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**CHILD HEALTH AND IMMUNIZATION –AN INDIAN
PERSPECTIVE**

**A study on immunization strategies for improving child health
in India**

**Thesis submitted for the Master programme in International social
welfare and health policy**

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Abstract

UNICEF reported that only less than fifty percent of children in India receive full immunization. It indicates that majority of children are not protected against vaccine preventable diseases. High infant mortality rate of sixty three deaths for every thousand live birth also points to the neglected child health activities in India. The thesis explores strategies which are needed for improving child immunization in India. Hence the purpose this study is to understand the current state of immunization in India, the reasons of poor coverage if any, and the rational strategy to improve vaccination coverage. This thesis report is a qualitative study and is based on literature reviews. The nature of this qualitative study is explorative. The main data sources for this study were official documents, private and public reports, academic and other sources.

The current status of child immunization in India was analysed based on NFHS 3 and CES 2009 survey reports. The reasons for poor immunization rates in least performing states and the special features that make the better performing states to be in high immunization coverage states was explored from NRHM studies. The least performing states were characterized by poor health facilities and other infrastructure facilities, lack of awareness about the immunization programs among people and general low income, literacy and gender inequality. On the other hand, the factors associated with high immunization performance in better performing states are active involvement of health sector, good health infrastructure and people's knowledge and awareness. The pulse polio programme which was a large success in India was considered in this thesis as an example program. The main factors which made the program a success were monitoring and supervision of the programme, wide mass campaign and immunization services at all levels including remote and marginalized sections. The main measures should be included to strengthen immunization coverage are prioritization of programme, strengthening of health infrastructure, improve communication and training of health care providers, strengthening of VPD and AEFI surveillance system, access for rural and marginalized section, supervision monitoring and micro planning, mass campaign, reminder\ recall, incentives, and flexible services.

Contents

1	Introduction	9
1.1.	Theme and research question.....	9
1.2.	Background.....	9
1.2.1.	History of immunization policy in India.....	9
1.2.2.	Previous studies.....	10
1.3.	Relevance	11
1.4.	Structure of the thesis.....	12
2.	Research method	13
2.1.	Reviewing literature.....	13
2.2.	Searching and selecting literature	13
2.3.	Limitations of the study.....	15
3.	Key concepts	17
3.1.	Child health	17
3.2.	Vaccine Preventable diseases	17
3.2.1.	Tuberculosis.....	17
3.2.2.	Polio.....	18
3.2.3.	Measles	18
3.2.4.	Diphtheria	18
3.2.5.	Whooping Cough (Pertussis)	19
3.2.6.	Tetanus (Lockjaw).....	19
3.3.	Factors affecting the uptake of full immunization.	19
3.3.1.	Lack of an effective disease surveillance system.	19
3.3.2.	Unavailability of effective vaccines.	20
3.3.3.	Poor Routine Immunization (RI) Coverage.....	20
3.3.4.	Shortage of human resource and health care centres.....	20
3.3.5.	Parenteral constrains.....	21
3.3.6.	Faulty planning and poor implementation of national vaccination policy.....	21
3.3.7.	Skill of health care provider.....	22
3.3.8.	Inequalities in immunization.....	22

4.	Conceptual Framework.....	23
4.1.	Theoretical perspective	23
4.2.	Diffusion of innovation (DOI) theory	23
4.2.1.	Categorisation of adopters	24
4.2.2.	Elements in the diffusion of Innovations.....	25
4.2.3.	The innovation- decision process.....	25
4.3.	Health Equity and Social Justice.....	26
4.4.	Health belief model.....	28
5.	Analysis.....	30
5.1.	Current state of immunization coverage.....	30
5.1.1.	Child immunization status	30
5.1.2.	NFHS 3	30
5.1.3.	CES 2009.....	31
5.2.	Immunisation Performance.....	32
5.2.1.	Based on Health profile	32
5.2.2.	Based on Health Infrastructure.....	33
5.3.	Reasons for the least performing states	34
5.3.1.	Uttar Pradesh (UP)	34
5.3.2.	Arunachal Pradesh.....	37
5.4.	Factors behind the success rate from well performing states	39
5.4.1.	Tamil Nadu	39
5.4.2.	Kerala	41
5.4.3.	Goa	43
5.5.	Motivation from polio immunization campaign	45
6.	Findings and Discussions.....	48
6.1.	Overview of findings.....	48
6.2.	Discussion	50
6.3.	Strategies policymakers can pursue to improve child vaccination.	51
6.3.1.	Interventions for supply side.....	51
6.3.2.	Interventions for demand side.....	57
7.	Summary and Conclusion	61
	Bibliography	63

Key words:

AEFI	Adverse Events Following Immunization
ANM	Auxiliary Nurse & Midwife
AP	Arunachal Pradesh
ASHA	Accredited Social Health Activist
BCC	Behaviour Change Communication
BCG	Bacille Calmette Guerin
bOPV	bivalent Oral Polio Vaccine
CAG	Comptroller and Auditor General
CES	Coverage Evaluation Survey
CHC	Community Health Centre
CSR	Centre for Social Research
CSSM	Child Survival and Safe Motherhood
DOI	Diffusion of innovation
DPT	Diphtheria Pertussis and Tetanus
EPI	Expanded Programme on Immunization
EPRPs	Emergency Preparedness and Response Plans
HBM	Health Belief Model
IEAG	India Expert Advisory Group for polio

IEC	Information Education Communication
IMR	Infant Mortality Rate
JPHN	Junior Public Health Nurse
mOPV	monovalent Oral Polio Vaccine
NFHS	National Family Health Survey
NPSP	National Polio Surveillance project
NRHM	National Rural Health Mission
NTAGI	National Technical Advisory Group on Immunization
PHC	Primary Health Centre
PPI	Pulse Polio Immunization
RCH	Reproductive and Child Health
SMNet	Social Mobilization Network
TAC	Technical Advisory Committee
TN	Tamil Nadu
UIP	Universal Immunization Programme
UNICEF	United Nations Children's Fund
UP	Utter Pradesh
VPD	Vaccine Preventable Diseases
WHO	World Health Organization

1 Introduction

According to WHO globally around nine million children die every year from vaccine preventable and infectious diseases. UNICEF India reported that there are over two million children deaths every year due to vaccine preventable diseases. India has an Infant Mortality Rate of 63 deaths for every 1000 live births. Measles is the major cause of death which is a vaccine preventable disease. Still only less than 50% of children in India receive full vaccination. According to UNICEF, despite the remarkable improvements in the health of the children in India, still a huge number of children suffering health problems and children in India are more vulnerable to vaccine preventable diseases (Child line India 2013, 1).

1.1. Theme and research question

The study aims to assess the effects of immunization program for improving child health in India. The study seeks to identify the current state of children's vaccination and reasons of poor vaccination coverage, and to understand the problems underlying India's child immunization programme. The research question the study aims to address as follows

- How to improve the current state of immunization coverage for vaccine preventable diseases among infants in India?

In order to find the answers for the research question the following subtopics was also covered in this thesis.

- What is the current state of full immunization coverage in Indian children?
- What all are the reasons of poor vaccination coverage in India?
- Identify rational remedy for the reasons of poor coverage?

The research theme focuses on the primary health care delivery system in India and its effects on child health. This study pays particular attention at deriving immunization strategies for achieving equitable access and universal coverage to child vaccination in India.

1.2. Background

1.2.1. History of immunization policy in India

Immunization is one of the very effective measures to prevent some harmful diseases in children which are avoidable. The vaccination programme in India was launched in 1978 as Expanded

Programme on Immunization. Later, in 1985 it got motivation from Universal Immunization Programme (UIP) and was aimed at covering all the districts in the country by 1989 to 1990.(Ministry of Health and Family Welfare, Annual report 2012-2013 2013, 66-71).

During 1992-1993, UIP became a part of Child Survival and Safe Motherhood programme and this programme was jointly funded by World Bank and UNICEF. This programme was planned to cover all the districts by the year 1996-1997. “The goals of the programme were to improve the health status of infants, child and maternal morbidity and mortality”. The Programme was successful in terms of “improving the health status of pregnant women, infants and children” (Ministry of Health and Family Welfare, Child Health Programme In India 2011).

During 1997-98, Government of India started Reproductive and Child Health (RCH) programme for improving health status of women and children and to reduce maternal and child mortality and morbidity. The programme was aimed to strengthen the routine immunization and pulse polio immunization (Ministry of Health and Family Welfare, Child Health Programme In India 2011). A specific Immunization Strengthening Project was formed during 2000-2003, this included three main components. These are polio eradication, routine immunization strengthening and strategic frame work for development (Khera, et al. 2012).

National Rural Health Mission started in the year 2005, this programme is intended to strengthen health system by improving child health services and disease control programs. Immunization is one of the key components of NRHM. Under Universal immunization programme, government of India started to give vaccines for six killer diseases namely tuberculosis, diphtheria, pertussis tetanus, poliomyelitis, and measles, childhood TB, and hepatitis to all at free of cost in India (Ministry of Health and Family Welfare, Annual report 2012-2013 2013). Despite of several efforts the studies showed that the necessity of strengthening immunization services in India (Vashishtha and Kumar 2013).

1.2.2. Previous studies

Nilanjan Patra, in his study “Universal immunization programme in India: The determinants of childhood immunization” discusses the reasons of poor vaccination coverage in India. The study reveals the effects of some demographic and socioeconomic variables on immunization of a child for six vaccine preventable diseases of childhood that comes under universal immunization programme. This study conducted that the likely-hood of vaccination is higher in boys, and

children from urban areas from household with improved standard of living and from educated mothers whereas children of higher order birth have the less chance to get the vaccination .Within the religious groups, Muslims are less likely to be vaccinated compare to the Christian and other minorities. Children from west zone of India are more likely to be immunized followed by south, north, east, central and north east respectively (Patra 2007)

According to Vashishtha V M, vaccine preventable diseases are still responsible for large number of under-five mortality. The absence of an effective VPD surveillance system in the country was identified to be one of the major challenges in the primary health care delivery system (Vashishtha 2012, 357-361).

According to UNICEF, children in developing countries are the worst victims of ill-health. These children are vulnerable to diseases or even death because they are poor, not able to utilize the existing routine immunization or health services, lack of sufficient vitamins and other essential nutrients in their diet, and a living environment that favours the development of disease causing organisms. The chance of becoming seriously ill or die is heavily based on the immunity of a child. Malnutrition added with unhygienic and poor conditions worsens the situation. For example, Measles rarely becomes the cause of death in industrialized countries whereas this accumulates 40% of cause in overcrowded areas. (Unicef 2008)The situation in India is not different from the above mentioned challenges faced by the people in developing countries.

Over eight million children in the world die every year from the five killer diseases - pneumonia, diarrhoea, measles, tetanus and whooping cough. UNICEF Report says that despite the immunization programme against these diseases, 2.4 million Indian children in states like Rajasthan, Uttar Pradesh and Madhya Pradesh die over year which accounted for more than 50% of infant deaths.

1.3. Relevance

Children are exposed to different microorganisms on a regular basis and are vulnerable to infectious diseases because of their immature immune system. Many of the infectious diseases can be effectively prevented and treated by vaccination. Immunization helps to fight against diseases causing organisms (pathogens) and strengthens immunity; here vaccination is the only method to save the life of child (Mathew 2012, 203-223).The introduction of vaccines has

affected the occurrence of many communicable diseases. The eradication of small pox disease from the world in 1977 is a good example for this. Poliomyelitis is closed to eradication. (Only 20 to 30 are reported polio cases in 2001)(Goodman, et al. 2003, 262-284)

Health status of children in developed and developing countries shows that there is a wide gap of good health services received by the children in developing countries. Mortality and morbidity rate are high in developing countries. Various reports have shown that universal coverage of immunization can improve the health status of children. By identifying the real cause of ineffective vaccination can throw light towards improvement in the existing health care delivery system (Bloom, Canning and Weston 2005, 15-39). Hence an attempt has been made in this thesis to identify the pit falls in the current health care delivery systems in India. The reasons behind success stories of better performing Indian states were also explored.

1.4. Structure of the thesis

The thesis comprises of seven chapters. The first chapter introduces the theme and research question of the thesis. The aim and objective of the study, research question and relevance of the topic are discussed in this chapter.

Second chapter deals with the methodology employed in the study. Here I defined and explained literature review as the method that will be applied to this study.

Chapter three deals with the basic concepts namely child health and vaccine preventable diseases and reasons of poor vaccination are included in chapter three.

Chapter four outlines the conceptual framework for child health and immunization. This includes health equity and social justice, diffusion of innovation theory and health belief model.

