



Capturing Gender Disparity in Immunization across Districts of West Bengal, India

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Abstract

The paper investigates the irregular trends in immunization in state of West Bengal in India by taking into account the gender disparity as one of the main influencing factors behind such irregular immunization. The source of the data is District Level Health Survey (DLHS-3) data for West Bengal collected for the reproductive and child health project for the year 2012-2013. The size of the sample is of 7,988 children across various districts of West Bengal. They answered various questions from a questionnaire which was used to assess the immunization disparity in West Bengal which occurs due to gender disparity. We use a binary logistic model of regression to assess the inequality in the process of immunization across the districts of West Bengal. The dependent variable in the model has two categories, one is immunized and other is not-immunized, and parental education, sex of the last surviving child, sex of the second last surviving child, caste and category of households, religion and the household's economic status are taken as the independent variable in the analysis. Only about 59.69 percent of the children have been vaccinated. A large proportion of mothers (47 percent) is illiterate or just has a primary education reflecting the level of ignorance about child health and immunization. Odds ratios obtained from logit regression show that girl children whose mothers were illiterate or had just a primary level education were less likely to be immunized properly compared to the ones

who had at least middle school education (odds ratio is 1.985) or a high school education (odds ratio is 2.697). Those whose last-born child was a girl was less likely to be immunized (odds ratio is 0.818) and those who stayed in urban areas were more likely to get vaccinated (odds ratio is 1.261). Thus, quite a few factors contribute to the sex bias in immunization.

Key Words: Gender disparity, health, immunization, west bengal, india, logit regression.

1. Introduction

Immunization is one of the most cost-effective public health interventions. It is one of the responsible factors for reducing the infant mortality rate, i.e., the rate of death of the children who are under 5 years of age (Barata and Pereira, 2012). Immunization programme is common across all counties in the world, based upon which vaccines are delivered to prevent different diseases. A major section of the beneficiaries of vaccination programmes are especially infants and pregnant women. Even though there are many types of vaccines for different kinds of diseases, however, the vaccines for preventing diphtheria, pertussis, tetanus, poliomyelitis, measles, Hepatitis B are essential immunization programmes across the countries of the world.

In spite of its cost effectiveness, the benefits of vaccination programmes are not distributed equally across regions and sectors of a nation. It is frequently observed that the children in rural areas fail to reap the benefits of all vaccination programmes even if they are at maximum risk of getting affected by vaccine-prevented diseases (Singh, 2013). The irregularity of immunization happens due to their reluctance and slow acceptance or opposition to the vaccination programmes. According to the empirical evidence, only 60 percent of the children in India receive complete vaccination, and in rural areas it is less than 50 percent. Proper implementation of the vaccination programmes which will enable to reap its benefits by all beneficiaries is indeed an exigent task. Another fact can be noticed in the case of immunization across the world and India as well that there exists significant gender discrimination among the children even in the immunization programmes. This widespread gender discrimination in immunization plays crucial role behind lower immunization in children, especially in the rural areas, where many people still follow several age-old customs and still prefer sons to daughters, thereby neglecting healthcare and the general well-being of the female child (Desai and Alva, 1998; Chowdhury et al., 2003; Joseph, 2012).

A considerable number of studies have already been done on the disparity in immunization programmes and also on the gender discrimination in immunization across different developed and developing countries (Bhuiya and Stretfield, 1991; Baker et al., 2011), and especially in India. Even though all of these studies do not identically hold gender disparity as the responsible factor behind the inequality of immunization, however, their conclusion is quite similar. Each of these studies concludes that the gender disparity is an indirect cause behind the disparity in immunization. The finding of a study done on the immunization across the states of India (Joseph, 2012) reveals that there exists a considerable disparity in the immunization status across the rich and poor states, i.e., the states having better performance and poor performance. There exists inequality in immunization both in the better performing states and poorly performing states, but the degree of inequality in the poorly performing states especially in the states which have showed poor performance always

(BIMARU) is greater than that of better performing states¹.

