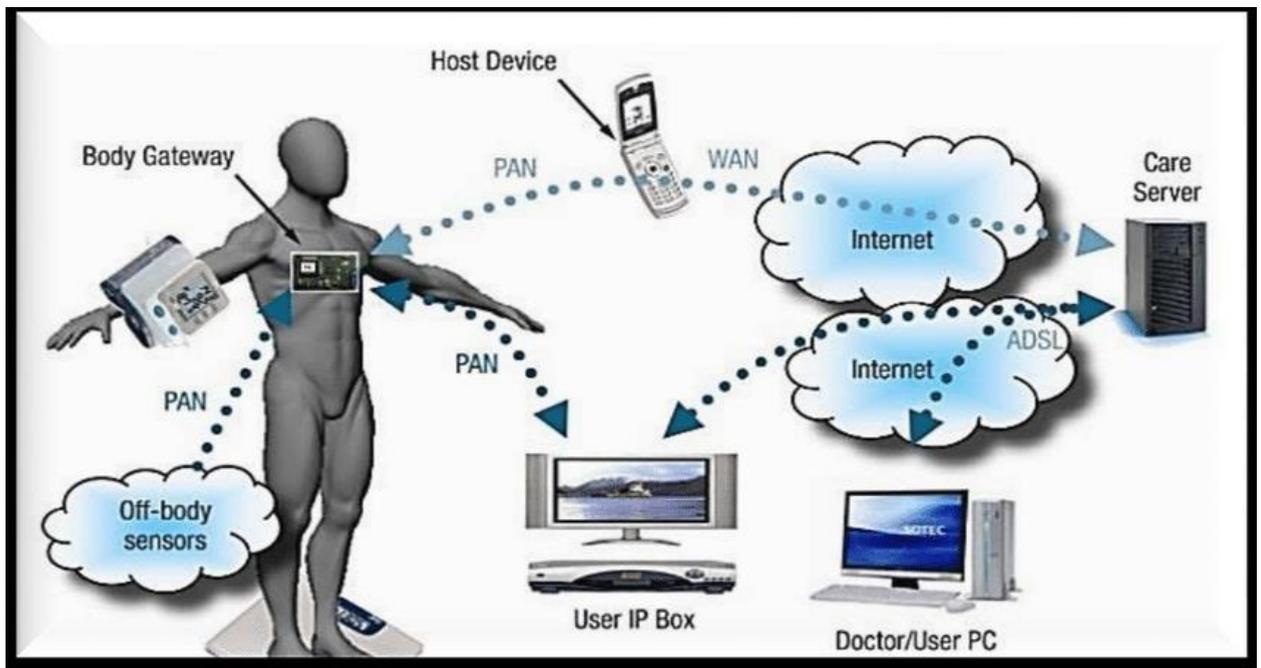


Figure 1. Concept of Smart Healthcare

Smart healthcare is a health-care delivery system that uses wearable devices, the internet of things, and mobile internet to dynamically access information, connect people, materials, and institutions in the healthcare industry, and then controls and responds intelligently to medical ecosystem demands. Smart healthcare can encourage interaction among all participants in the healthcare industry, ensuring that participants receive the services they require, assisting parties in making informed decisions, and



facilitating resource allocation. In a result, smart healthcare is a higher level of medical information architecture according to Gong FF et al[2013]. Figure 1 depicts the concept of Smart Healthcare.

These developments are focused on addressing people's specific requirements while increasing the efficiency of medical care, considerably improving the medical and health-care experience, and representing modern medicine's future development trajectory. This review will begin with an introduction to the concept of smart healthcare, followed by a brief overview of the key technologies that support smart healthcare, as well as their Challenges and Opportunities and finally, a discussion of smart healthcare's future prospects.

1.2. Key Technologies

Multiple participants, such as doctors and patients, hospitals and research organizations, are involved in smart healthcare. It's a multi-dimensional organic whole that includes illness prevention and monitoring, diagnosis and treatment, hospital management, health decision-making and medical research. Smart healthcare is built on the foundation of information technologies such as the Artificial Intelligence, Mobile Internet, Cloud Computing, Internet of Things and wearables. In all facets of smart healthcare, these technologies are frequently used.

Patients can utilize wearable gadgets to keep track of their health at all times, seek medical care through virtual assistants, and use remote houses to implement remote services; doctors can employ a variety of sophisticated clinical decision support systems to assist and improve diagnosis. Doctors can handle medical data using an integrated information platform that incorporates tools like the Laboratory Information Management System, Picture Archiving and Communication Systems (PACS), and the Electronic Medical Record. Surgical robots and mixed reality technology can help with more precise surgery.

2.1 Artificial Intelligence

Artificial Intelligence (AI) has undeniably changed the healthcare industry. There are numerous examples of AI use in healthcare. Deep learning algorithms have changed the way medical practitioners detect and analyze stress today. Micro-expression analysis is a technique for analyzing data from photographs that is considered to be effective. A number of professionals are presently developing AI-based solutions for digital eye scanning. Apart from that, the ubiquity of Chatbots and Virtual Assistants is causing a big upheaval in the healthcare industry. These assistants are being used by healthcare institutions to communicate with patients, create individualized plans for them, and aid them by addressing some of their most common health-related queries.



Figure 2: AI in Healthcare

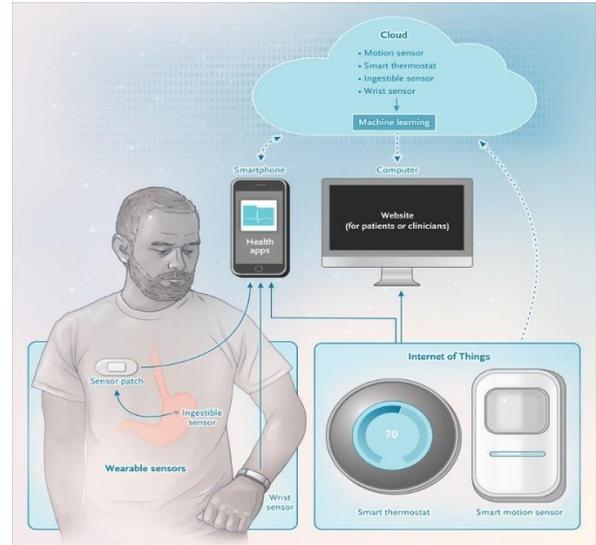


Figure 3: Mobile Internet

Figure 2 depicts the AI in healthcare. There are various successful AI applications in healthcare, such as Google's Deep mind Health Project or IBM's Watson technology for Oncology. Smart hospitals prioritize improved patient outcomes and increased efficiencies, and AI plays a significant role in both of these areas. AI aids in better decision-making by supporting optimal data management. It aids in the improvement of hospital management by providing real-time visibility into hospital activities. Online consultations powered by AI helpers are not only lowering healthcare expenditures, but they are also improving doctor-patient relationships.

2.2 Mobile Internet

Gone are the days when mobile technology was only used in taxis or for food delivery. The healthcare industry has also been streamlined as a result of the introduction of mobile technologies. Smartphones have made life easier; now, reports may be sent via instant messaging to patients or doctors. The operational time is reduced by 26 minutes as a result of this. Several devices feature built-in sensors that can track the patient's health and promote mobility when worn on the chest. There are a number of mobile apps that may be used to maintain track of a patient's health, and any minor issues are immediately communicated to both the patient and the doctor via text message. Smart hospitals are implementing mobility technologies to help patients live better lives and make better decisions. Figure 3 depicts the Mobile Internet.

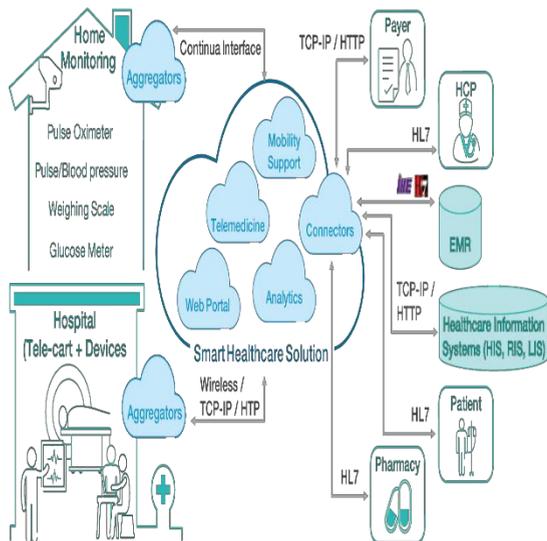


Figure 4. Cloud in Smart Healthcare

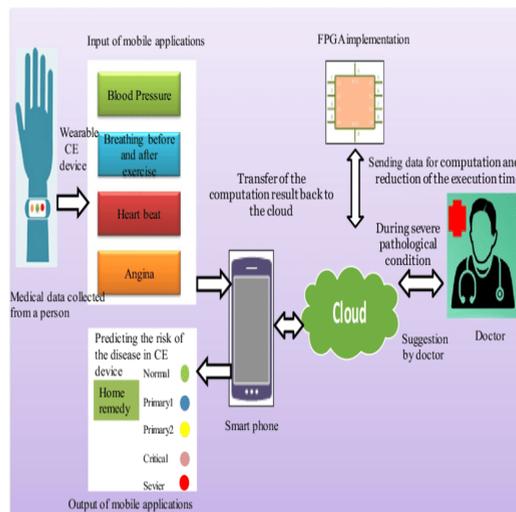


Figure 5. IoT in smart Healthcare

2.3 Cloud

Cloud computing is assisting hospitals in lowering their technology deployment expenses significantly. Cloud facilitates flawless operations for healthcare businesses due to its extensive storage capabilities, extraordinary flexibility, and inexpensive prices. Figure 4 depicts the Cloud in Healthcare systems. With the cloud, data can be accessed by anybody in the healthcare ecosystem at any time and from any device. This aids in the reduction of inefficiencies and the improvement of care quality. Smart hospitals rely on connectivity, and with the cloud, establishing connectivity, exchanging data across numerous devices and systems, swiftly analyzing data, and making insights available for informed decision-making has never been easier.

2.4 IoT

The Internet of Things (IoT) has transformed the healthcare industry. The Internet of Things (IoT) and sensors are the backbones of smart hospitals, allowing for connected healthcare. Smart hospitals can improve the quality of care while lowering the cost of care by connecting systems, processes, and workflows. Remote patient monitoring for management of remote patients with higher health risks, remote asset management for optimal utilization of hospital assets, ingestible sensors for medication adherence, patient registration and tracking sensors, and many more are some of the most commonly used IoT use cases in smart hospitals.

2.5 Wearables

Wearables are a technology that everyone in the healthcare business is required to pay attention to. Individuals' step-by-step movement, calories burned, and sleep record are all tracked by fitness tracking gadgets like Fitbit or the Apple watch. Medical professionals increasingly urge patients to wear smartwatches in order to effectively monitor their heart rates.