Chapter five focuses on the analysis of the current state of immunization coverage in Indian children. The factors contributing to the best and least performances in immunization are explored based on literatures on implementation of immunization programs in different states. An example from one of the effective programmes (pulse polio) in India also included.

Chapter six summarises the findings and outlines strategies to improve child immunization in India.

The main conclusion of this study is summarised in chapter seven.

2. Research method

This chapter describes the methodology used for this study and presents the process of searching and selecting literature. This thesis is a qualitative study as it analyses the texts rather than numerical data. Qualitative research analyses detailed knowledge and understanding of a text that is relevant to the context instead of a quantifiable phenomenon applying generalization. Qualitative research starts with an exploratory research question (Chambliss and Schutt 2010, 250-253).

The research design is explorative. An explorative research tries to find out the answers for “how people get along in the setting under question, what meaning they give to their actions, and what issues concern them “(Chambliss and Schutt 2010, 10). This study also focuses on exploring the reasons of poor vaccination coverage and the way to improve vaccination coverage by reviewing literature.

2.1. Reviewing literature

A review of literature stands as a base for this research by providing ideas to do investigation and effective evaluation. By selecting relevant materials on the topic provide a way to explore the information in order to use it in our own purpose (Hart 1998, 13).A literature review tries to evaluate and integrate the framework of primary reports with the aim to provide justification of the subject. The main advantage of this design is to increase an in-depth understanding and knowledge of the subject and helps to make a successful interpretation of the texts and social actions (Bruce 1994, 217-229).In this literature review, already published works are collected, presented and analysed to answer my research question.

2.2. Searching and selecting literature

The aim of this thesis is to find out how to improve the current state of immunization coverage for vaccine preventable diseases among infants in India. In order to accomplish this goal we need to figure out the reasons of poor vaccination coverage and the possible interventions that could be used to improve the current status of child immunization in India. The main data sources explored in this thesis were the survey reports and publications from the Government websites as well as the documents, papers and publications from books and other previous studies within the field.

Online resources such as Bibsys databases, eBooks, and Google scholar were also used for finding relevant literature. The key words used are 'immunization in India', 'child health', 'health status', 'state wise information', 'immunization programmes', 'National Family Health Survey', and 'Coverage Evaluation Survey'.

The survey report National Family Health Survey 3 and Coverage Evaluation Survey 2009 are the key data sources and it forms the base of this study. NFHS is a large scale survey conducted on representative households throughout India. The main objectives of this survey is to provide information regarding health and family welfare and any related issues to Ministry of Health and Family Welfare, Government of India. It provides National and State wise information on "fertility, infant and child mortality, the practice of family planning, maternal and child health, reproductive health, nutrition, anaemia, utilization and quality of health and family planning services". International Institute for Population Sciences is the agency designated by the Ministry of Health and Family Welfare, which provides technical direction and guidance for the above-mentioned survey. So far, three surveys have been conducted during 1992 to 2006. The NFHS-1 was conducted in 1992-93, and NFHS-2 and 3 were conducted in 1998-99 and 2005-2006 respectively (Ministry of health and family welfare 2007).

CES is another survey which had similar goals as NFHS. The main objective of this survey is to provide information regarding the impact of National Rural Health Mission strategies into Ministry of Health and family welfare, Government of India. It provides National and State information on maternal, new-born and child health services, this includes immunization status of women and children. ORG Centre for Social Research is the agency designated to conduct a national level survey. The technical direction and guidance for the survey is received from Technical Advisory Committee constituted by Ministry of Health and Family Welfare, Government of India and the funding is from IKEA social initiative (Unicef 2010). From NFHS 3 and CES2009, I analysed the current scenario and I also searched some main organizations reports such as WHO, UNICEF and health department reports from different states to get more ideas about the topic. The literature covered contains most relevant information regarding the topic being proposed.

As my research is based on finding methods to improve the current state of immunization coverage for vaccine preventable diseases among infants in India, I have analysed the reasons of

success and failures of immunization coverage from the different states in India. But to cover twenty nine states and six union territories for this analysis is a big challenge. Hence in the process of narrowing down, I have selected some specific states in India. To make the selection process more logical, I analysed the factors from five different states based on immunization performances in the NFHS3 and CES 2009 surveys. The states chosen in the analysis are Tamil Nadu, Goa, Kerala, Arunachal Pradesh and Uttar Pradesh. Three states, Goa, Kerala and Tamil Nadu, showed high immunization rates and the remaining two; Arunachal Pradesh and Uttar Pradesh are from poor performing states in both surveys. Highlight was given to success factors of better performing states and reasons for failure in poor performing states. Tamil Nadu state is the state which showed better performance in both surveys even with the large population so the results can be comparable with the poor performing and highly populated state Uttar Pradesh. The states Goa and Arunachal Pradesh follows a similar pattern in population whereas Goa takes first and second position in highly performing states in both surveys and Arunachal Pradesh were in last places in both surveys. The achievement of Kerala based on the surveys in terms of immunization performance is highlighted and compared with other states in India. Moreover, the health progress in Kerala had been comparable to developed nations. Hence Kerala was also included in this analysis.

The information regarding immunization services in different states has been collected from National rural health mission's official website. In addition to this other relevant literatures and publications are also referred to in this thesis for assessing immunization performance of these selected states.

2.3. Limitations of the study

According to Marshall and Rossman," No proposed research subject is without limitations, there is no such thing as a perfectly designed study"(2006, 42). So it is important to realize the limitation which affects the study. This study is a representation and my own analysis of a large amount of literature and documents. I was interested to find out the current status of immunization from the official reports of India for to make clarity on the results that I have read from other reports. I searched for latest statistical data to know the immunization coverage and I would like to take these data from solid sources. From the Ministry of health and welfare website of government of India I took two main recent reports. These are NFHS3 (2006-2007) and

CES2009. But the variations in these two reports were confusing to generalise the overall data. Hence through the comparison of these two survey reports I have chosen states in low performing states and states in high performing states.

Universal immunization programme in India intended to cover mainly vaccines for six killer diseases. In order to narrow the topic, the study is limited to the vaccine against these six diseases that given under the same Primary Immunization Programme and not covering the coverage of other vaccines already developed and provided through the private and public sector.

This study aims to understand the full immunization coverage of only children younger than twenty four months.

The indicators used to understand immunization performance of selected states are health profile and health infrastructure listed by the National Rural Health Missions website and the features related to immunization performance and the general development of the state. Hence the findings are limited to these mentioned areas only.

Compared to other states, the literatures and document regarding immunization performance of the state Goa are found to be less. However Goa is also included in the study to look for any special features implemented in relation to immunization.

3. Key concepts

This chapter presents the key concepts that have been used in this study.

3.1. Child health

Child health is defined as a state of physical, mental, intellectual, social and emotional well-being and not merely the absence of disease or infirmity. Healthy children live in families' environments and communities that provide them with the opportunity to reach their fullest developmental potential". This definition is based on child health terminology used by World Health Organization (First Things First 2007). This study connects child health in terms of full immunization. If the child completed one BCG vaccine, three doses of each DPT and polio vaccines, and one measles vaccine then they are considered to be fully immunized (Ministry of health and family welfare 2007). These vaccines are available free of cost under UIP in India.

3.2. Vaccine Preventable diseases

Vaccine preventable diseases (VPDs) are conditions which are avoidable by using available vaccines that protect against these diseases (Texas department of State health services 2010). Vaccines are the great health achievements in the 20th century. Vaccines provide immunity to the body by activating immune system of the body by producing antigens against disease causing organisms (G. o. Ministry of Health and Family Welfare 2008). Many of the diseases are controlled by proper vaccination and some diseases are eradicated from the world. The incidence rate of diseases in person who receives immunization is much less compare to those without vaccination. Outbreak of many diseases also can be prevented by timely interventions with the vaccines. Countless of human life is saved by vaccination. Under immunized children are more vulnerable to diseases and death.

The following are some of the important vaccine preventable diseases of the childhood.

3.2.1. Tuberculosis

Tuberculosis is caused by the bacterium *Mycobacterium tuberculosis*. It affects lungs but also to other parts of the body including bones, joints and brain. This infection may persist for a life time. The disease is transmitted through air from an infected person's coughs or sneezes to other person. It spreads very rapidly especially people living in crowded communities, has poor access

to health care services and malnourished. The risk of developing TB is highest among children younger than three years old. BCG is the vaccination that prevents against severe forms of TB in children younger than five years old (WHO 2013)(Texas department of State health services 2010).

3.2.2. Polio

The wild polio virus has been eliminated in North and South America but not elsewhere in the world, which means all children should continue to be immunized against it. Polio is a viral infection caused by any one of polio virus type 1, 2 or 3. It is transmitted by faecal-oral contact. Milder cases may last only a few days, causing fever, sore throat, stomach-ache and headache. If the disease worsens, it can cause severe muscle pain, paralysis, breathing difficulty, and even death. Live oral polio vaccine (OPV) four doses is recommended in endemic countries (WHO 2013)(Texas department of State health services 2010).

3.2.3. Measles

Measles is a serious highly communicable disease of childhood caused by the measles virus. It can lead to ear infection, pneumonia, seizures, brain damage and death. Before the measles vaccine was introduced, measles caused about 400 deaths in the U.S. each year. Measles begins with cold-like symptoms- fever, red runny eyes, cough, runny nose and tiredness. This lasts about three days. Then small white spots appear on the inside of the mouth and a rash begins, usually on the face. This red, raised rash spreads rapidly over the neck, upper arms and chest. Later it spreads over the back, abdomen, and rest of the arms, thighs, legs and feet. The illness lasts 7 to 10 days. Live attenuated viral measles vaccine is the preventive vaccine for this disease (Texas department of State health services 2010)(WHO 2013).

3.2.4. Diphtheria

Diphtheria is an acute infectious disease of the nose, throat, respiratory passages or skin caused by *Corynebacterium diphtheria* and usually transmitted through coughing or sneezing, from one infected person to the nose or throat of another. Symptoms include the gradual onset of a sore throat, a low-grade fever, and weakness. A thick mucus membrane often covers the entire throat and extends to respiratory passages, making it difficult to breathe. The lymph nodes of the neck tend to be enlarged. Diphtheria can lead to heart failure, paralysis and death. Three primary doses

DPT vaccine includes prevention against Diphtheria, Pertussis and Tetanus (Texas department of State health services 2010)(WHO 2013).

3.2.5. Whooping Cough (Pertussis)

Pertussis is a respiratory infection caused by the bacterium *Bordetella pertussis*. It is spread through air when an infected person coughs or sneeze. The main symptoms are runny nose, sneezing, cough and low grade fever. In severe cases, cough comes in exhausting bursts and breathe will have “whooping sound. This leads to difficulty in eating, drinking and breathing. Before the invention of vaccine, pertussis killed 5000 to 10000 people in each year in U S (Texas department of State health services 2010)(WHO 2013).

3.2.6. Tetanus (Lockjaw)

Tetanus is a serious illness caused by tetanus bacteria. The bacteria lives in soil and are found in the excreta of many animals. Stiffness and spasms of the muscles are the symptoms of this disease. It effects throat and can cause difficulty in breathing and eating. Muscle spasms can leads to fracture of the spine and long bones. It can lead to ‘locking’ of the jaw and eventually death due to suffocation. Approximately 30% of people who develop tetanus will die from this disease (Texas department of State health services 2010)(WHO 2013).

3.3. Factors affecting the uptake of full immunization

The study analysed literature for the factors behind the low immunization performance. The overview of the problems from the analysis is detailed in the following sections.

3.3.1. Lack of an effective disease surveillance system

It is hard to find reliable data regarding infectious diseases which can be trusted. Most of the data are the end result of some estimation or guess work made by the published studies. Insufficiency of an effective surveillance system creates problems like, unable to identify and quantify the prior disease which needs special attention (Thacker 2007, 729-731). This also reported as one of the problems in the national review of UIP¹ which was conducted in 2004. This report questions the continued sustainability of the UIP programme. The surveillance system for vaccine preventable disease and AEFI (Adverse event following immunization) is weak in the country.

¹UIP –Universal immunization programme

The laboratory facilities to conduct surveillance is lacking in various districts in India (Khera, et al. 2012).

3.3.2. Unavailability of effective vaccines

It is evident from the literature that many of the health care institutions are facing supply shortage including unavailability of effective vaccines .To meet the need of effective vaccines in a mass population is another challenging reason for poor immunization performance. Vaccines for some of the serious diseases, which are often fatal, are unavailable. In addition to this, some of the effective vaccines, for example: - HPV, Rotavirus, IPV, Hepatitis-A and Chickenpox vaccines are very expensive and it is not affordable to most of the people (Thacker 2007, 729-731). (Agarwal 2008, 625-628).

