CORRELATES OF CHILD IMMUNIZATION: A STUDY OF NORTHEAST INDIA

ABSTRACT

Dissertatation submitted to the Jawaharlal Nehru University in partial fulfillment of the requirement for the award of the degree of the

MASTER OF PHILOSOPHY

R. K. JEERMISON

CENTER FOR THE STUDY OF REGIONAL DEVELOPMENT
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067
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20th July 2006

Certificate

I, R. K. Jeermison certify that the dissertation entitled **"Correlates of Child Immunization: A study of Northeast India"** for the degree of **Master of Philosophy** is my bonafide work and may be placed before the examiners for evaluation.

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TO

LATE AYI

KHAYILA, TUISHILA AND NGALĀTENG

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For any error in this dissertation, I am solely responsible for it.

New Delhi-110067 *R. K. Jeermison*

Date: 20/07/06.

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Chapter one

Correlates of Child Immunization: An Introduction

Health is a key factor in a nation's growth and development. With the recommendation of the three-tier unit of integrated health services by the Bhore Committee (1946), the delivery system in India has eventually undergone significant changes. Public health infrastructure that were urban and clinic based before independence spread to the rural areas as a partial success of the first five-year plan. Public health in India has been a subject of national attention, public debate, and government intervention for several decades, and a number of national programmes were launched in the past to control and eradicate a number of diseases. Although success was accountable in some areas, public health services have been generally characterised by poor performance. "The burden of disease has fallen disproportionately heavily on the poor, the worst affected being children" (Bose 2003: 46).

The Constitution of India under article 21 makes Right to Life a fundamental Right. "Article 47, a Directive principle of state policy lays down that 'raising the level of nutrition and the standard of living of its people and the improvement of public health' is among the primary duties of the state" (Bose 2003: 45). Also, article 39 of the Indian Constitution laid down in a nutshell our duties and responsibilities towards our children. The duties and responsibilities are to monitor the growth and development of the child by providing nutrition, health care services and schooling. It is thus written to generate the greatest welfare to the people, although still, the promise of good health services by the government continues to remain elusive.

Health services can be divided into promotional or organizational, preventive and curative services. Promotional or organizational concerns with the spreading of awareness, educating the population about hygiene and sanitation. Preventive services are concerned with measures taken so as to be

free from illness and, curative services means to give treatment to the sick individual when he/she fails to take proper preventive care.

By convention, preventive procedures are divided into three categories.

(1) Primary prevention reduces the susceptibility of persons to diseases. Immunization and also health education may fall in this category.

(2) Secondary prevention is the early detection of disease so that treatment can be started before any irreversible damage has occurred.

(3) Tertiary prevention is the management of established disease so as to minimize disability.

Immunization is a prompt and effective intervention to correct departures from good health that can happen at any moment. It is a way of protecting the human body against infectious diseases through vaccination. Immunization prepares our bodies to fight against diseases in case we come into contact with them in the future. Babies are born with some natural immunity, which they get from their mother through breast-feeding. This gradually wears off, as the baby's own immune system starts to develop.

1.1: **Overview of Child Health Programme**

Immunization against smallpox as part of the public health programme under both the colonial regime and some of the princely states has a long history in India. Even before the discovery by Jenner, variolization was known and practice selectively in India and China since the seventeenth century (Das et al. 2000). There is an impressive array of colonial legislation, e.g. the compulsory Vaccination Act, Cantonment Act, and Epidemic Act. Immunization programme in the country had come a long way since then. Child immunization and children health issues are being addressed both internationally and nationally through various programmes and policies. The first international law that recognized the importance of the rights of child was the Geneva Declaration of 1924. Following this was the United Nations Declaration of the Rights of Child, which proclaimed the child to be the most privilege ward of humanity. It stated that; "mankind owes to the child, the best it has to give" (Venkateshwara 2004: 9). It was the 'Save the Children

International Union' (SCIU), which was founded in 1920 that promulgated the Declaration of Geneva and was later subsequently adopted by the League of Nations in 1924. Article 23 of the Covenant of the League included matters concerning the prevention and control of diseases. "The members of the League also agreed to encourage and promote the establishment and co-operation of duly authorised voluntary national Red Cross Organizations having as purpose; the improvement of health, the prevention of diseases and the mitigation of suffering through out the world" (Venkateshwara 2004: 10). In 1945, the United Nations set up an autonomous International Health Organisation within the UN system. The International Health Organisation adopted the organization named as World Health Organization (WHO) in 1946. One of the basic objective of the WHO as in article (1) is "to promote maternal and child health welfare and to foster the ability to live harmoniously in a changing environment" (Venkateshwara 2004: 55).

Regional organization like the South Asian Association Regional Countries (SAARC) also works in tandem with the UN. India took lead in formulating SAARC "Agenda for Child Development". Universal Child Immunization is one of the five goals that SAARC countries had promised to achieve by the year 2000 that is in conformity with the Alma-Ata Declaration "Health for All" by 2000.

"The Central Vaccination Act, 1880, that was directed against smallpox was the first piece of legislation written in the Indian statute book on child health. There were also state Acts for the prevention of smallpox among children" (Kapoor 1979:168). In independent India, with the adoption of the Constitution in 1950, economic and social planning was given the leading priority and was included in the concurrent subject. With the establishment of the Planning Commission, the Five Year Plans were formulated. The Five Year Plans adopted, though was unsuccessful in its initial period helped to recoup the losses of economic and social welfare the country had experience under the colonial legacy. "Despite all the emphasis placed in the plan document on the needs of children, the allocations for child development programme have been very inadequate compared to the requirements" (Baig

1980: 6). Although there was an increase in the allocations after the first Five Year Plan, these were hardly addressing the needy children of every section of the population. Indeed, the two Plans completing a decade went away surreptitiously with no mention of the child as such. "Paediatrics, it seems, was located in the 2nd Five Year Plan period as the weakest link in maternity and child health services" (Baig 1980: 7).

The Government of India in 1974 proclaimed the National Policy Resolution on 22nd August. The Policy measures suggested for the attainment of a comprehensive health programme, nutrition services for removing deficiencies in the diet of children, expectant and nursing mothers, compulsory education up to the age of 14 years etc. It also accorded a high priority to the preventive and promotive aspects of child health below the age of six. Although the Policy petered out with less significance, nevertheless, it was one of the measures for the first time that brought together in one place several areas of vital concern for the welfare and development of children. The Policy served as a vignette in this regard. A major welcome development that can be ascribed to the National Policy is the evolution of the scheme of Integrated Child Development Service (ICDS) which aims at providing a package of early childhood services to children below six and expectant and nursing mothers. Another important result of the Policy is the emphasis given to the expansion of the Special Nutrition Programme which is a direct nutrition intervention for the benefit of children below six years belonging to the most vulnerable sections of mothers (Rajendran 1980).

The ICDS Scheme was launched on October 2nd 1975 with the objective of improving the nutritional and health status of the children in the age group 0-5 years and to reduce the incidence of mortality, morbidity, mal-nutrition, and school drop-out, besides enhancing the capability of the mother to look after the normal health and nutritional needs of the child. According to the guidelines issued in July 1975 by the Union Ministry of Social Welfare, the main objectives of the ICDS Scheme are: -

(1) To improve the nutritional and health status of children in the age group 0-5 years,

(2) To lay the foundations for proper psychological, physical and social development of the child,

(3) To reduce the incidence of mortality, morbidity, mal-nutrition and school drop-out,

(4) To achieve effectively co-ordination of policy and implementation amongst the various departments to promote child development and,

(5) To enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.

One of the important packages of services included in the ICDS Scheme is the immunization against smallpox, diphtheria, tetanus, whooping cough and tuberculosis to all children below six years of age and against tetanus to all pregnant women.

Immunization of children that was carried out under the Maternal and Child Health Services was given a separate identity when the Expanded Programme on Immunization (EPI) was launched in 1978 for providing vaccination free of cost to cover all eligible children and pregnant women. In this Scheme all immunization services were integrated and provided through Primary Health centres (PHC) and sub-centres in rural areas and hospitals and dispensaries in the urban areas. The ultimate objective of the Programme is to reduce the incidence of the six preventable diseases and to protect each child from these diseases. At the onset only DPT, TT and BCG were introduced. Polio (OPV) and Typhoid were introduced one year later in 1979, and after another year (1980) tetanus immunization of school children was introduced. Measles on schedule was incorporated later in the 7th Five Year Plan (1985-90). Being satisfied with the results of intensification of EPI, the concept of Universal Programme on Immunization (UIP) came into existence. The UIP was introduced in 1985-86 with the following objectives:

(1) To cover at least 85 percent of all infants against the six preventable diseases by 1990, and

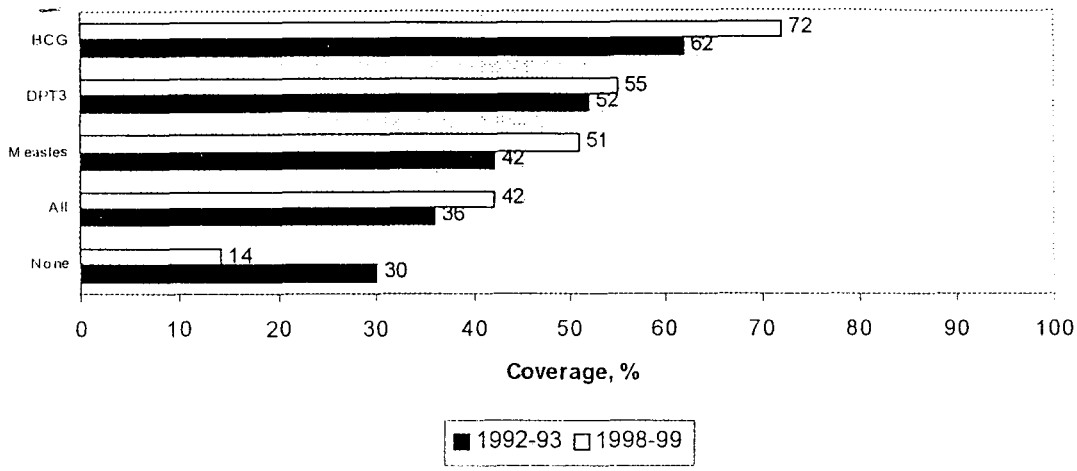
(2) To achieve self-sufficiency in vaccine production and the manufacture of cold-chain equipment.

In the UIP Typhoid vaccination was discontinued but Measles immunization was added. In 1992, the UIP became a part of the Child Survival and Safe Motherhood (CSSM) Programme, and in 1997, it became an important component of the Reproductive and Child Health (RCH) Programme.

Apart from these direct intervention programmes, there are other policy measures that included immunization of children as an important component. The National Health Policy (2002) and the National Population Policy (2000) are worth to mention in this respect. In the National Population Policy it is mentioned that "achievement of universal immunization of children against all vaccine preventable diseases" remains a key socio-demographic goal, along with "prevention and control of communicable diseases" (http://www.populationfirst.org). The National Rural Health Mission developed on the lines of the National Common Minimum Programme under the United Progressive Government commonly referred with the acronym UPA, also included immunization as one of its goals. However the Programme does not cover the entire country but only the rural areas and in the selected 18 states of, Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Bihar, Jharkhand, Chattisgarh, Madhya Pradesh, Uttaranchal, Uttar Pradesh, Orissa, Rajasthan, Himachal Pradesh and Jammu and Kashmir.

Today the country has a special intervention programme like the Universal Immunization Programme (UIP) that aims at 100 percent coverage of targeted population groups with vaccines against preventable and communicable diseases. Despite considerable gains in coverage in the country, infectious and communicable diseases (with the exception of smallpox) still take a heavy toll on Indian children. The National Family Health Survey (NFHS) conducted by the International Institute of Population Sciences (IIPS), Mumbai, revealed that there has been a steady improvement in coverage for immunization in the country from the first survey (1992-93) to the second survey (1998-99).

Figure 1.1: ***All India Immunization Coverage, Children Age 12-23 Months, NFHS 1992-93 and 1998-99.***

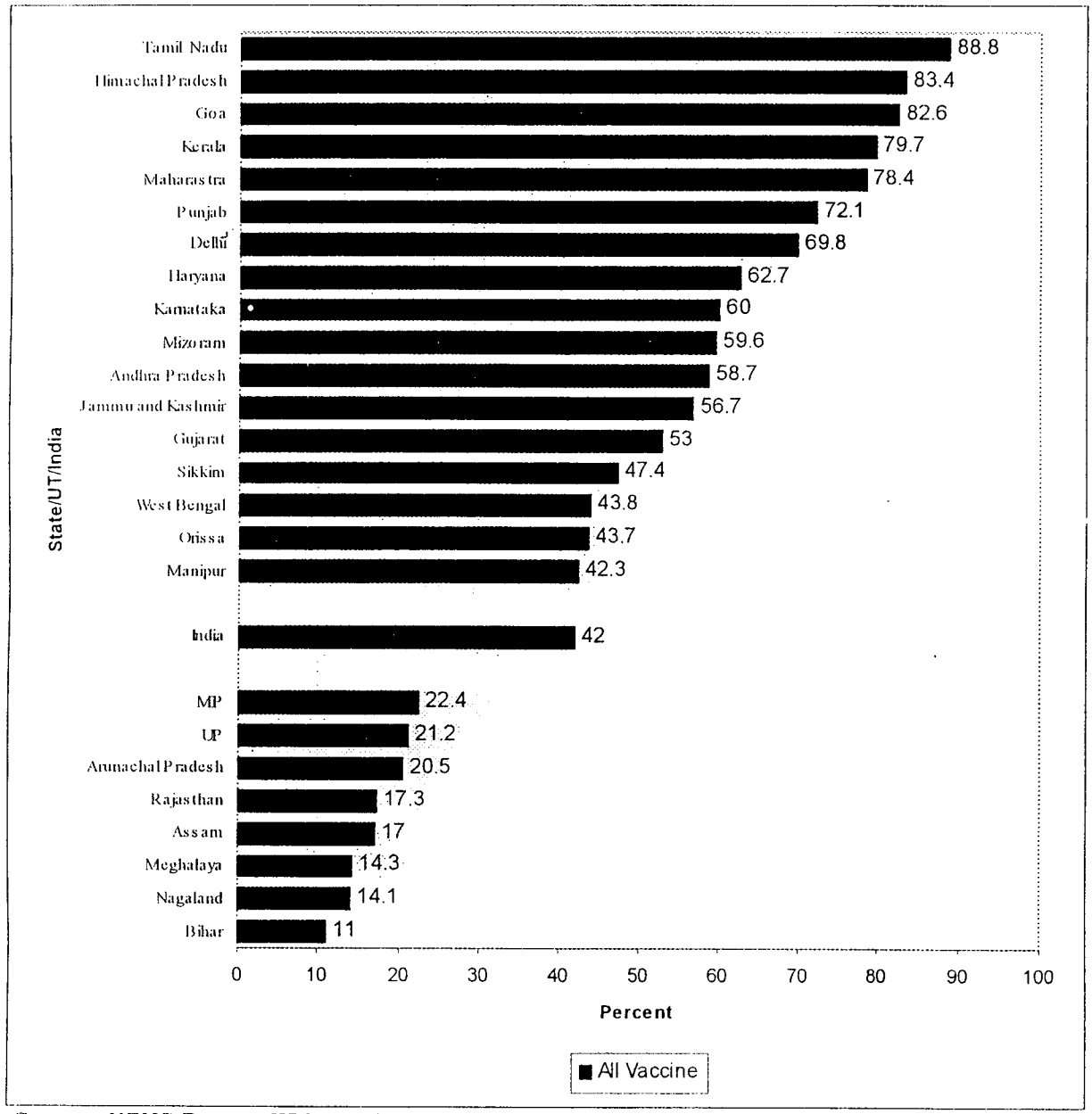


Source: NFHS Report, IIPS 1995 and 2000.

Fig. 1.1 shows that there was an overall improvement in the coverage of all the vaccines. BCG vaccine recorded an increase of 10 points within an interval period of six years. DPT3 with coverage of 52 percent for children age 12-23 months in 1992-93 increases to 55 percent in 1998-99 indicating a steady improvement. Measles vaccine that has always recorded the lowest coverage because of its late induction in the Immunization Programme also increases from 42 percent in 1992-93 to 51 percent in 1998-99. Full immunization (i.e. immunization against all BCG, DPT, Polio and Measles) also recorded an increase, but this was below 50 percent indicating the poor utilization of health care services. Children that do not receive any of the four vaccines however decrease from 30 percent in 1992-93 to 14 percent in 1998-99. This wide reduction indicates that most of the children are partially immunized.

Although there has been an improvement in the overall coverage, this was marked by wide variation amongst states and among different background characteristics. States with better resources, higher growth in income, and better governance have generally performed better. It is conspicuously visible that there is a wide disparity. Fig. 1.2 shows that southern states like TamilNadu and Goa have crossed 80 percent coverage and Kerala touching 80 percent in the year 1998-99. On the contrary, coverage in the northern states of Uttar Pradesh, Rajasthan, and the Northeast India recorded an

Figure 1.2: ***Percentage of Children Age 12-23 Months Who Received All Immunization by State/UT, NHFS 1998-99.***



Source: NFHS Report, IIPS 1995 and 2000.

appalling percentage of less than 25. Bihar and Nagaland recorded a low of 11 and 14 percent respectively, whereas TamilNadu and Himachal Pradesh recorded a pinnacle high of 88.8 and 83.4 percent. Out of the total 25 states surveyed, only 13 states were above 50 percent in the year 1998-99. This reflects the poor utilization of health services especially in North and

Northeastern states of the country. The variation reported for the urban and the rural areas is also huge. It was 61 percent in the urban areas as against 37 percent in the rural areas. Female literacy seems to play a great role in this regard. The NFHS reported that children from illiterate background accounted for only 28 percent in receiving all immunization. This goes on increasing with higher mother's education till it reaches 73 percent for those mothers whose educational level is high school complete and above (NFHS 2, 2000).

1.2: **Introducing the study area**

The Northeast region of India comprising of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura contributed a further diversity to the sub-continent by the presence of its varied socio-cultural attributes. The region is built and home to more than 225 tribal communities with its own unique way of survival. It is a treasure house of biological and cultural diversity, has high ethnic plurality and contains rich indigenous knowledge system. The region has a geographical area of 255083 sq.km. that accounts for about 8 percent of the total area of India. It lies in between 22° N and 29°5'N latitudes and 88°00 East and 97°30' East longitudes and share international boundaries with Bhutan, China, Myanmar, and Bangladesh. The region is predominantly interspersed with valleys and river plains, and characterized by heavy precipitation, rich forest cover and biodiversity, fragile mountain ecosystem, high seismicity, and drainage pattern marked by valleys dissected by three major rivers viz; Brahmaputra, Teesta and Barak and their tributaries. The climatic characteristics of the region can be described under the following three distinct climatic types:

(1) The cold humid monsoon climate of the frontier hilly region (above 2000-meter altitude).

(2) Wet sub-tropical monsoon climate (covering southern Arunachal Pradesh, western Nagaland, Manipur and Mizoram).

(3) Humid meso-thermal monsoon climate with heavy monsoon showers (covering the Brahmaputra valley, Meghalaya, and the Barak valley including Tripura) (Tripathi & Barik 2003).

The total population of the region according to the 2001 census is 38.5 million accounting for 3.74 percent of the country's total population (table 1.1). Assam has the largest population constituting 69 percent of the region's total population and Mizoram with the least contributing of only 2.31 percent. The density of population ranges from as low of 13 persons per square kilometre in Arunachal Pradesh to a high of 340 persons per square kilometre in Assam. With the exception of Assam, the region is sparsely populated. Its density is very much below the national average, and only Tripura is fast catching up to the national average.

On the other hand, the annual exponential growth rate of population is exceedingly high. Almost all the states with the exception of Assam and Tripura, have recorded tremendous increase over the past decade. Nagaland with an annual exponential growth rate of 4.97 is the highest in the country. Other states vary but are close to 2.5 percent. The lowest is recorded in Tripura (1.48) and Assam (1.73). The sex ratio for the region is 937 females per 1000 males as against the national average of 933 females per 1000 males. The highest sex ratio is amazingly recorded in the Hindu dominated state of Manipur (978) as against the Christian dominated state of Mizoram and Meghalaya. Arunachal Pradesh (893) and Nagaland (900) recorded the lowest sex ratio which is even below the national average. With regard to the sex ratio among children in the age group 0-6, the region is far better than the national average. It recorded 965 female per 1000 male as against the national average of only 927. This indicates the egalitarian structure present in the Northeast, as the people are utterly oblivious of the sex determination technology. Meghalaya recorded the highest figure touching 973 and, on the contrary, Manipur recorded the lowest of 957. The condition in Manipur presenting a contrasting ranking of the sex ratio and the child sex ratio in the region needs further research. The child population in the age group 0-6

years for the region accounted for 16.14 percent to its total population. The literacy rate of the region is 65.0 percent, which is very close to the national average of 64.8 percent. All the states, except Arunachal Pradesh, are above 60 percent. The highest is recorded in Mizoram (88%) followed by Tripura (73.2%) and the lowest in Arunachal Pradesh (54.35%). The gap between male and female is still very high in the region. However Mizoram, Nagaland and Meghalaya have narrowed the gap considerably.