Figure 6a. Wearable Technology in Smart Healthcare Healthcare



Figure 6b. Wearable Devices in Smart Healthcare

Figure 6a and 6b depicts the Wearable Technology and Wearable devices in Smart Healthcare. Monitoring timely movements of the patient in the hospital is easy. However, once the patient leaves the medical facility, it is hard for doctors to keep track of patients' health. Today, wearables are capable of detecting the abnormal heartbeat and the indication of atrial fibrillation. MYIA labs have developed under-bed sensors and apps to track the respiratory rate and also the heartbeat while the patients are asleep. Diabetes is one such disease that is hitting groups of people across the globe. And it is imperative for the patients to keep a track of their glucose level. Diabetes Sentry is a wearable that traces the temperature of the skin and uses the perspiration level to note a drop in the sugar levels. Patients can now keep track of their diabetes easily and take necessary precaution to prevent the rise of same. Smart hospitals are leveraging the powers of such wearable to helps the hospital staff and doctors stay connected with their patients and help the patients keep track of their health.

3. Challenges and Opportunities

Patients and providers are expected to be seamlessly connected across various health-care systems using digital health-care systems that utilize electronic health records and use technology such as IoT and big data. These systems are also becoming more and more connected to various types of medical wearable technology that are worn for real-time health-care monitoring over the Internet.

Smart healthcare, although helping to provide better healthcare to everyone around the world, also makes it more vulnerable to dangers. The security needs for smart healthcare systems differ from standard security solutions due to their dynamic nature and smaller form factors according to Zhang et al 2014. Personal information in healthcare networks can be readily tampered with. To keep the design costs down, smart healthcare systems use low-speed CPUs with limited on-device memory, making further security methods impossible to implement according to Zhang et al 2013.

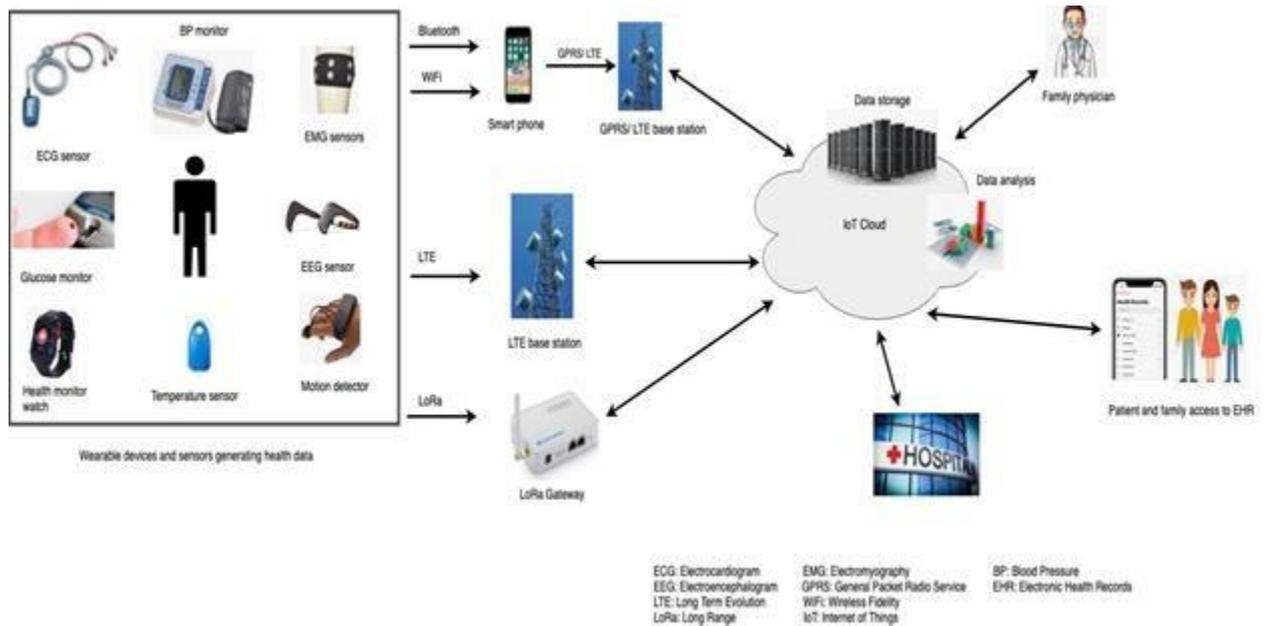


Figure 7: Challenges in Smart Healthcare

3.1 Challenges

The dispersed nature of Sensor-Cloud Infrastructure (S-CI) has revealed a unique set of obstacles for researchers in this emerging field. The following prospective research issues are depicted in this domain snapshot.

3.1.1 Lack of Standard Architecture

S-CI does not have a standard architecture in place to assure patient data privacy and security. Most studies use a hierarchical architecture. As a result, there is a pressing need to develop a common architecture for accessing PPPs in S-CI while preserving patient privacy and security.

3.1.2 Lack of Standard Dataset

Many studies have been discovered to provide cures without employing a well defined dataset. The majority of studies, according to Sajid et al [2017], employed common PPPs as their dataset, such as ECG, EGG, blood pressure, and pulse rate. Others just term it medical data or medical images, according to Shunu[2017], without identifying any specific PPPs. As a result, a standard or "golden" dataset is urgently needed.



3.1.3 Lack of Handling of Patient Behaviour and Intentions

According to Zhou et al [2015], how patient behavior and intentions are handled to drive collaboration in social networks is completely neglected. To tackle this issue, appropriate solutions and a trust model should be suggested.

3.1.4 Lack of Emergency Management

Another crucial feature of S-CI for PPPs real-time monitoring and access, emergency management, is overlooked when dealing with patient data privacy and security. Only a few studies address emergencies in their solutions according to J-X.Hu et al[2017]. There is a pressing need to deal with emergency management using realistic access scenarios.

3.1.5 Lack of Data Management in Multiple Accesses

For S-CI patient data monitoring and access, the investigations use standard and established encryption approaches. According to Lounis et al [2016], there is a tremendous need to create novel data management scenarios for the distributed environment and numerous access to PPPs among various medical entities.

3.1.6 Lack of Search Encrypted Medical Terms and Similarity Semantics

No single study has disclosed any mechanism in S-CI to search for encrypted key words of medical phrases, as indicated by Barua [2011], and to support key word similarity semantics. As a result, a search mechanism for encrypted and similarity semantics of key words in S-CI is critical.

3.1.7 Non-User-Friendly Applications

From the patient's perspective, S-CI procedures and processes should be user-friendly, especially for elderly or paralyzed patients, to make the process straightforward to follow.

3.1.8 Real-Time Implementation and Integration

In this research area, it has been noticed that procedures are simulated in an artificial environment for experimentation. As a result, Waqar's [2013] methodologies should be applied and incorporated in real time in the UEC–Eucalyptus platform to aid future advancement.

3.2 Opportunities

In smart healthcare, confidentiality is a critical security requirement. Only authorized users should have access to data that contains personal information about the user. The services or resources should only be accessible to authorized nodes and users. To confirm the peer's authenticity, at least two-level authentication must be established. The healthcare network's integrity must be maintained, assuring users that the data being transmitted and received is not tampered with or corrupted. If an interconnected device is hacked, the security system should prevent an assault on the healthcare network's information or devices. The networked devices must be self-healing to some extent, ensuring that if one fails, the impact on the healthcare network is minimal.



4. Discussion

The complexity and expense of installation are determined by the precision required of individual devices, as well as the functions and sophistication of the application for which they are utilized. VLSI, embedded systems, big data, machine learning, cloud computing, and Artificial Intelligence are all vertical areas that smart healthcare falls under. The importance, requirements, and uses of smart healthcare, as well as current industry trends and products, are discussed in this article. It provides a clearer understanding of the various platforms on which future study in this dynamic topic may be conducted.

Through interaction with top discovery engines, ensuring total IoT device visibility and risk analysis helps find and classify IoT devices on a particular network, exposing risks such as weak passwords, obsolete firmware, and known vulnerabilities. Even IoT devices with unpatched firmware or legacy operating systems should be 'virtually patched' to fix security concerns. To avoid IoT-targeted malware assaults, it's critical to detect and stop unwanted access and traffic to and from devices and servers.

5. Conclusion and Future enhancement

This article identified some of the difficulties and opportunities in smart healthcare. The paper also explored how the key technologies can be combined with smart health to provide better healthcare solutions. Healthcare solutions that are needle-free and cost-effective have always been in high demand. The shift to smart healthcare services is taking place slowly and steadily. This is mostly due to the fact that healthcare workers must be continually taught and motivated to adapt to the digital world. Finally, medical devices aren't the only targets; smart office and building management systems (BMS) assets are also great targets, whether as a gateway into the hospital network or as a target for manipulation and takeover. Though IoT-enabled smart healthcare systems can boost income and improve quality of life, the advantages can be easily outweighed if security is compromised. At both the client and developer sides, more precautions must be taken to deal with attacks and secure potentially sensitive information. While the health-care sector is increasingly interested in leveraging IoT and big data technologies to become more efficient, there are several challenges that need to be addressed before digital health care can become a widespread reality.

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Research Article

Pre-Hospital Management of Diarrhea Among Age Five Children in ILESS Community, Ogun State, Nigeria

¹Daini, Tolulope.G, ¹Sowole, Ayodele R, ¹Aborisade Monininuola V, ²Ogunfolu Abidemi I.

¹Department of Medical Laboratory Science– ²Department of Paramedic Technician Affiliation
Ogun State College of Health Technology, Ilese –Ijebu, Nigeria

Correspondence should be addressed to Daini Tolulope .G., folorunshograce@gmail.com

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Abstract

Diarrhea is the passage of unformed or watery stools occurring above three or more instances in a 24-hour period with an elevated frequency or decreased consistency of bowel movements, and it affects persons of all ages. Despite widespread global development in reducing child deaths over the last decades, diarrhea retains its place as a leading cause of mortality in children less than 5 years of age. The study is based on pre hospital management of diarrhea disease among under age five children in Ilese community. The study was a descriptive cross sectional survey involving One Hundred (100) mothers with children under age five using stratified sampling techniques. Data generated was analyzed and presented in frequency and percentage. Inferential (chi-square) analysis was conducted to test for the significant difference among means ($P < 0.05$) using SPSS version 22. Findings from this study showed adequate knowledge on diarrhea and pre hospital management in Ilese community ($X^2 = 18.85$, $P = 0.0044$) which contributed to understanding of major signs and symptoms of diarrhea such as passage of loose or watery stool. Oral rehydration ($X^2 = 22.48$, $P = 0.0010$) is the major pre-hospital management of diarrhea in Ilese community because of its effectiveness in the management of diarrhea. The knowledge of zinc treatment as management for diarrhea is significant. ($X^2 = 44.25$, $P < 0.001$) although it is not well utilized by the mothers. Therefore, oral rehydration is the only pre-hospital management that is adequately used by these mothers in Ilese community. Based on the outcome of this study, it was recommended that mothers should take the child to a health provider for ORS or intravenous electrolyte solution upon signs of dehydration as well as familiarizing with other symptoms defining medical treatment (bloody diarrhea) and health care workers should counsel mothers to begin administering suitable available home fluids immediately upon onset of diarrhea in a child.