3.3.3. Poor Routine Immunization (RI) Coverage

Based on the NFHS-3 report, coverage is still very small in many of the states. Full immunization coverage is still a distant dream. For example, only a one third of the 12-23 months old children are fully immunized with BCG, measles, and three doses of each of Polio/DPT in Uttar Pradesh and in Bihar. This very low rate in the two populous states of the country indicates the poor coverage in India (Thacker 2007, 729-731). A wide gap is evident in rural-urban, poor-rich and other related areas. And the immunization coverage reported by the districts and the states is usually higher than reality. There are many dropout areas. The dropout rate for vaccines is very high in some states and this reduces actual immunization coverage. Social mobilization is also weak and it is another reason for poor vaccination coverage and acceptability of immunization services (Khera, et al. 2012).

3.3.4. Shortage of human resource and health care centres

Human resources and technical capacity are deficient in various levels. Vacancies are more seen in poor performing states and at the field level. Staff shortage and lack of skilled workers are the common problems faced by the many of the immunization department in various states and it negatively affects the progress of the immunization coverage (Agarwal 2008, 625-628). The number of health workers involved for immunization programme is positively connected with the immunization coverage. This is evident from many of the literature review. Immunization successfully works with the rapport between the health care workers and the seekers, it is important to have the availability of health workers in the vaccination centre “over time and

space” to fulfil the demand of the seekers. Immunization demands a specific duration of time to be vaccinated fully, thus the availability of health worker is very essential to administer vaccines during this period. In addition to this, health workers active involvement in educating seekers and giving awareness to the community regarding the importance of vaccination is as important for the follow-up and building a right perception about the preventive aspects among the people. Health workers density also helps to ensure the availability of vaccines continually, its storage and giving training for the unskilled workers (Anand 2007, 1277 - 1285).

3.3.5. Parental constrains

Some parental constrains are also playing a significant role in immunization .Variation in time, date, and place of immunization makes inconvenience for the parents to access health services. Beliefs such as “uncommon diseases are not important, or mistaken belief that measles is common and therefore not a dangerous disease, vaccines are not effective or only the polio vaccine is necessary», are some of the reasons for pulling parents from immunization and results in no acceptance of immunization(Agarwal 2008, 625-628). CES 2009 survey quoted the responses of parents regarding the reasons for non-immunization. These are: did not feel need, not aware about vaccines and where to approach for immunization, time not convenient, scared about side effects, don't have time, wrong advice from someone and they cannot afford the cost of immunization. All these response pointing that a wrong perception and inconvenience factor exists in the system.

3.3.6. Faulty planning and poor implementation of national vaccination policy

The vaccination strategy is not based on the present requirements and needs. The vaccination program is managed and controlled by international agencies. The involvement of local experts and academic bodies are very poor. The available scientific data are not utilized well. And there is no national body to do a detailed study and analysis of epidemiological data of infectious diseases. There is also no central agency to make planning and implementation of vaccination policy based on the local needs. Even India's highest technical body National Technical Advisory Group on Immunization has failed its aim.(Thacker 2007, 729-731). Micro planning for health services to the community is seems to be poor. There is no organized micro-planning for immunization delivery (Khera, et al. 2012).

3.3.7. Skill of health care provider

The staffs providing immunization are not aware about the safe injection practices and waste disposal following immunization. This results in unsafe injection practices and improper waste disposal management (Khera, et al. 2012). Lack of skilled workers for the immunization services more worsens the quality of care provided to the children.

3.3.8. Inequalities in immunization

Based on CES data, 61% of children fewer than 12 to 23 months covered full immunization. Boys (45.3%) showed higher immunization coverage than girls (41.5%). The ratio of girls are little lower in each individual vaccination coverage. Children in lower birth order(67.4%) are more likely to be vaccinated fully than the higher birth order(40.4%).Children residing in urban areas showed higher vaccination coverage(67.4%) than children from rural areas(58.5). Mother's education also favours immunization coverage very strongly. Mothers who completed 12 or more years of formal education showed 76.6% and the mothers with no education ended up in 45.3%. These values show immunization coverage increases with the level of education. When comes to religion and caste/tribe, scheduled tribe children (49.8%) were the least category less likely to be fully followed by scheduled castes (58.9%), other backward class (60.6%) or other classes (66.3%). Like education, wealth index also positively connect with immunization coverage. The 75.5% of children are from families with high wealth quintile and only 47.3% children are from the households with low wealth quintile covered full vaccination (Unicef 2010, 23-65)

4. Conceptual Framework

This section will focus on one theory and two concepts that provide framework for the role of society and the individual responsibility towards accomplishing child immunization.

4.1. Theoretical perspective

According to Chambliss, “A social theory is a logically interrelated set of propositions about empirical reality”. Theories will help to make logical connections to general social process and large bodies of services. So developing and evaluating a theory is an important aspect of a social research (Chambliss and Schutt 2010, 23-25). The chosen theory and concepts are intended to help sensitising concepts. According to Bulmer, “sensitizing concepts” works as a guidance and gives directions for what to look during the study to the user (Blumer 1986, 147-152). I have applied the diffusion of innovation theory, the concept “health equity and social justice” and health belief model mainly at society level to direct the thesis in the right direction.

4.2. Diffusion of innovation (DOI) theory

Diffusion of innovation theory is one of the social science theories developed by E.M. Rogers in 1962. This theory explains “how, over time, an idea or product” passed through the specific social system. The result of this diffusion is that a society does something which was different from the past to adapt a new idea, behaviour or product. So the key for diffusion is to take or perceive the idea, behaviour or innovation. This theory is useful for the public health program that aims to make changes in the society. Innovations are successful or failures in some places and times .We need to understand the influencing factors behind the diffusion process of public health innovations. This will guide us to know about how the innovators deal with different norms, values, laws, religions, ideologies, and political issues that can influence the diffusion and prognosis of a particular innovation. We can choose the important public health interventions by understanding the nature and behaviour of the targeted population and the factors associated with their adoption of a particular intervention. In this study, DOI is used to understand why immunization programme fails to cover in some areas and why these programmes are succeeded in other areas(Rogers 2003, 5-11)(Greenberg 2006, 209-210).

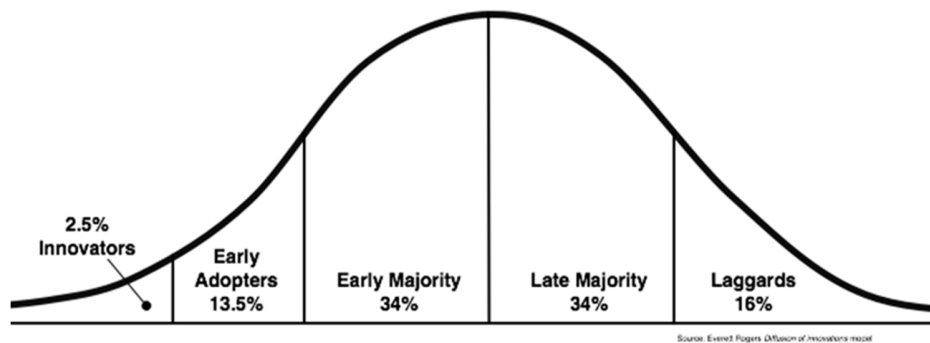
Innovation does not happen in a society at the same time, some people are more welcoming to innovations than others. It is established that the category who adopts the innovations early have

different characteristics than those who adopt later. So the adoption of something is heavily depending on the characteristics of the society. Thus it is important to have awareness of the targeted population before implementing a programme. This will help to find out what will work out and what will make hindrances in a community (Rogers 2003, 267-299).

4.2.1. Categorisation of adopters

The adopters are divided into five categories, these are

- **Innovators:** These are very interested people want to take innovations and want to be the first in adopting innovations. They are capable of taking risks and there is very little effort or nothing is needed to make this category to be convinced.
- **Early adopters:** These people denote opinion leaders who love to take leadership roles and are aware about the need to change. Interventions such as guidelines and materials for how to support innovations are just needed for this category and they don't need something to convince them for change.
- **Early majority:** Majority of population comes in this category. These people are rarely leaders but adopt changes before an average person. They are ready to take innovations but they need evidence base studies. So the interventions for this category should be training about the stories of effectiveness and use of innovations.
- **Late majority:** This category of people is difficult for change. They try innovation only after the trial from a large majority. The intervention for this group is to provide information of the effectiveness and success stories of an innovation in a large population.
- **Laggards:** These categories of people are very conservative and stand with traditional beliefs. And this is the hardest people to make changes. So the interventions must address “statistics, fear appeals, and pressure from people in the other adopter groups”.



The above diagram denotes the stages in terms of percentage by which a person adopts an innovation (Rogers 2003, 281).

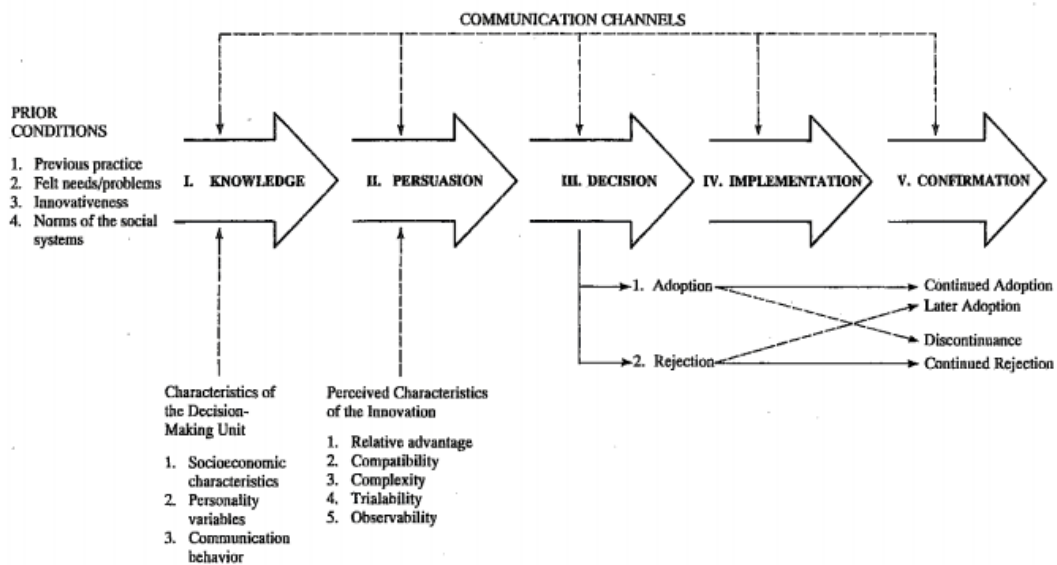
4.2.2. Elements in the diffusion of Innovations

The following are the four main elements in this process (Rogers 2003, 11-38).

- **The innovation:** It is an idea, practice or object perceived by an individual as new. It might not be just new knowledge. For example if a particular programme is already existed and still it didn't have favourable or unfavourable attitude nor acceptance or rejection from the individual or group can be considered as innovation.
- **Communication channel:** It refers how the information is passed from one person to other. Mass media channels (campaign, television, radio, newspaper and so on) and personnel channels (face to face exchange) are examples to develop and spreading of awareness and knowledge.
- **Time:** It indicates the time taken for innovation-decision process. It starts from individual passing the first knowledge to the adoption or rejection of particular innovation.
- **Social system:** "A social system is defined as a set of interrelated units that are engaged in joint problem solving to reach a common goal" (Rogers 2003, 23). The innovation is aimed at the social system. Hence we deal how the social system's structure involves in the diffusion process, the effects of norms, roles of opinion leaders and change agents, types of diffusion- decisions and the consequences of innovation.

4.2.3. The innovation- decision process

The Innovation- Decision process can be explained with the help of a diagram as follows (Rogers 2003, 170)



This theory also explains five influential factors that involves in the adoption of an innovation.

- **Relative Advantage:** The extent of an innovation is as comparable regards to the benefit than the previously used idea, program or product.
- **Compatibility:** The reliability or how well the proposed innovation suits to adopter's values, experiences and needs
- **Complexity:** It refers to, how complicated the innovations to "understand or use".
- **Triability:** The degree of an innovation can be tested or experimented before the adoption.
- **Observability:** This means how well the innovation can make concrete results (Rogers 2003, 229-266).

