

# Determinants Of The Utilization Of The Tetanus Toxoid (TT) Vaccination Coverage In Bangladesh: Evidence From A Bangladesh Demographic Health Survey 2004

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## Abstract

**Objectives:** This paper employs statistical methods to determine the complete vaccination rate and to identify the factors that influence vaccination of mothers during pregnancy. The principal objective of this paper is to suggest various policy options on the basis of study findings in order to provide guidelines to fulfill the complete vaccination coverage in Bangladesh. **Methods:** This study analyzes data extracted from Bangladesh Demographic and Health Survey 2004 (BDHS) considering only the case of the mothers of last five years preceding the survey. To meet the objectives this study considers bivariate and multivariate analysis. **Results:** The analysis showed that, although maximum respondents received two or more doses of TT injection a significant portion of women did not receive the TT injection yet (18.6 percent). The immunization coverage of two/more doses was higher among mothers whose husbands are highly educated and non-manual workers. This study elucidates that the rate of immunizing increases with the increase of mother's education. Receiving two/more doses of TT injection shows highest prevalence (58.3 percent) among mothers whose mobility status is unrestricted. The logistic analysis showed that receiving two or more doses of TT injection is almost 3 times higher among respondents using modern toilet facility. The model also shows that higher proportion of respondents belonging to upper category regarding household asset and quality index received two/more doses TT injection than their congruent parts. The other contributing factors for tetanus toxoid vaccination coverage were found to be mother's age at last birth, told about pregnancy complications, place of residences, mother's earning status, sources of drinking water. **Conclusion:** The results indicate several policy options: (1) improve the monitoring and supervision of vaccination activities especially in the rural area (2) mass media campaign to create awareness among both urban and rural women, their husbands and families about the importance of TT vaccination and the consequences of not being vaccinated (3) education for husband's and wife needs to be given very high priority (4) enable women to exercise their rights to control their concerning freedom of movement, own health care and access to economic resources

## INTRODUCTION

Tetanus is an important cause of death among neonatal in Bangladesh. It is a fatal disease caused by unhygienic conditions at childbirth. It is preventable through vaccination and given to mother during pregnancy for prevention of neonatal tetanus among newborn. For full protection, it is indicated that pregnant mother should receive two doses of the toxoid. If a woman was vaccinated during a previous pregnancy, she may only require one booster dose during a subsequent pregnancy. Five doses are considered to provide lifetime protection.

Bangladesh, one of the world's least developed countries; over 80% of women give birth without any help from a skilled birth attendant. Most deliveries take place at home,

often in conditions of very poor hygiene -- placing the lives of both mother and child at risk. Yet despite this unpromising start to life, death rates for neonatal tetanus in newborn babies have been reduced by over 90% in Bangladesh in little more than a decade. In the mid-1980s, Bangladesh had one of the highest rates of neonatal tetanus in the world: 41 cases for every 1000 live births. The proportion of pregnant women receiving TT injections has risen substantially. For births occurring "between" 1992-96, 75 per cent of mothers received at least one TT injection during pregnancy, while by 1995-99; the proportion had increased to 81 per cent. TT vaccinations are given to mothers through immunization centers and satellite clinics, and are therefore often given without a full antenatal visit, leading to the much higher levels of TT compared to ANC.

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Still, the variations of TT coverage are similar to variations of antenatal care. Women giving birth in rural areas and Sylhet division in particular were found to be less likely to have had a tetanus vaccination<sup>4</sup>. Even when the elimination target has been reached in Bangladesh, routine immunization and disease surveillance will have to continue, together with efforts to promote safe births. Unlike polio, maternal and neonatal tetanus can never be eradicated since the tetanus spores that cause the disease will persist in the environment.