Keywords: Children, Diarrhea, Oral Rehydration, Pre-Hospital, Ilese Community

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1.1 Introduction

Background to the Study

Diarrhea is the passage of unformed or watery stools occurring three or more instances in a 24-hour period which means an increased frequency or decreased consistency of bowel movements, and it affects people of all ages. It is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral, and parasitic organisms (WHO,2009; Dawit, 2016). Diarrhea is the second leading cause of child morbidity and mortality, especially in the developing countries like Nigeria. Globally, it is estimated that there are 2.5 billion episodes and 1.5 million deaths annually in children under five years (Black *et al.* 2010). Diarrhoea kills 2195 children every day—more than AIDS, malaria, and measles combined (Liu et al. 2012); Of 7.6 million deaths in children younger than 5 years in 2010, 64% (4.879 million) were attributable to infectious causes (Hashi *et al.* 2016) Diarrhea diseases are major causes of malnutrition, delayed physical development and early childhood mortality in developing countries and poor communities, and the major cause of death in children with diarrhea is loss of water and essential minerals (Dodicho, 2016).

The role of the mother is important in health promotion, diarrhea prevention, and management of the sick child. Care givers awareness and practice on fluid intake and child feeding during diarrhea episode are important. Mothers are the key caregivers, who determine and decide the type of food and fluids given to the child. The overall management of diarrhea depends on mother's decision. Therefore, their level of knowledge and practice on diarrhea are critically important (Peter & Umar, 2018). The usually recommended management of diarrhea is the use of oral rehydration therapy. Rice water, yogurt, soup, salt sugar solution, and clean water are also recommended home based fluids. Low osmolality oral rehydration salt (ORS) and zinc are also included as components of home management of diarrhea. Timely administrations of oral rehydration therapy and zinc tablets have proved to be of less cost and efficient as principal management to reduce deaths from diarrheal disease (Brown, 2009). Even though there was progress in advanced diagnostic methods, improved management, and increased utilization from health facility, diarrhea continued to be the main cause of morbidity and the second causes of mortality in under-five children. Diarrhea prevention and control efforts alone were less effective in reducing child mortality and should be complemented with good home management practice (Okoh and Alex-Hart, 2014; Thiam *et al.*, 2019).

1.2 Statement of the Problem

Despite the significance worldwide progress in reducing child deaths over the last decades, diarrhea remains a leading cause of mortality in children under 5 years of age. Diarrhea is a leading cause of morbidity and mortality across all age groups and regions of the world. Diarrhea remains a major cause of child morbidity and mortality globally. The World Health Organization (WHO) estimates that there are approximately 1.3 billion episodes and 3 million deaths annually in children under five years of age. Although there have been a few reports of declines in incidence rates in some specific countries, for most regions, no decline in the incidence of diarrhea was observed over the past five years. Surprisingly, the vast majority of these deaths are preventable through improvements in water, sanitation, hygiene, nutrition, breastfeeding, and immunization. It is important to note that >90% of cases of acute diarrhea can be effectively managed when equipped with adequate knowledge. Unfortunately, few young mothers do not have adequate knowledge on management of diarrhea outside hospital setting. This lack of knowledge can be due to lack of effective



attention directed towards the subject hence, this study investigates pre hospital management of diarrhea disease among under age five children in Ilese community in Ogun State, Nigeria.

1.3 Specific Objectives

Specifically, the study:

1. Knowledge of diarrhea and pre hospital management in Ilese community.
2. The use of fluid containing water, glucose, sodium and other elements as management of diarrhea in Ilese community
3. The use of zinc treatment as management of diarrhea in Ilese community.

1.4 Research Questions

- i. Is there adequate knowledge on diarrhea and pre hospital management in Ilese community?
- ii. Do respondents use fluid containing water, glucose, sodium and other elements for management of diarrhea in Ilese community?
- iii. Does respondents' management diarrhea by using zinc treatment in Ilese community?

1.5 Research Hypotheses

- i. There is lack of adequate knowledge on diarrhea and pre hospital management in Ilese community.
- ii. Fluid containing water, glucose, sodium and other elements is not used to manage diarrhea in Ilese community.
- iii. There is no significance difference between zinc treatment and management of diarrhea in Ilese community.

1.6 Significance of the study

Given the importance of diarrhea as one of the foremost causes of global morbidity and mortality, it is essential to document pre hospital management. This study gives more information on diarrhea especially the management outside hospital settings. This will help to prevent disability to have been occurring to children due to diarrheal illness. This study is carried out with the goal of consolidating available data on management of diarrhea outside hospital setting. This study will guide ministry of health and all health agencies across the country in the race to control the prevalence of diarrhea among children.

1.7 Scope of the Study

The study is based on pre hospital management of diarrhea. The study focuses on children under five years and is confined to Ilese community in Ogun State, Nigeria. Data collection is based on use of self-developed and validated questionnaire.



2.1 Review on Diarrhea

Diarrhea is a form of gastrointestinal infection caused by a variety of bacterial, viral and parasitic organisms or through contaminated food or drinking water, or from person to person as a result of poor hygienic practices. If left untreated, diarrhea can typically last several days. Diarrhea remains a major cause of mortality among under-age children (mostly under 5 years) around the world, especially in developing world (Black *et al*, 2010). The burden of Diarrhea disease seriously affects young children in developing countries whose incidence rates is high due to inadequate water, poor sanitation and suboptimal breastfeeding, zinc and vitamin A deficiency. Vulnerable children living in impoverished and undeveloped areas also have higher fatality rates compared to children living in developed countries due to lack of access to quality health care and timely intervention and effective treatment with oral rehydration solution (ORS) and zinc (Santosham *et al*, 2010). According to the African CDC report (2014), made up of an African CDC Coordinating Centre in Addis Ababa, recent mortality rate estimates in the country stood at; Malaria 20% , Lower Respiratory Infections 9% , HIV 9% , Diarrheal Diseases 5% , Road Injuries 5% , Protein-Energy, Malnutrition 4% , Cancer 4% , Meningitis 3% , Stroke 4% , Tuberculosis 4% among young adults. Diarrhea disease is the third leading cause of infant and child mortality in developing countries, (Black *et al*, 2010) and about 1.8 million children die per annum from this disease. The number of diarrhea deaths is ridiculously on the high side despite a fall in childhood diarrheal diseases from 4.6 million to 0.8 million over the last three decades. The prevalence of childhood diarrhea in Nigeria is 18.8%, with 26% of cases treated with oral rehydration salts (ORS) solution. Amongst children below five years old, diarrhea accounts for over 16 % of deaths, estimated at 150,000 annually (NDHS 2013, WHO 2009). Exposure to diarrhea-causing pathogens is frequently related to the consumption of contaminated water and to unhygienic practices in food preparation and disposal of excreta. The combination of high cause-specific mortality and the existence of an effective remedy make diarrhea and its treatment a priority concern for health services (UNICEF, 2013). The following factors are the causes of Diarrhea in children; Lack of adequate breastfeeding, Poor personal, domestic hygiene, Lack of access to safe drinking-water supplies, Bad or poor eating habits, Water pollution, Food poison and other disease causing factors.

3.1 Methodology

Descriptive survey research design was used for this study because of its suitability for data collection from relatively large number of sample at a particular time. Ilese community in Ogun State in Nigeria (where the study area falls) has a population of about 32,653 people (projection from 2006-2007 population census). It occupies an area of 409 square kilometers in Ogun State, bureau per square kilometer, the community was located under Ijebu North East Local Government of Ogun State which its head quarte is located at Atan. It has about one (1) primary school, 1 secondary school with only one Higher Institution (Ogun State College of Health Technology) located in the town. The population of this study are children under five at Ilese community.

One hundred (100) children was used for this study. Respondents were selected using stratified sampling techniques the instrument for this study was a self-developed structured questionnaire designed according to the variables to be tested in the hypotheses of this study. The questionnaire was in 2 sections (A and B,). Section A is based on demographic data of the respondents while section B is based on response to questions developed for this study. The instrument for data collection was the self-structured questionnaire which was subjected to the perusal for proper structuring and critics of the items in the questionnaire. In order to



test for reliability of the research instrument, Test-Retest method was used to establish reliability of the research instrument used for this study. Frequency, simple percentage and Inferential (chi-square) evaluation was used for testing the research hypothesis Demographic data of the respondents was subjected to simple percentage and standard deviation which was represented using bar charts.

4.1 Analysis Of Data Presentation Of Results

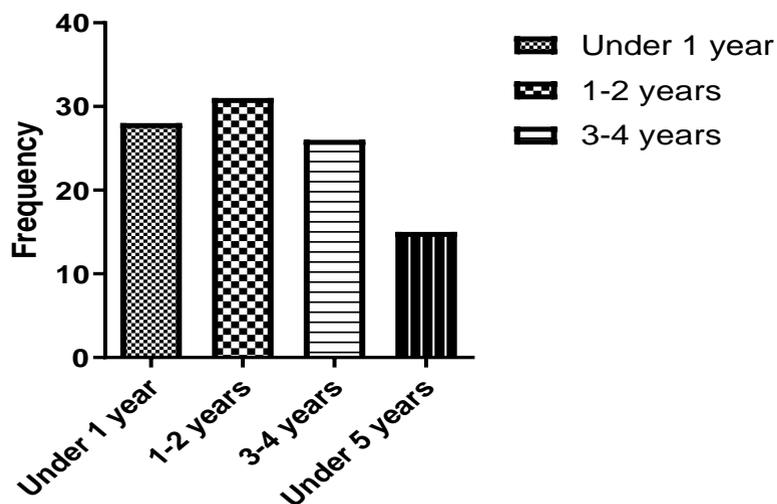
Presentation Of Personal Data Of Children

Table 1: Age of Child

Age	Frequency	Percentage (%)
Under 1 year	28	28
1-2 years	31	31
3-4 years	26	26
Under 5 years	15	15
Total	100	100

From table one, 28% of the children are under 1 year, 31% were between 1 and 2 years, 26% were 3-4 years while 15% were under 5 years.

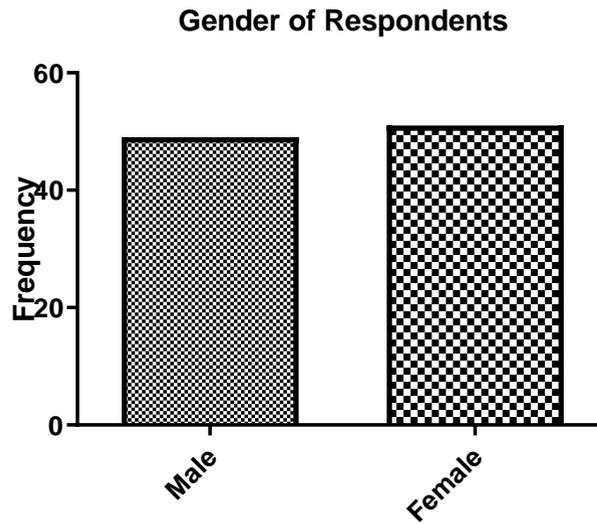
Age Distribution of Respondents



Gender of Child

Gender	Frequency	Percentage (%)
Male	49	49
Female	51	51
Total	100	100

The table above showed that 49% were male while 51% were female.



