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FACTORS ASSOCIATED WITH TETANUS TOXOID VACCINATION IN PAKISTAN

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ABSTRACT

Objective: The main idea of the study to explore the socio demographic factors that have association with tetanustoxoid (TT) vaccine before birth, of ever married women of age 15-49.

Design: The secondary data set is used of Pakistan Demographic and Health Survey (PDHS) of ever married women with sample size 13558.

Period: PDHS 2012-13.

Setting: The National Institute of Population Studies done this survey with the technical support from ICF International and Pakistan Bureau of Statistics and the USAID supported the financially.

Methods: Both descriptive (percentage) and inferential (chi-square & binary logistic regression model) statistics were used for data analysis.

Results: Higher proportion (58%) of women vaccinated before birth. Bivariate analysis revealed that age, palace of residence, education status, media access, wealth index, occupation and visited by family planning worker are found to be significant with respect to tetanus vaccination. Binary model showed that younger women were more likely [OR = 1.254 C.I = 1.077&1.459] to take tetanus vaccine compared to older ages. Respondents belong to ruralareas were less likely [OR=0.923 C.I = 0.810&1.051] to get vaccinated compared to their counterpart residentof urban settings. An illiterate woman less likely [OR = 0.247, C.I = 0.191 & 0.320] to be vaccinated compared to women with higher educational degree.

Conclusion: These statistical outcomes about tetanus vaccination and exploration of significant socio demographic factors of ever married women can be an emerging for disease management and control.

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INTRODUCTION:

People of all ages can get tetanus but the disease is mostly common and serious

in new-born babies and called neonatal tetanus and which is mostly fatal. In 2008 annually an estimated 59,000 new-borns died due to neonatal tetanus.[1]Globally neonatal tetanus (NT) is responsible for 14% (215,000) of all neonatal deaths (NDs)[2] and approximately 30,000 mothers are also died due to maternal tetanus each year.[3] Once an infant are infected with tetanus, more than two third (70%) not survived.[4] NT ranks as a main but preventable source of infant and neonatal death in many developing counties[5] including Pakistan less than 10% cases estimated under the current reporting system.[6] In developing countries only 52% of pregnant women are vaccinated with two or more TT doses. The World Health organization (WHO) conducted a meeting in 1989 with the key object the elimination of NT, among 161 developing countries, 104 finally got rid from NT in 2000.[7] Pakistan stood among 34 countries, still not achieved NT free country licence. In 1997 the reported death globally due to NT was estimated 248000 and 26400 of these deaths were from Pakistan with NT mortality rate of 5/1000 live births.[8] In Pakistan 22,000 NDs occur every year due to maternal and neonatal tetanus.[2] Save the Children and UNICEF teamed up with the governments of Pakistan, Mali, and Ethiopia in large-scale campaigns to eliminate tetanus from 2001-2005 and more than twelve million females in Pakistan and almost a million females in Mali administrated the three doses of TT vaccine, and results from the Ethiopia campaign are being tallied and Pakistan alone, NT deaths have been cut up from 28,000 annually to 14,000.[9]

WHO recommended some measures and procedure for the elimination of NT like conducting investigation in high risk areas of NT cases; endorse clean supply service, routine immunization of pregnant women and high risk approach of targeting women of child bearing age living in high risk area with three doses of TT vaccine. Although the government of Pakistan committed to eliminate the maternal neonatal tetanus in 2015 and adopted a high risk approach[10] and made good progress in last decade. TT immunization coverage ranging from 60% to 74% over the last ten year and there are many reason behind low coverage like demand failure for TT vaccine, poor knowledge about immunization among reproductive age women and insufficient information about the benefits of TT vaccine provided by media and health care workers, was a main reason for NT in Pakistan.[11] The percentage of women get vaccinated the two doses of TT vaccination was 56%, 57%, 45% and 53% in 2002, 2003, 2004 and 2007 respectively in Pakistan.[12, 13]

The tetanus vaccination failure and low courage is a major concern in a developing counties, the issues also have demographic and social dimension.[14-19] So evaluations of these factors are helpful in seeking preventative measures, So this study therefore aimed to investigate the significant socio demographic factors (age, education, Location and geographical area of residence, wealth index, media exposure, respondents occupation and visited by family planning worker) that should be targeted properly so that the ill health and mortality related tetanus can be minimized in new-born babies and save the mothers lives.