Table 1.1: ***Demographic profile of the Northeast India.***

India /State	Total Population			Sex Ratio	Sex Ratio	Density	Decadal Growth Rate	Average Annual Exponential Growth Rate	Literacy Rate		
	Persons	Males	Females	Females Per 1000 Males	Children 0-6 Females Per 1000 Males	(Per Square Km.)	1991-2001 in %	1991-2001 in %	Persons	Male	Female
India	102,861,032,8	532,156,772	496,453,556	933	927	313	21.54	1.95	64.8	75.3	53.7
Arunachal Pradesh	1,097,968	579,941	518,027	893	964	13	27.00	2.38	54.3	63.8	43.5
Assam	266,555,28	13,777,037	12,878,491	935	965	340	18.92	1.73	63.3	71.3	54.6
Manipur*	2,291,125	1,161,173	1,129,952	978	957	102	24.71	2.21	70.5	80.3	60.5
Meghalaya	231,882,2	1,176,087	1,142,735	972	973	103	30.65	2.67	62.6	65.4	59.6
Mizoram	888,573	459,109	429,464	935	964	42	28.82	2.53	88.8	90.7	86.7
Nagaland	199,003,6	1,047,141	942,895	900	964	120	64.53	4.97	66.6	71.2	61.5
Tripura	3,199,203	1,642,225	1,556,978	948	966	305	16.03	1.48	73.2	81.0	64.9
Northeast	38,441,255	19,842,713	18,598,542	937	965	151	22.00	1.98	65.0	72.2	56.7

Source: Census of India. Final population totals 2001.

* The population of Manipur includes the estimates of the three sub-division of Mao-Maram, Paomata, and Purul divisions of Senapati District.

The distribution of health infrastructure in the rural areas of Northeast India varies amongst states. According to the 9th plan of the Planning Commission, it recommended 3000-5000 persons per Primary Health Sub- Centre (PHSC) and 20,000-30,000 persons per Primary Health Centre (PHC). In the Northeast most of the rural villages are confined in the hilly tracts of the sub-Himalayan belt and inhabited predominantly by the schedule tribe population. Therefore, taking the standard fixed by the Planning Commission, it is pertinent that each PHC should serve 20,000 persons and each PHSC should serve 3000 persons in the hilly regions. In this case, let us assume all the rural villages in the Northeast to be located in the hilly regions. If the

assumption stands true, then every states, except Mizoram, doesn't fulfill the criteria stipulated by the Planning Commission in the 9th Plan. Keeping aside the assumption, it still revealed that the population served by the PHC is above the standard in the states of Assam, Nagaland and Tripura.

Table 1.2: ***Distribution of Health infrastructures in rural Northeast***

STATE	Rural population served per PHC	Rural population served per Sub Centre
Arunachal Pradesh	13386	3187
Assam	38059	4544
Manipur	23055	3787
Meghalaya	21937	4515
Mizoram	7717	1294
Nagaland	35809	5454
Tripura	45744	4923

Source: Health information of India. 2000-01
Census of India 2001; Provisional Population Totals.

The above table indicates that the health intervention through the three-tier infrastructure in the Northeast shows a dismal performance. The index of outreach to the health facilities (table 1.3) calculated by Roy and Chatterjee (2003) revealed the fact that, with the exception of Mizoram, all the other states in the Northeast sector are extending health care to more members of the population than fixed as norm. The worst situation is observed in case of Assam, Tripura and Manipur. Besides this, almost all the PHC in the Northeastern states are not adequately equipped the pivot of the health care system in the rural sector (Roy and Chatterjee 2003).

Table 1.3: **Index of Outreach**

	Total number of			Rural population served by each			Index of outreach*		
State	SUB CENTRE	PHCs	CHCs	SUB CENTRE	PHCs	CHCs	SUB CENTRE	PHCs	CHCs
Arunachal Pradesh	245	45	9	3545	19298	96492	118	96	121
Assam	5820	619	105	4403	37559	221419	88	125	184
Manipur	420	69	16	4329	26351	113639	144	132	142
Meghalaya	377	85	13	4916	21805	142574	164	109	178
Mizoram	336	55	6	1339	8182	75003	45	41	94
Nagaland	245	33	5	6676	49570	327163	225	248	409
Tripura	537	58	11	4931	45656	240734	164	228	301

Source: After Roy and Chatterjee 2003. Their figures are from the Rural Health Statistics in India, June 2000 and census, 2001. * The index of out reach is calculated by dividing the rural population served by each of the health facilities by the norm (e.g. a sub centre has to serve 3000 population in tribal areas etc.)

The situation thus, is bound to ensue for an appalling scenario in the future with high rates of morbidity, mortality and emaciated toddlers, if not corrected at the earliest. Projects under the Maternal and Child Health Programme such as Oral Rehydration Therapy, UIP etc. that aims for a healthy child, has barely done a thing for those who are especially living in the remote areas of the country. The infant mortality of the country in the rural areas reaches a hovering high of 66 per 1000 live births as against 38 in the urban areas. The death rates even revealed a wide difference between the two settings. The country with its aim of proliferating health care services to the rural areas by the creation of the PHC and Sub-Centre in its attempt to generate health equity is remarkable, but still pending. Health equity is define by the WHO (1998) as 'inequalities' in health status, risk factor or health service utilization between individual groups that are unnecessary, unavoidable and unfair. Strategies for achieving greater health equity include both direct and indirect measures. Prominent among indirect measures are macro economic policies and investment in human development. Among direct measures health policies and programmes such as child immunization programme do play a prominent role in promoting greater equity in health.

The country has come across a number of measures in order to eradicate the major diseases such as TB, malaria and water borne disease. But this has borne to be a futile attempt, except that it can glorify with the case of smallpox. Implementation of the programme is the greatest challenge the country has to under take. India despite being a signatory to the Alma Ata Declaration (1978), which aimed at 'Health for All' by 2000, is still lagging quite far from realising this dream even in the year 2003(Sankar and Kathuria 2003). The reason can be due to abysmally low allocation of funds to the health sector which is even less than one percent of the GDP.

The Northeastern states have performed better as unexpected in most of the health indicator as compared with other major states of the country. But this does not mean the region has achieved greater health equity, nor does the picture indicate a flight from the tragedy of diseases. The masses in the far-flung rural areas of the region are still far away from many of the health

services rendered by the Government. This will eventually aggravate the problem unless a major step for rectification is implemented at the earliest. All people should have recourse to health care, be it the poor or the rich. The existing gap on the utilization of health services between the rich and the poor, urban and rural, has its deep root causes which should be explored, to a means that measurable steps are taken that is accountable.

The infant mortality rate (IMR) in Assam is above the national average. As per the data provided by the Sample Registration System (SRS), the estimated IMR for Assam in the year 2003 is 67 per 1000 live births as against the national average of 60. The difference between the rural and urban areas is 70 and 35 respectively. Meghalaya also recorded a high of 57 per 1000 live births with 59 and 47 in rural and urban areas respectively.

Table: 1.4. ***Infant mortality rate and death rate, Northeast India 2003.***

STATE	Infant Mortality Rate			Death Rate		
	Total	Rural	Urban	Total	Rural	Urban
Arunachal Pradesh	34	35	11	4.7	4.9	2.5
Assam	67	70	35	9.1	9.5	5.9
Manipur	16	15	19	4.8	4.9	4.4
Meghalaya	57	59	44	7.4	8.1	3.4
Mizoram	16	18	14	5.1	6.2	3.6
Nagaland	NA	NA	16	NA	NA	2.4
Tripura	32	32	31	5.5	5.4	6

Source: Sample Registration System, 2003.
NA: Not Available

The figures in table (1.4) indicate that, it seems the government weren't entirely altruistic to the rural population. The death rate also gives us a glimpse that health services in Assam and Meghalaya is woefully inadequate. The other states of the region do show a lower IMR and death rate as compared to other major states in the country. But this is far behind the western countries.

1.3: **Objectives of the study.**

1. To investigate the effect of socio-economic and demographic variables on the utilization of health services particularly on receiving child immunization.

2. To analyse the drop-out rates of those triple antigens.

1.4: **Organization of chapters**

The dissertation is organized into five chapters. The **first** chapter present an overview of child health programme in the country and in the international scenario and also present an overall picture of child immunization in the country. Moreover this chapter introduce the study area, its demographic characteristics, and its health performance.

The **second** chapter reviews previously existing literature concerning socio-economic and demographic factors influencing child immunization in particular and child health in general.

The **third** chapter explains the type of variables selected for the analysis, its importance for the selection of the particular variable and its measurement.

The **fourth** chapter i.e. the analysis part are divided into three sections. The first section analysis the proportion immunized of the various socio-demographic characteristics, the second section analyse partial immunization i.e. analysing the drop out rates of those triple antigen, and the last section deals with the factors affecting full immunization.

The **fifth** and the last chapter conclude by presenting a general framework of policy implications.

Chapter two

A literature review

The study of disease and health care in social science goes beyond the individual human body and the individual psyche. It inquires into the social dimensions of affliction in two senses: how disease originates, and how it makes its appearance in a society at a given time. The form, distribution, and severity of disease are thus seen as products of the social circumstances under which people live and work. Societies vary markedly in their supply of food, provision of shelter, organization of work, habits of leisure, assortment of kin ties, networks of communal support, and hierarchies of power-as well as in the range of environmental hazards and constraints they are subject to (Susser et al. 1985) and therefore a coordinated study of the relation of social life and institutions to patterns of health and disease, and the provision of appropriate measures (medical and otherwise) to deal with the problems is of paramount importance.

This chapter reviews earlier researches conducted by various scholars on the relationship between social life and institutions and the utilization of health care particularly immunization of children. Several socio-economic and demographic variables, women's health seeking behaviour, women's autonomy and her exposure to mass media affects considerably the utilization of immunization services.

2.1: **Socio-economic variables:**

The primary focus of the epidemiologist is not on the individual, but on the health problems of social aggregates or large groups of people. The epidemiologist studies both the origin and the distribution of health problems in a population through the collection of data from many

different sources. And then he/she constructs a logical chain of inferences to explain the various factors in a society or segment of a society that cause a particular health problem (Cockerham 1978).

Several studies have documented the fact that education has a substantial effect on the utilization of health services (Hobcraft et al. 1985; Boerma et al. 1990; Caldwell and Caldwell 1990). The positive association between maternal education and use of preventive child and maternal health services is well documented with respect to antenatal care and both child and maternal tetanus immunization (Sommerfield and Piani 1997; Streatfield et al. 1990; IIPS and ORC Macro 2000; Bicego and Boerma 1993). The conceptual framework put forward by Mosley and Chen (1984) shows that child's health is a product of a combination of social, economic, biological and environmental factors that operate through a set of proximate determinants. In considering this framework, research confirms that causal linkages exist between maternal education and child health. Studies have revealed that with an increase in the educational level of the father, there is an increasing realization about protecting the child by all the four service components of the immunization programme (Srivastava and Saksena 1988; Pebley et al. 1996). In contrast to father's education, the influence of mother's education on acceptance of immunization programme was visible at a simple literacy level itself. The complete lack of protection by any of the vaccines declined steadily with increasing education of the mothers (Gulati 2003; Munshi and Lee 2000; Srivastava and Saksena 1988). Health education gains importance on the immunization strategy. Organizing mass immunization camps, spreading information via electronic media will educate the mothers especially on health. It was reported in the Integrated Child Development Service (ICDS) block of Tamil Nadu that only a small percent of mothers adhered to the immunization schedule. The non-adherence among the mothers were ignorance, lack of medical advice, non-availability of vaccines, and fear of

side effects (Kanthimathi and Suresh 1999). To remove this ignorance and fear of side effects, education appeared to be the most definite and important variable associated with awareness of immunization (Roy et al. 1988). In general, more highly educated women are both more likely to use any kind of care and more likely to use formal care and to have their children immunized completely (Pebley, Goldman and Rodriguez 1996). Education of the mother has a significant effect on the nutritional status of the child in all the socio-economic strata i.e. the proportion of children malnourished decreases with an increase in the educational level of the mothers. The reason for this is because education makes the mother aware of the importance of immunization, breastfeeding, family planning and spacing, hygiene and a balance diet (Joshi and Waigankar 2004). Das et al. (2001) also reported that diarrhoea prevalence was least among those whose mothers who had up to five years schooling, while the prevalence among illiterate, just literate and mothers educated beyond primary level goes on increasing. Research on missed opportunities for immunization is also found to be greatest among less educated women (Aswar et al. 1999).

Various cultural norms and beliefs affect the utilization of health services considerably. Cultural beliefs sometimes make the population ignore a disease and simply considered as a wrath from God. For instance small pox, chicken pox and even measles are not separately classified but considered as the same ailment and a condition being visited by a particular Goddess (Basu 1990). A study of Khairwars in Madhya Pradesh revealed that some of them blamed it to the 'attack by ghosts and evil spirits' as the reasons for falling sick (Pandey et al. 1996). Thus it is certain that utilization of health services would vary among various religions. A study reported that Muslims had a lower protection level for all the four vaccines of the immunization programme (Srivastava and Saksena 1988) and more recently Prasad (2003) documented the findings in the North eastern states of India that relatively a lower proportion of

Muslims reported visiting health facility than Hindus and other religious groups. It was also reported that in the North east, district with predominance of Muslim proportions depict lower RCH status (Gulati 2003). In terms of awareness, the Hindus again showed greater awareness for all the four vaccines than the Muslims (Roy et al. 1988).

Differences in global health assessment and functional limitations in daily activities by race and ethnicity persist even when income and education are controlled (Ren and Amick 1996). Various studies reported that some ethnic groups utilize alternative types of care in the form of 'traditional healers' (Louis and Thomas 2001; Pebley et al. 1996). A study by Suchman reveals that parochial groups subscribe to popular beliefs about medicine instead of scientific views. These groups were found to have close and exclusive relationships with families, friends, and members of their ethnic group, and to display limited knowledge of disease, scepticism of medical care, and high dependency in illness (Cockerham 1978). A study conducted in the urban slum of Gorakhpur city of Uttar Pradesh reported that superstitious therapy was higher among the Hindus and Muslims than the schedule caste and schedule tribe (Kushwaha et al. 1986). In the North eastern states of India there were no significant caste differences in visiting government health services in the rural areas, but proportion visiting government services was better among SC/ST compared with other caste Hindus in the urban areas (Prasad 2003). However a study in Madhya Pradesh reported that the likelihood of receiving full immunization is higher among those children who are not SC/ST (Munshi and Lee 2000) and also the chances of being malnourished are more for SC and ST (Mishra, Lahiri and Luther 1999).

A study in urban India revealed that high and middle class go more for health check up than the poor and very poor classes. The reasons are because they are not aware of health services because of their poor educational status. Further with their poor resources they cannot afford

to visit a doctor unless otherwise they suffer from diseases incapacitating them (Yesudian 1988). Immunization level in general rose with a rise in the occupational status of the respondents both in regard to individual and all services together (Srivastava and Saksena 1988). Munshi and Lee (2000) after constructing a composite index of household ownership of goods and relating with immunization coverage reported that children in the household with a higher score for ownership of goods have higher immunization coverage. Income of the household and immunization are directly related. With an increase in the income level of the household, there is a decrease in the proportion of children missing immunization (Aswar et al. 1999) and also the proportion reporting excellent health increased steadily with income, while the proportion reporting poor health declined steadily with income (Louis and Thomas 2001). From the literature review it is thus obvious that child immunization and economic well being of the household are positively related. Research in the United States has also identified economic resources as the predominant explanation for family structure variations and children's well being (Geronimus et al. 1994; Thompson et al. 1994).

2.2: **Demographic and other variables:**

Several studies have included mothers' age as a variable affecting utilization of maternal and child health services (Ray et al. 1984; Khan et al. 1994; Ahmed and Mosley 1997). The age of the mother is an important determinant affecting the coverage of child immunization. A study of mothers' age on child immunization reported that low percentage of children vaccinated against any vaccines was noted in the extreme age groups of mothers i.e. 15-19 and 35-40 age groups, and high percentage in the middle age group (Munshi and Lee 2000). Beyond 30-34 age groups, the proportion of respondents who were aware of any vaccines fell rather rapidly (Roy et al.1988). It is generally assumed that younger people are more accepting of innovations and alternative care

arrangements. Older people tend to be more traditional in their use of health services and practioners (Louis and Thomas 2001). But a study conducted in Uttar Pradesh revealed that younger men and women had less exposure to media than the older ones (Saksena and Rastogi 1989), which is surely going to have an adverse effect on the immunization programme.

Residence in an urban area increases the chances that a child will receive all four vaccinations (Pebley et al. 1996; Bawaskar and Sathe 1989; Munshi and Lee 2000). A study in Niger revealed that only one in ten rural children have received all vaccinations compared to half of urban children. Overall coverage levels in rural areas are less than half of those for urban children for BCG and measles. Due to higher drop-out rates in rural areas, coverage levels for the third dose of DPT and polio are less than one quarter of the rates seen in urban areas (Gage et al. 1997). There are various reasons for the low performance of the immunization programme in the rural areas. Gupta and Walia (1981) reported that a very small percentage of children availed medical aid from primary health centre (PHC) and sub-centre because of absence of doctors. It also found that the sub-centre remained in-operative for most of the year because of non-posting of staff and engagement of staff in surveys. Drugs were also seldom available and hence villagers could get very little medical help. The other reason is the absence of private clinic in the rural areas. Prasad (2003) reported that the proportion of people visiting government health facility increased monotonically in rural areas, while it declined monotonically in urban areas. It appears that private health facilities are not that available in rural areas of Northeast region compared to the urban areas because of which relatively higher proportion of people among educated were availing government health facility in rural areas, while it was not the case in urban areas, where a slightly higher proportion educated respondents preferred private services to government health services.

Males are more likely to get treated than are females (Basu 1990) and are more likely to get fully immunized (Munshi and Lee 2000). An analysis of DHS data by Hill and Upchurch (1995) documented the relative disadvantage of female children in receiving treatment for acute respiratory infections. Studies from Bangladesh and India have also documented the relative disadvantage of female children with respect to health care provision, finding significant gender differences in rates of treatment for diarrhoea (Chen et al. 1981; Rehman et al. 1982) and acute respiratory infections (Pande 1992). Malnutrition was found to be higher in females compared with males (Joshi and Waigankar 2004) because discrimination against girls in feeding and health care are at large in many developing countries (Abeykoon 1995; Pebley and Amin 1991; Visaria 1987; Elfindri 1993; Bairagi 1986). There is a marginal gender bias in utilizing pulse polio immunization as more males were taken to booth compared with females (Mishra et al. 2004) and moreover missed opportunities for immunization were higher for females than for males (Aswar et al.1999).

Child's birth order has a strong effect on the utilization of health services because higher order births are born into families that already have a number of young children who compete for resources and parental care (Pandey et al. 1998). Munshi and Lee (2000) documented the fact that the first birth order relatively has higher odds of receiving full immunization compared with other birth orders. The likelihood of being malnourished is also more for the higher birth orders (Mishra et al. 1999).

The health seeking behaviour of the mothers is worthy to mention with respect to child immunization. Institutional deliveries, utilization of antenatal services has a positive relationship with child immunization. A study in Uttar Pradesh revealed the promoting influence of antenatal consultation on the acceptance of immunization programme. The coverage of immunization among the group which had received antenatal

consultation was more than twice that of the group which had not received such advice for child immunization service (Srivastava and Saksena 1988). The association between family planning and advice given by the health staff and acceptance of any method was significant, thus establishing a positive relationship between family planning acceptance and advice provided at the time of immunization (Roy et al. 1988). The strong relationship between child immunization and antenatal services is further reported by Munshi and Lee (2000). In their analysis of NFHS data they conclude that the proportion immunized is almost twice as high for children whose mothers received antenatal care as for children whose mothers did not received antenatal services.