4.2 Presentation of Personal Data of Mothers

Table 3: Age of Mothers

Age	Frequency	Percentage (%)
20-29	29	29
30-39	46	46
40-49	25	25
50 and above	0	0
Total	100	100

From table above, 29% were 20-29 years, 46% were 30-39 years while 25% were 40-49 years

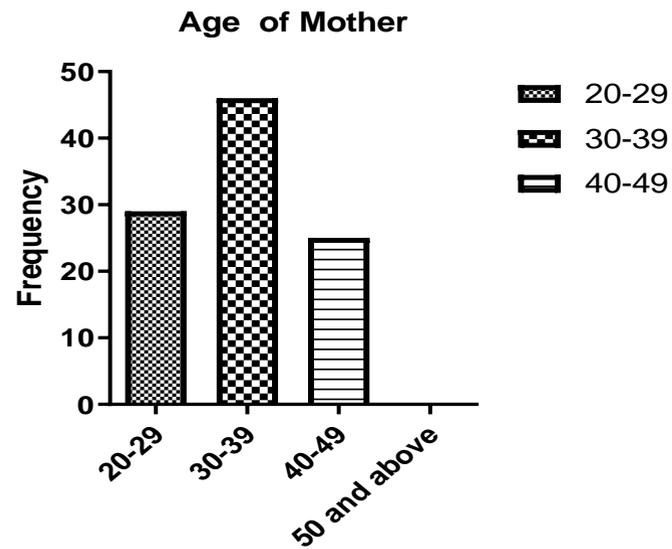


Table 4: Religion of Mother

Religion of Respondents	Frequency	Percentage (%)
Christianity	58	58
Islam	38	38
Traditional	0	0
Others	4	4
Total	100	100

Table above revealed that 58% were Christians, 38% were Muslims while 4% were not specific.

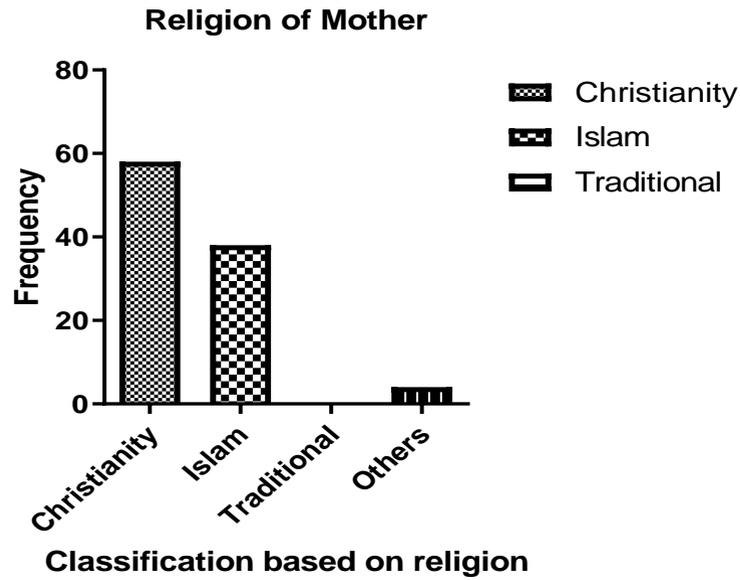


Table 5: Marital status of Mother

Marital Status of Respondents	Frequency	Percentage (%)
Single	0	0
Married	78	78
Widow	0	0
Divorced	22	22
Total	100	100

Table above revealed that 78% were married while 22% were divorced.

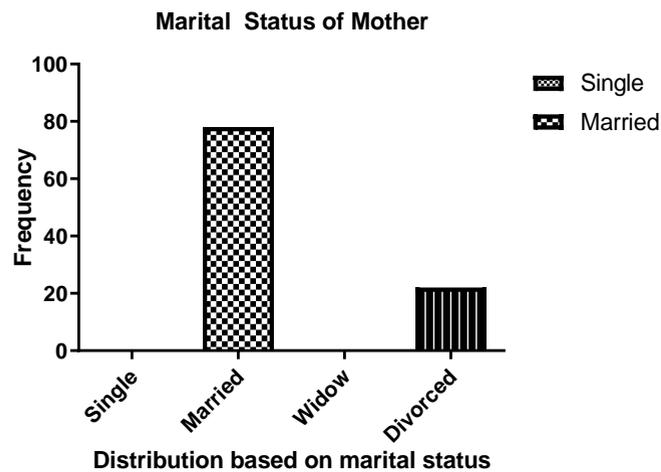
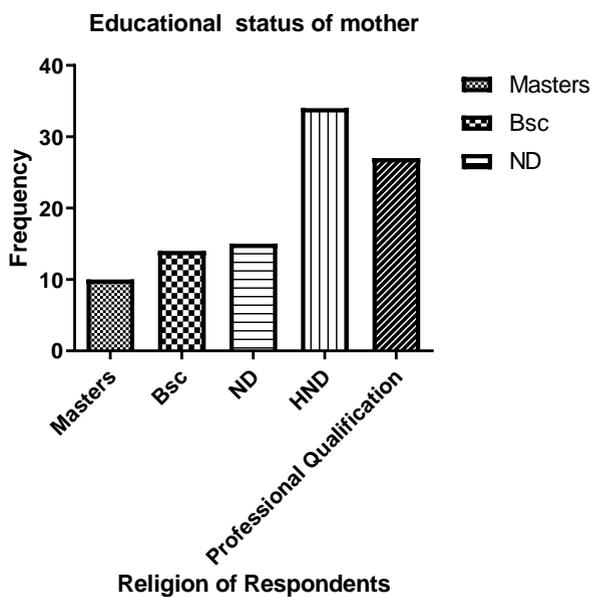




Table 6: Educational Status of Mother

Educational of Respondents	Frequency	Percentage (%)
Masters	10	10
BSc	14	14
ND	15	15
HND	34	34
Professional Qualification	27	27
Total	100	100

The table above revealed that 10% of the respondents had M.Sc, 14% B.Sc certificate holders, 15% were ND holders, 34% had HND holder and 27% had professional qualification.





4.3 Analysis of Research Hypotheses

Hypothesis one

There is lack of adequate knowledge on diarrhea and pre hospital management in Ilese community.

S/N	QUESTION	Yes	No	Total	X ²	df	Tab.	P Value	Inf.
1.	Do you think passage of loose or watery stool is major signs and symptoms of diarrhea?	98	2	100					
2.	In your opinion, does diarrhea cause death among children?	97	3	100					
3.	Do you think diarrhea is an infection of the intestine?	99	1	100					
4.	Does diarrhea infect all parts of the body?	90	10	100	18.85	6	12.59	0.0044	P<0.05
5.	Do you think there are certain age of people that are prone to diarrhea?	92	8	100					
6.	Does diarrhea increase rate of defecation?	99	1	100					
7.	Do you think acute diarrhea leads to appearance of blood in the stool ?	96	4	100					

The table above tested hypothesis one which examined knowledge on diarrhea and pre hospital management in Ilese community. Chi square value obtained was 18.85 while the tabulated value is 12.59, a P value of 0.0044 which is less than 0.05 ($P < 0.05$). The result (since the chi square value is greater than the tabulated value) showed that the hypothesis which states that there is lack of adequate knowledge on diarrhea and pre hospital management in Ilese community is rejected. This means that there is adequate knowledge on diarrhea and pre hospital management in Ilese community



Hypothesis two

Fluid containing water, glucose, sodium and other elements is not used to manage diarrhea in Ilese community.

S/N	QUESTION	Yes	No	Total	X ²	df	Tab.	P Value	Inf.
1.	Do you know what oral dehydration means?	98	2	100					
2.	Have you used fluid containing mixture of water, glucose, sodium when you had diarrhea?	94	6	100					
3.	Have you used fluid containing mixture of water, glucose, sodium when your child was having diarrhea	90	10	100					
4.	Did you notice any change in the health of your child	99	1	100	22.48	6	12.59	0.0010	P<0.05
5.	Do you think the fluid you gave your child reduced the number of stools	98	2	100					
6.	Did it take long before your child recovered after giving him/her the fluid	99	1	100					
7.	Can you recommend use of oral rehydration for management of diarrhea?	99	1	100					

The table above tested hypothesis one which examined significance difference between use oral dehydration therapy and management of diarrhea in Ilese community. Chi square value obtained was 22.48 while the tabulated value is 12.59, a P value of 0.0010 which is less than 0.05 ($P < 0.05$). The result (since the chi square value is greater than the tabulated value) showed that the hypothesis which states that fluid containing water, glucose, sodium and other elements is not used to manage diarrhea in Ilese community is rejected. It can be inferred that fluid containing water, glucose, sodium and other elements is been used to manage diarrhea in Ilese community.



Hypothesis three

There is no significance difference between zinc treatment and management of diarrhea in Ilese community.

S/ N	QUESTION	Yes	No	Total	X ²	df	Tab.	P Value	Inf.
1.	Are you aware of zinc treatment for management of diarrhea?	84	16	100					
2.	Have you used zinc treatment for management of diarrhea?	44	56	100					
3.	Do you think zinc treatment is effective in the management of diarrhea?	70	30	100	44.25	4	9.49	0.000	P<0.05
4.	In your opinion, do you think zinc treatment is used in various hospitals for management of diarrhea?	76	24	100					
5.	Can you recommend use of zinc treatment for management of diarrhea?	75	25	100					

The table above tested hypothesis three which evaluated significance difference between zinc treatment and management of diarrhea in Ilese community. Chi square value obtained was 44.25 while the tabulated value is 9.49, a P value of 0.000 which is less than 0.05 ($P < 0.05$). The result (since the chi square value is greater than the tabulated value) showed that the hypothesis which states that no significance difference between zinc treatment and management of diarrhea in Ilese community is rejected. This reveals that there is significance difference between zinc treatment and management of diarrhea in Ilese community.

5.1 Discussion of Findings

Findings from this study showed adequate knowledge on diarrhea and pre hospital management in Ilese community ($X^2=18.85$, $P=0.0044$). The knowledge acquired on diarrhea among respondents directly contributed to response among them. Majority 98% affirmed that passage of loose or watery stool is major signs and symptoms of diarrhea which may result to death if not treated on time (97%) and majority (99%) of the respondents also opined that diarrhea is an infection of the intestine which increases rate of defecation and sometimes causes appearance of blood in the stool (96%). The finding from this study conforms to the study of Dawit *et al.*, (2016). According to Dawit *et al.*, diarrhea is the passage of loose or watery stools occurring three or more times in a 24-hour period which means an increased frequency or decreased consistency of bowel movements.

Significant difference between oral rehydration and management of diarrhea was established in the study ($X^2=22.48$, $P=0.0010$). It was evident that oral rehydration is the major pre-hospital management of diarrhea



in Ilese community. This is because majority (98%) believed that oral rehydration is very effective in the management of diarrhea and 94% asserted that oral rehydration is very helpful in the management of diarrhea. 99% confirmed that oral rehydration is extremely safety therapy which can also be recommended. The finding is in line with the study of Peter & Umar, (2018). Bryce *et al.* 2020 also asserted that the mostly recommended management of diarrhea is the use of oral rehydration therapy. This is further buttressed by the study of Khalili *et al.*, (2013) who opined that level of knowledge and practice on diarrhea are critically important. The knowledge of zinc treatment as management for diarrhea is significant. ($X^2=44.25$, $P=0.000$). Majority (84%) are aware of zinc treatment for diarrhea. Although majority (56%) have not used zinc treatment for management of diarrhea but opined that it is effective (70%) and is used in hospitals.