Thus, research that addresses tetanus toxoid vaccination coverage in Bangladesh is seen as essential. This article investigates the scenario of tetanus vaccination coverage Bangladesh. The results of this study are expected to provide program and policy recommendations that will help to ensure the success of complete tetanus vaccination coverage of mothers in Bangladesh both at the individual and community levels

### MATERIALS AND METHODS

This study utilizes the data extracted from 2004 Bangladesh Demographic and Health Survey (BDHS), which were conducted under the authority of the National Institute of Population Research and Training of the Ministry of Health and Family Welfare in Bangladesh. The BDHS 2004 is a nationally representative survey from 11,440 ever married women of age 10-49 and 4297 men age 15-54 from 10,500 households covering 361 sample points (clusters) throughout Bangladesh, 122 urban areas and 239 in the rural areas. The study considered only the case of the mothers for their last child. In order to fulfill our objectives the respondents who took tetanus toxoid injection of last five years preceding the survey were considered. Bivariate analysis was performed to determine the differentials of tetanus vaccination coverage by explanatory variables. Pearson's Chi-square test of independence was performed to test the existence of significant association between categories of tetanus vaccination coverage and selected risk factors. Considering the fact that among multivariate techniques the Cox's linear logistic regression model is algebraically simple, computationally straightforward and efficient with acceptable degree of precision for a binary dependent variable, this study applied Cox's linear logistic regression model<sup>5</sup> for multivariate analysis.

### RESULTS

Before going directly into the findings concerning tetanus toxoid vaccination (TT) coverage, it is appropriate to

examine differentials of utilization of TT injection by demographic and health, socioeconomic and household related characteristics of mothers. Table 1 shows differentials of utilization of TT injection by demographic and health related characteristics of mothers. It is revealed from this table that mothers' age at last birth has a strong relationship with the acceptance of tetanus toxoid (TT) injection. We observe that receiving two or more doses of TT coverage is higher among mothers below aged 20 on the other hand proportion of receiving one dose of tetanus toxoid (TT) injection is higher among mothers belonging to age group 30 and over (29.4 percent).

### Figure 1

Table 1: Percentage distribution of mothers receiving tetanus toxoid injections during pregnancy, according to some selected demographic & health related characteristics by two-time span 1990-1999 & 2000-2004.

Tetanus toxoid (TT) injection received					
Demographic & Health related Characteristics	None	1-dose	2 or more doses	No. of Cases (N)	***
<b>Mothers' age at Last birth</b>					***
<20	13.0	20.9	65.8	1301	
20-29	17.4	28.3	54.3	1832	
30+	28.4	29.4	42.2	742	
<b>Future fertility Intention</b>					***
Wants	14.0	20.0	65.2	1555	
Don't wants	21.0	29.6	49.3	2389	
Undecided	20.8	22.3	56.9	130	
<b>Ever used any Contraception</b>					***
Yes	16.4	26.3	57.4	3407	
No	28.9	24.6	46.5	667	
<b>Wanted last Child</b>					***
Yes	16.5	24.9	58.6	3426	
No	28.5	31.8	39.7	648	
<b>Told about Pregnancy Complications</b>					***
Yes	9.9	26.9	63.2	1248	
No	22.2	25.6	52.2	2826	
<b>Told where to go about for Pregnancy Complications</b>					***
Yes	8.9	27.3	63.8	1176	
No	24.3	21.4	54.3	70	

Significance level: \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$

Mothers who want more children in future are likely to receive two or more doses of TT injection more than their congruent parts. Women's contraceptive use status also has strong relationship with the acceptance of TT injection. 57.4 percent mothers who have ever used any contraceptives received two doses or more TT, while it is 46.5 percent for those mothers who have never used any contraceptives method. The table 1 also elucidates that 58.6 percent woman who want the last birth taking two or more doses TT and about 31.8 percent mothers have taken one dose TT who

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does not want the last child. Women's response about their pregnancy complications has also a strong relationship with receiving TT injection. 26.9 percent mothers who can told about any pregnancy related complications during their pregnancy period have taken one dose TT and 63.2 percent taken two or more doses. Table 1 also represents that 63.8 percent mother having experiences about where to go for pregnancy complications have taken two or more doses of TT and 27.3 percent mothers have taken one dose of TT.

With regard to socio-economic characteristics Table-2 represents that 60.6 percent urban and 54.4 percent rural respondents have taken two or more TT doses whereas 14.7 percent urban and 19.9 percent rural respondents does not take any doses. Table 2 indicates that among all the other divisions women in Barisal division (73.1 percent) are more likely to receive two or more doses of TT.

### Figure 2

Table 2: Percentage distributions of mothers receiving tetanus toxoid injections during pregnancy, according to some selected socioeconomic characteristics by two- time span 1990-1999 & 2000-2004.

