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Influences of Selected Socio-economic and Demographic Factors on Child Immunization in a Rural Area of Bangladesh

Introduction

LEVELS of infant and child mortality in Bangladesh are higher by the standards of developing nations. It is estimated that under five mortality for the most recent five-year period (which roughly corresponds to the years 1989-1993) is 133 per 1000 live births. Two-thirds of the deaths under age five occur in the first year of life, the infant mortality rate being 87 deaths per 1000 live births. Out of the total child deaths in Bangladesh, 30 per cent die only due to six vaccine preventable diseases, namely tetanus, whooping cough, measles, polio and tuberculosis (Government of Bangladesh, 1985). Expanded Programme on Immunization (EP1) was formally launched in Bangladesh in 1979 and since then there has been a steady increase in the number of centres offering immunization services. The EPI has a target of providing immunization services to 100 per cent of all children under five years of age and to women in the 15-45 age group, including those who are pregnant by the year 2000 (Government of Bangladesh, 1993). The Bangladesh Demographic and Health Survey, 1993-94 reveals that 59 per cent of children aged 12-23 months are fully vaccinated, a marked improvement from less than 20 per cent, found in a 1989 national survey. Nonetheless, a large proportion of children obtain one or two vaccinations but fail to complete the full course (BDHS, 1993-94). The data from the national vaccination coverage survey conducted in early 1993 show that of all children aged 1-2 years at the time of the survey, 89 per cent had BCG, 74 per cent received all the three doses of DPT and polio and 68 per cent had measles vaccines (MHFW, 1993). A significant proportion pf children thus still have to be vaccinated to ensure a better child survival in the country.

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The purpose of the present paper is to study the level of childhood immunization in a rural area of Bangladesh and to examine the influences of selected socio-economic and demographic factors on immunization of child.

Material and Methods

Data

The data for the present study have been collected from a random sample of women of reproductive ages residing in Chanua Union of Feni sadar thana under the district of Feni, Bangladesh. The total area of Chanua Union is about 8 sq miles with a population of 17,550 according to 1991 census. The population density in the study area is 3,520 persons per sq mile which is much higher than that of 1,866 persons for Bangladesh (Bangladesh Bureau of Statistics, 1993). In the selected union, house to house visits were made to identify all ever-married women under fifty years of age with at least one living child under three years of age. 623 women were successfully interviewed by four trained female interviewers during the period between November and December, 1992.

Information about the selected socio-economic and demographic characteristics of respondents was collected during the interview. Also collected was the information about the immunization status of the last-born child and the penultimate child (if any) from their immunization cards. However, in case the respondents were unable to produce the immunization card, information about the type of vaccine(s) and the date(s) or age(s) of child at the time of vaccination was obtained by asking direct questions. In order to examine whether each of the selected socio-economic and demographic factors has significant relationship with childhood immunization, contingency chi-square test statistic has been used. Logistic regression analysis was employed to study the influences of selected socio-economic and demographic factors on the practice of childhood immunization. However, it should be pointed out that the present study is based on a small sample from small geographical area of Bangladesh. Thus the findings of this study may not be nationally representative.

Results

In this study, 602 respondents reported to have a last-born child under three years of age and the remaining 21 reported that their last child had died. Among the living children, 455 were between ages 2 and 3 years and the remaining were below one year of age. 262 respondents had a penultimate child aged two years and above. The Expanded Programme on Immunization recommends that correct age for giving DPT and polio is 6 weeks to 24 months of child's age, measles is 9-24 months and BCG is from birth to two years of age. Since some children might have received the vaccines beyond the recommended age, we present results for children aged between 12 and 36 months of age in case of last child. However, in case of penultimate child, age is not controlled.

Table 1 reveals that about four out of every five last-born children aged between 12 and 36 months were completely immunized with BCG vaccine followed by measles vaccine (76.1 per cent). But in case of penultimate child, only 57.3 per cent were completely immunized with BCG vaccine followed by measles vaccine (54.0 per cent). Thus the coverage of BCG vaccine is the highest for both the youngest and the penultimate children. About 9 and 8 per cent respectively of the youngest and penultimate children had received at least one dose of DPT but did not complete the required doses of vaccines while about 10 per cent of both the last-born and penultimate children did not complete the recommended doses of polio vaccine. Table 1 shows that 62.6 per cent of the youngest children aged 12 and 36 months were completely immunized with all types of vaccines while only 8.1 per cent of the children were not at all immunized. Only 24.1 per cent of the penultimate children were completely immunized whereas 40.1 per cent of the penultimate children did not receive any immunization.