6.1 Summary and Conclusion

There is adequate knowledge on diarrhea and pre hospital management in Ilese community. The knowledge acquired contributed to understanding of major signs and symptoms of diarrhea which include that passage of loose or watery stool, increases rate of defecation and appearance of blood in the stool which may result to death if not treated on time. Oral rehydration is the major pre-hospital management of diarrhea in Ilese community. This is effectiveness in the management of diarrhea which makes it look very helpful and safe. Oral rehydration is only the pre-hospital management that is preferred and used in Ilese community. People in Ilese community have knowledge of zinc treatment, are aware that zinc treatment is used in hospitals but have not used it therefore, oral rehydration is the first hand pre-hospital management of diarrhea.

6.2 Recommendations

- Mothers are advice to be neat, avoid dirty environment and understand signs of dehydration and take the child to a health provider for ORS or intravenous electrolyte solution as indicated as well as familiarizing with other symptoms refining medical treatment (bloody diarrhea).
- Government should provide and create clean water and environment for the populace
- Health Care Workers should counsel mothers to begin administering suitable available home fluids immediately upon onset of diarrhea in a child. Then treat dehydration with ORS solution (or with an intravenous electrolyte solution in cases of severe dehydration) and emphasize continued feeding or increased breastfeeding during, and increased feeding after the diarrheal episode.

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Article

Health Education for Social Change: A Strategy for Public Health development in Nigeria

Ibeka Paschal Onyekachi

Department Of Microbiology IMO State University Owerri, Nigeria

Correspondence should be addressed to Ibeka Paschal Onyekachi, ibekapaschal@gmail.com

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Abstract

Health education is one of the means of implementing health promotion and disease prevention programs. Studies have shown that the global economic challenges, social and environmental factors are the causes of many diseases and behaviours that are associated to illnesses. Health education provides information to target population on a particular health topics, including health benefits and threats they faced, thereby providing tools to build capacity and support behavioural changes in an appropriate settings. This paper explains the strategies through which health education improves health development in Nigeria, importance of health education, community health education and government policy and the economic importance of health education. Health education can help to boost the economy by reducing healthcare spending and lost productivity due to preventable illness.

Keywords: Health Education, Importance of Health Education, Community health education and Government policy, The Economic importance of health education, Health Education for social Change

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1.1 Introduction

The practice of health education in Nigeria has been in existence for centuries. As far back 1950 's. It was common to observe in primary and secondary schools and in teachers training institutions. Teachers inspecting children for cleanliness when children are found to be untidy or in need of immediate health attention. They were usually sent home or given first aid or sent to appropriate health providers.

The roles of health education in promoting health in Nigeria cannot be over emphasized. It has gone a long way to revert the health sector and the delivery system in terms of saving lives and the betterment of the populace.

1.2 Health Education

Health is the extent to which an individual or group is able to realize aspirations and satisfy needs and also change or cope with the environment. Health is the level of the general condition of a person's mind and body, usually meaning to be free from illness, injury or pain (as in "good health" or "healthy"). The World Health Organization (WHO) defined health in its broader sense in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Health education is the profession of educating people about health. Areas within this profession encompass environmental health, physical health, social health, emotional health, intellectual health, and spiritual health. It can be defined as the principle by which individuals and groups of people learn to behave in a manner conducive to the promotion, maintenance, or restoration of health. However, as there are multiple definitions of health, there are also multiple definitions of health education. The Joint Committee on Health Education and Promotion Terminology of 2001 defined Health Education as "any combination of planned learning experiences based on sound theories that provide individuals, groups, and communities the opportunity to acquire information and the skills needed to make quality health decisions." The World Health Organization defined Health Education as "compris[ing] [of] consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health.

1.3 Health Education in Nigeria

As well as health education in Nigeria is a concurrent responsibility of the three tiers of government in the country. Private providers of health care have a visible role to play in health care delivery. The federal government's role is mostly limited to coordinating the affairs of the university teaching hospitals, Federal Medical Centres (tertiary health care) while the state government manages the various general hospitals (secondary health care) and the local government focus on dispensaries (primary health care), which are regulated by the federal government through the national Health Care Development Agency (NPHCDA). A long run indicator of the ability of the country to provide food sustenance and avoid malnutrition is the rate of growth of per capita food production. Historically, health insurance in Nigeria can be applied to a few instances: free health care provided and financed for all citizens, health care provided by government through a special health insurance scheme for government employees and private firms entering contracts with private health care providers. However, there are few people who fall within the three instances.



In May 1999, the government created the National Health Insurance Scheme, the scheme encompasses government employees, the organized private sector and the informal sector. Legislative wise, the scheme also covers children under five, permanently disabled persons and prison inmates. In 2004, the administration of Obasanjo further gave more legislative powers to the scheme with positive amendments to the original 1999 legislative act.

2.1 Importance of Health Education

Health education programs help empower individuals and communities to live healthier lives by improving their physical, mental, emotional and social health by increasing their knowledge and influencing their attitudes about caring for their well-being.

Health education focuses on prevention, increasing health equity, and decreasing negative health outcomes such as availability and accessibility of health services, benefiting all stakeholders.

Health education utilizes several of the effective educational tools available for spreading awareness among people regarding their personal health. In our community health care center, a team of medical professionals and support staff offers basic information to the patients concerning their health and those in their family. Health education relies on the principle of “prevention is better than cure” and therefore makes aware the patients about their overall health status and measures to maintain and improve it. The importance of health education and preventive services lies in its valuable contribution to the education of the community. By adopting effective educational tools and resources available, our health care providers aid in propagating the message of good health. Our holistic approach to health education extends to all the areas of wellness such as physical, psychological, social, and spiritual.

Efficient programs implemented through health education in Nigeria certainly influence the overall community, thereby prompting the individuals to become more conscious regarding their personal health. Some of the key services offered by health education and preventive services are: Conducting presentations and classes for patients covering a range of topics like sexual and reproductive health, disease prevention, general well-being, stress management, and nutrition.

Special awareness programs for patients diagnosed with diabetes and hypertension that includes the numerous ways to cope with having the disease as well as in minimizing its effects on the body.

Mental health initiatives for college students and elders that comprise of detailed presentations and exercises designed to boost the psychological well-being of an individual.

Alcohol and drug prevention programs, offering a comprehensive review of the harmful effects in relying on such addictive substances. It also includes counselling and awareness programs aimed at vulnerable individuals like school and college students.



2.2 Community Health Education

Roles of health education has been described as “the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals.” It is concerned with threats to the overall health of a community based on population health analysis. Public health has many sub-fields, but typically includes the interdisciplinary categories of epidemiology, biostatistics and health services. Environmental health, community health, behavioral health, and occupational health are also important areas of public health.

The focus of health education is to prevent and manage diseases, injuries and other health conditions through surveillance of cases and the promotion of healthy behavior, communities, and (in aspects relevant to human health) environments. Its aim is to prevent health problems from happening or re-occurring by implementing educational programs, developing policies, administering services and conducting research. In many cases, treating a disease or controlling a pathogen can be vital to preventing it in others, such as during an outbreak.

Health education also takes various actions to limit the health disparities between different areas of the country. One issue is the access of individuals and communities to health care in terms of financial, geographical or socio-cultural constraints to accessing and using services.

2.3 Economic Importance of Health Education

Health education can also boost a community’s economy by reducing healthcare spending and lost productivity due to preventable illness. Obesity and tobacco use, for example, cost Nigeria billions of naira each year in healthcare costs and lost productivity. Health and education are two closely related human capital components that work together to make the individual more productive and therefore promote economic growth

Healthy and educated citizens are productive and better prepared to face the future. Health and education is a fundamental driver for economic growth and development. In economic parlance, it is believed that health and education are the two crucial factors for human capital development and as such have been demonstrated to be the basis of an individual’s economic productivity.

According to Ewurum et al (2015) given poor health infrastructure, illness and disease shorten the working lives of people, thereby reducing their lifetime earnings. Strauss and Thomas (1998) and Schultz (1999) opined that good health has positive effects on the learning abilities of children, which leads to better educational outcomes in school completion rates, higher mean years of schooling, achievements and increases the efficiency of human capital formation by individuals and households which ultimately impact the economy.

2.4 Health Education for Social Change

Recognizing that health improvement activities and performance monitoring imply the need for change in communities, the committee for health in Nigeria sought to explore some of the theories of social change



and how they might relate specifically to health and health care. It was noted that change is ubiquitous today in health care systems, health care policy, and social policy and is occurring in multiple dimensions.

Change is not linear. It occurs in a specific context and is subject to complicated interactions. Change is a process of transition; therefore, it is fruitful to study both the change process and its outcome. To determine whether an outcome is causally related to a particular intervention, it is necessary to study the process of change linking the intervention and the outcome. The suggestion was made that natural experiments provide unique opportunities to study change and deserve more scrutiny than they currently receive.

Change at the individual level is described by several models. The “stages of change” model was developed to describe smoking cessation. Readiness for change progresses through stages of precontemplation, contemplation, action, and maintenance. For maximum impact, health interventions are chosen with attention to the individual’s stage of readiness.

An organizational model of change described by Lewin (1976) is based on a three-stage process that includes “unfreezing” the old behavior, cognitive recognition of the need for a new behavior, and “refreezing” the new behavior. This description is accurate for many organizational change processes. In health care, however, change is currently so rapid that behaviour is in a seemingly constant state of unfreezing and refreezing.

3.1 Conclusion

The roles of health education in promoting health in Nigeria cannot be over emphasized. It has gone a long way to revert the health sector and the delivery system in terms of saving lives and the betterment of the populace.

Also, traditional medical practices are very much a part of the health care delivery system in Nigeria today as they were during and before the struggle for independence. Health care during the period of independence was oriented primarily to curative rather than preventive care. For example, as a result of the poor attempt to establish preventive programs, measles remained the greatest killer of children. By this time, the WHO had proven beyond reasonable doubt that proper execution of preventive programs can eradicate deadly diseases, and indeed, small pox was almost non-existent in Nigeria at this time.

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Research Article

An analytical study on the impact of overpopulation in the context of Sustainable Development and Public Health

Chiranjib Mitra

S. Roychowdhury

Indian Institute of Social Welfare and Business Management, Kolkata, India

Correspondence should be addressed to Chiranjib Mitra, chiranjibmitra9@gmail.com

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Abstract

In the present era, among all the other predicament, the human kind suffering most from, is the overburden of population, which has been considered a contemporaneous issue throughout the globe, The population-density tendency today is delineated by an incremental branching across the developed and developing countries. The humanity had already witnessed grievous natural calamities as a result of environmental consequences. Hence the purpose of this study is to understand the aftermath of overpopulation towards sustainability considering the 3 pillars of sustainability namely environment, society, and economy and also on the public health. The researcher seeks to find out the factors associated with the population hindering the sustainable development of a developing country which had been done through exploratory factor analysis. Several hypotheses had been formed to understand the significance of impact of overpopulation on economy, environment, society and public health through several parametric and non-parametric tests. This study is combination of exploratory and descriptive research design and a single questionnaire had been created and administered in different areas of the study to understand the awareness level of the population by the researcher. Finally, this study will elucidate the consequences of overpopulation precisely in context of sustainable development and public health.