4.3. Health Equity and Social Justice

Fabienne Peter's paper on health equity and social justice explores the importance of knowing relation between social inequalities in health and its effect on health outcomes. Social inequalities in health strongly contribute to the variations in health outcomes. For example, it can be assessed by life- expectancy at birth, infant mortality, morbidity etc. among different social groups. Gender, race, social class, occupational status, and socio- geographic locations are examples of different social groups. Recent studies also points out that, there is a relationship

between income inequality and people's health. In short, this reflects that poor achievement in health is the result of an unequal society (Peter 2004, 93-106)

According to Margaret Whithead, "health inequities are differences which are unnecessary but, in addition are also considered unfair and unjust" (Peter 2004, 94). The main concept of any theory of justice is that "there is some good that can be (re) distributed, that something can be changed about the situation that is considered unjust". In regards to health, allocation of health care is a tool to treat health outcomes and the term equity is more suits to health care. Difference in access to health care is strongly showing Inequality in health, this can be corrected by equitable distribution of health outcomes. Therefore tracing reasons behind the inequalities in health outcomes is an important matter to be addressed in order to make a better healthcare delivery system and a better society. By understanding social inequalities in health throw light towards the knowledge of, how the institutions of society works and gives the clear picture of justice in these institutions. Black report also suggests that , it is important to include social studies of health problems in order to improve the understanding of social and socio economic factors that play a crucial role in the promotion of health and as well as the causation of disease , this can help to design a broader social structure (Peter 2004, 93-106) .

John Rawls in his famous work 'A theory of justice' proposed three main principles of distributive justice. The first one is, all individual have an equal right to political and civil rights. Second one relating that everyone has the right to equal opportunities: people should have an equal access to possess positions in society. The third one explains 'democratic equality and difference principle'. The difference principle tells the need to judge social and economic inequalities. These principles concerned with distribution of justice irrespective of the class and abilities of the people. The social orders shouldn't be just directed to better off people it should give equal importance to needy and less fortunate people (Rawls 1999, 47-98).

Amartya Sen's capability approach also giving proper weight age to the subject of assessing health problems in society. The main concept of this approach is not just individual utility or wellbeing nor the peoples access to resources, it lies somewhere in between. He emphasizes "good health is an example of a functioning". It means health is a combination of several functioning (Peter 2004, 93-106).

Fabienne Peter argues an indirect approach to health equity is more suitable with the social model of health. This touches all the important social factors of health and tells the interconnection between social inequalities in health and justice. Based on this approach, it “sees difference in health outcomes as inequitable if they are the result of unjust social arrangements”. It also highlights broader social processes that make health inequalities not on the way of distribution of health (Peter 2004, 93-106).

Michael Marmots chapter on “social causes of social inequalities in health” also supports health is positively connected with the socio economic status. He examined some issues that explain social inequalities in health. On his point of view, it is wise to “uncover the social causes and pathways underlying differences in health outcomes between social groups”. He highlights the role of social factors in the production of ill health (Marmot 2004, 37-62).

4.4. Health belief model

Health belief model (HBM) was first developed by social psychologists Hochbaum, Rosenstock and Kegels. This model explains health behaviours based on the attitudes and beliefs of individuals. The main concept of this model is that a person will choose a health related strategy if that person:

- believes that he can avoid a negative health condition
- has a positive thinking of by opting an appropriate action can eliminate a negative health condition.
- feels that he or she can go for a recommended action with confidence.

HBM is based on four pillar concepts: perceived susceptibility (one’s view on chances of getting a condition), perceived severity (one’s view on the seriousness and consequences of a condition), perceived benefits (one’s belief about the recommended action can reduce the risk or seriousness of impact) and perceived barriers (one’s view on the real and psychological cost of the advised action) which explain perceived threat and net benefits. These concepts determine people’s “readiness to act” (cues to action). In addition to this “cues to action”, “efficacy” (once confidence to perform an action successfully) also strengthens HBM.

Health belief model can be applied to the wide area of health behaviours. HBM’s application in preventive health behaviour is well established (Twente 2012) .In regards to child immunization,

the parents' choice for immunizing their children is very crucial. If the parents perceive their children have the risk of getting serious condition and they are aware about the consequences of that condition combined with their knowledge on benefit part of vaccination helps the person to approach immunization in a positive way. In addition to this, health belief model also emphasis on the barrier of immunizations such as cost involved for the process also makes a person's choice of action. Hence this model can be applied in this research to explore society's acceptance of immunization programme by assessing health beliefs of individuals.

5. Analysis

This chapter deals with the analysis of the immunisation data from NFH-3 and CES 2009. The first section aims at analysing the current state of immunization performance which gives an overview of state-wise immunization status and this directs the study to find out better and least performing states. Immunization performances of these selected states are based on health profile and health infrastructures are listed in the second section. The third section is focused on finding why UP and AP are in poor performing lists. Fourth section presents the special features of Tamil Nadu and Kerala regards to their better performance. Next section contains an example from one of the effective programmes in India to adopt and to support the findings of the study. Last section includes an exploration of findings and discussion.

5.1. Current state of immunization coverage

This section presents the current state of child immunization coverage in India. Analysis is mainly based on UNICEF's Coverage Evaluation Survey 2009 (CES 2009) and NFHS 3 (National Family Health Survey, 2005-2006) data.

5.1.1. Child immunization status

Based on NFHS 3 report, only 43.5% of children between 12 to 23 months covered full immunization whereas CES2009 report says that 61% of children between 12 to 23 months covered full immunization.

Key indicators	NFHS 3 (2005-2006)	CES 2009
Children 12-23 months fully immunized (BCG, measles, and 3 doses each of Polio/DPT) (%)	43.5	61

Table 5-1 showing the main findings of NFHS3 and CES 2009

5.1.2. NFHS 3

Full Immunization Coverage by State

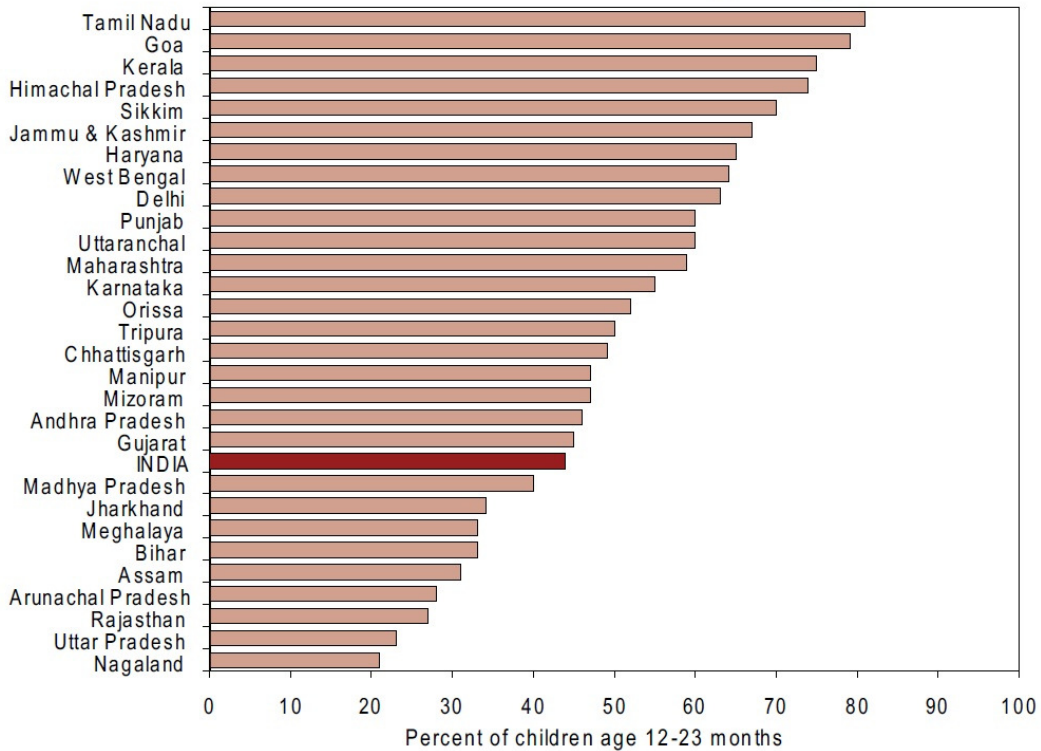


Figure 5-1 Graph showing immunization coverage state wise (MOHFW 2007, 15)

Immunization coverage rates in India shows wide range of differences. For example, only one third of children are fully vaccinated in the state of Nagaland, UP, Rajasthan, AP, and Assam whereas three quarters of children in Tamil Nadu, Goa and Kerala received full vaccination (Ministry of health and family welfare 2007).

5.1.3. CES 2009

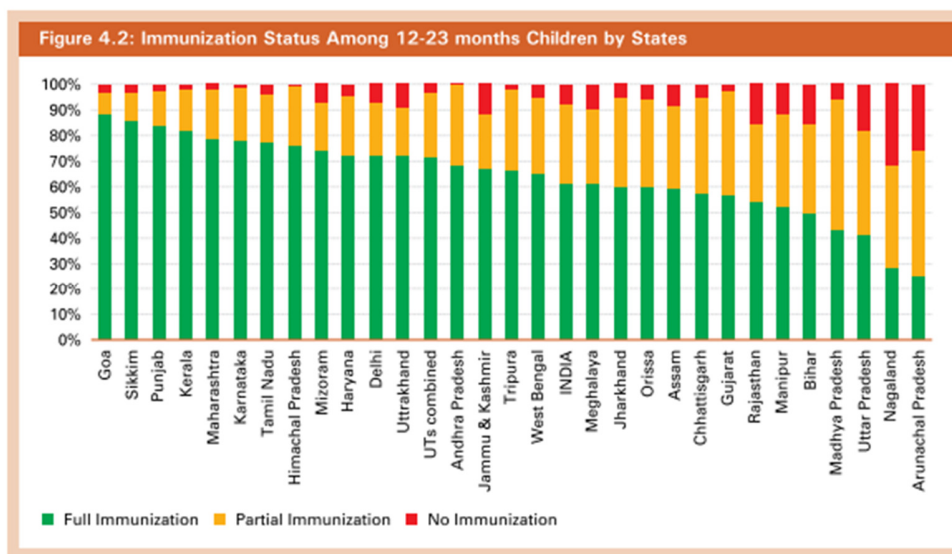


Table 5-2 state wise immunisation coverage from CES 2009(Unicef, Coverage Evaluation Survey Report 2009- State Fact Sheets 2010)

State by state data from CES 2009 survey also indicates that the coverage rate varies considerably all over India. The range starts from 25% fully immunized children in Arunachal Pradesh to 88% in Goa. Thirteen Indian states were below the national average of 61% immunisation coverage. More than 75% of vaccination coverage is only seen in states like Goa, Himachal Pradesh, Karnataka, Kerala, Manipur, Punjab, Tamil Nadu and Sikkim (Unicef 2010, 30).

As mentioned in section 2.2, the selection criteria of states for better and least performing states are based on these two reports. It can be seen that the states Tamil Nadu, Goa and Kerala was in top ranking and the states Arunachal Pradesh and Uttar Pradesh are included in least performing states. The next section analyses these states in relation to immunization performance based on two key indicators, health profile and health infrastructure.

5.2. Immunisation Performance

5.2.1. Based on Health profile

The following table represents health profile of selected states in comparison with India's average.

Name of the state	population (in crore)	Decadal Population growth	IMR ²	MMR ³	fertility rate	CBR ⁴	CDR ⁵	Sex ratio	Child sex ratio	literacy rate		
										Total	Male	Female
India	121.01	17.64	44	212	2.4	21.8	7.1	940	914	74.04	82.14	65.46
Goa	0.14	8.17	11	NA	NA	13.3	6.7	968	920	87.40	92.81	81.84
Kerala	3.33	4.86	12	81	1.8	15.2	7	1084	959	93.91	96.02	91.98
Tamil Nadu	7.21	15.60	22	97	1.7	15.9	7.4	995	946	80.33	86.81	73.86
Uttar Pradesh	19.96	20.9	57	359	3.4	27.8	7.9	908	899	69.72	79.24	59.26
Arunachal Pradesh	.13	25.92	32	NA	NA	19.8	5.8	920	960	66.95	73.69	59.57

Table 5-7 Demographic, Socio-economic and Health profile of States compared to India figures.

Source: Compilation from NRHM state wise information (NRHM, State wise information, Goa 2012)(NRHM, Statewise information, Kerala 2012)(NRHM, State wise information, Tamil nadu 2012)(NRHM, State wise information, Uttar Pradesh 2012)(NRHM, State wise information, Arunachal Pradesh 2012)

Tamil Nadu and Kerala are categorised as well performing states and the states of Uttar Pradesh and Arunachal Pradesh are considered as poor performing states. In both categories, the dramatic difference is seen in all indicators of health profile. The well performed states shows very low rate in IMR, MMR, total fertility rate, crude birth rate and crude death rate in comparison with least performed states. Notable difference is also seen in sex ratio and literacy, especially female literacy is the reason that outstands from poorly performed states. In short, this table establishes the differentiating features of each state. Education and sex ratio has some crucial role in determining health status of a state.