TABLE 1: PERCENTAGE DISTRIBUTION OF YOUNGEST CHILD AND PENULTIMATE CHILD BY IMMUNIZATION STATUS

	Immunization status						Total	
	Completely immunized		*Partially immunized*		*Not immunized*			
Youngest Child (12-36 months)								
BCG	81.4	(110)			18.6	(50)	100	(160)
DPT	74.2	(62)	9.0	(18)	16.8	(40)	100	(120)
Polio	72.6	(88)	10.4	(89)	17.0	(45)	100	(222)
Measles	76.1	(101)			23.9	(20)	100	(121)
All vaccines	62.6	(285)	29.3	(133)	8.1	(37)	100	(455)
Penultimate Child (all ages)								
BCG	57.3	(140)			42.7	(76)	100	(116
DPT	48.1	(16)	8.4	(80)	43.5	(44)	100	(140)
Polio	44.6	(22)	9.7	(75)	45.7	(75)	100	(127)
Measles	54.0	(65)			46.0	(40)	100	(105)
All Vaccines	24.1	(163)	35.8	(94)	40.1	(105)	100	(262)

Notes: \. Completely immunized—Received 3 doses of DPT and polio and one dose each of BCG and measles.
2. Partially immunized—Received at least one dose of any one of the vaccines but not completely immunized.
3. Column totals do not add up exactly because some of the children had received one type of vaccine but might not have received other/another type(s) of vaccine(s).
4. Figures in parentheses refer to the number of children.

Immunization differentials by selected socio-economic, demographic and cultural variables are shown in Table 2. The child was considered to be immunized if he/she had received at least one dose of specific vaccines (BCG, measles, polio and DPT). The table

shows that the percentage of immunized children is higher among households with better socio-economic status (households with electricity, higher income, higher land ownership, possession of more modern articles). Table 2 also shows that the immunization coverage is much higher for males than females. This may be due to the fact that in Bangladesh, sons are more valued because they are treated as an economic support for the family even from early boyhood.

Maternal education has a positive influence on the acceptance of immunization services. The percentage of children immunized is much higher among mothers who had at least one dose of tetanus vaccine. The practice of immunization is found to be higher among women whose husbands are engaged in service or business than women whose husbands are engaged in other occupations. The women who work outside the home had higher level of child immunization compared to those who do not work outside the home. The acceptance of immunization is found to be related to the number of living children. The size of the family may affect the use of preventive health services because mothers with a smaller number of children may have more time to spend on their children. Table 2 indicates that the smaller the family size, the greater the likelihood that children are immunized. For all four types of immunization, mothers with 1-2 children were more likely to immunize their youngest child and penultimate child than mothers who had 5 or more children. Religious differential in childhood immunization is not found to be pronounced. However, age of the respondents is an important factor, younger women are more likely to immunize their children compared to their older counterparts. Table 2 shows that the respondents aged less than 28 years were more likely to have immunized their children than respondents aged 28 years and above.

TABLE 2: PERCENTAGE DISTRIBUTION OF YOUNGEST CHILD AND PENULTIMATE CHILD WHO HAD RECEIVED AT LEAST ONE VACCINE BY SELECTED VARIABLES

Variables	*Percentage immunised*	
	Youngest child	*Penultimate child*
Land Ownership Status		
No land	65.2	60.7
Ownership of land	891	75.4
	$x^2 = 2.95$*	$X^2 = 0.692$
Occupation of Father		
Business/service	93.5	82.4
Other	78.3	70.8
	$X^2 = 26.I27$***	$X^2 = 14.482$**
Work Status of Mothers		
Non-working (housewives)	74.3	61.4
Working	97.2	88.2
	$X^2 = 25.41O$*****	$X^2 = 8.612$***
Sex of the Child		
Male	94.7	84.6
Female	79.1	72.9
	$X^2 = 9.341$**	$X^2 = 4.920$*