Keywords: Overpopulation, Sustainable development, public health, Exploratory factor analysis.

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1.1 Introduction

There exists a close and reciprocal relationship between population growth and sustainable development in a country. The population creates a source of labor that could be used to fasten the country's production. On the other hand, it could also be seen as a consumer group that uses and exhausts a large quantity of the country's resources. However, certain researchers from the earlier times have pointed out that the increase of population and the rapid growth of population in a country is tied to its economy. But the opinion of some other researchers is that though the population can increase exponentially in a country, its environmental resources are limited, and as a consequence this could prove to be a barrier to the sustainable development of the country. In the midst of these arguments the demographic transition theory attempts to clarify the relationship between population growth and sustainable development. Those who viewed it in a different way have adopted a benign attitude towards mass increase; that is, they considered it is not necessary to control the population growth of a country. According to them the increase in population does not bring bad results all the time. The pessimists look this situation differently and assert that if a country is to attain a higher state of development, the population growth should be reduced. That is, they claim that during the process of sustainable development population growth should be controlled. The social science researchers are of the opinion that an increased fertility rate and the resulting huge population growth act as a damper on sustainable development. The main objective of this paper is to examine the literature on the inter-relationship between population growth and sustainable development from both an optimistic angle as well as from a pessimistic angle. We can also consider the effect of sustainable development on population growth. In a country that has not yet attained satisfactory sustainable development, the birth and death rates will be rather high. When a country enters an era of sound sustainable development, more nutritious food will be consumed by the people and advanced medical care will also improve the life expectancy of the people. Due to the medical advances, ample supply of food items, and better sanitation brought forth by sustainable development there will be a sharp drop in the death rate.

2.1 Literature review and research gap

According to optimists like Balon (2012), development in a country without population growth will cause problems. When the population increases, they expect the savings and investments also to increase. When the population decreases, the production, capital accumulation, employment, incomes and savings will also decrease and may negatively affect the development.

As per Bhalla (2018), modern time environmental issues have fueled the production and marketing of electric vehicles from the year 2018. The concept of over population has revolutionized the Indian economy and also it had stated the perception that from economical perspective Indian market is considered to be the best market around the globe for global auto makers as it consist of cheap labors, geo-economic advantages, huge customer-base and also cheaper production cost, hence it is very much favorable for the automobile industries to implement such concept in the market.

It is evident that control of population explosion can and must have an instrumental role in reducing the emission of greenhouse gases in the environment, but it cannot be expected to have an immediate effect, with proper awareness and policies it can be achieved as stated by Gayathri (2016).

Hundal (2015) had stated that, in the last few years the concern towards ecological aspects and its degradation has been insulated more then ever. In spite of the fact, that there are multiple differences in the



opinion but still when it comes to safeguard the natural resources irrespective of different perception, they have illuminated harmonical uniformity of opinion.

As the environmental issues have been the major concerns for almost all the sectors in the society the organizations and the employees must work together with collaboration in order to achieve the sustainability spectrum within the organization as stated by Searcy (2009).

There are more pertinent branches of branches of management, however among all other, mass management stand out especially when it comes to technical front as per Seuring (2008).

As per Sukati (2012), the growth of population will cause a strong demand for goods that will make it possible to establish a good market as well as increase the demand for capital and population growth will speed up economic development.

According to Verma (2006), due to the present challenging condition and market saturation the structure of supply chain has become more composite in nature and along with that understanding and controlling, monitoring with this situation has become more difficult.

Sustainable development in context of eco-friendly cars is a new concept with two-dimensional approach, which apparently a new concept in the recent trends. Most of the research concentrated on the operations even emphasized on the sustainability aspects in terms of the synergy between technology and environmental aspects but there are very limited literatures available on these aspects in context of population growth and sustainable development. This research seeks to find out the factors that are essential and plays a pivotal role in implementing environmentally friendly practices in the organization.

2.2 Objective of the study

Main objective of the present study is to identify the factors affecting the implementation or impact of population explosion on the sustainability or sustainable development of the nation, followed by the understanding of the factors (independent) extracted from the different variables on the dependent variable, which is sustainability aspect of the population.

3.1 Research Methodology

This study includes the analyses using a combination of exploratory and descriptive research designs with a major focus on making use of inferential statistical procedures. The primary data was collected from eighty employees from various organizations of Kolkata with different job positions and responsibility and the secondary data was collected from websites, journals, magazines etc. Exploratory factor analysis (EFA), chi-square tests for independence of categorical variables, step-wise regression model, have been used to analyze the data with the help of the statistical software SPSS v.25.

A structured set of questionnaires were used for collecting the primary data, which was consists of questions for understanding the importance level towards implementing sustainability, the perception level towards eco-friendly cars, measured with the questions collected on a 4-point scale, where '1' represents lowest perception level, '4' indicates the highest.

First the relationship between main characteristics of the sustainability and their perception, awareness level has been examined using Pearsonian chi-square (χ^2) test, a nonparametric test.



Next an exploratory factor analysis (EFA) has been done to identify the factors that mainly influence the organization to sustainable production system for eco-friendly cars. For the purpose of scale reliability, Cronbach alpha has been also obtained. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test have been used, respectively, for assessing sampling adequacy and testing sphericity. Finally, a step-wise regression model has been used to establish a relationship between importance level towards sustainability and the major factors, extracted by the method of factor analysis, which may influence the implementation decision, from which it will also be evident that which of the extracted factors have more effect on importance level of the organization to implement such system for production of eco-friendly cars.

4.1 Data analysis: Results and discussion

This section explains the results of (i) factor analysis, which identifies major factors of population explosion that affect sustainability, (ii) step-wise regression analysis, from which how the sustainability depends on various identified factors can be obtained.

I. *Exploratory factor analysis*

Study reveals that there are twelve essential parameters that are used for understanding the factors of population explosion that influence in achieving the sustainable development. In order to understand the consistency of the data collected, Cronbach alpha has been computed as a measure to assess the reliability, which ranges from 0 and 1.

Table 2. Reliability statistics

Cronbach alpha	Number of items
0.812	12

Table 2 shows the value of Cronbach alpha as 0.812, which is a high value from which it can be inferred that there is a presence of internal consistency of the items in the scale, and also it does not mean that the scale is one-dimensional and also the scales used for measuring sustainability which is reliable enough to understand and interpret. Here twelve parameters have been considered with Likert scale, which gives a reliable scaling measure through Cronbach alpha value. The crucial parameters found are as follows:

1. Unavailability of agricultural land
2. Land and soil degradation
3. Preservation of forest
4. Scarcity of food grains
5. Loss of Bio-diversity
6. Change in consumption pattern
7. Rising demand for energy
8. Air pollution
9. Water Pollution
10. Global warming and climate change
11. Unemployment
12. Abated inclusive growth



The KMO measure of sampling adequacy has been used to indicate the proportion of variance in variables that might be caused by underlying factors, e.g., high values (close to 1.0) generally indicate that a factor analysis may be useful with the data.

Table 3. KMO and Bartlett's test result

Kaiser-Meyer-Olkin measure of sampling adequacy	0.720
Pearsonian chi-square test-statistic (for Bartlett's test of sphericity)	375.400
Degrees of freedom (df)	66
<i>p</i> -value (for statistical significance)	.000

Table 3 shows that the *p*-value in Bartlett's test is less than 0.05, as a result of which it can be concluded that the statements are significant at level 0.05 (two-tailed test).

In this research, EFA has been used to explore the various dimensions of sustainability towards implementation in automobile industry. Principle component analysis has been used with varimax rotation depending on the assumption that any extracted factor important to attributes of the electric vehicles should be inter-related. Eigen value of 1 has been used as cut-off value for extraction. Four-factor structure with the extracted factors explaining 70.8% of the total variance has been identified. The KMO measure yields a value of 0.72, indicating that the data were suitable for factor analysis.

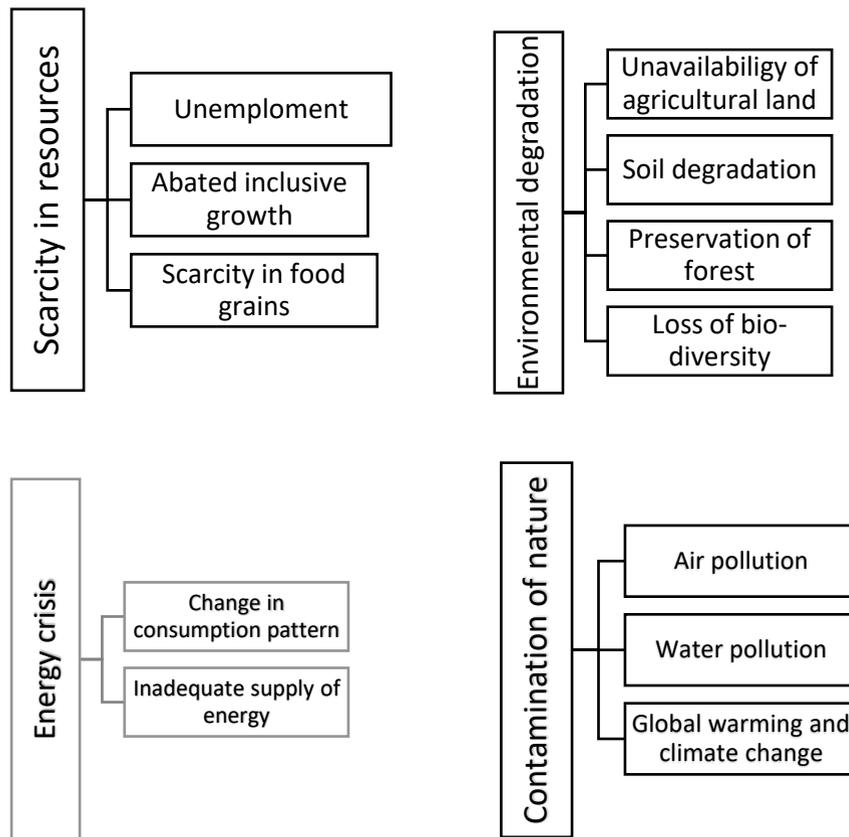


Figure 1. Factors affect the automobile industry towards sustainability

Figure 1 displays the four factors extracted from the twelve through EFA. For all of these four factors, the eigen values are more than 1. The grouping is based on the rotated component matrix. These four factors can be named as scarcity in resources, energy crisis, environmental degradation and contamination of nature. All of these factors are associated with sustainability and ecological aspects of the organization which can be achieved with effective and systemized implementation of eco-friendly practices within the organization.

III. Step-wise regression model

A step-wise regression have been done with all four factors to measure the sustainability of the organization. This stepwise regression model also shows how these four independent variables, viz., scarcity in resources, energy crisis, environmental degradation and contamination of nature, are impacting the dependent variable, *Y*, the sustainability.