5.2.2. Based on Health Infrastructure

Particulars	Goa	Tamil Nadu	Kerala	Uttar pradesh	Arunachal pradesh
Sub-centre				10516	70

²Infant Mortality Rate-Infant mortality rate (IMR) is the number of deaths of children less than one year of age per 1000 live births.

³Maternal Mortality Rate-The maternal mortality rate (MMR) is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management

⁴Crude Birth Rate-The crude birth rate is the number of births per 1,000 people per year.

⁵ Crude Death Rate-The crude death rate is the total number of deaths per year per 1000 people.

Primary Health Centre		27		1480	
Community Health Centre				778	
Health worker (Female)/ANM at Sub Centres & PHCs		680	1211	1749	
Health Worker (Male) at Sub Centres	68	7440	3290	18792	138
Health Assistant (Female)/LHV at PHCs	1	200	14	1652	NA
Health Assistant (Male) at PHCs	19		176		19
Doctor at PHCs				831	5
Pediatricians at CHCs	5	385	NA		47
Nursing Staff at PHCs & CHCs			314	4670	140

Table 5-8 Short fall [required no- in position]

Source: Compilation from NRHM state wise information (NRHM, State wise information, Goa 2012)(NRHM, Statewise information, Kerala 2012)(NRHM, State wise information, Tamil nadu 2012)(NRHM, State wise information, Uttar Pradesh 2012)(NRHM, State wise information, Arunachal Pradesh 2012)

Table 5-8 shows that India's health infrastructure is still lacking many of the essential facilities. There is no state with the complete facilities. The notable difference is seen in the availability of health care institutions (sub-centers, primary health center, and community health center.). The three better states are saturated with all the health care institutions except 27 primary health center's short fall in Tamil Nadu. Whereas Uttar Pradesh and Arunachal Pradesh have a marked short fall in sub centers and Uttar Pradesh lacks every health infrastructure particulars except the presence of health worker male at PHCs.

5.3. Reasons for the least performing states

5.3.1. Uttar Pradesh (UP)

State profile: Uttar Pradesh is the fourth largest state in the country situated at the north part of India. The population of this state is 166.2 million, the population density is 689 per sq.km (the national average is 312) and the decadal population growth rate is 20.9 (against national average

17.64). Apart from high population another huge difference is seen in sex ratio (908), literacy rate (69.72) and there is an enormous gap between male literacy rate (79.24) and female literacy rate (59.26) (NRHM 2012).

Health profile: From the Table 5-7, it is clear that, the health profile of the state is very low in contrast to India's average. Notable difference is seen in infant mortality rate of 57 (against Indian average 44), and maternal mortality rate of 359 (against Indian average 212) (NRHM, State wise information, Uttar Pradesh 2012).

Health infrastructure: A large number of short falls is seen in the health facilities of this state. Except male health assistant and paediatricians at CHCs, none of the particulars of health infrastructure are inadequate. It can be seen that shortage of 10516 sub-centres, 1480 primary health centres and 778 community health centres together with the health personnel shortage. It is estimated that, 1749 health worker females / ANM at sub centres and PHC s, 1652 female health assistants, 831 doctors at PHCs and 4670 nursing staff at PHC and CHCs are not in position (NRHM, State wise information, Uttar Pradesh 2012).

People's constraints : as per the study conducted by population council in rural UP, the barriers of full immunization are mostly related to the awareness regarding immunization and ineffective health care system (Ahmad, Khan og Hazra 2010, 65-72). Low risk perception of diseases, lack of faith in vaccination, lack of vaccine related knowledge, fear of side effects of vaccination, lack of family support, Lack of knowledge of the place and day of Immunization, and Uncertainty of service provision are the main reasons of poor intake. If the family members are not foreseeing the risk of getting infection in the absence of immunization, they show no interest in immunization. The qualitative study conducted by the same survey Quoted people's responses related to immunization. They expressed nothing will happen to their child without immunization. Some are scared about side effects such as fever, pain, swelling, abscess and child cries a lot after injection. The side effects developed to the elder children also pulled out the parents for immunizing their second child. Some mothers don't know where and when to go for next immunization and they are not informed about the date and place. Their response pointing that, there is no effective communication between ANM or Health workers in some areas. ANM were absent when they went for immunization. Limited mobility of some mothers and their unsupported family demotivates them to complete full immunization. Some expressed, if they

are not getting ANMs services in their village, it is hard for them to reach PHC. All these concerns from the people reflect people's Limited knowledge and poor services from the health sector(Ahmad, Khan og Hazra 2010, 65-72)(Nath, et al. 2007, 598-606).

Administrative issues: From the table 5-8, it is understood that the state lacks health facilities in a very large amount. None of the health infrastructures essential for the health care is not in adequate number and moreover a large scale of disparity is also seen in comparison with other states. Is the state is not providing financial support to strengthen its health care system? Many articles relating to Uttar Pradesh's NRHM (national rural health mission) funds by the central government notes that a wide range of corruption happened in health care and medicine. NRHM is a central government programme intended to provide health care services (including child immunization) to the rural areas. It is started in the year 2005 and sanctioned "the largest sum of money "\$1782 million to this state because of its poor health indicators. After an audit in Uttar Pradesh detected that a substantial amount of money is missing. According to CAG (Comptroller and Auditor General) around Rs5754 crore out of the total amount of Rs 8657 crore not reached to the health project. The report detected that around 550 sanctioned NRHM health centres were never built and not upgraded 134 primary health centers with other irregularities. This establishes the fact that the facilities are not reaching to the needy people because of the irregularities in the administration of health care delivery system in UP (Shukla 2012, 698).

The immunization status of UP is one of the clear examples of inequity in the health delivery system. The children who dropped out from the immunization schedule are belongs to the poor and marginalized sections. According to Save the Children India's research on routine immunization of UP, wealthier families has shown four times more likely to be vaccinated than low- income families. Gender inequality is also visible in UP, boys are vaccinated more than girls and the children of low birth orders are more vaccinated than higher birth order. Mothers' educational level and religion also have a negative impact on child immunization (Kohli 2013, 1). Many other reasons also have a vital role in low health performance of this state. About one third of population is staying below the poverty line and the state has a high number of children who leaves schools and go for child labour. Teenage marriage and early pregnancies are also very common in this state. The population growth of this state is 20.9 and it is higher than the national average (17.64). There is a positive correlation between the states of poverty and teenage pregnancies towards low immunization rates. Early marriage usually results in a lower

education status of the individuals which in turn results in a lower income potential (poverty) and could be a cause for lower immunisation. Studies have shown that early marriage will have the tendency to build larger families because childbearing started quite early. The fertility rate in Uttar Pradesh is highest among the country. Each woman gave birth to at least four children in their life time. The low economic status combined with larger families and low level of education makes the family to stay out of reach by the health services (UNICEF 2013)(Corcoran 1998, 49-67).

5.3.2. Arunachal Pradesh

State profile: Arunachal Pradesh is located in the North Eastern part of India. It is a hilly area spread over 83743 sq.km .The decadal growth of the state is 27% against 21.54% for the country. The state Arunachal Pradesh has very low population density. The urban population also presents very less in number and the literacy rate (66.95) is very low .Compared to male literacy(73.69), female literacy (59.57) also very much low. Sex ratio of Arunachal Pradesh is also very less (926 against 940 for the country). So the overall profile of the states is very much far below even from the national average. About 33.4% of people are living behind the poverty line in contrast to 26.10 national average (NRHM, State wise information, Arunachal Pradesh 2012).

Health profile: The health status of this state is better than the national average. The crude birth rate is 19.8, crude death rate is 5.8 and infant mortality rate is 32. In contrast to these rate the most differentiable features to be considered is the very low sex ratio, literacy rate and the small population size.

Health Infrastructure: The health infrastructure is inadequate even though the population density is low, due to the poorly connected road facilities in the remote areas. In this state, the health institutions to provide health care to the small population located at high altitudes are not adequate. About seventy sub-centres are in shortfall together with health personnel shortage (NRHM, State wise information, Arunachal Pradesh 2012)(Arunachal Pradesh 2004).

Administrative issues: In Arunachal Pradesh, about 98.3% of women (compared to national average 87%) reported that they did not receive any home visits from a health worker or family welfare worker. Only 19.1% report that the facility was clean contrast to national average 67.1%. And 48% reported that the staff communicated nicely compared to national average 72.9%.The majority of women are reporting the health facilities not adequate(Arunachal Pradesh 2004).

A number of barriers for poor immunization rate are cited by the department of health and family welfare by the Government of Arunachal Pradesh. Micro planning is inadequate in making inclusion policy for remote areas. This results in the lack of coverage in the rural areas on a regular basis. Micro planning holds the key for improving immunization rate in rural suburban areas. In addition to that there is also poor micro planning for the urban setting. The reasons for poor micro planning is contributed by staff shortage, lack of follow up in drop out cases and poor services in urban slums. Non-reporting of immunization performance by clinics and NHs, cold chain maintenance are not maintained by clinics/ NHs is also accounted as an immunization barrier.

Inadequate vaccine delivery system is another reason for poor immunization rate. This is mainly due to the poor mobility support and health worker (M) shortage. Injection practices and waste disposal practices are often dangerous due to the lack of skilled health care workers.

A number of different surveys and programme have been carried out for assessing immunization penetration in the state. The data received from all this research has not been used properly in order to generate appropriate actions. Another major barrier is the absence of accountability in health services. The reason for this being the lack of monitoring and supervision at all levels, poor vaccine preventable diseases surveillance and so on.

Health infrastructure is a key to the success of any healthy state. Lack of basic facilities in the rural areas is a barrier in achieving this goal. For e.g. there is no electricity in many remote areas, electricity charges are unpaid because the people can't afford the bill, low voltage and voltage variations at remote areas. Lack of auto disable (AD) syringes and waste disposal pits is another major deterrent.

Shortage of cold chain mechanics; There is not enough helpers and operators for monitoring /repairing cold chain equipment. Moreover there is shortage of medical officers and Para-medical staffs in remote areas. Inadequate training and knowledge of health staffs regarding cold chain maintenance also contributes to the poor situation in the state.

Awareness of health care is vital for improving immunization rate. Lack of information education and communication materials contributes to the downfall for creating awareness among the common people. This results in weak social mobilization (Department of Health and Family Welfare 2013)

People's constraints: District level household survey 2002-2004 (DLHS 2) of Arunachal Pradesh reported the reasons for not immunizing the children. Almost 32% of children not immunized due to their mothers were not aware about the need of vaccination and 14% mothers think that they were too young. The 15% of mothers were not known about place or time of vaccination, and 14% said about inconvenient time or place of vaccination. The other reasons for the no immunization listed by the mothers are fear of side effects (3%) and family problems counted 14%. And there is no much difference among rural and urban population who did not receive any vaccination (rural areas-32%, urban areas-33%), the main reason behind this very less difference is they were not aware about the need of vaccination and not informed about the time or place. Inconvenient place/ time and family problems again pulled down people from urban areas to receive vaccination services even in the presence of better facilities compared to rural (Development & Research Services Pvt. Ltd 2008).

In this state, about 98.3% of women (compared to national average 87%) reported that. They did not receive any home visits from a health worker or family welfare worker. Only 19.1% report that the facility was clean contrast to national average 67.1%. And 48% reported that the staff communicated nicely compared to national average 72.9%. The majority of women are reporting the health facilities not adequate (Arunachal Pradesh 2004)

5.4. Factors behind the success rate from well performing states

5.4.1. Tamil Nadu

State profile: The state of Tamil Nadu is situated on the south eastern part of India. It has a population of 62.41 million. The indicators such as sex ratio (995), child sex ratio (946), total literacy (80.33) (male literacy rate-86.81 and female literacy is 73.86) are very better than the national value (NRHM 2012).

Health profile: The health status of this state is seems to be in the stage of progression. The infant mortality rate (22), maternal mortality rate (97), total fertility rate (1.7), crude birth rate (15.9) and crude death rate (74) are much below than the national average (NRHM, State wise information, Tamil nadu 2012).

Health infrastructure: As like in other state Tamil Nadu is also lacking health infrastructure. But compared to other states the facilities are better. About 27 primary health centres short fall is

seen in this state together with health personnel shortage. Whereas the number of sub-centres, community health centres, doctors at PHCs and nursing staffs at PHCs and CHCs are said to be in adequate number (NRHM, State wise information, Tamil nadu 2012).