Household Income (In taka per month)		
<4000	81.4	70.2
Above 4000	96.4	88.3
	$X^2 = 20.482$***	$X^2 = 4.920$*
Years of Schooling of Mothers	58.2	42.7
0		
1-5	69.4	57.4
6+	98.6	88.3
	$X^2 = 18.246$****	$X^2 = 9.512$***
Mother's Tetanus Vaccine Status		
Had tetanus	92.4	86.1
No tetanus	65.8	58.7
	$X^2 = 21.372$****	$X^2 = 17.541$****
Ownership of Articles	78.2	72.4
None/Traditional'		
Modem	91.3	86.5
	$X^2 = 28.463$*	$X^2 = 8.641$**
Mother's Age	90.4	85.2
< 28 years		
28 years and above	72.3 $X^2 = 26.246$*	60.4 $X^2 = 4.982$**
Electricity in the Household	89.4	78.9
Yes		
No	58.7	50.4
	$X^2 = 18.359$***	$X^2 = 0.59$
Number of Living Children	95.7	89.1
1-2		
3-4	85.3	78.1
5+	50.4	48.2
	$X^2 = 22.491$***	$X^2 = 24.498$****
Religion	79.6	75.8
Muslim		
Non-Muslim	77.9	73.4
	$X^2 = 9.862$***	$X^2 = 16.625$***

Notes: 1. "Traditional class'" articles means cows, goats, boat, cycle, watch etc.

2. Significant *p<0.1,**p<0.05, ***p<0.01, ****P<0.001.

To assess the relative influences of the socio-economic, demographic and behavioural factors on immunization, we undertook a multivariate analysis i.e., logistic regression analysis. Immunization was defined by a dichotomous variable in which a child was considered to be completely immunized if he or she had received three doses of DPT and polio and one dose each of BCG and measles vaccines. Logistic regression was run by taking all the explanatory variables which were observed to have significant relationship with specific immunization (see Table 2). This study fits two logistic regression models. For the first model, the immunization status of the last child is regarded as a dependent variable and for the second model, immunization status of the penultimate child is taken as a dependent variable.

Table 3 shows that among the twelve explanatory variables included in the first model, five variables emerge as statistically significant. These variables are (1) occupation of father, (2) sex of the last child, (3) education of mother, (4) use of tetanus vaccine by mother and (5) household income.

TABLE 3: LOGISTIC REGRESSION COEFFICIENTS AND ODDS RATIOS OF CHILDHOOD IMMUNIZATION (LAST CHILD)

Variables	*Coefficients*	*Standard error*	*P-value*	*Odds ratio*
Constant	-0.0810	0.9136	0.9288	0.9216
LOS	0.0550	0.2593	0.0104	1.1300
OCCF	0.0061**	0.2872	0.9831	1.0061
WOSM	0.2960	0.0983	0.0026	1.3439
HI	0.4051*	0.2082	0.0517	1.4995
EDUM	0.9847*	0.4218	0.4127	2.6770
MTS	1.2270**	0.2132	0.0000	3.4105
SEC	0.4725*	0.2413	0.2001	1.6040
OWAR	0.1224	0.0477	0.0104	1.1302
REL	-0.0812	0.1073	0.4526	0.9220
ELEC	0.2835	0.2119	0.1821	1.3278
TNLC	0.0241	0.4701	0.9613	1.0244
MA	0.0012	0.5814	0.7253	1.0012

Log likelihood = -388.421668, Chi-square = 78.4825, D.F. = 12, P-value = 0.000000.
*$p < 0.05$, * * $p < 0.01$

Variables descriptions:
Dependent variable: Immunization status of last child (if immunized completely or partially - 1, otherwise = 0)
Explanatory variables:
LOS : Land ownership status (if own land = 1, if no land = 0)
OCCF : Occupation of father (if business/service = 1, otherwise = 0)
WOSM : Working status of mothers (if working = 1, otherwise = 0)
HI : Household income (a continuous variable)
EDUM : Years of education of mothers (0, 1.2,... a continuous variable)
MTS : Mother's tetanus vaccine status (if yes - I, otherwise = 0)
SEC : Sex of the child (if male =1, female = 0)
OWAR : Ownership of articles (if modern = 1, otherwise = 0)
REL : Religion (if Muslim = 1, otherwise = 0)
ELEC : Electricity in the household (if yes = 1, otherwise = 0)
TNLC : Total number of living children (0, 1,2,... a continuous variable)
MA : Mother's age (a continuous variable).

The positive regression coefficients of odds ratios greater than unity represent that the respondents are more likely to get their children immunized while the negative coefficients and consequently odds ratios less than unity represent that the mothers are less likely to

have their children immunized. It is interesting to note that land ownership status, working status of mothers, ownership of articles, electricity in the household and total number of living children are not significant in this model although these appear to have significant relationship with the acceptance of immunization in bi-variate analysis. It has also been seen that mothers who used T.T. vaccine during pregnancy are about 3 times more likely to have their child immunized than mothers who did not use any T.T. vaccine. Table 3 also reveals that mothers with at least some education are about 3 times more likely to have their children immunized than those having no formal education.