Initially it started with the correlation analysis with every independent variable with the dependent variable that has been shown in table no. 4

**Table 4.** Pearson correlation value

Variables	Sustainability (Pearson correlation)
Contamination of nature	0.785
Energy crisis	0.762
Environmental degradation	0.712
Scarcity in resources	0.305

It can be seen that the highest correlation value with the importance level towards sustainability is with contamination of nature with 0.785 followed by energy crisis with 0.762 then environmental degradation with 0.712 and lastly Scarcity in resources with 0.305, now the step-wise regression can be done to understand the final independent variables that can be selected for the final multiple regression model.

The process will start from regression analysis with importance level towards sustainability considering it to be dependent variable (Y) and Contamination of nature(x) and then all the variables as per their correlation values they will be added sequentially and after adding each of the independent variables the R² values will be measured to witness if there is any significant change or not.

Table 5. R² values

Variable names	R ² values
Contamination of nature	0.616
Contamination of nature and energy crisis	0.703
Contamination of nature, energy crisis, and environmental degradation	0.728
Contamination of nature, energy crisis, environmental degradation, and scarcity in resources	0.825

From table no. 5 it can be understood that when Contamination of nature variable is added with energy crisis variable the change in the R² value is quite significant similarly, when this both of the variables are added with environmental degradation variable the value has also increased and in the same manner when scarcity in resources have been added it also increased to 0.825 hence it can be concluded that all the variables can be included while running multiple regression model. Hence the final regression equation is as followed-

$$Y = 0.057 + 0.158x_1 + 0.350x_2 + 0.187x_3 + 0.301x_4$$

Here

X_1 = Contamination of nature

X_2 = Energy crisis

X_3 = Environmental degradation

X_4 = Scarcity in resources



5.1 Conclusion

In recent years, the elements of sustainability in an organization had been changed drastically, there had been a conglomeration and inclusions of several multidimensional aspects, which had given the understanding of optimum utilization of sustainability aspects in an organization towards a new direction. With the technological advancements, the corporates have realized the importance of sustainability and its implications. Sustainable development has been one of the most technical driven branches among other management branches. From the above research, it can be concluded that most of the organizations are aware of the growing concern of global warming and the importance of sustainability and also there had been certain factors that are considered for implementing sustainability aspects in the organization. The automobile industries are now being very much motivated and technological driven in indulging themselves in various measures to maintain certain protocol so that environmental goals can be achieved. They have also understood the need of being socially aware and their contribution to the society. As sustainable developmental practices are now being treated as one of the cataclysmic social responsibility of the organizations which are now adopting and implementing the viable and sustainable practices in almost all the areas of a company, not only to survive in the competitive age but also to stimulate the growing concern of environmental aspects in the society.

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Research Article

Health Expenditures and Its Outcomes in India

Dr R. Ramachandran

Assistant Professor, Department of Economics, Sona College of Arts and Science, India

Correspondence should be addressed to Dr R. Ramachandran, ecoramttl@gmail.com

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Abstract

The level of infant and child mortality is a useful indicator of development in any societies. High rates of maternal mortality contribute to excess female mortality in the reproductive years, the mortality rate being more than 50 per cent higher for females than for males. Maternal mortality rates in India are among the highest in the world, and more than 50 times the average for industrialized countries. In this context the present study based on secondary data collected between 2001- 2018 in Sample Registration System (SRS) Bulletins. Female education, empowerment, attitude of health care workers and distance of health facilities to the people in most communities are factors to be addressed in reducing child morbidity and mortality rates and improving maternal health, thus achieving the Millennium Development Goals (MDGs) 4 and 5. To get this done, policy makers, health personal and community at large should join hands.

Keywords: IMR, MMR and MRMBS.

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1.1 Setting

The level of infant and child mortality is a useful indicator of development in any society. India has a high maternal mortality ratio - approximately 453 deaths per 100,000 births in 1993. This ratio is 57 times the ratio in the United States. India's maternal mortality ratio (MMR) is a cause for concern as it constitutes 15 percent of the total global maternal deaths. The MMR was 280 per 1,00,000 live births in 2005 and it came down to 174 per 1,00,000 live births in 2015 (WHO et al 2015). The trend of excess female mortality is pronounced till the age of 35. High rates of maternal mortality contribute to excess female mortality in the reproductive years, the mortality rate being more than 50 per cent higher for females than for males. MMRs in India (at 500 per 100,000 live births) are among the highest in the world, and more than 50 times the average for industrialized countries. Vora et al., (2009) estimated that of 5,36,000 maternal death occurring globally each year 1,36,000 take place in India. Estimates of the global burden of disease for 1990 also showed that India constituted 25 percent to disability Adjusted Life Year (DALY) lost due to maternal condition alone. Half of the pregnant mother still does not complete three Ante-natal Care (ANC) visits and a quarter does not receive Tetanus (TT) prophylaxis. Frequent pregnancies compound a woman's lifetime risk of dying from maternity-related causes. The absence of trained attendance at birth for the majority women contributes greatly to high rates of maternal mortality.

Recently, a number of economists have developed macroeconomic theories that integrate an account of the demographic transition with theories of long-run economic growth. However, in most cases these studies have concentrated on the fertility aspect of the demographic transition, while abstracting from mortality decline (Galor and Weil 2000, Greenwood and Seshadri 2002). Demographers, in contrast, have pointed out that in many countries mortality decline preceded fertility decline, which suggests a causal link from falling mortality to falling fertility. Falling mortality rates lower the cost of having a surviving child, hence net fertility¹ actually increases, not decreases, as mortality declines (Boldrin and Jones 2002; Fernandez-Villaverde, 2001). Poor health has repercussions not only for women but also their families. Women in poor health are more likely to give birth to low weight infants. They also are less likely to be able to provide food and adequate care for their children. Finally, a woman's health affects the household economic well-being, as a woman in poor health will be less productive in the labor force. The present study focused on maternal and child health care expenditure and their outcome.

2.1 Review of Literature

Fernandes et al., (2021) noted that health insurance coverage reduces the rates of out-of-pocket payments associated with the use of MHC services utilization. Such payments may pose as financial barriers to women when accessing maternal healthcare services. Interestingly, women who were covered by health insurance were less likely to use skilled birth attendance during delivery. It is founded that evidence for education, marital status, wealth index and parity influencing respondents to completing the four recommended ANC visits. As observed with the first key maternal health service, educated women are more informed of pregnancy-related risks and will thus adhere to completing the required amount of ANC visits in comparison to lower and none educated women.

Mohanty and Kastor (2017) revealed that the NHM is effective in increasing in utilization, continuation of services in public health centres and reducing OOPe and CHS in public health centres on maternal care. We suggest that the cash incentive under NHM should continue and private health care providers should be regulated with respect to pricing and quality of care. The program should focus on improving the quality



of services in public health centres. Besides, we recommended that the forthcoming health survey (NSS) should integrate an abridged version of the consumption schedule, question on expenditure on home delivery and a separate code for caesarian and normal delivery is recommended.

Govil et al., (2016) explored that 66 percent of the women received incentives under JSY. Almost all women who delivered at public health facilities received JSY incentives (96 % had already received and 4 % were about to receive at the time of survey). More than half of the respondents (57 %) had received any postnatal care (PNC). All women reported the total cost on antenatal care, only 23 % could provide the expenditure incurred on various services during antenatal care. The share of medicine in OOPE was 59 % followed by sonography (18 %), blood tests (8 %), transportation (8 %) and doctor consultation (7 %). It varied almost in the similar proportion among women who received antenatal care exclusively from public facility, private facility or from both public and private facilities.

Ahmed Shoukry Rashad1 and Mesbah Fathy Sharaf (2015), suggested that reducing reliance on OOP health expenditures, and increasing public health investments would not only increase access to healthcare, and subsequently improve citizens' health, but also would protect households from financial risks arising from health payments. This paper urges further research on the optimum amount of funds that are needed for achieving universal healthcare coverage in Egypt. The risk of catastrophic health expenditure was higher among rural households, those with no health insurance, households whose head was not employed, households with young children, and those with a chronically sick member. Anti-poverty policies in Egypt should target vulnerable households with high risk of experiencing catastrophic health expenditure.

Mukherjee et al., (2013) examined that the depth of catastrophic expenditure was higher among women belonging to households from lower MPCE quintiles compared to those belonging to higher consumption quintiles, both in rural and urban areas. The mean overshoot among women from Christian households in rural areas was highest (Rs.1182) followed by Hindus (Rs.575) and Muslims (Rs.499). The overshoot among women from Christian households was highest (Rs.1434) in urban areas as well, followed by women from Muslim households (Rs.1313). The poor people face the highest burden in relative terms despite the fact that they spend less in absolute terms and most of the maternal health care services in government health facilities are free of cost. The percentage share for catastrophic OOP expenditure was slightly lower for urban households than their rural counterparts. It may be due to better government health services and relatively higher income of households in urban areas.

Van Minh et al. (2013) examined the catastrophic and poverty impacts of OOP health expenditures in Vietnam, and found that between 2002 and 2010, 4 to 5% of households have incurred catastrophic health expenditure, and between 3 to 4% of households have been impoverished because of OOP payments for healthcare.

Tiziana Leone et al., (2012) considered 9,643 households where at least one woman used maternal health care services during the year preceding the survey. Of these, 26 % of the households had missing data on antenatal care (13 %), delivery (5 %) and postnatal care (8 %). The average indirect expenditure for delivery care is even higher than the direct expenditure, suggesting substantial OOPE for delivery care in public health facilities. In contrast, the direct costs for delivery care in private facilities are much lower than the indirect costs. It is likely that the direct expenses in private health facilities also include accommodation costs. The expenditure for delivery care in public health facilities in poor states such as Bihar, Uttar Pradesh, Madhya Pradesh and Orissa is substantially higher than the national average. The use of maternal health care is also significantly low in these states. By contrast, the costs associated with delivery care in private



health facilities appear to be more in economically well-off states such as Goa, Himachal Pradesh, Delhi, Punjab and Kerala

3.1 Methods

The present study based on secondary data collected between 2001- 2018 in Sample Registration System (SRS) Bulletins. Apart from schemes under the National Health Mission (NHM), State specific land mark initiatives such as Dr.Muthulakshmi Reddy Maternity Benefit Scheme (MRMBS), Birth Companion Programme (BCP), 24x7 delivery care services in all Primary Health Centres (PHCs), Birth waiting rooms, Accessible blood bank and Storage Centres, Menstrual Hygiene Programme, Chief Minister's Comprehensive Health Insurance Scheme etc., have contributed significantly towards the improvement of health indicators. In addition to these schemes, strengthening of Basic Emergency Obstetric and Newborn Care (BEmONC), Comprehensive Emergency Obstetric and Newborn Care (CEmONC), Maternal and Child Health level-II centres apart from upgradation of facilities are pioneering schemes which have later been adopted by many other States in India particularly in Tamil Nadu. The inter district disparities and the intra district challenges are also being addressed by implementing need based local initiatives, like prior admission of high risk mothers in birth waiting rooms, hiring the services of Obstetricians and Anaesthetists etc. The State has also announced the two nutrition kits for the pregnant women and also announced that conditional grant is also extended to Higher Order Births (HOB) with a view to encourage them to accept contraception to prevent further pregnancies which is expected to result in improving outcomes on these critical indicators.