METHODS AND MATERIAL:

Data source: So far three demographic health surveys have been conducted as part of the MEASURE DHS international series. The national institute of population studies done these survey with the technical support from ICF International and Pakistan bureau of statistics and the USAID supported the financially. The most recent data set PDHS 202-13 for ever married women with sample size 13558 used for present study.

Bivariate analysis is performed for both respondents with the object to determine the socioeconomic characteristics that have potential influence in TT vaccine of ever married women. Pearson's chi- square test of independence was performed to evaluate the association between dependent and independent variable. To understand the functional relationship of variables binary logistic regression analysis was carried out.[20] The dependent variable in our study was take necessary doses of tetanus vaccine before birth had two categories (0=no and 1=yes). The explanatory variables were age (15-49), place of residence (urban and rural), place of residence by province (Punjab, Sindh, KPK, Baluchistan and GilgitBaltistan), educational level (Illiterate, primary, secondary and higher), media exposure (read newspaper, listen radio and watching TV), wealth index (poor, middle and rich) and respondents occupation (working and not working) and Visited by family planning worker last 12 months (no and yes).

RESULTS:

The maximum (20.1%) and the minimum (4.2%) respondent fall in age group 25-29 and 15-19 respectively. The percentage of rural (53.2%) respondents is higher compared to urban (46.8%). Punjab and Sindh has higher percentage of ever married women followed by KPK, Baluchistan and GB. More than half (56.2%) of the ever married women are illiterate. 43.5% ever married women are wealthier followed by poor (37.4%) and middle (19.1%) families. Television is accessed by higher proportion of women compared to other media sources. The majority (78.1%) of the respondents are not working.More than half of the respondents agreed that family planning worker not visited to them in last 12 months. The detail description is illustrated in Table 1. Higher proportion (58%) of women takes the necessary doses of tetanus vaccine before birth. Graphical illustration is depicting in Figure 1 with tetanus toxoid vaccination status of ever married women before birth.

Bivariate analysis: By incorporating the bivariate analysis the findings revealed that age and TT vaccine are disproportionally associated ($p<0.000$) i.e. early age groups of respondents are more prone to take tetanus vaccine. As

TABLE 1:
SOCIO DEMOGRAPHIC CHARACTERISTICS OF EVER MARRIED WOMEN (N=13558)

	PDHS 2012-13	
Covariate	**Response**	**Frequency (%)**
Age	15-19	567 (4.20)
	20-24	2048 (15.1)
	25-29	2723 (20.1)
	30-34	2438 (18.0)
	35-39	2300 (17.0)
	40-44	1808 (13.3)
	45-49	1674 (12.3)
Place of residence	Urban	6351 (46.8)
	Rural	7207 (53.2)
Residence by province	Punjab	3800(28.0)
	Sindh	2941 (21.7)
	KPK	2695 (19.9)
	Baluchistan	1953 (14.4)
	GB	1216 (9.0)
Education status	Islamabad (ICT)	953(7.0)
	No education	7625 (56.2)
	Primary	1831 (13.5)
	Secondary	2415 (17.8)
	Higher	1687 (12.4)
Wealth index	Poor	5072 (37.4)
	Middle	2589 (19.1)
	Rich	5897 (43.5)
Access to media	Not read newspaper	10068 (74.3)
	read newspaper	3490.0 (25.7)
	No Access to radio	11172 (82.4)
	Access to radio	2386 (17.6)
	No access to TV	4309 (31.8)
	Access to television	9249 (68.2)
Occupation	Not working	10591(78.1)
	working	2967 (21.9)
Visited by family planning worker last 12 months	No	4808 (56.3)
	Yes	3732 (43.7)