Special features identified: Annually around 11.5 lakhs of infants are benefited by the Immunization programme. The effective implementation of immunization programme in Tamil Nadu resulted in reduction of vaccine preventable diseases. The diseases such as Diphtheria, pertussis, neonatal tetanus and poliomyelitis are not reported in the last five years (NRHM 2013).

The state Tamil Nadu's success story behind the drastic change of health sector is well written in the chapter 6 of the book 'Good Health at Low Cost' (Muraleedharan, Dash and Gilson 2011). It is written that, health care system of Tamil Nadu was reconstructed during late 1970s and early 1980s as per 1978 s Alma Ata declaration. Government started giving support to maternal and child care services during late 1990s and early 2000s. Vision, commitment and leadership of senior civil servants were seen in the progress of a better system. Economically this state ranks third and shows a higher rate in human development index, literacy rate and in other socioeconomic indicators. Budget allocation of Tamil Nadu shows, it gives enough importance to the health aspect of the people. Medical, public health and family welfare is the second category behind education that spends the largest portion of state budget. Since 1990s, central Government's 20% of budget is allocated to health and family welfare department and 45% of the same budget is allocated for primary health care services in Tamil Nadu. This is reflected in the states achievement in literacy as well as in health indicators (Infant mortality rate, under-five mortality rate, maternal mortality rate) compared to many other states in India.

The key factor of Tamil Nadu's success is its consistent policy, adequate budget support to the primary health care activities and proper guidance from health secretaries and senior civil servants. In order to improve the access to health care even in rural areas, the health authorities established autonomous bodies and services of trained health workers and it is benefited most by the women and children in the remote areas. Multipurpose workers schemes were implemented promptly and they imparted health awareness to the public during home visits. They provide vaccinations, antenatal and post natal care, contraception, maternal and child health services during this home visits. PHCs were constructed faster in Tamil Nadu than many other states. The successful implementation of national UIP makes more support to the point how this state

ranked among top states in immunization coverage (Muraleedharan, Dash and Gilson 2011, 159-192). The establishment of mobile medical units in slums and remote areas helped to reach immunization services to all. From May 2008, the immunization services are given under the supervision of medical officers all over the state. Injection safety also ensured by using auto disabled (AD) syringes (NRHM 2013).

Apart from the health facilities many other socio economic factors mooted this state to achieve a better position in health. Low fertility rate, better literacy rate and progress in empowered women also decreased maternal and child morbidity and mortality level. Other factors such as improved road and other infrastructure facilities and high income also complimented for a better health outcome (Muraleedharan, Dash and Gilson 2011).

5.4.2. Kerala

State profile: Kerala is a small state situated in the south west part of India and has a population of 31.84 million. It has only 1.18% of the total area of India but 3.34% of the total population of the country (The population density is 819 sq.km. against the national average of 312).The population growth rate shows slower rate than the national rate. The sex ratio of Kerala stands out by with 1084 and this is the only one which showed a higher sex ratio. A notable difference is also seen in literacy rate. This is the state with highest male and female literacy (total literacy rate- 93.91, male literacy- 96.02, and female literacy- 91.98)(NRHM, Statewise information, Kerala 2012)

Health Profile: Kerala's infant mortality rate (12), maternal mortality rate (81), total fertility rate (1.8) crude birth rate (15.8) and crude death rate (7) show a higher improvement of health status compared to other states (NRHM, Statewise information, Kerala 2012).

Health infrastructure: In Kerala, none of the public health care institutions like sub-centres, community health centres and primary health centres are not in short fall it means the state has adequate number of health care institutions. But health personnel's shortage is seen in most of the category (NRHM, Statewise information, Kerala 2012).

Special features identified: Government of Kerala followed many measurements to improve the immunization status. Established many outreach camps and utilized the service of ASHA to make the maximum coverage. Other measures include higher number of outreach camps to cover

migrant populations, local specific IEC/BCC (information education communication / behaviour change communication), award to the best performing junior public health nurses are also planned to improve the immunization coverage. The state also decided October month as “immunization month” every year (National Health Mission, NRHM components 2013) .Special focus also given to tribal, coastal and urban slums by providing immunization sessions in these remote areas. The involvement of private institutions and NGOs in strengthening immunization services are another factor to be highlighted in this state. To make availability of vaccines in order to conduct regular immunization sessions, alternate vaccine delivery programmes were created and this eliminated the problem of too much dependency on routine governmental system.

State also ensured safe carriage of vaccines. Vehicle facilities were provided for the safe transfer of vaccine and also maintained cold chain system for the storage of vaccines. Transport facilities also touched rural areas. Government hired extra vehicles when government vehicles are not available and junior public health nurses (JPHN) to increase the number of service providers like in urban slums (National Health Mission, Immunization strengthening 2013).

When comes to gender equality, the state ranks higher proportion of female. The sex ratio of Kerala is 1084 (Sex ratio is the number of females per 1000 males in the population). It is a tool to assess gender equity in a society “at a given point of time” (Medindia 2013). This should be highlighted because of two main reasons. The first one is, India’s ranking in gender development index is 114 out of 155 countries as per Economic survey 2011-2012. So the sex ratio of Kerala stands contrary to the India’s pattern as it is the only one state showed more female population. And the second thing is, gender disparity has a major role in socio economic development of a society, as it reduces economic growth as well as it shows a wider gap between the positions of men and women (Das and Pathak 2012, 257-264). The literature by K.R. Lakshmy Devi on Education health and women’s empowerment- Kerala’s experience stated the connectivity between the triad of education, health and women’s empowerment. Health and education is the two determinants of women’s economic participation and also these two are very influential to understand the gender inequality in a given society. From Kerala’s example, it is noted that achievement in education and health leads to reduce gender inequality and more women’s participation and their ability to control over their environment. It also helps to develop greater gender development and better empowerment. Therefore gender inequality hampers a person’s

education, employment and health (Lakshmy Devi 2012, 279-287)(National Coalition on Population Stabilization 2011). From the early discussion, especially the reasons from the states Uttar Pradesh and Arunachal Pradesh it is well established that mother's role in immunization is very important to achieve full immunization coverage. When the society started to give importance to women and when women are empowered and able to take decision regarding the health aspect of her family, the result is evident as Kerala's progress in immunization coverage. So gender equality together with education could be another factor which can be taken for the interventions.

In comparison with the Indian average of life expectancy (sixty four years), the state of Kerala has the highest level (seventy four years, seventy six for women). Amartya Sen argues that an overall self-awareness of diseases and disease conditions are so extensive in Kerala. This in turn helps people in Kerala, to avoid premature mortality so effectively. This could also be due to the state's high literacy rate and the wide spread availability of public health facilities. So it is seen that people of Kerala are keener in seeking appropriate medical care than the other states in India (Sen 2004, 263-268).

Sen quoted the finding study conducted by Linda Chen and Christopher Murray (1992) .This study gives a picture of perceived morbidity rates and observed mortality rates between Kerala and United States. This study also shows the health position of Kerala is much higher than the rest of India. An analysis of Sen's explanation regarding the reasons for the longevity in Kerala shows that literacy and extensive public health facilities are crucial in determining people's longevity and health(Sen 2004, 263-268).

5.4.3. Goa

State profile: Goa is a small state situated in the south west part of India and having the population of 1.45 million. The population density of Goa is 364 per sq.km. as against the national average of 312 and the population growth rate shows slower rate than the national average.. The sex ratio of Goais968which is higher than the national sex ratio. Goa is one of the states in India with highest literacy rate. The state has a high male and female literacy (total literacy rate- 87.4, male literacy- 92.81, and female literacy- 81.84)(NRHM, State wise information, Goa 2012)

Health Profile: Goa's infant mortality rate (11), crude birth rate (13.3) and crude death rate (6.7) show a higher improvement of health status compared to other states (NRHM, State wise information, Goa 2012).

Health infrastructure: In Goa, public health care institutions like sub centres, community health centres and primary health centres are in adequate number. But shortfall is seen in the availability of health personnel in most of the categories except health worker female, doctors at PHCs and nursing staffs at PHCs and CHCs. But the health infrastructure of Goa is far better in comparison with other states as it shows very less number of short falls in every category (NRHM, State wise information, Goa 2012)

Special features identified: Like in Tamil Nadu and Kerala, the state Goa performs well in health, education, social security per capita incomes etc. The health care system of Goa is strong and is evident in the health indicators such as reduction of death, infant mortality, maternal mortality and increased life expectancy. According to The Eleventh Finance Commission (2000), Goa is the best State with social and economic infrastructure. The National Population Commission also ranked Goa as the best state in terms of quality of life. The magazine 'India Today' in two consecutive years (2003 & 2004) also listed Goa at the top for its achievements in health indices (Amballoor 2010).

The universal immunization programme in Goa started during 1985-1986. The high literacy of people from Goa depicts their awareness of immunization services available to them.

It is seen that the government of Goa took special efforts for social mobilization. In addition to routine immunization services, the government of Goa established outreach sessions of immunization at all peripheral units on first Saturday of every month. These outreach sessions are run by a team of health professional and they visit underserved areas and conduct special immunization services (D. o. Government of Goa 2013).

Goa Children's Act 2003, section 5 deals with health and nutrition. In that, children's immunization status is also considered as an important strategy to ensure safe childhood. In this act, the state is entitled to ensure the creation and maintenance of comprehensive health cards. This card should include the details such as "growth and development, immunization and other records for all infants and children including children at crèches, homes and schools, and migrant

children”. The same act also stressing that the medical services in the state “shall include facility as specified under the national immunization schedule” (Government of Goa 2010, 553-605).

5.5. Motivation from polio immunization campaign

It is a good strategy if we look any programme that has been proven to have a successful implementation in the same setting. As a part of searching literature for my study, a programme which stood apart as a promising examples one of the effective vaccination programmes in India, 'pulse polio immunization programme'. Various studies showed it is an example of continuous effort of the government that increased participation of people. In 2013, India achieved a major milestone in pulse polio programme i.e. two years without any polio cases. This suggests that the present polio interventions are effective in eliminating polio viruses and covering a large population (UNICEF-India 2013).

Here I am writing a short description of pulse polio about how it was administered and how this programme stands out.

The idea of global initiative of eradication of polio came in World Health Assembly resolution in 1988. India started Pulse Polio Immunization programme in 1995. Under this program, children between 0-5 years are administered polio vaccine during national and sub national immunization rounds every year (NRHM, Pulse Polio Programmes 2013).The progress to polio free India started much later but the continuous monitoring and effort made India's present status. UNICEF's article on 'The journey to a polio- free India' described how this programme is implemented in India. It covered many challenges by strong focus, continuous evaluation of the programme and introduced innovations in vaccination campaigns to cover all children. Strong community Ownership is another feature of this programme. Billions of dollars were spent and following a strict management and planning for the vaccination campaigns.

The following table shows the implementation of pulse polio programme in India (Unicef, The journey to a polio-free India 2013)(Governance Knowledge centre 2013).

1994	Conducted pilot polio immunization activity (targeting 1 million children below 3 years of age).
1995	Launched first polio immunization campaign and national immunization day (covered 88 million children).

1997	NPSP (National Polio Surveillance project) established in collaboration with WHO and Govt. of India.
1999	Type 2 polio virus eradicated. House to house strategy begins (immunized 159 million children). India divided into high, medium and low risk states. Sub national immunization days started in medium and high risk states. Constituted IEAG (India Expert Advisory Group for polio).
2001	Established SMNet (social mobilization network) in Uttar Pradesh to mobilize community for polio immunization. The popular actor Amitabh Bachan became the ambassador for polio.
2002	Govt. of India took leading role in financing the programme by taking its own resources. WHO- NPSP expands network. First polio summit by rotary international.
2003	Introduced underserved strategy in Uttar Pradesh (focused marginalized sections). UNICEF expanded mobilization network in Bihar
2004	Polio surveillance increases in sensitivity (the programme now can easily identify the cases anywhere in the country). Launched transit vaccination strategy (teams stationed at bus stand, railway stations, highway, markets and congregation sites). Second polio summit by Rotary international.
2005	More effective monovalent oral polio vaccine (mOPV) introduced. Social mobilization intensified (involvement of religious leaders, Muslim institutions, mosques and madrasas).identified influencers from the community and they joined with immunization teams to increase acceptance of polio vaccine.
2006	Tracking of new-borns started in Uttar Pradesh and Bihar (booklets are provided to vaccinators to register all new-borns and immunize them for at least eight polio rounds). Operational strengthening to improve micro planning for revisits to households with unvaccinated children.
2007	Ulemas committee formed in UP by Rotary international to enhance Muslim committee participation. Monthly accelerated immunization rounds in UP and Bihar. Implemented migrant strategy (identified the families moving out in n Punjab, Gujarat, West Bengal, Maharashtra, Delhi and given immunization).