Socioeconomic Characteristics	Tetanus toxoid (TT) received			No. of cases (N)	***
	None	1-dose	2-or more Dose		
<b>Place of Residence</b>					**
Urban	14.7	25.3	60.6	843	
Rural	19.9	26.2	54.4	3233	
<b>Administrative division</b>					***
Barisal	18.3	20.1	61.6	224	
Chattagong	20.6	23.9	55.5	863	
Dhaka	15.6	27.6	56.8	1295	
Khulna	17.3	31.9	50.8	457	
Rajshahi	16.6	24.9	58.5	944	
Sylhet	32.3	23.7	44.0	291	
<b>Religion</b>					
Muslim	18.8	25.8	55.3	3753	
Non-Muslim	14.0	28.0	58.1	322	
<b>Mothers education</b>					***
No education	26.0	26.4	47.7	1517	
Primary	17.9	27.7	54.3	1222	
Secondary	10.8	23.8	65.4	1101	
Higher	8.1	25.1	66.8	235	
<b>Mothers earning status</b>					
Not working	18.0	26.0	56.0	3357	
Working for Cash	19.5	26.5	53.9	599	
Others	24.6	23.7	51.7	118	
<b>Husbands education</b>					***
No education	24.4	26.0	49.6	1618	
Primary	17.0	28.6	54.4	1066	
Secondary	13.6	23.3	63.0	982	
Higher	10.0	25.7	64.3	4075	
<b>Husbands Occupation</b>					
Manual	19.0	26.0	55.0	2853	
Not-manual	17.1	26.4	56.5	1054	
Others	17.3	22.6	60.1	168	
<b>Has permission to Go out sides alone</b>					
Unrestricted	21.3	20.1	58.3	204	
Restricted	21.3	30.9	47.9	94	
No mobility	23.6	28.3	48.1	800	
<b>Ownership Of land</b>					*
Yes	10.6	19.2	70.2	198	
No	17.1	25.4	56.9	184	
<b>Having mass media exposure</b>					***
Yes	9.3	23.4	67.3	654	
No	20.2	26.5	53.3	3421	

Significance level: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$

The result revealed that non-Muslim mothers received one dose (28.0 percent) and two or more doses (58.1 percent) of

TT injection than their Muslim counterparts (25.8 percent received one dose and 55.3 percent two or more doses). During pregnancy more than 66 percent higher educated mother received two or more doses TT and about 26.0 and 56.0 percent mothers have taken one and two/more doses TT, who are not working for cash. The analysis illustrates that, higher the level of education of husband the higher the rate of acceptance of two or more doses TT injection. 26.4 percent mothers have taken at least one dose of TT whose husbands are involving any professional jobs

Immunization with TT injection shows highest prevalence (58.3 percent) among mothers whose mobility status is unrestricted. Women having agricultural land in the house hold are more likely to receive two or more doses TT injection (70.2 percent) and the corresponding figure for receiving two or more dose is 70.2 percent mother. Mothers having mass media exposure shows the higher proportion rate for receiving two/more doses of TT. Table 3 exhibits that women having electricity in household are more likely to receive one or two/more doses of TT than women having no such facility. Receiving two or more doses TT injection is found to be higher among mother's who use piped water for drinking purposes (from safe sources) which is about 65.7 percent.

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**Figure 3**

Table 3: Percentage distributions of mothers receiving tetanus toxoid injections during pregnancy, according to some selected household characteristics by two- time span 1990-1999 & 2000-2004.

Household Characteristics	Tetanus toxoid (TT) received				***
	None	1-dose	2-or more Dose	No. of cases (N)	
<b>Household has Electricity</b>					***
Yes	11.7	26.5	61.8	1601	
No	22.8	25.7	51.5	2470	
<b>Sources of drinking Water</b>					***
Piped water	11.3	23.0	65.7	274	
Well water	18.8	26.1	55.1	3716	
Other sources	25.0	32.1	42.9	84	
<b>Type of toilet facilities</b>					***
No facilities	24.9	25.2	49.9	547	
Modern facilities	14.4	26.0	59.6	2339	
Open/Hanging/ Others	23.4	26.4	50.2	1189	
<b>Household assets Index</b>					***
Lower	25.4	26.5	48.1	1801	
Middle	15.9	27.3	56.8	829	
Upper	11.1	24.7	64.2	1444	
<b>Household quality Index</b>					***
Lower	20.9	27.3	51.8	1854	
Middle	18.8	24.7	56.5	1608	
Upper	9.7	25.8	64.4	596	

Significance level: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$

Table 3 also elucidates that the rate of receiving two or more doses of TT is found to be high among mothers using modern toilet facilities and having household quality and assets index in the upper category.