Table 4 shows the effects often socio-economic and demographic factors (found to be significant in bi-variate analysis) on the practice of childhood immunization in case of penultimate child. The logistic regression analysis reveals that, as found in the case of last-born child, occupation of father, maternal education, mother's tetanus vaccine status and sex of the child have significant positive effects on the immunization of penultimate child. Although household income is found to significantly affect immunization of last child, the influence of household income on immunization of penultimate child is not statistically significant. It is to be noted that the women who had T.T. vaccine during pregnancy of penultimate child are about three and a half times more likely to get their penultimate child immunized than those who had no T.T. vaccine. A penultimate male child is about three times more likely to be immunized as compared to their female counterparts.

TABLE 4: LOGISTIC REGRESSION COEFFICIENTS AND ODDS RATIOS OF CHILDHOOD IMMUNIZATION (PENULTIMATE CHILD)

Variables	*Coefficients*	*Standard error*	*P-value*	*Odds ratio*
Constant	-0.6063	0.9101	0.5053	0.5454
OCCF	0.3565*	0.2793	0.2019	1.4283
WOSM	0.1314	0.2567	0.6087	1.1405
HI	0.0193	0.0371	0.6037	1.0194
EDUM	0.1575*	0.0425	0.0002	1.1706
MTS	1.2661**	0.2366	0.0000	3.5471
SEC	1.0660*	0.2366	0.0001	2.9037
OWAR	-0.2780	0.2881	0.3345	0.7573
REL	-0.0349	0.0228	0.1241	0.9657
TNLC	0.0347	0.0541	0.4826	1.0447
MA	-0.1861	0.4059	0.6466	0.8302

Log likelihood = -354.471992, Chi-square = 45.28, D.F. = 10, P-value = 0.000000.

*$p < 0.05$, * * $p < 0.01$

Variables descriptions:
Dependent variable: Immunization status of penultimate child (if immunized completely or partially = 1, otherwise = 0).
Explanatory variables: As in Table 3.

Discussion and Policy Implications

Education of mothers was found to have a significant positive relationship with childhood immunization for both the last and penultimate children. Maternal education is to some extent, the reflection of the standard of living of the family. It is associated with family income, occupation and life style that affect health care practice and consequently the well-being of the child. An educated family may have better knowledge of hygiene and health care and is more likely to pay attention to preventive health care for their children. In some developing countries, recent studies indicate that education of parents, especially mothers's education has a positive effect on the practice of childhood immunization (Chakrabarty, 1987). A recent national survey also reveals that mother's education has a positive significant effect on childhood immunization (MHFW, 1994). Thus attention should be focused on the need of expanding educational facilities of women, particularly in rural areas with a view to encourage wider use of immunization services.

This study also reveals that the mother's T.T. vaccine status during last pregnancy has statistically significant effect on youngest and penultimate childhood immunization. The BDHS data collected during 1993-94 also demonstrate that the mother who had received T.T. vaccine during her pregnancy is more likely to be aware of the childhood immunization (MHFW, 1994). The highly significant effect of mother's tetanus vaccine status on childhood immunization for both the youngest and penultimate children indicates that a mother who had T.T. vaccine during pregnancy is more likely to get their child immunized. Therefore, mothers should be motivated through mass media and EPI workers to take T.T. vaccine during their reproductive period or pregnancy in order to raise the level of immunization.

It is expected that the children belonging to a higher income household should experience higher practice of immunization. This expectation presumes that children in higher income households will consume more health enhancing goods and services per capita than will children in lower income households. The significant positive regression coefficient of household income on childhood immunization in case of last child is consistant with this expectation.

The multivariate analysis has also shown that sex of the child is one of the important determinants of childhood immunization. National level data during the period 1993-94 reveal that 62 per cent boys received all the recommended immunizations while 56 per cent of female children were completely immunized (MHFW, 1994: 109). Similar results were also observed in urban and rural areas of Bangladesh (Taslim, 1993; Aziz, 1993). Thus along with taking steps to improve the educational status of women, efforts must be made, especially through mass media to bring about changes in the prevailing social attitudes towards women so that female children get equal opportunity in receiving immunization.

References

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