Several studies have documented the positive relationship between (working) status of women and utilization of health services (Basu 1992; Dyson and Moore 1983; Ray et al. 1984). Basu (1990) reported that women from Tamil Nadu have a greater command over their lives especially in terms of physical movement and ability to interact with others compared to women from Uttar Pradesh, and thus are more likely to receive health care services for their children. Working women are also freer to take their own health decision (Mondol 1997).

According to Learner mass media acts as a 'mobility multipliers', spreading favourable attitude for social change (cited in Schramm 1964). Exposure to mass media will render the traditional and conservative societies to change their attitudes and behaviours and help to escape from misconceptions about modern medicines and therapy. Media exposure and education has a direct relationship. A study in Uttar Pradesh revealed that the proportion of those who were 'not exposed' to any media of communication was higher among illiterate respondents compared to those who were literate or educated (Saksena and Rastogi 1989). There is a strong association between media exposure of mothers and utilization of health services. Munshi and Lee (2000) in their analysis of NFHS data revealed that children of mothers who are exposed

to any form of mass media are more likely to get fully immunized than for children whose mothers are not exposed. Similarly children of mothers who are not regularly exposed to electronic mass media also have a higher prevalence of stunting, wasting and underweight children, indicating that they are more malnourished compared with children whose mothers are regularly exposed to media (Mishra et al. 2000). More recently, a correlation between ever-married women exposed to mass media and children receiving BCG, DPT, polio and measles vaccines in the northeast India were high and significant (Nangia and Banerjee 2003). The effectiveness of media on immunization programme is so strong that radio and TV staff should be given orientation regarding ICDS, EPI, control of diarrhoeal diseases, water supply and sanitation (Johri 1989). Studies also found that TV played the dominant role in polio vaccination awareness, but also the role of health functionaries and neighbours is encouraging for further sustaining effect of the campaign (Kalrao et al. 2000; Mishra et al. 2004).

2.3: **Efficacy of the vaccines:**

All the vaccines that are included in the immunization programme lack its complete protective efficacy. Among these, Bacillus Calmette Guerin (BCG) vaccine remains a highly controversial method of preventing tuberculosis despite more than 80 years of use and its current status as a compulsory or an officially recommended vaccine in 182 countries and territories (Fine PEM 1988). "Formal evaluation of protective effect of BCG vaccine began in 1930s, but it was not until the late 1950s that scientists became aware of discordance between the various results. Striking differences had emerged between a major trial in the UK by Medical Research Council, which showed more than 75 percent protection, and trials by US Public Health Service in Georgia, Alabama, and Puerto Rico, which all recorded less than 30 percent" (Zodpey 2004). Several studies have been conducted since then with protective efficacy

ranging from nil to 98 percent (Zodpey 2001). Among all these studies, the Indian Council of Medical Research (ICMR) BCG trial generated a debate about the role of BCG in the prevention of tuberculosis. This study being one of the biggest projects undertaken in the country to prove the efficacy of BCG vaccine concludes that BCG does not protect against bacillary pulmonary tuberculosis. It was seen that BCG efficacy was nil in the entire period of their study (ICMR 1999). "As soon as the second report on 15 years follow up of tuberculosis prevention trial was published in August 1999, Indian Express again hit the headlines 'TB vaccine is worthless, says ICMR'. Times of India reported 'should the BCG vaccine be stopped'? This created a lot of heat and dust in the scientific community as well as in general public" (Zodpey 2004). However, apart from this study, Kaur et al. (2002) reported that BCG vaccination provides variable protection from primary tuberculosis ranging from none to as high as 80 percent. The BCG reaction set in significantly earlier in term and heavier babies in comparison to preterm and low birth weight neonates. However the study noted that by eight weeks BCG reaction were observed in all the groups. The scar formation indicated that the vaccine induces immunity (Kaur et al. 2002). Although ICMR stated that BCG vaccine apparently does not prevent tuberculosis but interferes with the haematogenous spread of tubercle bacilli which could result in the fatal forms of tuberculosis like TB meningitis, military TB, and other extra pulmonary forms of TB among new born and young children (Zodpey 2004). Other vaccines have been found to be effective. Measles vaccine efficacy rate is generally above 81 percent (Basu et al. 1981). But in an unfortunate incident three children died after measles vaccination in Bhandar Kavathe sub-centre. Investigation reveals that one 'used vial' of measles vaccine was kept in cold water in an earthen pot for about seven days and that was the one that probably contaminated killing three children. It was further found that the measles vaccine was infected by staphylococci (Phadke et al. 1991). This

indicates the poor cold chain system in the rural areas of the country. A study in urban slums of Madras city reported that pulse polio immunization was found to be effective. Although anti-body response was about 84 percent, the protective efficacy was 98.2 perecent (Krishnan et al. 1999; Prakash et al. 1999).

2.4: **Drop-out rates of DPT and polio antigen:**

Anand et al. (1996) reported drop-out rates in a two dose measles vaccine but the National Immunization Programme (NIP) recommended only one dose of measles vaccine to be administered at the age of 9-12 months. In their study they found that a good proportion of children came for early vaccination of measles i.e. before 9 months. This is despite the communication by the government media that measles vaccine is to be given only at the age of 9 months or above. The absence of proven effectiveness and presence of adverse side effects is probably partly responsible for the relatively low figures for the acceptance of at least one dose of triple antigen and even more responsible for the sharp fall in the number of children who are allowed to take the full recommended course of three doses (Basu 1990). Incomplete immunization is as good as not being immunized. Various researches reported that immunization coverage is generally quite good for the first dose, but gradually for subsequent doses the number of beneficiaries decreases (Munshi and Lee 2000; Anand et al. 1996; Punhani and Mahajan 1989). There are various reasons for being drop out for the subsequent doses of triple antigen. Prominent among them are due to its febrile reactions following the injections (Patel 1980), allergic manifestation, developing erythematous rash and the reported death due to vaccination (Sokhey 1990), lack of awareness regarding immunization schedule and medical advice, non-availability of vaccines, inconvenient timings and long distance to be travelled (Aswar et al. 1999).

From the reviewed literature, it is ascertained that socio-economic structure of the society has a strong effect on the utilization of child health services. For instance, education helps us released from the oppression of traditional and conservative practices, helps us expose to mass media and above all change the attitude and behaviour of the people in such a way that it brings development to the society. In the same way economic well being of the household has a strong effect on the utilization of health services. Rich families tend to be more concern of their health than do poor families. The reason are because they are poor that they cannot afford for the medical expenses, they are illiterate for they cannot support for schooling and thus lack awareness of the importance of preventive health services. Poor families employed here and there, depending on the season, living hand to mouth from a little charity or in exchange for the worst sort of labour would hardly think of availing preventive health services for their children unless there is disease incapacitating them. Household from rural areas suffers from the problem of inaccessibility and other necessary infrastructures. But these are not the only reasons for their poor utilization of health services. A complete chain of inadequacy of basic amenities and other modern infrastructure have left the rural inhabitants suffer from these disabilities. The multifaceted socio-demographic set-up of the society operated altogether in availing health services and therefore the explanation based on a single variable would leave out the importance of other variables and hence would give an incomplete picture of the socio-demographic determinants on the utilization of child health services. These socio-demographic variables are linked to each other finding it difficult to isolate one from the other. The literature reviewed thus enables us to formulate the conceptual framework.

Chapter 3

A Conceptual Framework for the analysis of Child Immunization

In the preceding chapter we discussed some of the existing literature relating to how socio-demographic conditions of the population affect the utilization of health services, particularly immunization. In this chapter we will formulate and explain the conceptual framework for the present analysis.

3.1: **Conceptual framework.**

Population groups are identified on the basis of religion, culture, economy etc. referred collectively to as social structure. There is no unanimity among scholars on the definition of social structure; neither can we employ the term in a strict sense. Therefore this is replaced by the concept of 'socio-economic variables' based on observable criteria (see chapter three). Again this is not a petty task. For example observable criteria will be to evaluate the individuals performing particular job in economic sectors like agriculture, manufacture, managing, marketing, servicing etc. Accordingly these form primary social groups of one kind. But hundreds of primary groups can be identified in this way and this is an unavoidable necessity. Therefore deduction from cross-classification of the economic sectors in a society and the jobs performed by the individuals in these sectors becomes imperative. The deduction of collectiveness in the context of economic activities of the individuals can be differently deduced according to other qualifying attributes employed to interrelate the mutually distinct collectiveness. Keeping aside all the

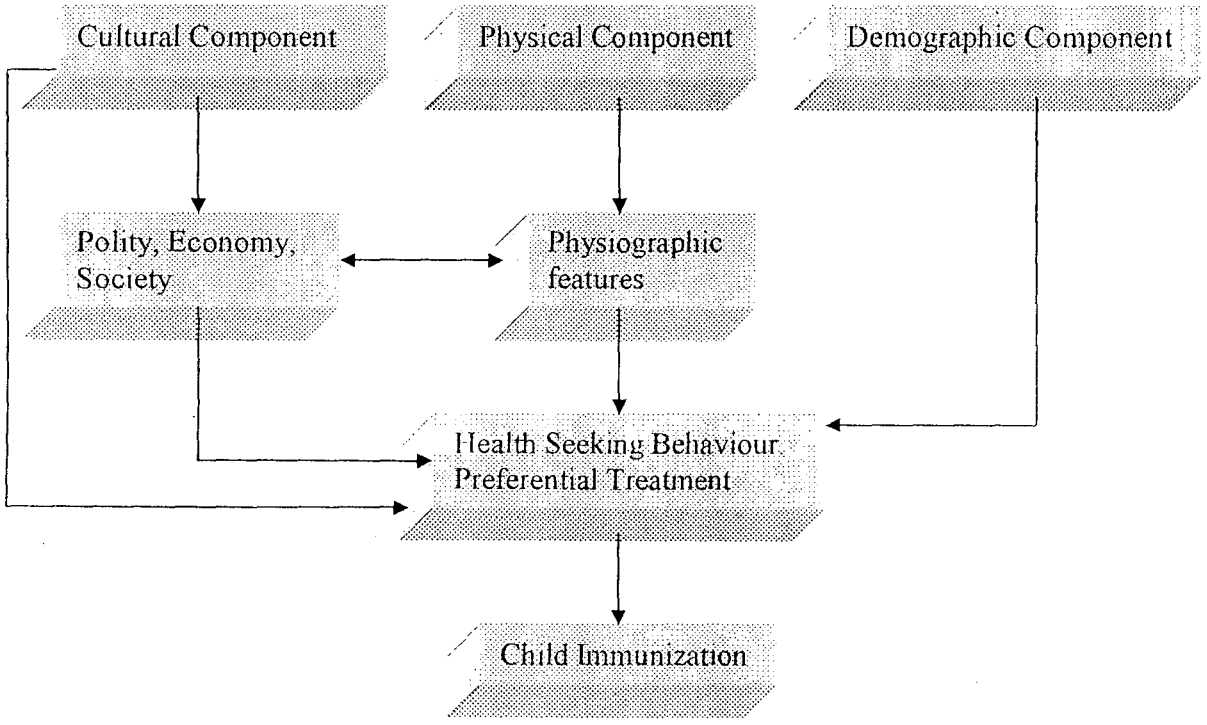
complexities in the language, the selection of variables and the derived groups is at our discretion based on sound statistical reasoning.

Since attitudes, taste, and knowledge differ from person to person and from one society to another society, the stage of development also varies. This attitude, taste, and knowledge are the product of the environment in which the individual is brought up. The environment can be of different entities. For example 'culture' or the 'physical landscape' that may or may not be an impediment in the development process. The individuals' perceptions are moulded by culture and thus follow a different course of living. "Culture denotes the benchmark for the perception-action-perception syndrome of individuals for their group formation into collectiveness" (Mukherjee 1991: 38). According to the International Centre for Development (1979) "culture is defined as an aggregate of values and traditions which is deeply linked to everyday life of the people, and in that sense, it is the matrix of perception which allows one to apprehend the world" (cited in Mukherjee 1991: 31).

Following the definition of culture, it can be inferred that there are values and traditions that are antagonistic and supportive to certain development activities that the world today manufactured. Thus, immunization as a 'development variable' is perceived in a different way by different people that have its deep roots imbibed in their tradition. The schematic diagram in figure 3.1 present the pathways through which cultural, physical and demographic components affect child immunization. It can be seen that culture (here values and traditions) affect the polity, economy and the society and these in turn determine the health seeking behaviour of the population. For instance, household income is one of the important reasons for seeking or not seeking medical services. Taher Monstafa and Gertrud Weiss states "low income Mexicans-Americans often consult physicians only late in their illness and in general demonstrate a lack of confidence in professional health personnel. Instead they tend to favour the use of 'folk' medicines, which

involves treatment by friends, relatives or neighbours who employ patent medicines and home cures for ailments" (cited in Cockerham 1978: 70). The religion in a society is also a strong determinant for the population's health seeking behaviour. There are cases where vaccination was said to annoy the goddess *Sitala Matala,* and it was believed that if vaccination or medication were resorted to, the touchy goddess would surely kill or maim more people (Jaggi 1980). Diseases such as smallpox, chickenpox and measles were also not classified separately but considered as one. These diseases were considered as a visit from goddess *Mariamma* for South Indian women and *Sitala* for the North Indian women (Basu 1990). Based on this, the health seeking behaviour of the individual and the preferential treatment given to the children are webbed in the complicated function of cultural organization.

Fig.3.1: ***Factors influencing child immunization.***



The physical component i.e. the physiographic features affects the polity, economy and the society, and in turn man with his ingenuity alters the physiographic features to a condition that suit him best. The physiographic feature is a key factor in the distribution of population settlement and its pattern in a region. The physical component here concerns with the accessibility and inaccessibility of a unit of settlement to various types of health infrastructure. The proximity and accessibility to health infrastructure influence positively on the health seeking behaviour of the individual and hence more coverage of child immunization. The inverse is true for settlements that are distant apart from health infrastructure and with less accessibility. Because of its inaccessibility and its distance, the cost of transportation increases multiplying the economic burden of the poor village folks. This factor thus leads to the preferential treatment given to the children.

The demographic characteristics determine the health seeking behaviour of the individual to a great extent. The age of the mother is an important factor in this regard. The exposure to mass media in today's world differs according to age. Generally mothers' of today's generation are more exposed to mass media. This helps generate awareness about health and thus brings a positive influence on health seeking behaviour that ultimately leads to a better coverage for child immunization.

It is now clear that the factors affecting child immunization is not only clinical but also, socio-demographic factors are fundamental and these must take precedence over clinical factors in the study of child immunization. Based on the conceptual framework, we now proceed to construct the hypotheses for the present study.

3.2: **Hypotheses**

It is with certainty that the background characteristic of the respondents and their partners greatly affects the well being of their children as well as on the achievement of the state's health services. Allocation of more money to the health sector and providing better infrastructure not only

to control or erase communicable diseases and reduce mortality, but also an impressive individual and the society when cooperate with the state will only bring improvement in the health sector.

The difference observed in the coverage of child immunization therefore is the outcome of the background characteristics of the parents. Earlier studies have confirmed that mothers' education has a great impact on the immunization of children (Srivastava & Saksena 1988; Streat Field, Singarimbum and Diamond 1990). Children whose mothers are educated are more likely to be immunized against preventive diseases as compared with children whose mothers are not educated. Caldwell also observed that "education itselfs actually leads to changes in women's values, beliefs, power, or knowledge, which in turn leads to lower child mortality either through better domestic child care or more effective use of health services" (Sandiford et al. 1995). Thus,

(1) The higher the educational level of the respondents and the partners, the higher the utilization of immunization services and hence more coverage.

Cockerham (1978), Aswar et al. (1999), Yesudian (1988) in separate research conducted in different societies and different place, all reached the conclusion that difference in income has a great impact on the utilization of health services. The poor are not always accessible to health services and thus the coverage against child immunization would also be considerably low. On the basis of previous research findings it seems reasonable to hypothesize that:

(2) Household with a higher score in the economic well-being index are more likely to be immunized compared with households on a lower score.

Saksena & Rastogi (1989), and Mishra et al. (2004) are of the opinion that mother's exposure to mass media can make their attitude modernize i.e. release from the bondage of conservative orthodox practices, and render them to avail health services, including immunization and even

tubectomy. Thus based on their observation and from the literature reviewed, we hypothesize that:

(3) Mothers who are exposed to mass media are more likely to have their child immunized compared with those children whose mothers are not exposed.

Women's autonomy largely affects the utilization of health services. Arnold et al. (1998) and Basu (1990) reported that women who enjoy higher status are more likely to utilize health services provided by the government. Women with lower status hardly enjoy the liberty of going outside their homes to the city hospitals or primary health centres for health check-up if their husbands or relatives do not accompany them. Thus, if husband or the relative are busy in other schedule, then woman cannot take her children for health check-up even in dire need. Thus, we hypothesize that:

(4) Woman with higher autonomy are more likely to have their child immunized than those children whose mothers enjoy lower autonomy.

3.3: **Source of data**

Data for this study comes from the National Family Health Survey 2 (NFHS 2) conducted in the country in the year 1998-99. NFHS 2 provides information on a variety of issues including fertility, mortality, family planning, nutrition, maternal and child health. The survey was funded by the United States Agency for International Development (USAID) through ORC Macro, USA. UNICEF provided additional financial support for the nutritional components of the survey. The Ministry of Health and Family Welfare, Government of India (GOI), New Delhi, designated the International Institute of Population Science (IIPS), Mumbai, as the nodal agency for this project. 13 field organizations were selected to collect the data. Eight of the field organizations are private sector organizations and five are Population Research Centres established by the GOI in various states.

The NFHS 2 in the country covered a nationally representative sample of more than 90,000 ever-married women of age 15-49 years. It covers 99 percent of India's population living in all 26 states. IIPS also co-ordinated the first NFHS in the year 1992-93. Many similarities of information collected are observed in both the survey, making it comparable over the intervening period of 6 and half years.

The present study is based on children who have received immunization services during the 3 years preceeding the survey in the Northeast states of India, covering Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The information is collected on ' whether the child has received DPT, BCG, Polio and Measles'. A total of 1264 children age 12-23 months represented a sample for the Northeast region on which information regarding child health is obtained. The study analyse the data from the kids file that is a special file provided by the NFHS 2.

3.4: **Explanation of the variables and their measurement**.

The dependent variable selected for the study is the immunization of children aged 12-23 months who were immunized three years before the survey was carried out in the North-eastern states of India. The survey was intended to unveil the proportion of children immunized against the six highly infectious but preventable diseases namely: Diptheria, Pertusis, Tetanus, Childhood Tuberculosis, Measles and Polio. The vaccines to prevent against these diseases are DPT, BCG, Measles and Polio. These specific vaccines selected for the survey is in conformity with the vaccines included in the Universal Immunization Programme (1985) of the Reproductive and Child Health Programme. The present study especially focussed on full immunization of children. 'Received full immunization' here refers to those children age 12-23 months who have received all the four vaccines mentioned above. The variable is obtained by creating a dummy variable (yes/no) of all the eight vaccines. Children that have received full immunization are coded as 1, whereas, those who

do not complete the full immunization or has not received any are coded as 0. Moreover those children who are not fully immunized can be partially immunized. Partial immunization has been attempted in two ways. The first analyses the percentage of children missing full immunization because they missed only one vaccine, and the second analyses the drop-out rates of DPT and polio i.e. those children dropping out for the subsequent doses between DPT 1, 2 and 3, and polio 1, 2 and 3. In this study immunization coverage (in percent) against separate vaccines are also shown but the main intention is to analyse the full immunization of children. Full immunization here includes all the four vaccines as mentioned.

Table 3.1: ***Dependent variable.***

Codename in NFHS 2 (Kids file)	Label	Values assigned
h2	Received BCG	No=0. Yes=1
h3	Received DPT1	No=0. Yes=1
h5	Received DPT2	No=0. Yes=1
h7	Received DPT3	No=0. Yes=1
h4	Received Polio1	No=0. Yes=1
h6	Received Polio2	No=0. Yes=1
h8	Received Polio3	No=0. Yes=1
h9	Received Measles	No=0. Yes=1
	Full immunization	No=0. Yes=1

The independent variables selected include religion, ethnicity, educational status of both the father and mother, economic well-being index of the household, birth order number, sex of the child, age of the mother, place of residence, women's autonomy, media exposure and health variables.