This inequality in immunization can be explained more critically if we classify the population by gender, parental education, religion, caste, and so forth (Song and Bhugard, 2011). Overall girls performed worse than boys, higher birth order infants were found to have lower vaccination coverage. Parental education and women empowerment in households were found to be positively correlated to children's vaccination status (Matthew, 2012). In another study done by (Barman and De, 2017), three rounds of the NFHS conducted in 1992-1993, 1998-1999 and 2008-2006 were analyzed. The analysis showed considerable variation in child immunization coverage across six geographical regions in India. Even though there was a decline in urban-rural and gender differences over time, children, especially girls living in rural areas remained disadvantaged (Singh, 2013). Not only in India, studies covered in other South-East Asian countries have also shown the same thing. One paper examines inequalities in the use of and access to vaccination services in Bangladesh. The analysis showed that female children have lower immunization coverage than male children. Mother's education was positively related to the child's immunization status (Chowdhury et al., 2003). The trend is also seen in the Sub Saharan countries where various surveys have been carried out. One such report shows that both the Sub Saharan countries of Morocco and Tunisia prefer sons over daughters. According to Demographic and Health Survey (DHS) data, girl children are subjected to considerable disadvantage in terms of healthcare both in infancy and childhood. This leads to an inequity in the healthcare of male and female children; the treatment for diseases as well as immunization is mostly in favour of boys. Even though the difference is not huge, it shows that there is indeed a gender disparity when it comes to healthcare of children, especially vaccination coverage (Obermeyer et al., 1997).

All these and many other studies show that the developing countries show a lot of gender inequity when it comes to healthcare of children. Various factors like economic status, parental education, occupation, etc. indirectly aggravate gender bias, if not directly. Even though the gender gap is not too glaring in many countries, in some countries, like India, the gap is quite large. The gap is even more egregiously seen in those states which have been performing poorly after independence compared to the better performing states. One of the poorly performing states of India is West Bengal and in the past this state, especially the districts have shown some level of inequity in terms of healthcare of children, gender wise. This paper shows the trends of gender disparity in terms of health care in the districts of West Bengal and the factors affecting it.

Various demographic, socio-economic and spatial variables were used in the

¹BIMARU is an acronym formed from the first letters of the names of the India states of Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh. It was coined by Ashish Bose in the mid-1980s. BIMARU has a resemblance to a Hindi word "Bimar" which means sick.

study so as to understand the reasons behind the gender disparity in immunization in West Bengal. The main variables used were sex of the last surviving child, birth order of the child, mother's age, and the sex of the household head, caste/religion of the child's family and parental education. The rest of the paper is organized as follows. Next section contains the data source and methodological issues followed by the documentation of empirical findings. Final section discusses the empirical results and concludes the paper

2. Data and Methodology

The source of the data is the District Level Health Survey (DLHS-3) data collected for the reproductive and child health project for the year 2012-2013. The DLHS is a household survey at the district level and in DLHS-3, the survey covered 611 districts in India. The total number of households representing a district varies from 1000 to 1500 households. The DLHS-3 is designed to provide information on family planning, maternal and child health, reproductive health of ever married women and adolescent girls, utilization of maternal and child healthcare services at the district level for India. In addition, DLHS-3 also provides information on new-born care, post-natal care within 48 hours, role of ASHA in enhancing the reproductive and child health care and coverage of Janani Suraksha Yojana (JSY). An important component of DLHS-3 is the integration of Facility Survey of health institution (Sub centre, Primary Health Centre, Community Health Centre and District Hospital) accessible to the sampled villages.

The focus of DLHS-3 is to provide health care and utilization indicators at the district level for the enhancement of the activities under National Rural Health Mission (NRHM). In this study, a total of 7,988 women were interviewed on the basis of whose answers we have established relationships between the various variables and shown that gender disparity is indeed a major reason for the disproportion in vaccination status among male and female children. Binary logistic regression has been used to determine the extent to which these factors affect the immunization of children by calculation of the ordered ratios, thereby giving a much clearer picture.

Predictor Variables

Various socio-economic and demographic variables were used to assess the vaccination scenario in the districts of West Bengal. The major variables used were sex of the last surviving child, parental education, religion, caste and category of the household and whether the household belongs to the urban or rural sector.