FIGURE 1:
TETANUS VACCINATION BEFORE BIRTH OF EVER MARRIED WOMEN

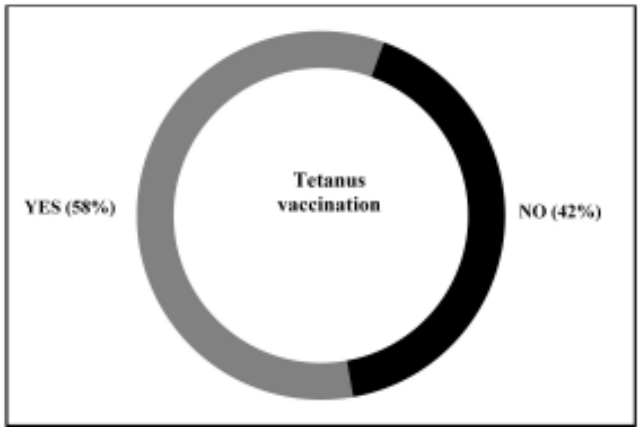


TABLE 2:
CROSS TABULATION OF OUTCOME VARIABLE VERSUS EXPLANATORY VARIABLES

Number of tetanus injections before birth

Covariate	Response	No	Yes	p-value
Age	15-19	38.8%	61.2%	0.000
	20-24	39.7%	60.3%	
	25-29	39.0%	61.0%	
	30-34	39.4%	60.6%	
	35-39	45.7%	54.3%	
	40-44	50.3%	49.7%	
	45-49	71.5%	28.5%	
Place of residence by region	Punjab	24.0%	76.0%	0.000
	Sindh	42.6%	57.4%	
	KPK	43.5%	56.5%	
	Baluchistan	71.8%	28.2%	
	GB	48.2%	51.8%	
Residence	Urban	34.3%	65.7%	0.000
	Rural	47.3%	52.7%	
Educational level	Illiterate	56.9%	43.1%	0.000
	Primary	32.8%	67.2%	
	Secondary	21.4%	78.6%	
	Higher	13.1%	86.9%	
Read newspaper	No	49.1%	50.9%	0.000
	Yes	19.6%	80.4%	
Listen radio	No	42.9%	57.1%	0.000
	Yes	35.3%	64.7%	
Watch TV	No	58.5%	41.5%	0.000
	Yes	32.7%	67.3%	
Wealth quintile	Poor	58.9%	41.1%	0.000
	Middle	38.6%	61.4%	
	Rich	24.8%	75.2%	
Respondent occupation	No working	40.9%	59.1%	0.009
	Working	44.3%	55.7%	
Visited by family planning				
worker last 12 months	No	39.5%	60.5%	0.000
	Yes	29.9%	70.1%	

age increases the TT vaccine coverage decreased. Place of residence by urban rural are found to be significant with respect to TT vaccine higher proportion of urban women get vaccinated than rural. Ever married women resident of Punjab province are more likely to take necessary doses of TT vaccine before birth followed by Sindh, KPK, GB and Baluchistan. Women education and TT vaccine are found to be significant ($p<0.000$), respondents with no education less likely to take TT vaccine as compared to higher education degree fellow. Newspaper, radio and television are significant ($p<0.000$) with respect to TT vaccine. Wealth index and TT vaccine have association ($p<0.000$), poor respondents remained unvaccinated compared to middle and rich families. Respondent occupation is associated with TT vaccine. Visited by family planning worker last 12 months is statistically significant in our findings and increase the chances of TT vaccine. The detail explanations of bivariate analysis are illustrated in Table2.

Binary logistic regression analysis: Factors along with odds ratio and 95% confidence interval are showed in Table 3 the models revealed that younger women were 1.254 times more likely to take tetanus vaccine compared to older ages. Respondents belong to rural areas were less likely [OR = 0.923] to vaccinate compared to their counterpart resident of urban settings.Ever married women from Punjab province are 2.025 times more prone to take the necessary doses of tetanus vaccine as compared to their counterpart lived in GB. An illiterate woman less likely [OR = 0.247]

TABLE 3:
BINARY LOGISTIC REGRESSION ANALYSIS ABOUT TETANUS INJECTIONS BEFORE BIRTH

Variables	Category	Odds Ratio	95% C.I
Age (ref 35-49)	15-24	1.254**	[1.077 & 1.459]
	25-34	1.229**	[1.082 & 1.395]
Residence (ref urban)	Rural	0.923*	[0.810 & 1.051]
Place of by region (ref GB)	Punjab	2.025***	[1.652 & 2.484]
	Sindh	1.026	[0.836 & 1.258]
	KPK	1.191	[0.972 & 1.459]
	Baluchistan	0.362***	[0.291 & 0.449]
Education (ref higher)	Illiterate	0.247***	[0.191 & 0.320]
	Primary	0.395***	[0.305 & 0.511]
	Secondary	0.607***	[0.476 & 0.774]
Read Newspaper(ref yes)	No	0.840*	[0.706 & 1.000]
Has Radio(ref yes)	No	0.934	[0.809 & 1.079]
watch TV (ref yes)	No	0.658***	[0.582 & 0.745]
Wealth index (ref rich)	poor	0.584***	[0.494 & 0.689]
	Middle	0.909	[0.775 & 1.067]
Occupation (ref work)	No work	1.011	[0.881 & 1.161]
Visited by family planning worker			
last 12 months (yes)	No	0.650**	[0.506 & 0.784]