Religion: The effect of religion on child immunization is inexplicable because the interpretation of some religious text is not compatible to vaccination or to some modern allopathic therapy. The repression of religion is so strong that it powerfully dictates the way of life of the individual. It seems the workings of power, and in particular those mechanisms that are brought into play in societies such as ours, really belong primarily to the category of repression of religion. Traditional forms of knowledge in the old regime and even today are dependent on religious authority, such as the Gita or the Bible that kept people ignorant and superstitious. The substantive definition identifies religion in terms of what it is. "Religion may be that clutch of beliefs and actions predicated upon the assumption of the existence of supernatural beings or powers"(Steve 1992: 9). It is upon these beliefs of the existence of supernatural beings that individuals behaviour are difficult to comprehend. The subtleties of the individuals' behaviour because of being dogmatic therefore need a better consideration that should be meticulously unfolded. For instance in many religions, disease were regarded as a punishment from the gods and goddess or evil spirit for breaking the sacred laws. Witchcraft and sorcery were the antidotes against the disease. Thus diseases were considered as a handiwork of some unseen malevolent power. Clinging to these beliefs of the divine intervention means acceptance of vaccination does vary amongst individuals. Religions here identified are based on the question posed to the mothers by asking the type of religion. Different types of religion are thereby ascertained as answered by the respondent. Various type of religion found in the northeast are Hinduism, Christianity, Muslim, Jainism, Buddhism, animism, totemism, etc. But in order to simplify, so that enough cases are available for statistical analysis, the major religion are identified as it is, and those religions representing a smaller population are clubbed together. Thus, the different types of religion processed in this study are Hinduism, Christianity and others. Hindus

contributed a sample of 448 children out of the total 1264 children, and Christians contributed 517 children out of the total sample size. The remaining 299 belong to other types of religion. In the study Hindus are coded as 1, which also becomes a reference category in the multivariate analysis, Christians as 2 and others as 3.

Ethnicity in the study is based on the government's categorisation of Schedule Caste (SC), Schedule Tribe (ST), Other Backward Class (OBC) and the General category. The different ethnic groups in the Northeast exhibit a different stage of development. SC and ST are generally considered as backward socio-economically. And on that basis the government identifies the group to be designated as SC or ST. Although these categorisation may not stand appropriate with time because society is not in static equilibrium, but are in dynamic equilibrium, changes with development, can perish at any moment, or can restructure, yet these categorisation remains relevant still today.

The ST forms the bulk of the population in the Northeast especially in the rural areas. These ST populations are far away from the modern infrastructure and knowledge. They are generally primitive thriving on subsistence farming. They have their own way of treating and curing illness. Since they are also poor, they are not always accessible to medical services. The dependent poor patient will receive medical services if any charitable medical institution provides it. On the other hand service providers also prefer rich or upper class patients leaving the poor to get second rate medical care or not at all. NFHS 2 asked the respondents whether she belong to ST, SC and others. In this study three types are identified, they are SC with a sample size of 185 children age 12 – 23 months, ST with a sample size of 706 and others representing 364 children out of the total 1264 children. ST accounting the bulk of the sample size is relevant because most of the rural areas in the north-east are inhabited by the ST population, and in this study rural areas accounted for more than 78 % of the total sample size.

Education: Progress for any family in a tradition bound community is predicated on the husband and the wife's education, work status, and the ability to support a family. Education contributes a large share to one's disposition and this fact has been substantiated by many studies (Srivasta and Saksena 1988; Caldwell and Caldwell 1990; Pebley et al. 1996). A study by Roy et al. (1996) confirms the fact that education appeared to be the most definite and important variable associated with awareness of immunization. Education is associated with the release of the individuals from the bonds of tradition, with the progressive differentiation of society, with the emergence of civil society, with social equality, and with innovation and change. It helps people expose to mass media, helps them escape from superstition and religious dogmas. The effect of education to the people is manifold, and this has contributed significantly to the development of the country. Education is the most important variable in this study because the effect of education on child immunization is substantially high. Education of both the mothers and fathers are analysed separately. The NFHS provides a long list on the educational level of the respondent and the partner. They include 'no education, primary school incomplete, primary school complete, secondary school incomplete, secondary school complete' etc. However in this study three variables are created. Primary school incomplete and complete are clubbed together and others are given as secondary/higher educational level. Thus the final lists are 'no education, primary education, and secondary/higher education. The sample size for the respondents' education are more or less equally distributed between the three educational categories, but in the case of partner's education the secondary/higher education has a large sample size of 709 children. This indicates that male members are more likely to obtain higher education as compared with females.

Economic well being index is derived by calculating the various indices that a household acquired. These include the ownership status of

consumer durable goods, land ownership, availability of basic amenities, employment and the type of occupation the respondent and her partner perform. The detailed components of consumer durable goods included the ownership of radio, TV, refrigerator, bicycle, motorcycle, telephone, car etc. and the ownership of land (self & rented). The availability of basic amenities includes availability of electricity, the source of drinking water (tap/piped, hand pump, and others), and the type of toilet facility (flush, pit, others) (table 3.2).

With regard to employment and occupation, the current type of employment according to being paid employee, self, and unpaid is sought. It also considers whether the employment is seasonal/occasional or all year round. In terms of occupation the NFHS 2 register a comprehensive account on the type of occupation. However in the analysis these are being clubbed and categorized so as to give a more simplistic picture. The type of occupation therefore covers those working in the primary sector (agriculture, household, domestic) and those working in the secondary and tertiary sectors (services, industrial, marketing, government employees like clerk, teachers etc.).

All the components mentioned are therefore assigned different weightage based on statistical reasoning. For example cars and motorcycle are assigned 3, telephone, TV, refrigerator are assigned 2, and those working in the tertiary sector as 3. These components are thus summed up in order to derive a single variable. The result derived with a differential score ranging from a minimum of 4 and a maximum of 26 are categorized again into two categories based on the total score. The categories are those with a score of 8 and below, which are term as low, and those with a score above 8, which are term as high. The score that separate the lower and high are based on the statistical requirement for the analysis and assessment of the ground situation in the Northeastern states of India. The weightage assigned to the different variables is given on the third column of table (3.2).

Table 3.2: ***Economic Well-Being Index Parameters.***

Code name as in NFHS 2 (Kids file)	Label	Values assigned
v125	Has car	No=0. Yes=3.
v124	Has motorcycle	No=0. Yes=3.
v122	Has refrigerator	No=0. Yes=2
v121	Has television	No=0. Yes=2
v119	Has electricity	No=0. Yes=1
v120	Has radio	No=0. Yes=1
v123	Has bicycles	No=0. Yes=1
v113	Source of drinking water	Piped/taped=1. Other=0.
v116	Type of toilet facility	Flush=1. Others=0.
v705	Partner's occupation	No=0. Agri. HH.Domestic=1 Clerical.Sales. Services=2. Prof. tech. manager=3.
v717	Respondent's occupation	No=0. Agri. HH.Domestic=1 Clerical.Sales. Services=2. Prof. tech. manager=3.
v707	Type of land where works	Others land=1 His/family's land=2
v718	Current type of employment	Self/others=1 Paid employee=2
v720	Earn cash for work	No=0. Yes=1.
v732	Employment all year/seasonal	Seasonal=1. All year=2.

Birth order number: The birth order number (BORD) given in the NFHS 2 applied linear splines i.e. the 1st BORD, 2nd to 3rd, 4th to 5th, and 6th and above. But in this study the BORD of 4th to 5th and 6th and above are clubbed together because the sample size in the higher BORD became small. Thus, the final lists categorised are the 1st BORD (reference category), 2nd to 3rd, and 4th and above BORD. Of the total 1264 children age 12-23 months, 361 are in the 1st BORD, 513 in the 2nd and 3rd and 389 in the 4th and above BORD.

Table 3.3: ***Socio-Demographic variables***

Code name as in NFHS 2 (Kids file)	Label	Values assigned
v130	Religion	Hindus=1. Muslims=2 Christians=3. Others=4
v131	Ethnicity	Schedule caste=1 Schedule tribe=2 Other backward class=3 None of them=4
v149	Respondent's education	No education=0 Primary edu.=1 Secondary/higher=2.
v729	Partner's education	No education=0 Primary edu.=1 Secondary/higher=2.
Bord	Birth order number	1=1. 2=2-3. 3=4-5. 4= 6 and above.
b4	Child's sex	Male=1. Female=2
v013	Mother's age in 5 years group	1=15. 2=20-24. 3=25-29. 4=30-49.
v025	Type and place of residence	Urban=1. Rural-2.

Mother's age: The mothers' age in NFHS 2 also applied linear splines i.e. in five years age groups viz; 15-19, 20-24, 25-29, 30-34, and 35-49. But in this study the age group from 30-49 are clubbed together to bring out a reasonable sample size. Thus, the final age groups are 15-19, 20-24, 25-29, and 30-49. The sample sizes are more or less equally distributed, with the exception in the 15-19 age- groups where it is only 117 respondents (table 3.3)

Sex of the child: Unequal treatment of the girl child and the boy is visible in every society. The reasons can be social, economical or political. Societies are more biased towards the girl child and as a result the position of the girl child has deteriorated considerably, especially in the North Indian states. This in the words of Mira Seth was 'due to change in political equation' (Seth 2001).

The country has a distinctive role assigned to male and female. These practices led to the deterioration of women's status much further. The lower status of women appeared to be a universal fact, visible in all societies to a greater or lesser degree. The dominant explanation for this, at an earlier time, was biological determinism, which argued that the biological difference between men and women explained their different

status. However, feminist sociologists attacked this. Their main contention was that this was not due to biological difference, but pointed the finger at culture. The reasons for the lower status of women in the country are manifold, and this is one of the consequences for the unfortunate innocent girl child to live in distress right from the day she is born. The sample size of male child in the study is 679 (53.7%) out of the total 1264 children.

Type and place of residence: The rural areas in the Northeast are identified as the locus of poverty and deprivation. They lack modern infrastructure such as schools, communication infrastructure, health manpower and infrastructure, electricity and good housing, and thus, often fall prey to various diseases. Mass illiteracy in the rural areas is the greatest evil that has hampered in their progressive exposure to modernity. The government had done little to erase the disparity between the two settings. Sub-centre and PHC set up in the rural areas to address the needs of the rural people often lack the basic requirements such as drugs, blood banks, refrigeration units and cold chain system, health personnel etc. A study in Ropar, Punjab reported that a very small percentage of children availed medical aid from PHC/Sub-centre because of absence of doctors. It also found out that the Sub-centre remained inoperative for most of the year because of non-posting of staffs, engagement of staffs in surveys and leave without proper substitute of staffs. Drugs were also seldom available and hence villagers could get very little help (Gupta and Walia 1981). This kind of condition is not confined only to some particular PHC/Sub-centre, but has always been a trademark of every PHC/Sub-centre in the country. It seems the ancient function of urban-based health services of the pre-independence period are re-activated therein. The sample size of the children surveyed by the NFHS 2 in the rural areas accounted for 78.9 percent of the total 1264 children.

In addition to the socio-demographic variables, the study also includes some of the health variables and other variables with the assumption that these variables do affect the coverage of child immunization considerably. The health variables selected are those mothers that received tetanus toxiod (TT) injection before birth, antenatal visit for pregnancy (ANC), place of delivery, and discuss health awareness.

Health variables: TT injection before birth is based on the simple asked question whether the respondent received TT injection before birth. If yes then it is coded as 1 and if no then it is coded as 0. There is a large sample size (867 mothers) for those who received TT injection before birth swhich is a positive signal to a better health of the mothers. On the contrary, delivery of child takes place mostly at homes (883 babies deliver at home of the total 1264 children surveyed). Delivery in hospitals, PHC, sub-centre, maternity ward etc. has a share of only 381 of the total 1264 children age 12-23 months.

Antenatal visit for pregnancy is a positive health measure for delivering a safe and a healthy child. The Maternal and Child Health Programme recommended a minimum of three antenatal visits for every woman who is pregnant. The NFHS 2 carried out in 1998-99 asked the respondent on whether they have visited for antenatal care during pregnancy, and the number of times visited. Based on this, the present study categorised the number of times visited into three groups, they are: not visited even once (coded as 0), visited once or twice (coded as 1), and visited thrice or more (coded as 2). The sample sizes among these three groups are more or less equally distributed.

The variable 'discuss health awareness' is derived by taking any of the variables that the respondent discuss during their health facility visit. Table 3.4 show the variables (as in NFHS 2) of the various types of issues that the women discusses during their health facility visits.

Table 3.4: ***Variables for health seeking behaviour of the mothers***

Code name as in NFHS 2 (Kids file)	Label	Values assigned
m1	Received TT injection before birth	No=0, Yes=1
m14	Antenatal visit for pregnancy	No=0, Once or twice=1, 3 times or more=2.
m15$1	Place of delivery	Homes=0, Hospitals=1.
s309d	Discussed immunization during health facility visit	No=0, Yes=1
s309e	Discussed nutrition during health facility visit	No=0, Yes=1
s309f	Discussed disease prevention during health facility visit	No=0, Yes=1
s309h	Discussed antenatal care during health facility visit	No=0, Yes=1
s309i	Discussed delivery care during health facility visit	No=0, Yes=1
s309j	Discussed post-partum care during health facility visit	No=0, Yes=1
s309k	Discussed child care during health facility visit	No=0, Yes=1
s309m	Discussed oral rehydration during health facility visit	No=0, Yes=1
s309x	Discussed others during health facility visit	No=0, Yes=1

A total of 9 variables that are selected includes discussion on immunization, nutrition, disease prevention, antenatal care, delivery care, post-partum care, childcare, oral rehydration and others. If the woman has discussed on any of these issues then, by creating a dummy variable, the present study put forward that she has discussed health awareness and code it as 1. On the other hand, if she has not discussed on any of these issues then, it is coded as 0. The sample size shows that about 75 percent of the total 1264 mothers have discussed something about health awareness.

Women's autonomy: The low status accorded to women in the country has a long history, although we find that in the Vedic age, women had perhaps the most honoured position in the contemporary world (Seth 2001). However with the changes in the production, patriarchal societies became more important in the hide and seek game of economic production. Since then, the economic importance of women became

invisible and their status fell considerably. It is rightly remarked "patriarchal violence is not a feature of some feudal past but the necessary correlate of the so-called modernization process". It further states "it is not the male attitudes alone which import ideologies of domesticity to the third world, but the very economic logic of capitalism" (Schech and Haggis 2000: 94). Today we see that there is a distinctive role assigned to men and women. The position of women differs across the social and political stratum of the society. Women enjoy certain privileges in some society while it is not so in others. A comparative study of the South and the North Indian women show that the position of women is better in South India (Basu 1990). Better female autonomy means that the women will be much more likely to decide that a sick child needs early treatment and will be better able to interact with the outside world and obtain such treatment. Women's autonomy in the study focussed especially on the decision taking of the mothers on a variety of issues. The term autonomy however may generate a perpetual debate for no really a reason can suffice a stand that a woman has a higher autonomy as compared with others. Autonomy thus, in the study means the ability to make her own decisions without being influence by anyone else. Therefore adhering to this simple definition, the concept of autonomy means the ability to take decisions on (1) obtaining health care for the child, (2) to purchase jewellery, (3) decision about herself in staying with the family, and also (4) permission needed to go to the market, (5) to visits friends and relatives, and (6) to keep money set aside with her. Based on these 6 variables a composite index is derived having a total score of 6 (i.e. if the result is positive in each variable for which it is coded/assigned as 1, then the summation of all these variables is 6) and a minimum of 2. Subsequently an index is prepared by considering those with a score of 3 and below as low autonomy and those with a score of 4 and above as high autonomy. Thus, a sample of 247 were observed in the high score and 1017 women in the low score.

Media exposure: With the advent of information technology, the local is no longer largely self -contained but "thoroughly penetrated by and shaped in terms of social influence quite distant from them" (Giddens 1990: 19). Today the technology constituting the information revolution can be (apart from print media) facsimiles, mobile phones, cable and satellite television, or the "quintessential superhighway, the Internet" (Schech and Haggis 2000: 193). These technologies have enabled the distant world to come closer. However, still many section of the population in the third world have not even dialed a telephone. Failure to access and utilize the new forms of technologies and information implies an even greater marginalization from the world economy, and a widening of the gap between those in the know and those who are not. Castell argued, "the informational economy, while connecting the whole planet in a series of networks of flows, does so selectively. Significant parts of the world, deficient in the knowledge and information valued as the productive motor of the new system, become irrelevant to the global informational economy" (cited in Schech and Haggis 2000: 200). The case in the Northeast especially in the rural areas is a good example. It seems because of the absence of information technology, and even daily newspaper, the people are always held incommunicado. This is one of the reasons for the low immunization coverage in the region. The pedagogical institution or the media has imposed a ponderous silence on the immunization of children. Immunization of children especially polio has been perceived as a pretext of the government to make the child infertile, which is a covert measure of the birth control programme. This misconception spread like wildfire in the rural areas of Manipur in the late 1990s. Sometimes the role of media also is such that one sees a veritable discursive explosion. Nevertheless, information network must be made available to the rural people because this will help them reduce misconceptions, fears and apprehensions regarding child immunization, birth control methods or any others. Media exposure in the study is

obtained by utilising the NFHS 2 variables viz: reads newspaper once a week, watches TV every week and listen to radio every week. If the respondent is positive in any of these variables, then the study considers that they are exposed to mass media. The sample size for those women who are exposed to mass media is 786 of the total 1264 women, and those who are not exposed is 478 women.

3.5: **Statistical sample**

The statistical sample selected for the analysis to empirically determine the effect of the independent variables on the response variable and the association between the independent and the dependent variables, the following statistical techniques are employed.

In order to measure the association between the dependent and the independent variables, Karl Pearson's chi-square technique is adopted in addition to cross tables. This technique explains the association of categorical variables in a sysytematic manner. The formulae is:

$$x^2 = \sum_{i=1}^{n} \left\{ \frac{(o_i - e_i)^2}{e_i} \right\}$$

Where, oi and ei are the observed and estimated frequencies respectively of the ith class. The shape of the distribution will vary with (n-1) which is known as its degrees of freedom.

The second section that deals with partial immuization involve percentage calculation. Here two different types of partial immunization are attempted. The 1st analyze the percentage of children missing full immunization because they missed only one vaccine.

The second analyze the dropout rates of those triple antigens i.e. DPT and Polio. As DPT and Polio each has three doses administered at

different periods, it is obvious that some will miss some doses at the subsequent period.

The third section deals with the multivariate analysis and employs logistic regression models to examine the effect of the independent variables on the dependent variable. The dependent variable in the analysis is 'full immunization' of children age 12-23 months. Many of the factors associated with the dependent variable are also associated with each other. Consequently, any apparent effect of one factor on the dependent variable may be due to the confounding effects of one or more of other factor(s). Therefore, when assessing the effects of any one factor on the dependent variable, a multivariate analysis is necessary to control for the effects of other potentially confounding factors. The dependent variable in the model is a dummy variable that simply indicate whether the child has received full immunization or not. 12 independent variables are used in the analysis and all are categorical.

In the analysis both unadjusted and adjusted odds ratio are presented. Unadjusted odds ratios means when it is not control for other counfounding variables (zero-order estimates), on the other hand adjusted odds ratios means when other confounding variables are controlled.

In a logistic regression model we assume that the P (probability of occurrence of events) is related to the independent variables in the form of logistic function instead of a linear function. In this model, a sigmoid curve is used to fit the observed points. Since the tails of the sigmoid curve level off before reachilg P=0 or P=1, the impossible values of P (P<0 and P>1) observed in a probit model are avoided.

The logistic form of logistic function is assume as:

$$P = \frac{1}{1 + e^{-(a+bx)}} \qquad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where, P is the estimate probability (here the probability of receiving full immunization), x is the predictor, a & b are the constants, and e is the base of natural logarithm (e=2.7183). The independent variable has the largest effect on P when P=0.5 and P becomes smaller in absolute magnitude as P approaches 0 or 1.

It can be also seen that:

$$1 - P = \frac{1}{1 + e^{(a+bx)}} \qquad \text{.....(2)}$$

and,

$$\frac{P}{1-P} = e^{a+bx} \qquad \text{..... (3)}$$

therefore,

$$\log \frac{P}{1-P} = a + bx \qquad \text{.....(4)}$$

In other words, in a logistic regression we assume that logarithm of the odds (odds of those that received full immunization) is a linear function of the independent variable. In case we have K independent variables; x_1, x_2, x_3.....xK, the relationship can be easily extended as:

$$\text{Log} \frac{P}{1-P} = a + b_1x_1 + b_2x_2 + b_3x_3 + \text{.....} bKxK.$$

The coefficient b_1 represent the additive effect on one unit change in independent variable x_1 on logistic odds of receiving full immunization. The quantity e^b is called odds ratios which represent the multiplicative effect of unit change in independent variable x_1 on the odds of receiving full immunization. The e^b Exp (B) is (more readily) understandable as a measure of effect.