Now we have employed multivariate logistic regression to identify the factors affecting receiving TT injections during pregnancy. Two models are fitted, in the first model receiving one dose of tetanus toxoid (TT) injection as dependent variable and it is coded as 1 if the mother received one dose injection; otherwise it is 0 and in the second model receiving two/more doses of tetanus toxoid (TT) injection as dependent variable and it is coded as 1 if the mother have taken two/more doses TT injection; otherwise it is 0. The results are presented in Table 4. It has been observed that mother's age at last birth is significantly associated with receiving one and two/ more doses of TT injection. Mothers belonging to age group 20 to 29 years and above thirty are more likely to receive one dose of TT than mothers below age twenty on the other hand mothers below aged 20 are more likely to receive two/more doses of TT than their congruent parts. Mother who can't told their pregnancy complications are 0.917 and 0.852 times less likely to receive one dose and two/more doses TT than the mothers who can told their pregnancy complications.

Mother's education also represents strong positive significance with receiving two or more doses TT injections. Mothers who are higher, secondary and primary educated are likely to receive 1.5, 1.3 and 1.2 times more two or above doses TT injections than mothers with no formal education. Women who are working for cash are 1.7 times more likely to take one dose but 0.9 times less likely to take two or above TT injections than mothers who are not working for cash.

**Figure 4**

Table 4: Multivariate logistic regression estimates of regression coefficient and relative odds for significant characteristics of mother's receiving one dose & two doses or more tetanus toxoid (TT) injection by time span 2000-2004.

Characteristics	Received one dose TT		Received two or more doses TT	
	Coefficient $\beta$	Odds ratio	Coefficient $\beta$	Odds ratio
<b>Mothers' age at last birth</b>				
<20 @		1.000		1.000
20-29	0.143**	1.868	-0.845***	0.846
30+	0.334	1.933	-0.613	0.527
<b>Told about pregnancy Complications</b>				
Yes @		1.000		1.000
No	-0.086*	0.917	-0.160*	0.852
<b>Told about where to go for pregnancy complications</b>				
Yes @		1.000		1.000
No	-0.225	0.603	-0.986	0.734
<b>Place of residence</b>				
Urban @		1.000		1.000
Rural	0.037	1.037	-0.229*	0.758
<b>Mothers education</b>				
No education @		1.000		1.000
Primary	0.222*	1.295	0.296*	1.274
Secondary	-0.369*	0.419	0.935***	1.393
Higher	-0.517	0.597	0.690***	1.502
<b>Mothers earning Status</b>				
Not working @		1.000		1.000
Working for cash	0.243	1.784	-0.476***	0.907
Other	-0.131**	0.831	-0.104**	0.601
<b>Husband's education</b>				
No education @		1.000		1.000
Primary	-0.129	0.879	-0.042*	0.958
Secondary	0.552	1.737	0.309**	1.362
Higher	-0.138	0.963	0.380***	1.462
<b>Husband's Occupation</b>				
Manual @		1.000		1.000
Not-manual	0.548*	1.730	0.294***	1.745
Other	-0.064	0.938	1.664	2.515
<b>Religion</b>				
Muslim @		1.000		1.000
Not muslim	0.521	1.683	0.141	1.151
<b>Household has Electricity</b>				
Yes @		1.000		1.000
No	-0.364*	0.439	-0.095	0.910
<b>Sources of drinking Water</b>				
Piped water @		1.000		1.000
Well water	0.413**	1.638	-0.404*	0.469
Other sources	0.440	1.644	-0.029	0.030
<b>Type of toilet facility</b>				
No facilities @		1.000		1.000
Modern facilities	0.486**	1.626	1.041***	2.833
Open/Hanging/ Others	0.083	1.920	0.305	1.356
<b>Household assets Index</b>				
Lower @		1.000		1.000
Middle	0.110	1.896	0.678**	1.508
Upper	-0.307	0.359	0.016***	1.948
<b>Household quality Index</b>				
Lower @		1.000		1.000
Middle	-0.040*	0.961	0.104*	1.110
Upper	-0.143	0.866	0.237**	1.268
<b>Constant</b>	0.670		2.094	