4.1 Analyses and Discussion

In Tamil Nadu, department of health has 1,806 Primary Health Centres (PHCs) in rural areas including 422 Upgraded PHCs, 320 Primary Health Centres in urban areas other than Chennai and 8,706 Health Sub Centres (HSCs). 140 PHCs are functioning in Chennai Corporation limits. Tamil Nadu is one state to provide health care free of cost. ANC, investigation, AN feeding, intranatal care, postnatal services including infant care, transport are provide as “cashless service and free drugs and consumables, free diet up to three days during normal delivery and up to seven day for C-section, free diagnostics and free blood wherever required. The state government has launched a revised MRMBS from 01-06-2011 by enhancing the maternity benefit to the poor pregnant women mothers from Rs.6000 to Rs.12000. The cash assistance is given in three installments on a conditional basis and restricted to two deliveries, from 1st October 2012 benefit the scheme are disbursed directly to the bank account of the beneficiaries through electronic clearing system.

Under the MRMBS aimed at reducing IMR and MMR, the State Government has already enhanced the assistance from Rs.12, 000/ to Rs.18, 000/- per beneficiary. An amount of Rs.4,000/- from this assistance will be used for providing “Amma Maternity Nutrition Kit” comprising iron tonic and nutrition supplements to reduce anaemia amongst the pregnant women and improve the birth weights of infants. In the Budget Estimates of 2018-19, Rs.1, 001.33 crore has been allocated for this flagship scheme. On an average, six lakh women benefit from the scheme every year. The following figures show that amount disbursed to beneficiaries through MRMBS in Tamil Nadu.



Figure -1: Amount Disbursed to Beneficiaries (Rs. In crore)

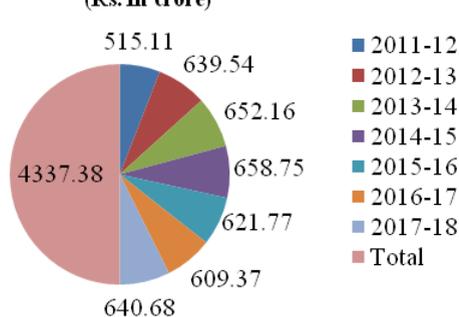
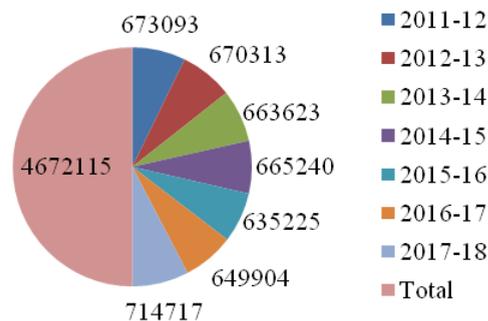
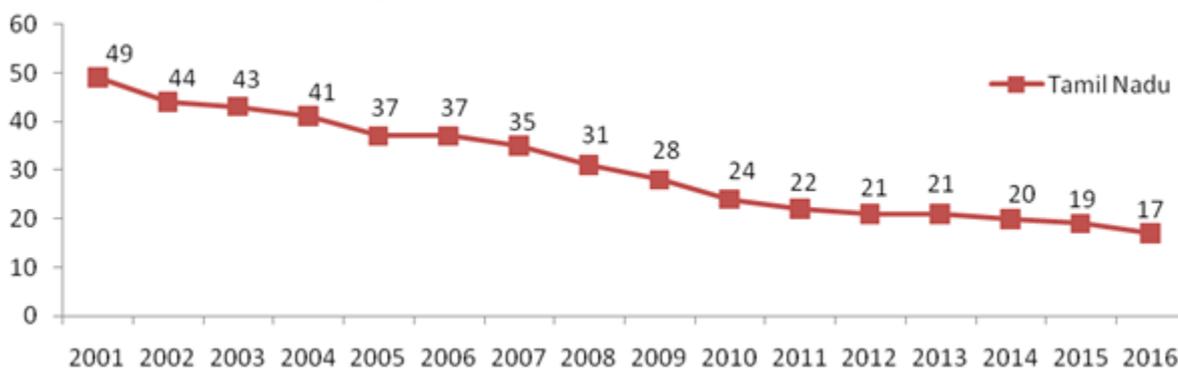


Figure - 2: No. of Beneficiaries



On an average, six lakhs women benefit from the scheme every year and six hundred crore spend for that. It can be understood that every year around six lakhs child are born in Tamil Nadu. It is one of the reasons for raising population in Tamil Nadu and India. At the same MRMBS protect the child from death and complicated. The above figures show that the Infant Mortality Rate (IMR) stood the least in the care of Tamil Nadu (49 per thousand) in 2001. It can be understood, it was declining continuously since 2002 (44 per thousand) until 2016 (17 per thousand). This conditional cash transfer scheme has a significant effect on the proportion of women seeking institutional delivery and has especially increased the use of public sector facilities for delivering. The ability of the household to spend on health care facilities is an indicator of enlarging the capability of household's member. Children in low-income countries face much higher risks of mortality compared to their counterparts in more affluent societies. The Counselling for health related issues need immediate attention to health project and keep improve the human health and development for overall economic development (Rajendran and Ramachandran (2015).

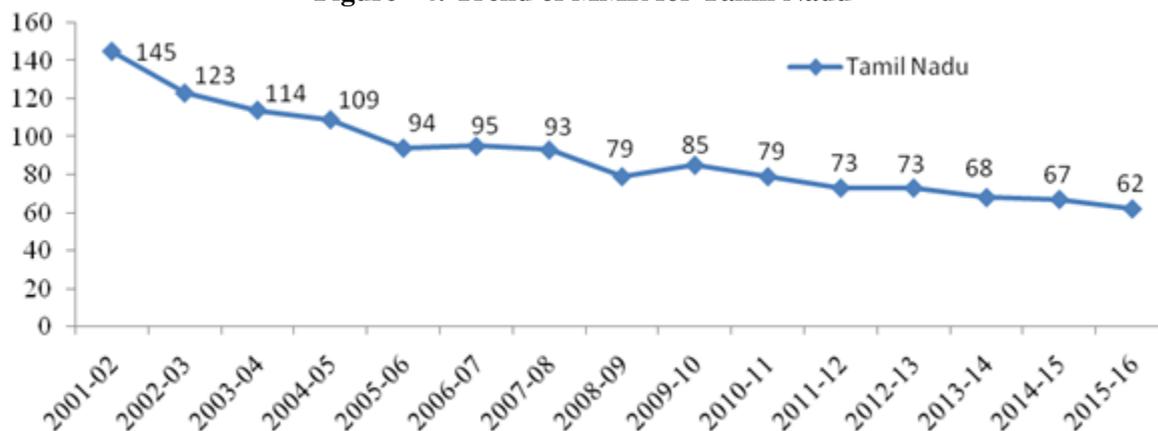
The current level of IMR in Tamil Nadu for the year 2016 is 17 per 1,000 live births as per the SRS (2016) survey. The State ranks as the second lowest among the major States in the country. The State is taking multipronged efforts to bring down the IMR by focusing on the components such as the Neo-natal Mortality Rate (NMR) etc. The goal is to ensure that all preventable causes of infant deaths are eliminated by appropriate interventions. Immunization is one of the most cost effective public health interventions since it provides direct and effective protection against preventable morbidity and mortality (Rajendran and Ramachandran, 2013). Immunization is largely responsible for reduction of under 5 mortality rate.

**Figure - 3: Trend of IMR for Tamil Nadu**

Source: Sample Registration System (SRS) Bulletins.

Based on the healthy states progressive India report, the state realizes that unless intensive efforts are taken to reduce Low Birth Weight (LBW) children and improve the nutritional status of pregnant women sustained improvements in these parameters would become tougher. Hence as part of the vision 2023, the public health policy has been focused on maternal and newborn health, with a multi-dimensional approach including addressing issues such as empowerment of women, improve nutrition which are the key factors behind the advances in maternal and child health in Tamil Nadu. In Tamil Nadu, as revealed by the National Survey (NFHS 3, 2005-06) mild to moderate malnutrition burden in children under three years of age in 29 percent. It can be a direct or indirect cause of child morbidity, thereby increasing the case fatality rate in these children is 5-20 times higher compared to well nourish children. The impact of the initiatives of the government is reflected in improved literacy, reduced incidence of early marriage, early pregnancy and frequent pregnancies and high level of public awareness on family planning and good nutrition. Low awareness among the clients is one of the major reasons of low utilization of services (Rajendran and Ramachandran (2016).

The Millennium Development Goal (MDG) aims at reducing the MMR by three quarters during 1990-2015. Though India has achieved some progress, this needs to be speeded up for a sustainable faster development (Dreze, 2015). In order to achieve this goal, all women need access to high quality of ANC. However, ANC services are available in developing countries including but utilization of these existing services is poor. India continues to lag behind in checking maternal mortality and child mortality to expected levels. MMR is calculated as the number of maternal deaths during a given year per 1,00,000 live births. Monitoring MMR helps to understand the obstetric risks associated with each pregnancy and the quality of the health care system in a country. Maternal Mortality Ratio represents the most sensitive and key indicator of women's health and their status in the society. The following figure shows that Trend of MMR for Tamil Nadu.

**Figure - 4: Trend of MMR for Tamil Nadu**

Source: Sample Registration System (SRS) Bulletins.

During DLHS-4 21 percent decreased in Blood Pressure (BP) taken, 38 percent decreased in Hemoglobin (HB) tested, 64 percent decreased in Abdomen examined and 58 percent decreased consumed 100/more Iron and Folic Acid (IFA) tablets. It can understand that only 32 percent of the pregnant women full checked ANC and other are not. Antenatal women are hesitant to avail IFA tablets as the tablets are bitter in taste and also feel sleepy/drowsiness. When they consume tablets, vomit immediately and become dull. After that women cannot go for their routine work. Educated women are aware of the utilities of the IFA and hence consume the tablets regularly unlike less educated counterparts (Rajendran and Ramachandran, 2013). Lack of health education is one of the reasons for low level of full ANC received. Not only this and also in BP taken, HB tested, Abdomen examined and consumed 100/more IFA tables. After introduction of MRMBS in Tamil Nadu, it gives positive trend that MMR reduced from 145 per lakhs in 2001-02 to 62 per lakhs in 2015-16. The state of Tamil Nadu's MMR 93 is second best in the country after Kerala (81) and has improved from an already low base of 111 in SRS 2004-06. Now it is 63 as per department of public health records.

5.1 Conclusion

The MRMBS is important intervention to promote institution deliveries. Its strength lies in the fact that the government has made budgetary allocation for the poorest. There is some evidence to suggest that institutional deliveries have increased, IMR and MMR reduced due to the MRMBS. Female education, empowerment, attitude of health care workers and distance of health facilities to the people in most communities are factors to be addressed in reducing child morbidity and mortality rates and improving maternal health, thus achieving the Millennium Development Goals (MDGs) 4 and 5. To get this done, policy makers, health personal and community at large should join hands.

6.1 Suggestion

Providing health care to newborns and potential mothers are essential for reducing IMR and MMR, thereby improving the health status. All complicated maternal cases should be advised to stay in hospital itself and take care of their children's health after discharged from the hospital. Every woman must be utilizing their



MRMBS case only for their health not for household expenditure. The medical personal should focuses on emphasizing the hygienic practices not only to mothers but also to attendants.

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