It is now cystal clear from the conceptual framework that the socio-demographic influence on child immunization follows a zigzag course through the intervening variables of health seeking behaviour and preferential treatment. The study will now analyse the data in order to prove the hypotheses using the statistical tools mentioned.

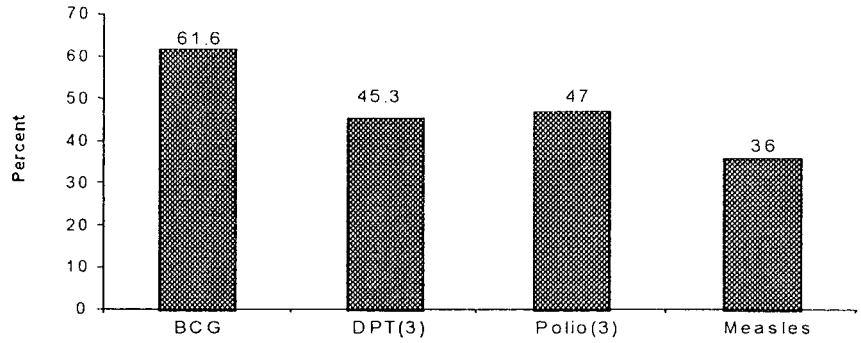
Chapter four

Correlates Of Child Immunization

4.1: **Proportion immunized.**

The proportion of children immunized in the Northeastern states of India is extremely poor. Children immunized against all the four vaccines included in the immunization programme are only 27.8 percent. Immunization in the Northeast is thus characterised by poor performance. Of all the vaccines, BCG has the highest coverage of 61.6 percent followed by Polio 3 with 47 % and DPT 3 of 45 % (fig. 4.1). Measles vaccine reported the lowest coverage of only 36 percent. Despite considerable gain since 1992-93, the coverage figure is still appalling. The variation reported for the coverage of different vaccines can be due to inadequate supply of specific vaccines or not accepting some particular vaccine because of its subsequent complication. The poor coverage of measles vaccine can be due to its late entry in the immunization programme, and also because of its late vaccination to the child i.e. the child is only to be vaccinated after reaching the age of nine months.

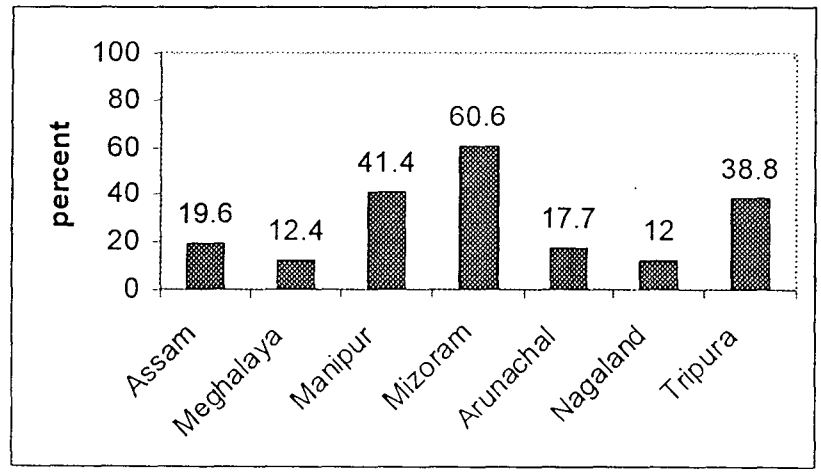
Fig. 4.1: ***Percentage of Children Age 12-23 Months receiving specific Vaccinations, Northeast, 1998-99.***



Source: IIPS, 1998-99.

Variations are reported amongst the various states in the region. States with higher literacy rate, better health infrastructure generally performed better. Mizoram with 60.6 percent for full immunization is the only state in the Northeast to have crossed the 50 percent mark (fig.4.2); other states fall below 50 percent. After Mizoram, these are followed by Manipur (41.4 %), Tripura (38.8 %), Assam (19.6 %), Arunachal Pradesh (17.7 %). The lowest coverage for full immunization was reported from the states of Nagaland (12 %) and Meghalaya (12.4 %). The findings indicate that child immunization in the region is still long way from reaching the 100 percent coverage. The aims and objectives of the Universal Immunization Programme (UIP) was to achieve self-sufficiency in vaccine production and the manufacture of cold chain equipment, and to cover at least 85 percent of all infants against the six preventable

Fig. 4.2: ***Percentage of children age 12-23 months who received full immunization, Northeast India, 1998-99.***



Source: IIPS, 1998-99.

diseases by 1990. However, 15 years have passed and still many states in the country are yet to fulfil the objectives. Children who do not receive any vaccines were also substantially high (27 %). It can be stated that children who do not complete full immunization were because they have missed some particular vaccines. Moreover, they are also likely to drop

out for the subsequent doses of DPT and Polio antigen. In the Northeast 15.3 percent of children could not reach full immunization because they missed one vaccine (table 4.5). There are also large cases where children drop out for the subsequent doses of DPT and Polio antigen (table 4.6). Since these antigens are supposed to follow three different schedules, it can be ascertained that there are a large number of children that did not complete its course. The percentage of children dropping between DPT 1 and 2 was 9.85, which further increases to 20.67 percent between DPT 2 and 3 and culminate at 28.43 percent between DPT 1 and 3. The findings for Polio are even more appalling. The drop out rate between 1 and 2 for Polio was 9.53 percent, which further increases to 25.09 percent between Polio 2 and 3 and to 32.12 percent between 1 and 3 (Table 4.6). The drop out rate can also be seen with respect to the highest coverage antigen dose i.e. BCG and lowest coverage antigen dose i.e. Measles. The drop out rate between BCG and Measles is 41 percent. This overall picture of child immunization in the Northeast is deplorable. The condition is worse for children belonging to the poor and traditional societies. Mothers' with no or lesser education, lower autonomy, less exposure to mass media etc., are all the factors hampering full immunization. The confounding factors affecting full immunization and included in the multivariate analysis are given in table 4.1.

Table 4.1 shows definitions and mean values of variables included in the immunization coverage model. Mean values are presented for the whole region rural areas separately. Values for urban areas are not shown separately because the number of children in urban areas is too small to provide a meaningful result- just over one forth of children covered by the survey live in the urban areas. In the region as a whole, 40.9 percent of children age 12-23 months are from the Christian community, 55.9 of children age 12-23 months live in a household whose head belongs to the Schedule tribe (ST). 31.4 have mothers age 25-29, 39

Table 4.1: ***Definitions and mean values of variables in the immunization coverage model, Northeast India, 1998-99.***

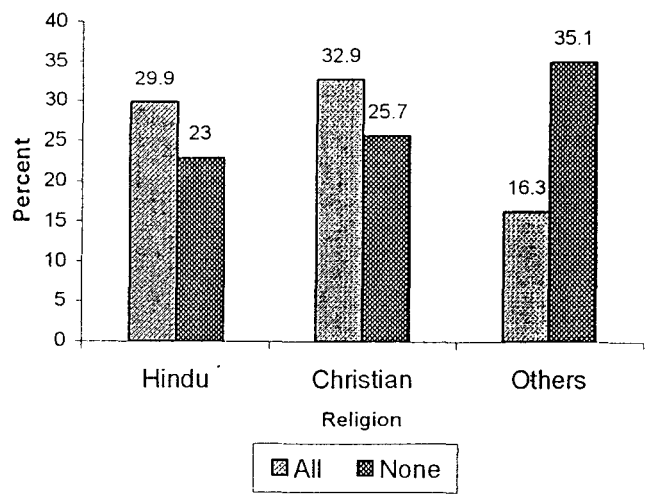
Variable	Definition: dummy variable with value 1 if the specified condition is met and 0 otherwise.	Mean (%) Whole state	Rural	Urban
Response variable				
Full immunization	Child has received BCG, measles, and three doses of DPT and polio vaccines.	27.9	22.9	46.8
Predictor variables				
Mother's education				
Primary	Mother is literate with primary education	24.8	26.7	18.0
Sec./higher education	Mother is literate with secondary or higher education	39.0	32.4	63.7
Partner's education				
Primary	Father is literate with primary education	19.8	21.6	13.1
Sec./higher education	Father is literate with secondary or higher education	56.1	50.2	78.3
Mother's age				
20-24	Mother's age is 20-24 years	30.2	29.9	31.5
25-29	Mother's age is 25-29years	31.4	30.6	34.5
30-49	Mother's age is 30-49 years	29.1	29.4	28.1
Media exposure	Mother watched television or listen to radio at least once a week	62.2	55.4	87.6
Health awareness	Mother who discussed immunization/nutrition, prevention of disease, delivery, antenatal care & post partum care during health facility, received TT injection etc.	74.9	76.0	71.8
Child's sex	Child is a girl	46.3	45.5	49.1
Child's birth order				
2 to3	Child's birth order is 2 or 3	40.7	38.5	48.7
4 and above	Child's birth order is 4 and above	30.8	34.1	18.4
Religion				
Christian	Child lives in a household whose head is a Christian	40.9	39.5	46.4
Muslims/Others	Child lives in a household whose head is other than Hindu and Christian	23.7	25.7	16.1
Ethnicity				
Schedule tribe	Child lives in a household whose head belongs to a schedule tribe	55.9	56.7	52.8
Others	Child lives in a household whose head belongs to other than SC & ST	29.5	28.5	33.3
Economic well being index				
High	Child lives in a house with an ownership score of durable goods, landholding and occupation is above 8.	66.9	62.5	83.1
Residence	Child lives in rural area		78.9	21.1
Women' autonomy	Mothers whose autonomy is high in taking decision for buying jewels and obtaining health care, about staying with her family and permission needed to visit friends/relatives and to the market, and allow to have money set aside.			
High		19.5	18.7	22.8
Number of children	**Number of children age 12-23 months**	**1264**	**997**	**267**

percent have mothers who are literate with secondary or higher education, and 62 percent have mothers who listen to radio or watch television at least once a week. 53.7 percent of children age 12-23 months is males, and 40.3 percent of the children fall in the birth order number of 2 to 3.

Socio-economic variables in this analysis include religion, ethnicity, education, and economic well being (index) of both the respondent and the partner. Since child immunization differs among different groups and within the group as well no conclusive result can be drawn. Nevertheless a generalize picture can emerge which will render policy makers and students to apprehend the broad picture of child immunization in the Northeast.

Various studies revealed that Muslims had a lower coverage of child immunization compared to the Hindus (Srivastva & Saksena 1988; Roy et al. 1988). The reasons are not one-sided, but multi-dimensional. The present study also confirms the fact that it has the lowest coverage as compared with other religion.

Fig 4.3: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Religious Characteristics, Northeast, 1998-99.***

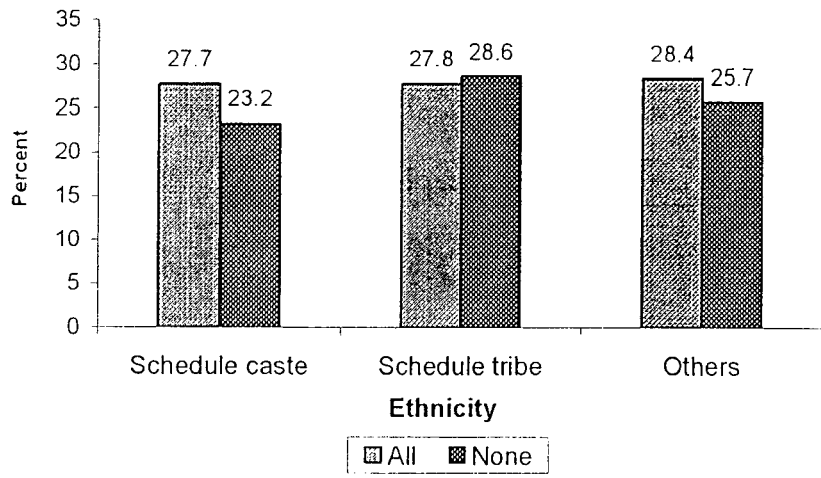


Source: IIPS, 1998-99.

Christians revealed the highest coverage in all the components included in the immunization programme. Christians also revealed the highest of 33 percent for 'full immunization' and the least of 25.7 percent for 'none immunization'. On the contrary, Muslims/Others revealed the lowest of only 16.3 percent for full immunization and the highest of 35.1 percent for none. This perhaps is the reflection of the orthodoxy in this category. Hindus in the Northeast are also better than the religion belonging to Muslims/Others category. The chi-square test between religion and full immunization shows that it is statistically significant at 1 percent level of significance.

In the Northeast based on the sample of 706 ST children, only 27.8 percent of the children had received full immunization. Children that do not receive any vaccines also show a high of 28.6 percent. This indicates the poor performance of the immunization programme. This is also equally true for the SC population. Only 27.7 percent of SC children had been administered full immunization and 23.2 percent had not received any vaccination. In contrast to this, the other ethnic groups revealed the highest coverage of 28.4 percent for full immunization and 25.7 percent for nil immunization.

Fig 4.4: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Ethnic Characteristics, Northeast, 1998-99.***



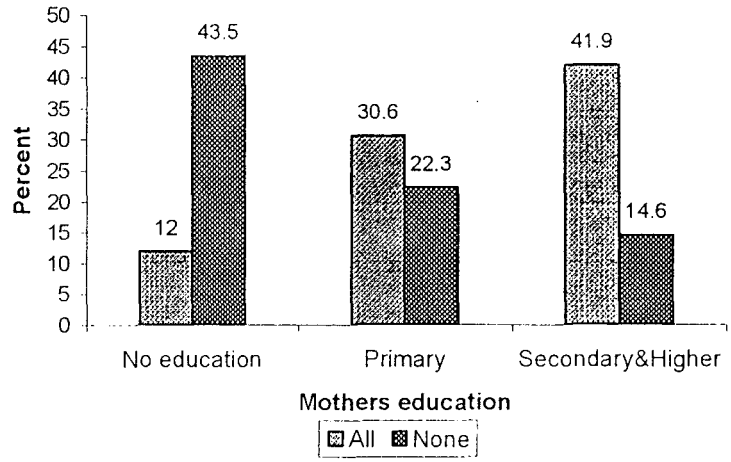
Source: IIPS, 1998-99.

There are a number of reasons for this low coverage. Important among them can be ignorance, distance to be travelled to the Sub-Centre or PHC, economically very poor to bear the transportation cost and relying on other sources. For instance the study of the Khairwars revealed that they by and large relied on the *Dewar* or tribal doctor or magic man. The reason is because the doctor did not provide service free of cost but charged them for making a diagnosis and for the medicines. Therefore they preferred the local Dewar who did not have to be paid immediately in cash but could be remunerated later in kind. Besides, he was a part of their socio-religious life (Pandey et al. 1996).

This is also true for the Northeast tribal population in many cases. Since the tribal are poor and cannot afford the cost of referring it to an allopathic doctor or bear the transportation cost to take the patient to the PHC, they often tried home remedies using their indigenous knowledge of curing an ailment.

The study of the effect of education on child immunization in the Northeast revealed that with the increase in the educational level of both the mother and the father, there is an increase in the percentage of children who are administered full vaccination. Children coming from the background of 'no education' of both the mother and the father received full immunization as low as 12.0 percent and 11.5 percent respectively. On the other hand, this category (no education) represents 43.5 percent and 45.6 percent with regard to nil vaccination. Mothers with primary education represent 30.6 percent for full immunization and 22.3 percent for nil immunization. This is also the case with the father's education, although the mother's effect is more pronounced than the father's education. Still, with the increase in the educational level of the mother and the father, there is an increase in the immunization coverage and lower percentage for receiving no vaccination.

Fig 4.5: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Mother's Educational Characteristics, Northeast, 1998-99.***



Source: IIPS, 1998-99

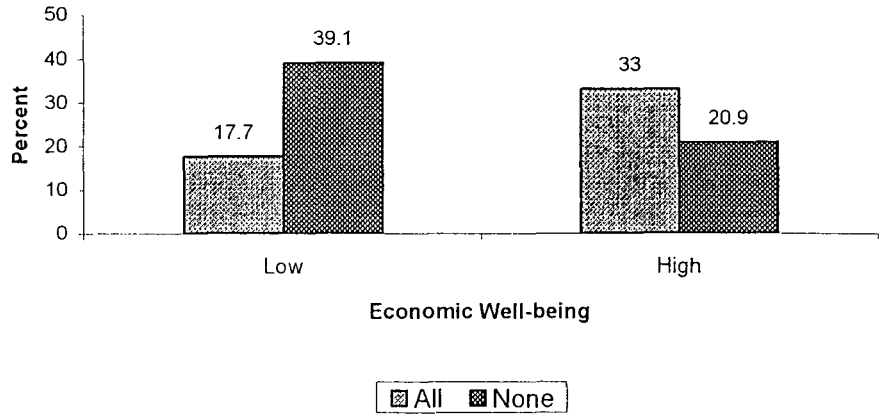
When the educational level of both the parents increases to secondary/higher, the percentage for full immunization increases to 41.9 percent and 36.2 percent for the mothers' and fathers' education respectively and a lower percentage of 14.6 and 17.5 for nil immunization. Thus it is clear that with the increase in the educational level, there is an increase in the coverage for full immunization and a decrease for no vaccination. The chi-square is significant at 1 percent level of significance which proves the hypothesis.

A perusal into the present analysis revealed that the poor (having lower score) has a lower coverage compared with those with high score. The low index group represent a meagre 17.7 percent of being fully immunized and 39.1 percent of not being immunized even by a single vaccine. On the contrary, those in the higher index account for 33.0 percent of being fully immunized and 20.9 percent of not being immunized by any vaccine.

The chi-square is also significant at 1 percent level of significance. It is obvious that those rich households are from the urban areas and have better education. Various studies have revealed that immunization level

in general, rose with the rise in the occupational status of the individual and income of the household (Srivastva & Saksena 1988).

Fig 4.6: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Economic well being Background Characteristics, Northeast, 1998-99.***



Source: IIPS, 1998-99

Table 4.2: ***Percentage of Children Age 12-23 Months who received specific Immunization by Socio-economic Background Characteristics, Northeast India, 1998-99.***

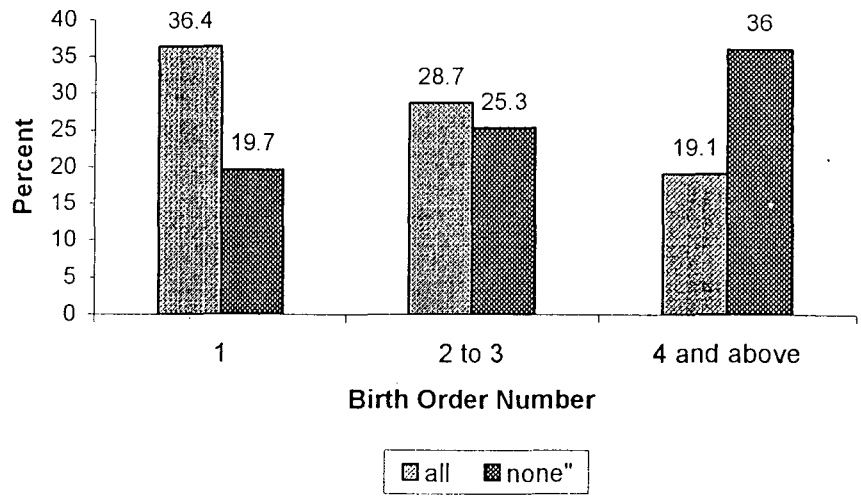
	Percent vaccinated							
Socio-economic Characteristics	BCG	Polio 0	DPT (3)	Polio (3)	Measles	All	None	No. of children
Religion								
Hindu	67.0	17.2	49.6	49.8	38.2	29.9	23.0	448
Christian	64.0	13.2	46.8	50.9	40.4	32.9	25.7	517
Others	49.2	13.7	36.2	36.5	25.1	16.3	35.1	299
Ethnicity								
Schedule caste	70.8	18.9	49.2	47.3	36.2	27.7	23.2	185
Schedule tribe	59.8	12.6	43.2	46.5	36.4	27.8	28.6	706
Others	60.3	16.6	47.3	48.2	35.1	28.4	25.7	364
Respondent's Education								
No education	42.7	13.3	29.1	30.2	18.2	12.0	43.5	457
Primary	65.6	13.7	46.8	50.6	38.9	30.6	22.3	314
Secondary&higher	76.5	16.6	59.3	60.8	50.7	41.9	14.6	493
Partner's education								
No education	39.7	13.1	26.9	28.5	17.7	11.5	45.6	305
Primary	57.2	14.8	37.2	39.2	30.4	24.4	31.2	250
Secondary&higher	72.5	15.4	56.1	58.1	45.8	36.2	17.5	709
Economic well-being index								
Low	48.4	10.7	34.6	38.1	22.9	17.7	39.1	419
High	68.0	16.7	50.6	51.5	42.5	33.0	20.9	845

Source: IIPS, 1998-99

The demographic variables selected in the analysis include the birth order number of the child, mother's age, sex of the child and place of residence. Demographic characteristics offer a useful basis for examining the correlates of health status. Compositional variables such as age, sex and birth order number allow health demographers to infer a great deal about a population's health characteristics.