2008	High-risk blocks are mapped, and additional stay points built in the hardest-to-reach areas where children are being missed. Further expansion of WHO-NPSP.
2009	Introduced 107 block plan in UP and Bihar. Targeted migrant populations in brick kilns, construction sites, slums and nomadic settlements
2010	Bivalent oral polio vaccine (b OPV) introduced. Each case of polio recommends as a public health emergency by IEAG.
2011	A large-scale mop-up immunization activity launched within 7 days after the detection of a single case of polio in Howarah, three additional mop up rounds (to cover the areas more extensively) conducted in seven weeks after confirmation. All states and union territories prepared EPRPs (Emergency Preparedness and Response Plans) to treat any polio case as public health emergency.
2012	India completed one year without any polio cases.

Analysis of pulse polio programme reveals some essential components needed for a successful immunisation campaign. It can be seen that the pulse polio programme started with a pilot activity and this helped to make a broadened understanding of a small setting. And the programme is highlighted through the launch of national immunization day and mass campaign. Another feature of this programme is a solid research and studies and data analysis which was made with the help of NPSP and IEAG. Special focus also given to the marginalized area by categorizing India into three and special efforts were put in high risk and medium risk areas. Started ‘underserved strategy’ and established many blocks for immunization in rural and hardest to reach areas. Promoted social mobilization through social mobilization network, improved micro planning and mass campaign by the celebrities and the influencers of community are another interesting strategy from this programme. Each case of polio was treated as a case of emergency. Continuous monitoring and evaluation are also a notable feature of this programme.

6. Findings and Discussions

The key argument among researchers dealing with health equity is that the variation in health outcome is the result of an unfair approach. It is noted that the health outcome in terms of immunization coverage is so different among different states in India (see section 5.1)

Provision of immunization services shows varied results among children from rural and urban, male and female baby, low birth order and high birth order, wealthy and poor people, educated and uneducated mothers. So the services are not distributed evenly (see section 3.3.8). According to Fabienne Peter, equitable distribution of health can be a remedy for inequalities in health. So the interventions shall be aimed at provision of services that should be available to every individual by improving access to immunization services.

6.1. Overview of findings

The overview of the reasons from the least performing states is presented below.

Supply side issues	Demand side issues	General issues
<ul style="list-style-type: none"> -Inadequate health infrastructure. -Lack of facilities. -Personnel shortage. -Ineffective communication between health care provider and the receiver. -High rate of absenteeism. -Inaccessibility of health services in the rural and marginalized areas. -Corruption -Poor mobility support. -Lack of monitoring and supervision, Poor micro planning -Weak VPD and AEFI surveillance. -Unskilled health staffs - Weak social mobilisation. 	<ul style="list-style-type: none"> -Low risk perception. -Lack of faith in vaccination -Lack of vaccine related knowledge -Fear of side effects - Lack of family support. -Unclear about the place, day and time of immunization services. -Uncertainty of service provision. -Personal beliefs 	<ul style="list-style-type: none"> -Low level of education. -Inequity of health care delivery system. -Low economic status. -High population growth -Decreased sex ratio. -Poor infrastructure (e.g.-poorly connected road facilities) -Less empowered women -Low female literacy.

From the above table we could figure out that the key factors for least performance on the supply side is the lack of adequate health infrastructure and poor facilities in the health sector. On demand side the main concern is the lack of awareness in the society regarding child immunization. In addition to this the key general issues like low education and literacy level, less female empowerment and high population also contributes to the poor performances.

The reasons from well performing state are useful to make interventions for improving coverage. The findings from these states are listed in the following table. From the table we could summarize the common factors that contribute for the high performance in child immunization in these three states. The key points are economic stability, high literacy and better health infrastructure facilities and services. The role of government in establishing and implementing various health policies and services should also be highlighted for the good performance in all these states.

Tamil Nadu	Goa	Kerala
<ul style="list-style-type: none"> -Economically better state. -Vision, commitment and leadership of senior civil servants -Government's support to maternal and child health services -better literacy and low fertility rate -Improved road facilities -women empowerment -Guidance to health secretaries -Autonomous bodies and service of the trained health workers. -Launched multipurpose workers scheme. -Established PHCs faster. -Established mobile medical units. -ensured Injection safety by auto disabled syringes. 	<ul style="list-style-type: none"> - Economically better state - high literacy rate - high sex ratio -Established outreach sessions -Involvement of health professional immunization programmes - Importance given to immunization programme by Goa children's act -Creation and maintenance of Health cards -Ensured facilities for immunization services. 	<ul style="list-style-type: none"> -High literacy and female literacy. -Lowest rate in population growth. -Established many outreach camps. -Utilized ASHA -Local specific IEC/BCC. -“Immunization month” -Special focused to marginalized areas. -Involvement of private institutions. -Alternate vaccine delivery programme - Ensured safe carriage of vaccines -Hired extra vehicles for the vaccine carriage, transportation also touched rural areas. -Gender equality -Women participation -Extensive public health facilities.

6.2. Discussion

The poor results in Uttar Pradesh and Arunachal Pradesh shows that the practices of immunization programmes are not diffused in the social system. Still many people are staying away from immunization services. Here innovation term is used for immunization programme because the coverage rate shows still it didn't have a favourable or unfavourable attitude from many parts. The key factor of diffusion which is the adoption of completing immunization schedule is also not perceived by the people.

From the analysis, it is detected that the influencing factors made the immunization programme failure in some places and success in other places. The nature and behaviour of the population and the role of government in imparting the idea of immunization was different in well performing and poor performing states. The adoption of immunization services were more seen among people from Kerala, Tamil Nadu and Goa than Uttar Pradesh and Arunachal Pradesh. So the adoption of immunization services in these states is heavily depending on the characteristics of the state. Thus looking what worked in these states could be used for improving the coverage in the lower performing states. This can be considered as diffusion of innovation process.

It is noted that in Uttar Pradesh and Arunachal Pradesh, the communication channel to impart awareness and knowledge to the public is lacking. It has been already three decades from the launch of universal immunization programme in India and still it is new to many people. It is evident that the innovation- decision process infiltrated both in the government as well as to the community in Tamil Nadu, Kerala and Goa than Uttar Pradesh and Arunachal Pradesh. It is noted that PHCs and other health institutions are constructed in these states faster than others (see section 5.4.1.4).

Communication channel is very important from gaining of new idea or knowledge to confirmation of whether to accept or reject the innovation. It is seen that the Governments of better performing states has shown more dedication and facilitated the requirement for immunization programmes everywhere. For example, the Government of Tamil Nadu had started multipurpose workers scheme, established mobile medical units and autonomous bodies, and provided services of trained health workers to make awareness and to improve coverage even in remote areas. Likewise, the Government of Kerala established many outreach camps, utilized the service of ASHA, used local and specific IEC\BCC. The state Goa also improved the

involvement of health professionals and outreach sessions to improve immunization services everywhere. These activities play an important role in every stages of innovation decision process. This means that the people from better performing states got the opportunity and are exposed to the idea of immunization services than the poorly performing states. These governments looked implementation stage of immunization programme and provided a favourable atmosphere for people's persuasion and decision process. People are more aware about the need of immunization and they were involved in the immunization activities. Results from the previous surveys illustrates that people have a tendency to continue the immunization services. From this we can conclude that from this innovation –decision process based on vast majority of people from these three states.

Based on DOI theory, the reverse result of Arunachal Pradesh and Uttar Pradesh shows that the spread of information and facility provided were not good enough for the diffusion of immunization programme in these states.

6.3. Strategies policymakers can pursue to improve child vaccination.

An important factor to be noticed while making intervention is there is no state with full immunization coverage. Even the states included in the well performing states also lacks many of the criteria needed for to make a best example. So various strategies should have to consider both from better performing state as well as from other sources to make an effective interventions. There are many reasons attributing to poor immunization coverage. The reasons and interventions are categorized into two main areas. The first one touches the role of government in the provision of immunization services, and the second one relates to the role of people and their approach to vaccination.

6.3.1. Interventions for supply side

6.3.1.1. Prioritization of programme

It is important to prioritize immunization programme like any other important programmes to make an effective immunization programme in the country. The detailed study of the programme, adequate budget allocation and follow up through evaluation are the special features of a programme if the government have prioritized a particular programme. It is essential for the policy makers to have a clear view regarding the implementation of immunization programme in

the real setting to make more effective interventions. They should acquire the deepened understanding of diseases and the health behaviour of the people. So it is important to make a shift in the perception from a holistic and universal view to the deepened understanding of the specific issues that affect health and try to focus on the most effective interventions (Banerjee and Duflo 2011, 8-13). For this, the policy makers should understand the underlying issues that create poor vaccination coverage and work towards alleviating the causative factors of these problems within the community.

Budget allocation should consider preventive health care as an essential service to the public. It is seen that, the state Tamil Nadu gave prioritization by allowing second largest allocation of fund to health department to improve public health activities directs how this state made comparatively better results. As seen in Uttar Pradesh the planned budget was misused and didn't reach the services to the needy population. So for this, ensure the fund is utilized for its own purpose by thorough monitoring by a special authority. A detailed study of providing an effective immunization services should be done before implementing a programme to make a cost – effective interventions and allocate a considerable amount of money required for this services. Strict monitoring of the programme related to financial aspect is also very important.

Evaluation of the programme is also high in demand in every stages of the programme. It will help to find out whether the programme is going through the desired direction.

6.3.1.2. Strengthening of health infrastructure

The main problems identified in the health infrastructure are lack of facilities, personnel shortage and high rate of absenteeism. This was the main reasons from UP and AP. Even if the people are aware about the need of immunization but the state lacks essential facilities to meet also makes very poor coverage. There are many places which lack adequate number of health care institutions, human resources and basic facilities. It is necessary to build health care institutions according to the population and it should touch the rural and marginalized areas. The functioning of these institutions should be assured by hiring required number of health care providers and other personnel required for rendering the services. Provision of training and other facilities for immunization also demanded to strengthen the health infrastructure.

Government and each state government should focus on child health services, and should establish an extensive health care facility with the involvement of private institutions. It is

necessary to utilize the service of autonomous bodies, trained health workers (ASHA) and multipurpose health workers scheme also in low performing states as seen in Kerala and Tamil Nadu , this can tackle health personnel shortage in immunization.

The findings from Uttar Pradesh and Arunachal Pradesh established that the services of health workers not accessible to some people. When they went for immunization health workers are absent, their services not reaching to the villages or there is not enough number of staffs are available to provide services effectively. Inclusion policy should be taken to make the very first level workers and the workers involved for the services. They should have the motivation to work and should have a clear purpose that they are working for a common goal that is achieving full immunization coverage. Incentives or awards for the best worker who follows their duties and responsibilities and can reduce the wages or other incentives who takes absence from the work so often.

From the literature (see section3.3), it is noted that, India facing supply shortage of vaccines to cover entire population. Based on the third stage of innovation-decision that is implementation of an innovation puts the individual to use a particular innovation. Supply shortage is an operational problem for this stage as it makes difficult for the people to receive services. If the government is not providing immunization services in terms of adequate supply of vaccines and facilities to render immunization services the spread of immunization services will be interrupted or the people will not receive services. Hence it is important to ensure an uninterrupted supply of vaccines to every state through a well-defined stock management system (Vashishtha and Kumar 2013, 111-118). The central government also should focus on providing technical support and resources to every state. Special focus should be made to uplift low performing states.

6.3.1.3. Improve Communication and Training to health care providers

According to DOI, gaining of sufficient knowledge is the first stage of adoption of an innovation. The role of health care workers in improving vaccination coverage was well established in the immunization performance. They are the person who comes in direct contact with the health care receiver. The state UP reported there is no effective communication happens between people and health care workers. Poor communication with the health care increases high drop rates and very low coverage. If the health care provider (health care professionals at all level including the first level) have the real perception of vaccine preventable diseases and have the skills, they can

impart better understanding and acceptance among the people. It is important to conduct classes for health workers and further education by providing materials and opportunities to learn more about immunization area (Smith-Akin 2000, 92-96). As immunization is a new method of prevention and didn't pass through many generations, so many people will have the problems in the acceptance. They have many questions because they are putting effort to an undetected disease or it is a painful procedure for a disease that didn't developed so far. There for to make awareness among the people about why it is a recommended action and convincing them to approach immunization without fear, health care provider should educate them. For that they should have a deepened understanding of what they are intended to do. Unsafe injection practices and poor method of immunization waste disposal, and inadequate knowledge of health staffs in maintaining cold chain maintenance for vaccines in UP and AP also shows lack of knowledge and skills. This will attribute to side effects and rejection of immunization services from the seekers. Thus, the importance of acquiring knowledge regarding vaccination, vaccine preventable diseases and safe method of administration has a real impact in the vaccination coverage.