Parental education is considered because education is believed to play a huge role in the attainment of proper vaccination. Generally, the higher the level of parental education, greater is the importance of child immunization, irrespective of the child's sex.

Religion, caste and category of households has also been considered as proxy variables. Also, the urban/rural status of the household has been considered so as to assess the availability of immunization facility in different sectors.

Analytical Model

Bivariate and multivariate analyses have been performed to attain the study objective.

The χ^2 test was used to identify the differences in proportion. To examine the influence of gender disparity, and other variables on immunization decision we run the generalized logistic regression. The generalized logistic regression can be written in the following form:

$$\text{logit } x = \alpha_0 + \sum_{i=1}^k \alpha_i Y_i \quad (1)$$

Where, x is the probability that an individual to be immunized; $\text{logit } x = \ln \left[\frac{x}{1-x} \right]$ and $\{Y_i\}$ ($i = 1, 2, \dots, k$) are the earlier mentioned predictor variables included in the logistic regression; α_0 is the intercept and α_i s are the regression coefficients.

3. Empirical Findings

3.1 Sample Characteristics of Data

The sample characteristics of the study are as given in the following table. About 47 percent of the women were found to be illiterate, 40 percent of the children had never been vaccinated at all. The sample characteristics are shown in Table 1.

Bivariate Analysis

The following table shows the sex various sex differences of last surviving children, second-last surviving children, education level of mothers, economic status caste, category and religion of households. A large proportion of mothers (41 percent) had an education status between primary and secondary level, which means they had enough knowledge and the sense to get their children vaccinated properly.

Table 2 reports the percentage distribution of the population from different groups defined by sector, gender, mother's education, caste and religion across the immunized and not-immunized categories. According to the computed percentage figures reported in this table, it is clear that males are more likely to be immunized; children from rural areas are less likely to be immunized; children of illiterate mothers are less likely to be immunized; children from backward social groups are less likely to be immunized; and children from Hindu household are more likely to be immunized.

Table 1: Sample Characteristics

Way of Categorization	Percentage of sample population
Immunization of the child:	
Immunized children	59.69
Not-immunized children	40.31
Gender:	
Male	51.42
Female	48.58
Mother's education:	
Illiterate or literate upto primary level	47.80
Above primary and literate upto middle	25.69
Above middle and upto higher secondary level	17.29
Above Higher Secondary level of education	9.22
Caste:	
Scheduled Castes (SCs)	21.54
Scheduled Tribes (STs)	12.99
Other Backward Castes (OBCs)	38.53
Other castes (OCs)	26.94
Religion:	
Hindu	71.46
Muslim	26.90
Others	1.64
Sector:	
Rural	52.58
Urban	47.42

Source: District Level Health Survey, 2012-13 (DLHS-3)

3.2 Multivariate Analysis

In the earlier sections we have already mentioned that in this study we use the logistic model of regression. The Table 3 reports of the results of this logistic regression. In this regression analysis the independent dummy variables are gender of the child and sector. We have taken male child and rural sector as the reference categories of these independent variables. Mother's education, social groups and religion are taken as the independent categorical variable in the regression. In case of mother's education 'Illiterate or literate upto primary level' is taken as the reference category. In case of social group Scheduled castes is as the reference category, and in case of religion Hindu is taken as the reference category. The odds ratios obtained from the generalized logistic regression reveal that there exists a gender disparity in the immunization status. From the prima facie evidence is the clear that there is a disparity in the odds ratios between the last born male child and the last born female child in the process of immunization. The last born male child is more likely to be immunized than the last born female child. According to the result of the estimation of regression equation, the probability of immunization for a male child is greater than the probability of immunization of a female child. It is also revealed from the results of regression that the children from urban areas are significantly more likely to be immunized than the children from the rural areas.