The study of the effect of birth order number (BORD) on immunization in the Northeast revealed that children with lesser BORD indicate a higher percentage of coverage compared with those in the higher BORD.

Fig 4.7: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Birth Order Number Characteristics, Northeast, 1998-99.***



Source: IIPS, 1998-99

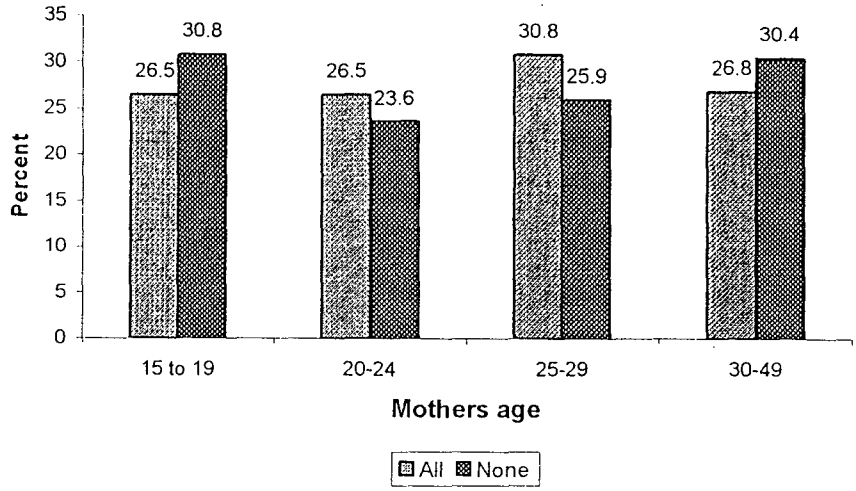
Children in the first BORD represent 36.4 percent to full immunization. The situation became appalling with the increase in the BORD till it represent as low as 19.1 percent for the 4 or above BORD. Children that received no vaccination in this category (4 or above) also revealed a high of 36.0 percent. The chi-square test between full immunization and BORD is statistically significant at 1 percent level of significance, which means the association is absolutely strong. The reasons for this inverse

relationship i.e. higher the BORD, lower the coverage of immunization are based on the decision of the parents in evaluating the importance of their children.

The age of the mother and its effect on child immunization is rather confusing. It is often always assumed that younger mothers today are more likely to be educated, have more exposure to mass media, more modernized and un-dogmatic. On the other hand it is also assumed that older mothers with experience in mothering are more likely to take better care of their children. This is a contentious issue and no agreement can be mutual regarding this.

A study in the Northeast revealed that the middle age-groups i.e. 20-24 and 25-29 are more educated and have more exposure to mass media as compared to the extreme age-groups i.e. 15-19 and 30-49 (see appendix 4). A study by Saksena et al. (1989) also reported that younger men and women had less exposure to mass media. These extreme age groups with less education can be one of the reasons for reporting lower immunization coverage.

Fig 4.8: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Mother's Age Characteristics, Northeast, 1998-99.***

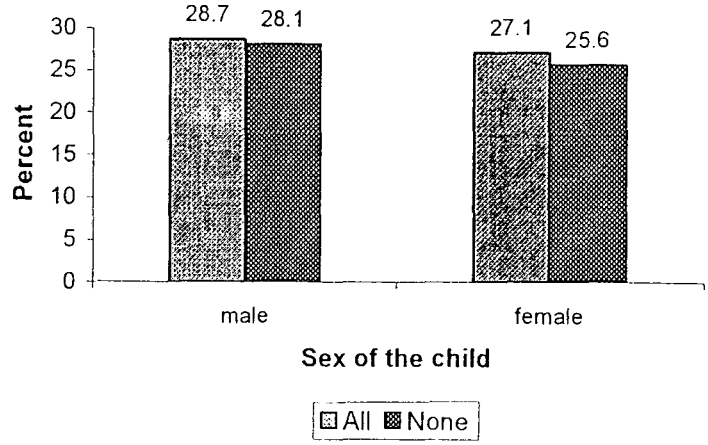


Source: IIPS, 1998-99

The present analysis revealed that women in the age-group 15-19 represent only 26.5 percent of receiving full immunization as compared to 30.8 and 26.8 percent for the age groups 25-29 and 30-49 respectively.

Immunization status for the male and the female child in the region reported more or less the same coverage figures confirming Northeast's proud image of being an egalitarian society in the country in terms of giving equal treatment to both the male and the female child. Although the percentage received for full immunization is considerably low the difference between the two is meagre. Male represent 28.7 percent and female 27.1 percent for full immunization, and for no vaccination the male sex represent a higher percent of 28.1 and female 25.6.

Fig 4.9: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Child's Sex Background Characteristics, Northeast, 1998-99.***

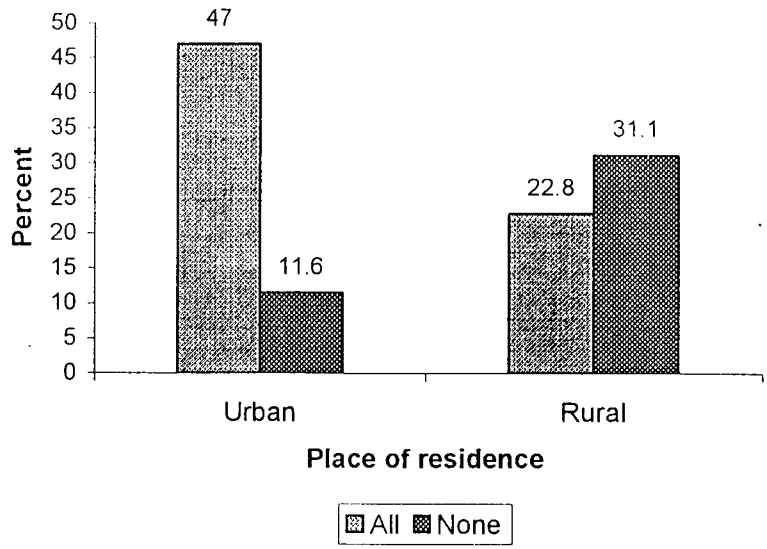


Source: IIPS, 1998-99

The rural areas in the Northeast are identified as the locus of poverty and deprivation. They lack modern infrastructure such as schools, communication infrastructure, health manpower and infrastructure, electricity, good housing etc., and thus, often fall prey to various diseases. Mass illiteracy in the rural areas is the greatest evil that has hampered in their progressive exposure to modernity. A perusal into the

present analysis revealed a great disparity in the coverage of immunization between the two settings. A difference of 24.2 percentage point is observed. The rural areas represent a low of 22.8 percent for full immunization and a high of 31.1 percent for nil immunization. On the contrary, the urban areas revealed a higher percentage of 47.0 for full immunization and 11.6 percent for nil immunization. This shows that greater efforts should be placed in the machinery of the administration to ensure better health services in the rural areas.

Fig 4.10: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Residence Characteristics, Northeast, 1998-99***



Source: IIPS, 1998-99

Table 4.3: ***Percentage of Children Age 12-23 Months who received specific Immunization by Demographic Background Characteristics, Northeast India, 1998-99.***

	Percent vaccinated							
Characteristics	BCG	Polio 0	DPT (3)	Polio (3)	Measles	All	None	No. of children
Birth order number								
1	69.3	19.4	56.8	57.5	45.2	36.4	19.7	**361**
2 to 3	64.8	14.4	44.9	44.7	38.1	28.7	25.3	**514**
4 and above	50.1	10.8	35.2	40.6	24.7	19.1	36.0	**389**
Mother's age								
15 to 19	55.6	11.1	41.9	44.4	36.8	26.5	30.8	**117**
20-24	64.4	15.4	44.2	45.4	35.1	26.5	23.6	**382**
25-29	64	13.6	49.1	48.9	40.1	30.8	25.9	**397**
30-49	57.9	16.3	43.5	48.1	32.3	26.8	30.4	**368**
Child's Sex								
Male	61.3	14.9	47.1	47.7	36.4	28.7	28.1	**679**
Female	61.9	14.5	43.2	46.4	35.6	27.1	25.6	**585**
Place of residence								
Urban	82.4	19.1	64.4	64.7	58.8	47	11.6	**267**
Rural	56	13.5	40.2	42.4	29.9	22.8	31.1	**997**

Source: IIPS, 1998-99

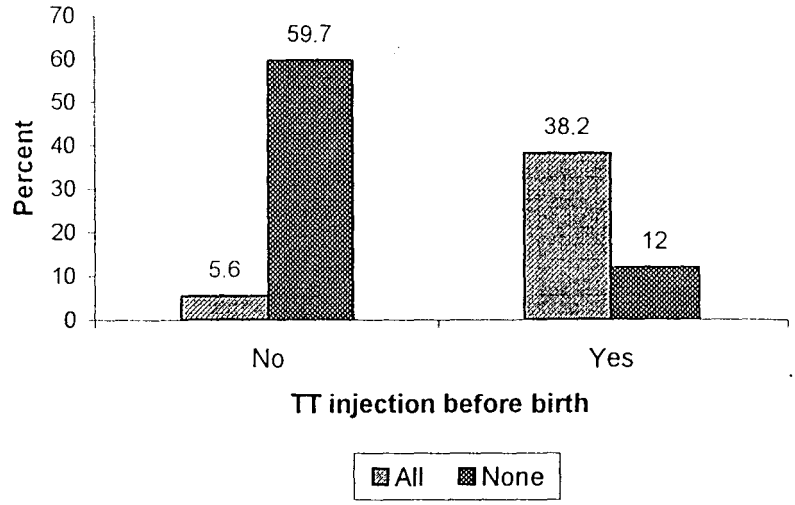
Heath variables' in the study include the status of the respondent's receiving tetanus injection before birth, place of delivery, antenatal visits for pregnancy and awareness on health. 'Others' variable include the autonomy of the respondent and her exposure to mass media.

It can be always presumed that those mothers that have a positive status on health variables are more likely to receive vaccination for their children. Since they have already been administered tetanus injection, iron and folic acid during their ante-natal check up, it is with certainty that the health service providers would have discussed the importance of immunization of their children and other health care services. Another important aspect is with regard to the place of delivery. Hospitals delivery has a strong positive aspect on child immunization. It is compulsory for the health staffs to administer BCG vaccines to the baby born and advice the parents to subsequently visit the hospital at a later date for polio,

DPT, and measles vaccines. Today, apart from these four vaccines included in the Programme, hepatitis B is also administered, and even more, the mothers had to undergo HIV testing.

The present study revealed that mothers who had tetanus injection before birth represent 38.2 percent for full immunization as opposed to a meagre 5.6 percent for those who did not received tetanus injection.

Fig 4.11: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Tetanus injection of the mothers, Northeast, 1998-99***

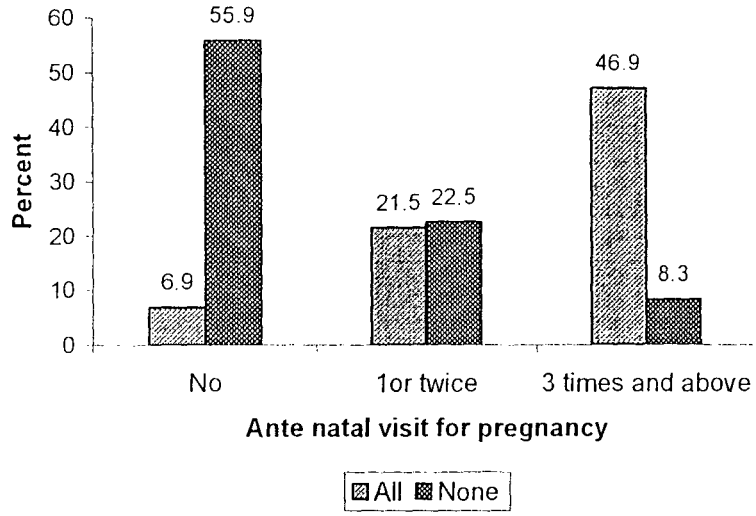


Source: IIPS, 1998-99

Mothers who delivered their child at home also represent only 19.8 percent as opposed to 46.8 percent for those who delivered their child in the hospitals/CHC/PHC or any other maternity ward (Table 4.4). Positive relationship is observed between the number of antenatal visits and full immunization and an inverse relationship with nil vaccination. Previous study also ruled out that the coverage of immunization among the group that had received antenatal consultation was more than twice that of the group, which had not received such advice (Srivastava et al. 1988). The present study also shows that with the increase in the number of

antenatal visits, there is an increase in the coverage of immunization and a decreasing coverage for nil immunization.

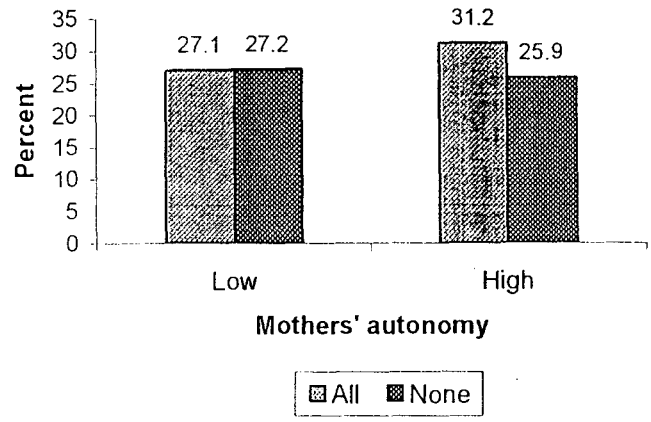
Fig 4.12: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Ante-natal visits Characteristics, Northeast, 1998-99.***



Source: IIPS, 1998-99

The concept of autonomy as explained in the preceding chapter has to do more with her liberty in decision taking. The present study of child immunization and mothers' autonomy revealed that with higher autonomy of the women/mothers, there is an increase in the coverage of child immunization. Mothers' with lower autonomy had a low of 27.1 percent of full immunization and 27.2 percent for no vaccination. On the other hand, mothers' with higher autonomy increases to 31.2 percent for full immunization and a lower percentage of 25.9 percent for no vaccination. This indicates that there is a positive relationship between the two. However when the association is tested, this is statistically insignificant.

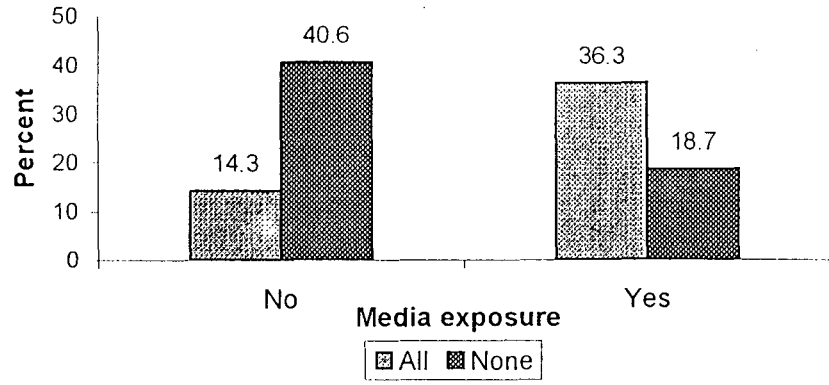
Fig 4.13: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Mother's Autonomy Characteristics, Northeast, 1998-99***



Source: IIPS, 1998-99

Exposure to mass media has a strong effect on child immunization. The present analysis indicated a positive relationship between child immunization and the exposure of mothers to mass media. The chi-square is statistically significant at 1 percent level of significance. Mothers with no exposure contributed an abysmally low percent of 14.3 to full immunization and a pinnacle high of 40.6 percent for nil immunization. On the contrary, mother's with some exposure to any form of electronic mass media had 36.3 percent of their children fully immunized and 18.7 percent not vaccinated by any vaccines. This shows that exposure to mass media is an important determinant for child immunization. The reasons for this is that exposure to media will certainly generate awareness of preventive health services, will get to learn more about health education and above all will make the mothers escape from traditional practices and render them to be more modernised.

Fig 4.14: ***Percentage of Children Age 12-23 Months receiving Full Immunization according to Mother's Exposure to Mass Media Background Characteristics, Northeast, 1998-99***



Source: IIPS, 1998-99

Table 4.4: ***Percentage of Children Age 12-23 Months who received specific Immunization by selected Background Characteristics, Northeast India, 1998-99.***

	Percent vaccinated							
Health and other characteristics	BCG	Polio 0	DPT (3)	Polio 3	Measles	All	None	**No. of children**
Received tetanus injection before birth								
No	26.4	7.6	15.4	18.7	10.8	5.6	59.7	**397**
Yes	29.5	18	59.1	60.1	47.5	38.2	12	**867**
Place of delivery								
Homes	51.5	12.6	37.1	38.9	26.2	19.8	35	**883**
Hospitals	84.8	19.7	64.3	66.1	58.8	46.8	8.4	**381**
Ante-natal visit								
No	28.7	8.2	16.8	21.8	12.6	6.9	55.9	**404**
For twice	61.6	15.3	40.7	42	32.2	21.5	22.5	**307**
3 times and above	85.5	19.2	68.7	68.4	55.2	46.9	8.3	**553**
Discussed health awareness								
No	61.7	18.2	45.9	48.6	36.8	28.8	28.7	**209**
Yes	76.2	18.1	57.9	58.2	44.6	36.6	14	**623**
Women's autonomy								
Low	61.6	14.7	45.1	46.3	34.6	27.1	27.2	**3187**
High	63.6	14.6	46.2	50.6	41.7	31.2	25.9	**851**
Media exposure								
No	47.5	7.6	31.2	32.3	21.3	14.3	40.6	**478**
Yes	70.1	18	53.9	56.1	44.9	36.3	18.7	**786**
Total	61.6	14.7	45.3	47	36	27.8	27	**1264**

Source: IIPS, 1998-99

4.2: **Partial immunization**

As mentioned 27.8 percent of children age 12-23 months are fully immunized, and 27 percent have not received any vaccinations. 73 percent (100 minus 27 percent) have received at least one vaccination, implying that 45.2 percent (73 minus 27.8 percent) have had one or more vaccination(s) but are not fully immunized. These children are defined as partially immunized.

Immunization as a preventive health care service is perceived differently by different people. The service escapes attention because if there are no identified illness the people simply ignore it or would not allow the providers to administer it because of certain misconception. It was reported that 15.3 percent of the children in the Northeast region failed to reach full immunization because they missed only one vaccine. If these children had not missed one vaccination, full immunization coverage would be 43.1 percent instead of 27.8 percent. Among the 15.3 percent of children who missed one vaccination, 69.28 percent (10.6 out of 15.3 percentage points) missed the measles vaccination (table 4.5). The picture do clearly gives insight into the low coverage of measles vaccine that needs to be strengthened. A perusal into the various background characteristics of those that missed one vaccination reveals that the low coverage of full immunization was a direct result of non-acceptance or unavailability of a particular vaccine due to some reasons. As mentioned above, the percentage of children that was not fully immunized because they missed only measles vaccination was intriguingly high. The religions other than Hindus and Christians have a higher percentage of children missing measles (11.0), polio (4.0) and DPT (2.0) vaccinations. Interestingly this group showcase the achievement in the BCG vaccination for there was only one child that missed BCG vaccination.