Besides education, it is necessary to ensure the number of health workers involved as per populations to know whether they get a manageable number of people. If the numbers of health workers are low and they have to deal a large population, it is sure that they will not get enough time with each family. In that case, it is necessary to hire health personnel according to the demand.

Assessment and feedback for vaccination providers are also very important. This involves evaluating their performance retrospectively and giving response. Assessing the performance and giving feedback to the vaccine provider also enhance immunization coverage. During the process of evaluation the authority can judge their skill and can assess whether it reaches to the prescribed standard. Based on this they can organize incentives or awards for the best worker and can give continuing education for the poor workers. This will increase their skills and motivates them to work towards for the immunization goal (Smith-Akin 2000, 92-96).

6.3.1.4. Strengthening of VPD and AEFI surveillance system

Evidence based policy is a useful approach to prevent failure of interventions. This approach include taking decisions regarding programs, policies and interventions on the basis of a solid

research and detailed study within the field(Dobrow, Goel og R.E.G 2004, 207-217). It is important to conduct research and studies on the reasons of poor coverage and what measures will be affective in a selected community to make the best use of existing resources and for desired targets. Current status analysis has shown the variation in the coverage and the reasons are varying according from state to state. Thus to conduct effective programmes from the administrative level as well as to attain a positive response from the people, it is important to have policies based on best available research in the field. The new knowledge gained through the studies will help a more informed decision making regarding further interventions. Therefore evidenced based policy will helps to find out what interventions are “best suited for”, “what will works” in the real setting and whether “is it worth” in terms of cost effectiveness(Davies, Nutley and Smith 2000, 43-60). Davies, Nutley and Smith argued that ensuring thorough consideration to real situation and the quality of research carried out should be taken into account while doing an evidence based studies (2000, 59-60).The reports and findings from the state explain that India lacks an effective surveillance system for the monitoring of vaccine preventable diseases and adverse event following immunization. Falsification of date obtained from weak surveillance system will leads to hiding of the areas which needs prioritization and recommendation. Like NPSP (National polio surveillance project, it is successful innermost detecting polio cases) Government should establish surveillance system for other vaccine preventable diseases. So this will helps to the detection and identification of areas where the threat of these diseases is present and can make appropriate actions based on the studies. In the case of pulse polio programme, they started a surveillance system in the beginning of the programme.

6.3.1.5. Access for rural and marginalized section

Reports from Uttar Pradesh and Arunachal Pradesh showed that many of the immunization services are not reaching to the rural and marginalized areas. It is reported in UP, if the services are not reaching to their village it is difficult for them to reach PHCs. Same way people from remote areas in AP also suffering lack of coverage due to poor infrastructure facilities. The health facilities are not adequate and health personnel are absent even in the available facilities. It effected largely on people’s participation by reducing their participation in immunization programme. To tackle inaccessibility of health services in rural and marginalized areas and to increase social mobilization, Govt. of Tamil Nadu and Kerala established many outreach camps, mobile medical units, improved transportation facilities, hired extra vehicles and utilized services

of multipurpose workers and ASHA. So this should be another area the government should give special attention to. Focus on rural and other outreach sections can improve the national average of full immunization to a large extent as this constitute a major part of poorly on unimmunized children. As an illustration for this, we can take the case of polio. The programme was successful in focussing marginalized sections and established social mobilization network to improve access in these areas. The same study,

In order to solve health personnel's absence and decreased availability of health services, in 2003, NGO 'Seva Mandir' established its own camps in Udaipur for immunization. This was effective in elevating immunization rates; it went from 6% to 17% (Banerjee and Duflo 2011, 56).

6.3.1.6. Supervision, Monitoring and Micro planning

Supervision, monitoring and micro planning is very important to provide quality immunization services to the public. Supervision is the "process of guiding, supporting and assisting staff to perform well in carrying out their assigned tasks (USAID 2009)." Supervision is so very useful to detect any shortcomings very early. Monitoring system also helps to collect and analyze data from well-defined indicators and hence we can deliver high quality services. And also for the provision of effective immunization services, a local level planning, quality supplies and services are essential. Therefore to ensure a successful immunization program demands thorough supervisory support to all levels of immunization programme including micro-planning and monitoring of data.

Through supervision we can identify the problems faced by the health workers in covering immunization and monitor their performance. This is a method to get a feedback to the concerned authorities and can recommend actions based on this. So in every level, there should have a proper authority and a medium for conducting supervision, monitoring and micro level planning. The medium can be a checklist or the use of technical aids to record data systematically and accurately. The use of supervision and monitoring thus can lead to an effective micro-planning everywhere and also will optimize the allocation of resources and promote vaccination coverage. Findings from UP and AP give a picture of lack of supervision, monitoring and micro planning in immunization services. Same time, the case of pulse polio enlightens the role of IEAG and NPSP was crucial in the path of success.

6.3.2. Interventions for demand side

According to Banerjee and Duflo, poor people have a tendency to choose health curing options instead of health prevention options, even though the cheapest is health prevention options. To overcome this, Government and many organizations are providing free or subsidized services. But still it is not meeting the desired outcome (2011, 51-54). It seems to be several reasons for this. From analysis it is seen that people's knowledge, education and beliefs about child vaccination influence their decision to vaccinate their child. So the main interventions also should touch the factors which have an influential role in making changes in the parents.

6.3.2.1. Awareness programmes

Awareness programs are capable of making right perception among people. Awareness programs are discussed under to titles. .

Programmes to convince people: Education has positive effects on several levels, effect of which is far reaching. The studies showed that the education can reduce child mortality and youth pregnancies and poverty.(Banerjee and Duflo 2011, 92). So educating people about preventive health interventions is very important. People will know why the implementation of child vaccination is so important and what is the necessity of completing an immunization schedule is. Banerjee and Duflo argued that still information is not complete; people make decisions based on their own situation and reality and these decisions might not always in accordance with the information that they heard(2011, 71-101). There are many reasons for this, so the policy makers should concern about the beliefs and underlying factors that influence low performance.

By using DOI theory, we can analyze root of the problem. It is noted that, poor performing states have different characteristics from well performing states due to the changes in social, economic, geographic, and demographic profile. Well performing states are differentiated with high income level as well as better literacy rate especially female literacy, low fertility rate, women empowerment, and gender equality. So the strategies to make changes in these areas in poorly performing states are essential to improve vaccination programmes.

The shifting of adopter categories from the low level to the high is very much needed in poor performing states. Because of financial, education and poor facility constraints most of the

population are embedded in the late categories. So the intervention must focus on changing of their behaviour.

In this case a possible strategy can make in the light of health belief model (HBM), and DOI theory.

Application of Health Belief Model

<i>Concept</i>	<i>Application</i>
Perceived Susceptibility	Find out the areas with poor coverage. Make awareness regarding vaccine preventable diseases among health personnel's as well as parents. Inform them about the epidemiology of these diseases and increase their knowledge by creating awareness on the point 'these diseases are endemic and the children are at risk if they are not vaccinated'.
Perceived Severity	Increase people's knowledge regarding the complications that develops in the absence of vaccination.
Perceived Benefits	If the people are aware about the benefits of immunization they will listen to the information such as when and where they have to go for immunization and how they can complete full immunization.
Perceived Barriers	The role of government plays in every level. It is more evident in reducing the barriers that we discussed earlier. Take appropriate measures such as assistance, incentives, ensure proper running of health care institutions.
Cues to Action	Elevate their readiness to act by continuous monitoring of the programme by promoting awareness and reminders.
Self-Efficacy	Encourage people's initiation and the support for the programme.

Table 6-1 Health Belief Model(Twente 2012)

Mass campaign: As seen in extensive campaign for pulse polio programme, the involvement of celebrities and other influential people in the community and the use of media such as television, radio, posters can capture people's attention towards immunization programme. A large number of people were utilized pulse polio programme all over the country. Through mass campaign, we can spread awareness regarding immunization services to the public. These mass campaigns should include each disease and its vaccination and the importance of vaccination. In addition to this, the time of vaccination for each diseases and available services should pass through mass media.

6.3.2.2. Programmes to attract people

Reminder\recall: The facility for reminder or recall option for the providers and the seekers may be a best remedy for drop out cases as well as covering other vaccines (Briss, et al. 2000, 97-140). Through reminder, the provider and the seeker can be informed about due date for the next or specific vaccinations (Lewin, et al. 2011, 1-7). The study conducted by Briss, et al. argued that a strong scientific evidence is found behind the use of reminder\recall can improve vaccination coverage (Briss, et al. 2000, 97-140). So it is important to maintain a system that covers the details of the child taking immunization or supposed to take. It should be well maintained. The application of technology will help to implement this in a large context. Reminders can be delivered through vaccination card, by computer, by mail, by telephone or mobile reminders. When issuing immunization cards to the parents, they should teach about the age at which the child has to undergo various immunizations. The details of each vaccination should be entered in the documents & the immunization card. Follow up also should be facilitated by using reminder/ recall or verbal communication.

Incentives: Studies showed incentives can improve implementation of a preventive health program. This is most effective in the 'Laggard' category mentioned in DOI theory, which are difficult to make changes. Incentives are a way to stimulate people to adopt the particular strategy by means of cash (Conditional Cash Transfers) or small incentives. Conditional cash transfer proved its effectiveness but CCT is tested mainly in the areas where health facilities are available and it is very expensive in terms of meeting a large population. Seva Mandir's immunization programme is one among small incentives that have made big accomplishment. This programme proved relatively small incentives can make big changes in the community where immunization rate is very poor. It offered two pounds of dried beans and a set of stainless steel plates in one camp of thirty established camps in Udaipur (a district in the state of Rajasthan, India), to parents who brought their children for immunization. The study result is, the level of immunization increased from 6% to 38% (Banerjee and Duflo 2011, 62-63).

Flexible services: Time inconsistency is one of the problems faced by the people. Time inconsistency often can be the factors what averting people from intention to action. People postpone their action may be because the intended results will come in the future some time (Banerjee and Duflo 2011, 65). Use of incentives or benefits can help to reduce time inconsistency. So the strategies should focus on elevating immunization as an important activity

for their children. As seen in pulse polio programme, provision of immunization services at flexible time, establishing small or mobile units in more accessible areas, and wide campaign can make the people to come forward by elimination time constraints.

7. Summary and Conclusion

This thesis explores the reasons for low vaccination coverage and ways to improve child vaccination coverage in India. The main data sources for this study were the official websites and reports of immunization coverage and services in India. The study focuses on five selected states and one programme.

The study explores the reasons for poor vaccination coverage from two poor performing states and differentiating features from three well performing states. In the light of diffusion of innovation theory, it is argued that immunization is still an innovation to the most of the states. Immunization services are not diffused in the system for most of the states. It was noted from low performing states that the reasons for poor vaccination coverage are a combination of various issues such as poor health facilities, lack of awareness about immunization programs and general underdeveloped status regards to wealth, literacy and gender inequality. Whereas the factors associated with high immunization performance in better performing states are active involvement of health sector and health infrastructure and other infrastructure facilities, people's knowledge and general development of the state. An analysis of pulse polio programme revealed that the interventions such as monitoring and supervision of the programme, social mobilization and immunization services at all levels including remote and marginalized sections can make notable improvement in immunization programme. In addition to this, other strategies to strengthen immunization coverage such as prioritization of programme, strengthening of health infrastructure, improve communication and training of health care providers, strengthening of VPD and AEFI surveillance system, access for rural and marginalized section, supervision monitoring and micro planning, mass campaign, reminder\ recall, incentives, and flexible services.

These strategies will not cure the problem of poor immunization coverage in the country completely. Further investigation regarding how to balance the society regards to health equity and social justice in terms of immunization coverage and health services shall be carried out. Studies involving vaccine stock management system including production and distribution of vaccines, government's role in ensuring health facilities and services, improving educational level and decreasing gender disparity also have a crucial role in immunization coverage among minors.

To conclude from this study it is evident that there is still a long way to go to accomplish child immunization in India at satisfactory levels. This study figured out some of the key measures and strategies that could hopefully help to improve child immunisation in India by incorporating these findings in the new initiatives in this field.

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