Note: @ represents reference category. Significance level: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

Mothers whose husbands have higher and secondary education reported 1.4 and 1.3 times more likely to receive two or above doses TT injections than those mother's whose husbands are illiterate. Mothers whose husbands are not manual worker ( Service man, Businessman etc..) 1.73 times more likely to one dose TT and 1.74 times more likely to receive two or above TT doses than mothers whose

husbands are manual worker. Table 4 indicates that non-Muslim mothers are 1.6 and 1.1 time more likely to receive one dose and two or above doses TT than Muslim mothers. Mothers whose households have no electricity are 0.4 times less reported of receiving one dose of TT than mothers having electricity in their house. Mother using well water for drinking purposes is 1.6 times more likely to receive one dose of TT injections than who are using piped water but 0.4 times less reported of receiving two or above doses TT than who are using piped water for drinking purposes. Mothers using modern toilet facilities 1.6 times more likely to received one dose TT and 2.8 times more likely to receive two or above doses TT injections than mothers having no such facility. Mothers who are in upper and middle categories in household asset index are 1.9 and 1.5 times more reported of receiving two or above doses TT than mothers belonging in lower categories. This situation is also same for household quality index, where mothers in middle and upper categories are reported 1.1 times and 1.2 times more receiving two or above doses TT injections than mothers in lower categories.

## **DISCUSSIONS**

This study was designed to make a comparative scenario of tetanus toxoid vaccination coverage in the Bangladesh. The study represents that 26.0 percent mother has taken one dose, 55.6 percent received two or more doses and 18.4 percent mother did not take any dose of tetanus toxoid (TT) injection during their pregnancy period. Mothers giving birth at a younger age are more likely to have received two or more doses TT injections during pregnancy period. Women with more education are more likely to receive two or more doses of TT injection, compared with less educated women. Mass media exposure also has positive effect on TT coverage. In recent years, a number of governmental and non-governmental organizations have enriched their maternal and child health related programmes on television, radio and newspapers which is likely to have increased the mother's knowledge on safe motherhood. Findings from this study indicate that urban mothers were receiving more two/more doses of TT injection than their counterparts in rural areas. This is likely to be attributed to unavailability of healthcare facilities in rural areas. Moreover, in Bangladesh, especially in rural areas, there is a problem of communication and transportation, which involves both, time and cost<sup>6</sup>. On the other hand, though government health services are financially not so expensive, organizationally and physically they may not be ideal to

fulfill the demand of the clients.

Immunization of receiving two/more doses of TT injection shows highest prevalence (58.3 percent) among mothers whose mobility status is unrestricted. Mothers who want more children in future are more likely to receive two/more doses of TT injection than their congruent parts. So, it can be inferred that receiving TT is more or less contingent on future fertility intention Women's contraceptive use status also has strong relationship with the acceptance of TT. The results elucidate that rate of receiving one or two/more doses of TT injection are almost high among mothers who have ever used any contraceptives methods.

From multivariate logistics analysis it was proved that mothers can not told about their pregnancy complications, are less likely to receive one or two/more doses of TT than those mothers who can told. This may be explained by the fact that conscious mothers are more sincere to take proper government health care. The observation that Muslim mothers sought less received of TT injection than non-Muslim mothers is most likely to be attributed to the religious beliefs. Muslims husbands do not give permission to their wives to go to doctors or outside their home<sup>7</sup>. Household economic indices and hygienic conditions have implication in seeking care from healthcare facilities. It has been shown that hygienic conditions such as use of potable water and type of toilet facilities have are positive indicators of maternal health care system<sup>8</sup>. Interestingly, women who were using piped water for safe drinking purposes received more two/more doses of TT injection than mothers using well water or from other sources such as river and lakes.

In conclusion, findings from this study suggest the need for creation of awareness regarding TT vaccination, and generate demand for use of maternal health services about the benefits of TT injection. It is desirable to conduct mass media campaign to create awareness among both urban and rural women, their husbands and families about the importance of TT vaccination and the consequences of not being vaccinated. Health care providers in interpersonal communication should be trained. Improve the monitoring and supervision of vaccination activities especially in the rural area. Provide the equipment required for delivery of vaccination services to all Primary Health Care Centres. Enable women to exercise their rights to control their own fertility and their right to make decision concerning freedom of movement, own health care and access to economic resources through special information, education and

communication campaign.

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