Table 4.5: ***Percentage of children age 12-23 months who were not fully immunized because they missed only one vaccination, Northeast India, 1998-99.***

		BCG		Polio		DPT		Measles	
		Percent	No.of children	Percent	No.of children	Percent	No.of children	Percent	No.of children
Religion	Hindu	0.70	3	3.80	17	0.70	3	10.90	49
	Christian	0.60	3	1.70	9	1.90	10	10.10	52
	Others	0.30	1	4.00	12	2.00	6	11.00	33
Ethnicity	Scheduled caste	1.60	3	3.80	7	0	0	13.00	24
	Scheduled tribe	0.40	3	2.50	18	2.10	15	9.50	67
	None of them	0.30	1	3.50	13	1.10	4	11.50	43
Mothers' educational	No education	0.20	1	2.20	10	0.90	4	9.60	44
	Primary	0.60	2	2.20	7	1.90	6	10.80	34
	Secondary &higher	0.80	4	4.30	21	1.80	9	11.40	56
Partner's education.	No education	1.00	3	2.30	7	1.30	4	8.20	25
	Primary	0.40	1	2.40	6	1.60	4	7.60	19
	Secondary &higher	0.40	3	3.50	25	1.60	11	12.70	90
Economic well-being index	Low	0.70	3	2.10	9	1.40	6	11.20	47
	High	0.50	4	3.40	29	1.50	13	10.30	87
Birth order number	1	0.60	2	4.20	15	1.90	7	12.20	44
	3-Feb	0.60	3	2.90	15	1.90	10	9.10	47
	4 and above	0.50	2	2.10	8	0.50	2	11.10	43
Mothers' age	15-19	0.90	1	2.60	3	1.70	2	7.70	9
	20-24	0.30	1	3.40	13	2.10	8	9.70	37
	25-29	1.00	4	3.30	13	2.00	8	10.80	43
	30-49	0.30	1	2.40	9	0.30	1	12.20	45
Child's sex	Male	0.90	6	3.40	23	1.30	9	10.80	73
	Female	0.20	1	2.60	15	1.70	10	10.40	61
Residence	Urban	0.40	1	4.50	12	1.90	5	10.10	27
	Rural	0.60	6	2.60	26	1.40	14	10.70	107
Tetanus injections bef. birth	Received no inject.	0.30	1	2.00	8	1.30	5	5.80	23
	Yes received inject.	0.70	6	3.50	30	1.60	14	12.80	111
Place of delivery	Homes	0.60	5	2.50	22	1.10	10	10.90	96
	Hospitals	0.50	2	4.20	16	2.40	9	10.00	38
Antenatal visits for pregnancy	No antenatal visits	0.20	1	1.70	7	1.70	7	5.90	24
	Once or twice	1.00	3	3.30	10	1.00	3	8.50	26
	3 times or more	0.50	3	3.80	21	1.60	9	15.20	84
Discussed health awareness	No	0.50	1	3.80	8	1.90	4	11.00	23
	Yes	0.60	4	2.60	16	1.60	10	14.30	89
Women's autonomy	Poor	0.60	6	2.90	30	1.10	11	11.20	114
	Good	0.40	1	3.20	8	3.20	8	8.10	20
Media exposure	No	0.40	2	2.70	13	0.80	4	10.50	50
	Yes	0.60	5	3.20	25	1.90	15	10.70	84
Total		0.60	7	3.00	38	1.50	19	10.60	134

Source: IIPS, 1998-99.

In terms of ethnicity, SC has the highest percentage of children missing BCG, measles, and polio vaccinations, except for DPT vaccination where there were none. ST would have had a higher coverage for full immunization than the 'others group' if 2.10 percent of the children that missed full immunization because they missed DPT vaccination were administered against DPT. Then, the percentage for full immunization of ST will be 29.9 percent (27.8 plus 2.10 %) and for 'others' it will be 29.5 percent (28.4 plus1.10 %).

A positive relationship is observed between educational level of the mothers and children not fully immunized because they missed only one vaccination. With the increase in the educational level the missed out rate increases consistently. The same condition applies for the partner's education except with the case for missing BCG where it is lower for the higher educational level. Household with higher economic well-being index has a higher missed out rate for DPT and polio.

Background characteristics according to mothers' age are rather enigmatic. Mothers' in the middle age group (25-29) have a higher coverage for full immunization compared with the extreme age groups (15-24 and 30-49). However, this group (25-29) has a higher rate that missed full immunization because they missed measles vaccination compared with the age groups of 15-19 and 20-24. For BCG also this group has higher rate compared with the age groups of 15-19, 20-24 and 30-49. With regard to polio and DPT vaccines the age group 30-49 revealed a lower missed out rate compared with the middle age group of 20-24.

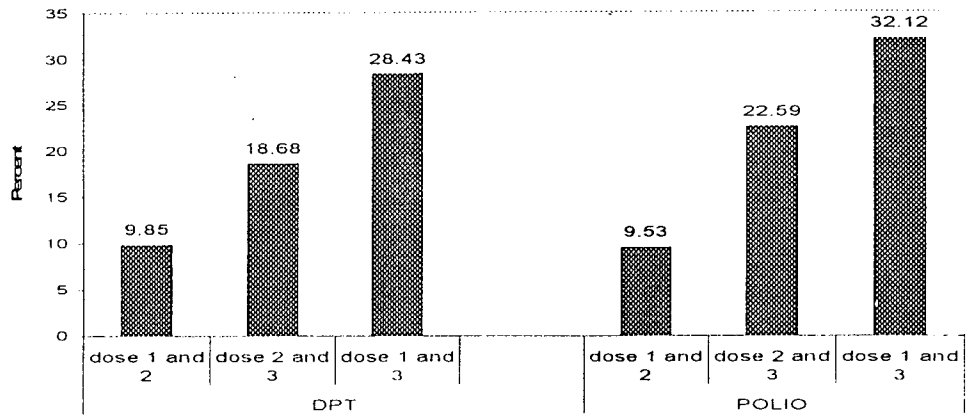
The sex of the child also differs for the four vaccines. The female child has a lower missed out rate for BCG (0.20%), polio (2.6%) and measles (10.4%) vaccinations, and on the contrary, the males has a lower missed out rate for DPT (1.3 %) vaccination.

Children that missed full immunization because they missed polio and DPT vaccinations were higher in the urban areas compared to its

counterpart. In the same way, mothers that have exposure to any mass media also have a higher missed out rate for all the vaccines than for those mothers' who are not. Children of mothers' with higher autonomy that failed to reach full immunization because they missed either polio or DPT vaccination were higher than for children whose mothers enjoy a lower autonomy. If there were no children that missed DPT vaccination, then the coverage for full immunization would have increased from 27.1 percent to 28.2 percent (27.1 plus 1.1 %) for lower autonomy group and from 31.2 percent to 34.4 percent (31.2 plus 3.2 %) for higher autonomy group.

Moreover there are large cases of children that dropped out for the subsequent doses of DPT and Polio vaccines. Table 4.6 shows the proportion of children who started but failed to complete the three part-series of DPT and polio vaccinations. The drop-out rate between the first and third doses are 28.43 percent for DPT and 32.12 percent for polio. Among 800 children who received the first dose of DPT vaccine, 9.85 percent missed the second dose, and an additional 20.67 percent missed the third dose. Similarly, among 877 children who received the first dose of polio vaccine, 9.53 percent missed the second dose, and an additional 25.09 percent missed the third dose. There are various reasons for this drop-out. The febrile reaction following immunization terrified the common people, and thus discontinuation of any triple antigen is ineluctable. The papule, pustule, and scar formation after BCG vaccination are often regarded as a negative symptom and therefore, the people would not turned up for other vaccinations at the later date. Among the commonly reported severe events following immunization are hypersensitive reactions and neurological syndromes, including vaccine encephalopathy.

Fig. 4.15: ***Percentage of children age 12-23 months who received one vaccination against DPT or Polio but then drop out before receiving the full course of vaccinations, Northeast India, 1998-99.***



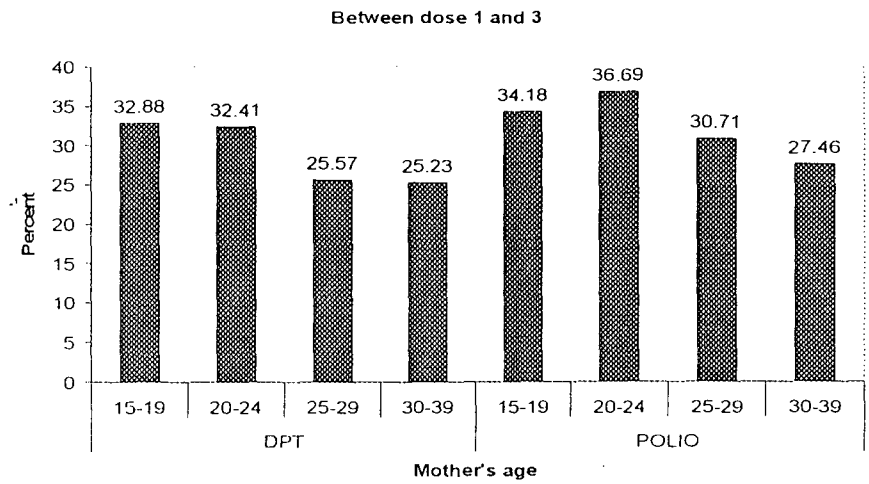
Source. IIPS, 1998-99

Sokhey (1991) reported that in seven incidents following DPT and OPV vaccinations, the children had allergic manifestation within 20 minutes to a few hours. One child had erythematous rash and recovered after two days of anti-allergic treatment. In six other children the reactions were manifested as crying spells, respiratory distress, refusals of feeds or restlessness. In all but two children the reactions were reported after the first dose. The survey conducted all over the country reported that the major symptoms following DPT/OPV1 vaccination are erythematous rash, incessant crying and respiratory distress within 20 minutes, mild fever, restlessness, seizures, frothing, severe spasms, convulsions, injection-site abscesses etc. and after the second dose of DPT/OPV are watery diarrhoea followed by bloody and mucoid diarrhoea within 9 to 10 hours of immunization. In a similar case following DPT2 vaccination there were cases of swelling of both feet and anuria after 5 hours. In the early hours febrile, cardiomegaly (X-ray confirmed) and tachycardia were reported (Sokhey 1991). Although the cases may not be related to immunization, but as it happens just after immunization, this will have an adverse effect on the immunization programme. Seen in this context is that many deaths were also reported. A death due to vaccine

encephalopathy was also reported from Haryana (Sokhey 1991). These are some of the reasons that make people doubtful about the efficacy of the vaccines and, therefore, will make them discontinue the subsequent doses of DPT/OPV vaccines. These doubts/suspicions vary amongst the individual. The illiterate mothers will be more doubtful compared with the literate mothers because they are ignorant of some of the symptoms that are natural after immunization. Therefore, a perusal into the different background characteristics is valued.

Table 4.6 shows that among children who received the first dose of DPT/ polio vaccination, those children from the Christian community are more likely to complete the full series than those from the other communities. The drop-out rate of DPT between dose 1 and 3 for Hindus, Christians and others are 28.06, 26.81 and 32.5 percent, and for polio it is 31.71, 29.3, and 38.67 percent respectively. ST and SC are also less likely to complete the full series compared with others. Educated mothers with secondary or higher qualification are more likely to complete the full series of DPT and polio vaccines for their children as compared with those children whose mothers had a lower qualification. The drop-out rate of DPT between the first and the third dose for those with no education, primary education and secondary/higher education are 37.09, 29.19 and 22.89 percent, and for polio it is 41.67, 31.76 and 26.47 percent respectively. This shows an inverse relationship between mothers' education and drop-out rate of the two triple antigens. Children belonging from a higher economic well-being index are also more likely to complete the full series than those children belonging to the lower economic well-being index. Mothers in the higher age-groups i.e. 25-29 and 30-39, had lower drop-out rate as compared with mothers in the lower age-groups. The drop-out rate of DPT between the first dose and the third dose for mothers in the age-groups 15-19, 20-24, 25-29 and 30-39 are 32.88, 32.41, 25.57 and 25.23 percent, and for polio it is 34.18, 36.69, 30.71 and 27.46 percent respectively.

Fig. 4.16: ***Percentage of children age 12-23 months who received vaccination against DPT1 or Polio1 but then drop out before receiving the third course of vaccinations according to mothers' age, Northeast India, 1998-99.***



Source. IIPS, 1998-99

The drop out rate indicates a positive relationship between mothers' age and drop-out rate of DPT and polio. Girls are slightly less likely to complete the full series than are boys. Children living in the rural areas had a higher drop-out rate than those in the urban areas. The drop-out rate of DPT between the first dose and the third dose for urban and rural areas are 22.17 and 30.64 percent, and for polio it is 24.12 and 34.76 percent respectively. This indicated that people from the rural areas are still ignorant on the significance of immunization of their children. Children whose mothers have higher autonomy are also slightly more likely to complete the full series than are those children whose mothers enjoy a lower autonomy. Mothers who are exposed to mass media are more likely to complete the full series of DPT and polio vaccinations for their children as compared with those children whose mothers are not exposed.

Table 4.6: ***Percentage of children age 12-23 months who received one vaccination against DPT or Polio but then drop out before receiving the full course of vaccinations, Northeast India, 1998-99.***

	Percentage dropping out for DPT			Percentage dropping out for polio		
	Between Dose1 and 2	Between Dose 2and 3	Between Dose 1 and 3	Between Dose1 and 2	Between Dose 2 and 3	Between Dose1 and 3
Religion						
Hindu	10.32	19.86	28.06	10.06	24.15	31.71
Christian	7.53	20.92	26.81	8.33	22.87	29.3
Muslims/others	13.75	21.74	32.5	11.05	31.65	38.67
Ethnicity						
Schedule Caste	10.16	20.87	28.91	10.37	28.1	35.56
Schedule Tribe	8.35	22.59	29	9.48	25.28	32.37
Others	12.35	16.98	27.16	9.2	23.18	29.89
Mother's education						
No education.	15.96	25.28	37.09	15.83	31	41.67
Primary education	5.26	25.38	29.19	5.15	28.05	31.76
Sec.Higher education	8.68	15.56	22.89	8.09	20	26.47
EWBI						
Low	14.29	18.99	30.48	11.3	25	33.47
High	8.28	21.22	27.7	9.03	25.13	31.78
AGE						
15-19	13.70	22.22	32.88	12.66	24.64	34.18
20-24	10.28	24.89	32.41	10.43	29.55	36.69
25-29	8.02	19.09	25.57	7.14	25.38	30.71
30-39	9.81	17.1	25.23	9.84	19.55	27.46
Child sex						
Male	8.14	18.78	25.35	8.96	23.53	30.28
Female	11.56	22.87	31.72	9.95	26.68	33.98
Residence						
Urban	8.6	14.85	22.17	7.02	18.4	24.12
Rural	10.15	22.88	30.64	10.26	27.4	34.76
Autonomy						
Low	10.45	20.03	28.39	9.21	26.25	33
High	6.83	22.97	27.95	10.29	19.87	28
Media exposure						
No	11.91	27.32	35.74	11.61	33.76	41.2
Yes	8.82	17.99	25.22	8.64	21.35	28.22
Total	9.85	20.67	28.43	9.53	25.09	32.12
No. of children	**800**	**721**	**572**	**877**	**793**	**594**

Source. IIPS, 1998-99.

The relationship between the different background characteristics and drop-out rate is t hus ascertained, and that health education, especially with regard to the symptoms after immunization should be explained to the people in order to totally remove their suspicions.

4.3: **Factors affecting full immunization**

This section presents a multivariate analysis based on logistic regression of selected factors affecting full immunization. The analysis focussed on the 1264 children born during the period of 12-23 months before the survey. Table 4.7 present estimation results for the immunization coverage model. This table shows the effects of selected socio-economic and demographic variables on the complete immunization of children. The effects are estimated using logistic regression model.

Hindus and Christians have about the same odds ratio of receiving full immunization, but children belonging to other religion have a considerably lower ratio of receiving full immunization compared with Hindus and Christians. Model 1 presents estimates after controlling only the socio-economic variables (Table 4.7). The unadjusted odds ratio and the ratios in model 1 do not seem to have much difference but it can be seen that the odds ratio increases in the subsequent models. In model 2, after controlling for all the demographic variables, we noted that the likelihood of receiving full immunization for 'Other' religions was highest. Controlling all the independent variables in model 4, however, explains away most of the effects of religion suggesting that the effects of religion stem mainly from the relatively high socio-economic status of families belonging to Christians and other religions. Similarly, children from all the ethnic groups have more or less the same odds ratio for full immunization. But when the independent variables are controlled, the effects of ethnicity largely disappeared. It can be seen that the odds ratio of ethnicity, especially that of Schedule Tribes (ST) reduces from model 1 itself and the significance level started decreasing where it becomes insignificant even at 10 percent level when all the independent variables are controlled.

Mothers' education has a substantial effect on child immunization. The odds ratio of receiving full immunization among children of mothers with primary education are twice more likely to receive full immunization

compared for children whose mothers are illiterate, and four times more likely for children whose mothers had secondary or higher education. Adjusting for the other independent variables slightly reverse the primary and secondary/higher ratios of receiving full immunization (Model 2), and reduces the effects of mothers' education on full immunization in the subsequent model. But seen here is that the effects remains large and statistically significant indicating a substantial direct effect on full immunization. This finding suggests that efforts to improve women's education may contribute directly as well as indirectly to better coverage of child immunization. An important reason for the large direct effect may be that educated mothers are more knowledgeable about preventive health care and make better use of health services.

The effect of husbands' education is consistent with hypothesized relationship. Women whose husbands completed at least primary education are more likely to get their child fully immunized compared with children of illiterate fathers. Partners/husbands with primary education are 1.44 times more likely to get their child fully immunized, and partners with secondary/higher are 3.39 times more likely to get their child fully immunized compared with illiterate fathers. However, when the other confounding variables are controlled, the effects reduce, and this reduces abruptly in model 1 implying that the effects largely stems from the other socio-economic status of the partners. Although the effect reduces when other factors are controlled it is significant in the case of partners with secondary/higher educational qualification.

Economic well being of the household in which the child resides has a strong effect on receiving full immunization. The unadjusted odds ratio of receiving full immunization is twice more likely for children residing in household with a higher economic well being index compared with those in the lower index. This differential is reduce considerably in the

Table 4.7: ***Estimated odds ratios of the logistic regression models for receiving immunization among children age 12-23 months who received full immunization, Northeast India, 1998-99.***

		Unadjusted Odds ratio	Adjusted Odds ratio			
			Model 1	Model 2	Model 3	Model 4
Religion	Hindu†					
	Christian	1.15	1.475*	1.51*	1.87**	1.88**
	Muslims/others	0.46***	.555***	.609**	.585**	0.58**
Ethnicity	Schedule caste†					
	Schedule tribe	1.00	.611**	.640*	0.65	0.63
	Others	0.93	1.28	1.18	1.30	1.30
Mother's education	No education †					
	Primary	3.23***	2.44***	2.42***	2.21***	2.1***
	Sec./higher	5.05***	3.12***	2.57***	2.19***	2.06***
Partner's education	No education†					
	Primary	2.44***	1.64**	1.55*	1.45	1.45
	Sec./higher	4.39***	1.89***	1.65**	1.75**	1.66*
Economic well-being index	Low†					
	High	2.28***	1.59***	1.41**	1.28	1.18
Birth order number	1†					
	2 to 3	0.7**		.647***	.716*	0.69*
	4 to 5	0.41***		.435***	.583**	0.57**
Mother's age	15-19†					
	20-24	1.00		0.95	0.96	0.98
	25-29	1.24		1.24	1.48	1.47
	30-49	1.01		1.49	1.64	1.63
Child's sex	Male†					
	Female	0.92		0.89	0.79	0.79
Residence	Urban†					
	Rural	0.33***		.520***	.580***	0.61***
Discussed health awareness	No†					
	Yes	1.42**			1.63**	1.59**
Media exposure	No†					
	Yes	3.42***				1.32
Women's autonomy	Low†					
	High	1.22				1.31
- 2log likelihood			1343.72	1310.347	954.286	950.724

† =reference category in the underlying logistic regression

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$

Unadjusted odds ratio means zero-order estimates, Model 1 excludes control of demographic and other variables from the logistic regression, Model 2 excludes control of other variables but includes socio-demographic variables, Model 3 includes socio-demographic and health variables, and Model 4 includes control of all the confounding variables in the logistic regression.

subsequent model s and the effects become statistically insignificant once controlled for the variable *'discussed health awareness'* in model 3, suggesting that economic well being index has a very little effect on child immunization in the North eastern states of the country.

Because competition for child care increases as the number of children increases within a family, one might expect that children of lower birth order will be paid more attention and more concern and thus would enjoy better health care as compared to children in higher birth order. The analysis confirms this expectation. Children of birth order 2-3 are 30 percent less likely to receive full immunization, and children with birth order of 4 and above are 60 percent less likely to receive full immunization compared with children in the first birth order. Adjusting for the other variables in model 1, 2 and 3 makes little difference to the effects of birth order on child immunization especially for 2-3 birth orders, indicating that the effects operate independently of the effects of other predictor variables. However, for children in the birth order of 4 and above, the odds of receiving full immunization increases slightly from 0.41 to 0.57 when other independent variables are controlled.