Table 2: Bivariate Analysis

	Condition of Immunization	
	Immunized	Non-immunized
Gender:		
Male	73.18	26.82
Female	47.31	52.69
Mother's education:		
Illiterate or literate upto primary level	41.13	58.87
Above primary and literate upto middle	56.22	43.78
Above middle and upto higher secodnary level	71.43	28.53
Above Higher Secondary level of education	94.19	5.81
Caste:		
Scheduled Castes (SCs)	67.85	32.15
Scheduled Tribes (STs)	61.89	38.11
Other Backward Castes (OBCs)	79.14	20.86
Other castes (OCs)	89.32	11.68
Religion:		
Hindu	90.11	9.89
Muslim	79.98	20.02
Others	82.23	17.77
Sector:		
Rural	91.38	8.62
Urban	52.77	47.23

Source: District Level Health Survey, 2012-13 (DLHS-3)

Table 3: Results of Logistic Regression

	Odds Ratio	p-value
Sex:		
Male	Ref.	Ref.
Female	0.818**	0.0217
Sector:		
Rural	Ref.	Ref.
Urban	1.261*	0.0994
Mother's education:		
Illiterate or literate upto primary level	Ref.	Ref.
Above primary and literate upto middle	1.985***	0.0002
Above middle and upto higher secodnary level	2.697*	0.0711
Above Higher Secondary level of education	2.615**	0.0214
Caste:		
Scheduled Castes (SCs)	Ref.	Ref.
Scheduled Tribes (STs)	0.718*	0.0502
Other Backward Castes (OBCs)	1.076**	0.0369
Other castes (OCs)	1.253**	0.0218
Religion:		
Hindu	Ref.	Ref.
Muslim	0.404**	0.0071
Others	0.987***	0.0022

Note: *, ** and *** imply significant at 10%, 5% and 1% level respectively

Source: District Level Health Survey, 2012-13 (DLHS-3)

It can also be observed from the estimation results that mother's education plays important role behind the immunization of a child. Children of mothers having formal education upto middle level, higher secondary level and higher level are more likely to be immunized compared to the children of illiterate or low educated mothers. In other words, illiterate mothers are less likely to be aware of their child's immunization compared to the mothers having primary education (odds ratio is 1.985) or higher secondary education (odds ratio is 2.697), and higher level of education (odds ratio is 2.615).

Classification of the sample by caste also enables us to explain the inequality in the process of immunization. It is observed from the analysis that the children from the backward social groups are less likely to be immunized than the children from the advantaged social groups. The odds ratios of immunization of the children from ST group reveals that in the context of immunization STs are lagged behind than the children from the SC group. Moreover, it is also observe that the children from Hindu households are more likely to be immunized than the children from Muslims and other religious groups.

4. Discussion and Conclusion

Using data from the District Level Health Survey (DLHS-3) data carried out West Bengal, this study shows that sex differences that are seen while immunizing children. Even though past studies in this field have shown the significance of mother's education and that of rural/urban sector, this study also shows the effect of caste, category and religion of the household on the immunization status of a child, especially if it is a girl child. In this study, girl children have been found to be neglected in terms of health care if their mothers are not well educated, if they stay in rural areas, if they don't belong to Hindu households or if they belong to Scheduled Tribes or Scheduled Castes. Hence, these were the independent variables used in this study.

The level of education is an important thing to be noted here. Education plays a vital role when it comes to healthcare of children and allotting equal importance to both male and female children. Education, especially for mothers creates awareness for the need of immunization and thus, mothers who are more educated are more likely to be immunized. This shows that mothers who were less educated were not aware of the importance of vaccination.

Religion is another thing to be kept in mind. Some religions provide much less importance and care to girl children compared to Hinduism. Thus, from this study it is seen that compared to Hindu households, Muslims and households following a different faith were less likely to care about the female child's wellbeing. Also, caste and category influences the healthcare of girl children. Scheduled tribes were less likely to immunize children, probably because of their own customs and traditions. However, no factor which promotes sex bias in children's healthcare should be there. Every child has to be immunized, irrespective of sex, level of parental education, caste or religion. Awareness for

child health should be there. There should be policies, various government programmes like health schemes to promote equity in health care. Such programmes should also have proper media coverage. Such policies could help in the prevention of female mortality due to vaccine-preventable diseases.

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