The estimated odds ratio of children fully immunized does not vary much by mothers' age and is also statistically insignificant even after controlling for the other predictor variables. Similarly the odds of receiving full immunization are interestingly the same for male and female with only a slight difference. But this is statistically insignificant, although the proportion fully immunized is just 1 percentage points higher for males.

The unadjusted odds ratio of children fully immunized is considerably lower in rural areas than in urban areas. However, once the independent variables are controlled the odds ratio in the rural areas started increasing. The odds ratio became greatest when controlled for all the independent variables as can be seen in model 4 of table 4.6. It can be seen that the ratio nearly doubles from 0.33 to 0.61 indicating that

children from the rural areas are still 39 percent less likely to receive full immunization compared with children in the urban areas. The finding suggests that the effects of residence are mostly indirect through the other independent variables. The ratio that is higher in the urban areas is very much consistent with the hypothesized relationship because mothers in the urban areas are more educated, have better health facilities, and also have more health awareness due to greater exposure to mass media.

Children of mothers who discussed health awareness are 42 percent more likely to receive full immunization compared with children whose mothers do not discussed. When the other independent variables are controlled the ratio increases slightly to 1.62 in model 3 and to 1.59 in model 4 implying that the effect of this variable operate independently of other factors because the unadjusted and adjusted ratios slightly differ. The probable reason for the higher ratio is that mothers who discussed health awareness may be more educated, may have more interaction with health professionals and the desire to learn more, and may have easy access to health services.

Media exposure has confounding effects on child immunization. Children of mothers who are exposed to the electronic mass media are 2.42 times more likely to receive full immunization compared with children whose mothers are not exposed. However, when controlled for other independent variables, it largely eliminates the effects of mothers' media exposure and becomes statistically insignificant. This suggests that mothers' media exposure has no independent effect on child immunization.

Mothers' with higher autonomy are more likely to get their child fully immunized but the results are statistically insignificant in both the un-adjusted and adjusted analysis.

The findings for rural areas are somewhat similar to those for the whole region. Although the unadjusted ratios differ the adjusted ratios tend to be similar with only a slight difference. In rural areas the adjusted odds ratio of full immunization is higher for mothers with secondary/higher educational level than for mothers with primary education (the reverse is true for the whole region). As for husbands educational level the difference of the odds of full immunization between primary and secondary/higher widened in the rural areas, and also becomes statistically less significant (table 4.8). This is not the case for the whole region, and it is also more significant.

The adjusted odds ratio of children living in a household with high economic well-being index increases in the rural areas and is statistically significant at 10 percent level of significance (for the region as a whole it was lower and was not statistically significant). The findings authenticate that rural children living in household with higher economic well-being index are more likely to get fully immunized than are those in the lower economic well-being index. Although the effects considerably reduce when controlled for the other 11 independent variables, nevertheless, the effects of economic well-being index on child immunization in the rural areas operate significantly directly and indirectly (through other predictor variables).

In rural areas the adjusted full immunization ratio is higher for the first-born children than for the second-or third-born children but the difference is statistically insignificant. For the region as a whole it is also higher and the difference is statistically significant. Interestingly, the adjusted effect of child sex that is statistically insignificant for the region as a whole becomes significant in the rural areas. The boy child is 28 percent more likely to get fully immunized than is the girl child. The findings although do not show a wide difference. It still indicates a widespread discrimination, especially in the rural areas where illiteracy is rampant. Rural children whose mothers are exposed to mass media

are 54 percent more likely to get fully immunized than of those children whose mothers are not exposed. For the region as whole, this was statistically insignificant but for the rural areas it becomes statistically significant. Although the adjusted ratio nearly reduce by half from the unadjusted ratio the effect is still large, suggesting that exposure to mass media has a predictable role for full immunization of children in the future.

Table 4.8: ***Estimated odds ratios of the logistic regression models for receiving immunization among children age 12-23 months who received full immunization, rural Northeast, India, 1998-99.***

	Unadjusted Odd s ratio	Adjusted Odd s ratio
Religion		
Hindu†		
Christian	0.89**	1.53
Muslims/others	0.51***	0.53**
Ethnicity		
Schedule caste†		
Schedule tribe	0.73	0.6
Others	0.95	1.66*
Mother's education		
No education †		
Primary	2.82***	1.91**
Sec./higher	4.37***	2.00**
Partner's education		
No education†		
Primary	1.85**	1.17
Sec./higher	3.67***	1.6*
Economic well-being index		
Low†		
High	2.28***	1.43*
Birth order number		
1†		
2 to 3	0.73*	0.81
4 to 5	0.46***	0.76
Mother's age		
15-19†		
20-24	0.99	1.05
25-29	1.19	1.55
30-49	0.84	1.32
Child's sex		
Male†		
Female	0.80	0.72*
Discussed health awareness		
No†		
Yes	1.64**	1.57*
Media exposure		
No†		
Yes	3.22***	1.54*
Women's autonomy		
Low†		
High	1.22	1.46
-2log likelihood		657.391

† = Reference category in the underlying logistic regression

*** p ≤ 0.01, ** p≤ 0.05, * p≤ 0.10

The estimated constraint is 0.82 for receiving full immunization

Chapter 5

Conclusion.

Despite considerable gains in the coverage of immunization since 1992-93, the immunization programme in the country is still far away from realizing its dreams of 100 percent coverage. The case of the Northeast is especially appalling with regard to child immunization since only 27.8 percent of children are fully immunized. Of all the states, the outcome of immunization programme is worse for Nagaland and Meghalaya with coverage of only 12 percent, and the maximum is for Mizoram with coverage of 60 percent. Although the percentage for Mizoram is high, still the weakness of the programme can be felt in the region. The immunization coverage also differs for all the four vaccines. BCG has the highest coverage of 61.6 percent and measles the lowest of only 36 percent. The late inception of measles in the immunization programme can be a reason for its poor coverage.

Many studies revealed homogeneity in the findings of the proportion of children immunized according to various socio-economic background characteristics. Children from Muslim households revealed a lower coverage compared to others and also children whose mothers are not educated represent a lower coverage. The findings are similar for the Northeastern states of India.

There are a large number of children dropping out for the subsequent doses of DPT and polio antigens in the region. This means that incomplete immunization is as good as not being immunized. Impregnated with certain misconceptions such as making them infertile, and also the subsequent complications after vaccinations indubitably are important reasons for the high drop-out. The root causes for this exist due to mass illiteracy and poor exposures to mass media. The drop-out

rates between DPT 1 and 3 for uneducated mothers and mothers educated up to secondary or higher are 37 and 22.8 percent respectively and 41.6 and 26.5 between polio 1 and 3. Similarly drop-out rates between DPT 1 and 3 for mothers not exposed to mass media and those exposed are 35.7 and 25.3 percent, and 41.2 and 28.0 percent between polio 1 and 3 respectively. The picture indicates wide differences in both the variables. Therefore based on the findings, policymakers must confer priority in educating the population about health through mass media and campaigns.

The multivariate analyses help us decipher the confounding factors affecting child immunization and provide a picture as to what variable(s) plays the important role in child immunization. Utilization of immunization services differs considerably according to the educational attainment of the mothers. Since in the logit model we controlled for other socio-demographic variables, education does not operate independently of other factors. But the findings place the major importance on mothers' education because the odds of receiving full immunization is double for higher educational level compared with uneducated mothers even after controlling for all the 12 variables included in the analysis. Another important finding for the Northeast region is that mothers who discussed about health related issues are 60 times more likely to received full immunization for their children compared with mothers' who do not discuss.

The picture in the rural areas of the region is somehow different. Apart from mothers' education that played a prominent role for child immunization, the adjusted odds ratios also gives importance on media exposure, ethnicity and economic well being of the households. This means the effect of media exposure, ethnicity and economic well being is large compared with other variables. Mothers who are exposed to mass media are 54 times more likely to have their child immunized against all the four vaccines compared with mothers who are not exposed. And,

children who are not SC/ST are 66 times more likely to received full immunization compared with SC, and 100 times more likely compared with ST. The reasons for SC/ST children not being immunized are because they belong to poor families, uneducated parents and conservative societies.

It is thus clear that there exist a wide inequity in the health service utilization between urban and rural areas and between the various socio-demographic background characteristics of the population. When taking region as a whole, the effect of mother's education and health awareness is greatest on child immunization, and when analysed separately for rural areas, the effect on child immunization is greatest of mother's education, media exposure, ethnicity and economic well being. The findings authenticate the deplorable situation in the rural areas of the region. Policy makers must assess the ground situation in the region and frame policies separately for the rural areas also. Unavailability of mass media has closeted the rural folks from the outside world, and also the lack of educational facilities, are some of the root problems for the failure of the immunization programme. Health intervention is therefore not necessarily by setting up health centres and providing free drugs, but also by spreading awareness on the importance of immunization and others through mass media and door-to-door campaigns. In order to fructify the programme, educating the population must be given priority since it is one of the most important variables that affect child immunization.

The large cases of dropping out for the subsequent doses of those triple antigens are because of misconceptions about the vaccines. The febrile reactions and the scars, rash, papule and pustule developed following vaccinations are often regarded as negative symptoms by the locales. And these misconceptions are greatest for uneducated mothers and mothers who are not aware of the effects of immunization. Seen from the analysis, the government must intensify the immunization programme by

extending the previous approach, so-called Information, Education and Communication (IEC) of the Family Planning Programme into the immunization programme. Door-to-door campaigns on immunization planned with great sagacity would gain impetus for the programme especially in the rural areas. Any programme on immunization must thus consider the social conditions of the population. Medical factors such as the efficacy of the vaccines, cold-chain storage, availability of health personal and drugs are also equally important for the successful implementation of the programme.

The Expanded Programme on Immunization (EPI) that changed to Universal Immunization Programme (UIP) in the year 1985 has more or less remained stagnant since its introduction. Apart from the UIP, there are various national programmes such as the Integrated Child Development Service (ICDS), the National Health Policy (NHP) and the National Population Policy (NPP) that include child immunization as its component. But because of its tardy implementation of projects and limited success in getting across messages to the public on the importance of immunization, the programme seems to have eventually petered out.

What seems to be highly appreciated is the involvement of the anganwadi workers in the ICDS. The anganwadi workers are selected from each village and are trained in catering the needs of the children. The nutritional component thus got a boost since the workers selected are confined within their own village. This concept of workers selected from their own village/community can be also seen in the medical arena. The Community Health Workers (CHW), the Community Health Volunteers (CHV) and later the Village Health Guides (VHG) were recruited to involve community in providing basic health needs. However, this was strongly opposed by the Indian Medical Council because the volunteers might act like a doctor and can administered antibiotics, which is not recommended. The VHG continued for sometime but gradually

diminished. Today we again have the Accredited Social Health Activist (ASHA) in the National Rural Health Mission, which is developed similarly on the lines of the anganwadi workers. Immunization programme should also employ a community worker that visits door-to-door at the village level and discuss the importance of immunization and act as a representative between the primary health centres and the common people. By including social health activists in the immunization programme perhaps will gain impetus.

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Appendix 1: Number of children age 12-23 months who received specific immunization by selected background characteristics, Northeast India, 1998-99.

	BCG	POLIO 0	DPT 3	POLIO 3	MEASLES	Full immunization	None vaccinatio
Religion							
Hindu	300	77	222	223	171	134	10
Christian	331	68	242	263	209	170	13
Muslims/others	147	41	108	108	75	48	10
Ethnicity							
Scheduled caste	131	35	91	87	67	51	4
Scheduled tribe	422	89	305	328	257	196	20
Others	225	62	176	179	131	105	9
Educational attainment							
No education	195	61	133	137	83	55	19
Primary	206	43	147	158	122	96	7
Secondary &higher	377	82	292	299	250	201	7
Partner's educational attainm.							
No education	121	40	82	86	54	35	13
Primary	143	37	92	98	76	60	7
Secondary &higher	514	109	398	410	325	257	124
Economic well-being index							
Low	203	45	145	159	96	74	164
High	575	141	427	435	359	278	177
Birth order number							
1	250	70	205	207	163	131	71
2-3	333	74	230	230	196	147	130
4 and above	195	42	137	157	96	74	140
Mother's age							
15-19	65	13	49	52	43	31	36
20-24	246	59	169	173	134	101	90
25-29	254	54	194	194	159	122	103
30-49	213	60	160	175	119	98	112
Sex of child							
Male	416	101	319	323	247	194	191
Female	362	85	253	271	208	158	150

contd

Appendix 1:contd. Number of children age 12-23 months who received specific immunization by selected background characteristics, Northeast India, 1998-99.

	BCG	POLIO 0	DPT-3	POLIO 3	MEASLES	Full immunization	None vaccination
Place of residence							
Urban	220	51	172	172	157	125	31
Rural	558	135	400	422	298	227	310
Tetanus injections bef. birth							
No	105	30	61	74	43	22	237
Yes	673	156	511	520	412	330	104
Place of delivery							
Homes	455	111	327	343	231	174	309
Hospitals	323	75	245	251	224	178	32
Antenatal visits for pregnancy							
No antenatal visits	116	33	68	88	51	28	226
Once or twice	189	47	125	129	99	66	69
3 times or more	473	106	379	377	305	258	46
Discussed health awareness							
No	129	38	96	101	77	60	60
Yes	475	113	360	362	278	227	87
Women's autonomy							
Low	621	150	458	469	352	275	277
High	157	36	114	125	103	77	64
Media exposure							
No	227	49	149	154	102	68	194
Yes	551	137	423	440	353	284	147
Total	**778**	**186**	**572**	**594**	**455**	**352**	**341**

Appendix 2: Number of children age 12-23 months who received one vaccination against DPT or Polio but then drop out before receiving the full course of vaccinations, Northeast India, 1998-99.

Independent variables	DPT			Polio		
	Missed between 1 and 2	Missed between 2 and 3	Missed between 1 and 3	Missed between 1 and 2	Missed between 2 and 3	Missed between 1 and 3
Ethnicity						
SC	13	24	37	14	34	48
ST	36	89	125	46	111	157
Others	30	36	66	24	54	78
Residence						
Urban	19	30	49	16	39	55
Rural	59	119	178	67	160	227
Child's sex						
Male	35	74	109	42	100	142
Female	43	75	118	41	99	140
Religion						
Hindu	32	55	87	33	71	104
Christian	25	64	89	31	78	109
Muslims/others	22	30	52	20	50	70
EWBI						
Low	30	34	64	27	53	80
High	49	115	164	58	146	204
Educational attainment						
No education.	34	45	79	38	62	100
Primary	11	50	61	12	62	74
Sec.hig	33	54	87	33	75	108
AGE						
15-19	10	14	24	10	17	27
20-24	26	56	82	29	73	102
25-29	21	46	67	20	66	86
30-39	21	33	54	24	43	67
Autonomy						
Low	67	115	182	65	168	233
High	11	34	45	18	31	49
Media						
No	28	56	84	31	79	110
Yes	50	93	143	52	120	172
Total	78	149	227	83	199	282

Appendix 3: Association between dependent variable (Full Immunization) and independent variables.

Pearson Chi-Square test			
Independent Variables	Value	Degrees of freedom	Sig. (2-sided)
Religion	27.088	2	.000
Ethnicity	0.051	2	0.97
Educational attainment	99.4657	2	.000
Partner's educational attainment.	67.4171	2	.000
Economic well-being index	32.151	1	.000
Birth order number	27.844	2	.000
Mother's age	2.37304	3	0.50
Sex of child	0.4203	1	0.52
Place of residence	60.8192	1	.000
Tetanus injections before. birth	143.688	1	.000
Place of delivery	96.597	1	.000
Antenatal visits for pregnancy	192.843	2	.000
Discussed health awareness	4.0897	1	0.04
Women's autonomy	1.5996	1	0.21
Media exposure	71.3607	1	.000

Appendix 4: Number of children age 12-23 months whose mother had some exposure to mass media and educational attainment according to background characteristics. Northeast India. 1997-98.

Background characteristics		Had media exposure		Educational attainment					
		No.	%	No edu.	%	Primary	%	Sec.& hig.	%
Religion	Hindu	279	62.3	177	39.5	96	21.4	175	39.1
	Christian	358	69.2	116	22.4	155	30.0	246	47.6
	Muslims/others	149	49.8	164	54.8	63	21.2	72	24.1
Ethnicity	Scheduled caste	73	64.0	49	43.0	28	24.6	37	32.5
	Scheduled tribe	451	63.9	215	30.5	192	27.2	299	42.4
	Others	221	59.2	168	45.0	73	19.6	132	35.4
Educational attainment	No education	153	33.5						
	Primary	197	62.7						
	Secondary &higher	436	88.4						
Economic well-being index	Low	158	37.7	219	52.3	109	26.0	91	21.7
	high	628	74.3	238	28.2	205	24.3	402	47.6
Mother's age	15-19	65	55.6	49	41.9	32	27.4	36	30.8
	20-24	241	63.1	128	33.5	91	23.8	163	42.7
	25-29	257	64.7	121	30.5	102	25.7	174	43.8
	30-49	223	60.6	159	43.2	89	24.2	120	32.6
Place of residence	Urban	234	87.6	49	18.4	48	18.0	170	63.7
	Rural	552	55.4	408	40.9	266	26.7	323	32.4
Tetanus injections before birth	Received no inject.	164	41.3	233	58.7	92	23.2	72	18.1
	Yes received inject.	622	71.7	224	25.8	222	25.6	421	48.6
Place of delivery	Homes	471	53.3	405	45.9	230	26.0	248	28.1
	Hospitals	315	82.7	52	13.6	84	22.0	245	64.3
Antenatal visits for pregnancy	No antenatal visits	155	38.4	240	59.4	95	23.5	69	17.1
	Once or twice	191	62.2	118	38.4	71	23.1	118	38.4
	3 times or more	440	79.6	99	17.9	148	26.8	306	55.3
Discussed health awareness	No	135	64.6	64	30.6	45	21.5	100	47.8
	Yes	435	69.8	181	29.1	170	27.3	272	43.7
Women's autonomy	Low	622	61.2	366	36.0	253	24.9	398	39.1
	High	164	66.4	91	36.8	61	24.7	95	38.5
Media exposure	No			304	63.6	117	24.5	57	11.9
	Yes			153	19.5	197	25.1	436	55.5

Appendix 5: Places where most vaccination are given according to background characteristics (in percent)

Background characteristics		Govt./municipal hospital	CHC/rural hospital/PHC	Sub-center	Others
Religion	Hindu	25.8	40.1	16.9	17.2
	Christian	18.0	19.8	36.6	25.6
	Muslims/others	27.7	33.0	20.9	18.3
Ethnicity	Scheduled caste	22.9	50.0	15.0	12.1
	Scheduled tribe	20.9	22.5	32.1	24.5
	None of them	26.8	33.8	20.4	19.0
Educational attainment	No education	17.3	40.0	20.8	22.0
	Primary	15.0	34.2	30.0	20.8
	Sec.&higher	31.0	21.6	26.9	20.4
Partner's educational attainment.	No education	14.5	38.2	20.0	27.3
	Primary	18.3	30.2	32.5	18.9
	Sec. &higher	26.7	27.7	25.8	19.8
Economic well-being index	Low	20.2	39.3	26.3	14.2
	High	23.9	26.7	25.9	23.5
Birth order number	1	26.7	31.6	22.6	19.1
	2-3	23.5	30.1	28.8	17.6
	4and above	17.7	28.2	25.8	28.2
Mother's age	15-19	32.5	28.8	21.3	17.5
	20-24	22.1	35.8	23.9	18.2
	25-29	24.6	26.3	28.7	20.5
	30-49	19.0	28.5	26.9	25.7
Sex of child	Male	25.2	28.1	27.9	18.8
	Female	20.4	32.3	23.9	23.4
Type of place of residence	Urban	37.3	13.3	32.2	17.2
	Rural	18.0	35.8	23.9	22.3
Tetanus injections bef. birth	No	10.0	34.4	18.8	36.9
	Yes.	25.7	29.2	27.6	17.6
Place of delivery	Homes	19.8	35.1	22.8	22.4
	Hospitals	28.2	21.8	31.4	18.6
Discussed health awareness	No	29.5	21.5	27.5	21.5
	Yes	22.5	34.8	24.1	18.6
Antenatal visits for pregnancy	No antenatal visits	13.1	33.5	20.5	33.0
	Once or twice	19.9	35.6	23.7	20.8
	3 times or more	27.9	26.3	29.1	16.8
Women's autonomy	Low	23.2	30.6	24.7	21.4
	High	21.9	27.9	31.1	19.1
Media exposure	No	15.8	39.4	24.7	20.1
	Yes	26.1	25.9	26.6	21.4