Key: ref implies reference category; ***p<0.001, **p<0.01, *p<0.05 and GB= GilgitBaltistan

to get vaccinated compared to women with higher educational degree. Ever married women having no access to newspaper and TV are more likely to remain unvaccinated compared to their counterpart having access to these media modes. Poor respondents are less likely [OR= 0.584] to take tetanus vaccine before birth compared to women with higher socio economic status. Visited by family planning worker last 12 months is increasing [OR=35] the chances of vaccination.

DISCUSSIONS AND CONCLUSION:

Pakistan is a developing and ranked as a 6th most populous country with scatter social norms by location and geographical area, large proportion lived in rural areas and lack of basic health care settings. These are the ideal condition for frequent occurrence of disease.[3]In our finding 58% ever married women take the tetanus vaccine before birth. Bivariate analysis shown that age, palace of residence, education status, media access, wealth index, occupation and visited by family planning worker are found to be significant with respect to tetanus vaccination.To better understand the causes of low coverage and socio demographic factors that have association with tetanus vaccination, several studied conducted in Pakistan.[14-19]A cross sectional study conducted in Peshawar found that overall coverage of tetanus vaccine was low (55.6%) and the main reason for that lack of awareness, being busy, centre too far, misconception and fear of reactions and the main factors associated with immunization status husband education, females' knowledge and views on immunization, income, distance, frequency of health visits.[19] The vaccination coverage is below the World Health Organization universal recommendations in Sindh (63%), the lack of knowledge is the main reason for it.[18]A similar study in Lahore capital of Punjab province found 87% coverage and the main reason for low coverage were lack of awareness about the importance of vaccination among the public and misconceptions about it.[16] In a review study of grey literature to assess the neonatal tetanus elimination in Pakistan, found that tetanus toxoid (TT) vaccination coverage ranging from 60% to 74% over the last decade, the key reason of neonatal tetanus was low coverage of TT vaccine, demand failure, inadequate knowledge of TT vaccine, inadequate information about the benefits of TT vaccine provided by health care workers and the media, dwellers of rural settings, lack of formal education, poor knowledge about place and time to get vaccinated and lack of awareness about the importance of TT vaccine.[11] In our study almost yielded the statistically significant factors, binary model exhibited that younger women were more likely to take tetanus vaccine compared to older ages in our findings. A study conducted in Bangladesh, revealed that women aged greater than 30 years had a lower access rate to tetanus vaccination than women aged 20-29 years.[21]There are wide variations in the TT vaccination coverage from place to place in our study and identical to the previous studied.[14-

[17]NT is more prone to occur in poorer and rural setting areas, the prevalence of NT is 5-12 times higher in these areas.[22]NT risks in rural areas are eight times more compared to their counterpart lived in urban areas.[23]While by regionally, the ever married women residents of Punjab province more likely to get vaccinated as compared to compared to GB and respondents belong to Baluchistan less likely to take TT vaccine in our findings, the reason behind this could be the province has low status in term of health, education gender equality indicators, economic development and physical status comparing with other provinces and Pakistan taken as whole. From health prospective education is very important indicator, better educated individuals indeed to have a better health and a lower risk of mortality.[24]An illiterate woman less likely to get vaccinated compared to women with higher educational degree in our finding.[11, 18] Effective media companion regarding maternal tetanus and proactive mobilization of lady health workers is statistically significant and ultimately important in vaccination improvement.

Finally it is concluded that age, palace of residence, education status, media access, wealth index, occupation, visited by family planning workers are found to be significant with respect to tetanus vaccine before birth of ever married women age 15-49. It needs to launch some comprehensive programme in poorer and rural settings areas by using all media modes particularly TV. The availability of these statistical outcomes can be handy for the formulation of adequate policies to improve in tetanus toxoid vaccination that might be helpful in disease management and control so that the new-born babies and the mother deaths can be minimized.

Study limitations: This study based from secondary data set taken from PDHS, in which a few limited question asked about tetanus vaccine to a small proportion of ever married women, which does not allow establishing temporal relationship on the basis of these findings. This study goal was to only pinpoint the socio demographic factors that might be helpful in disease management and control.

REFERENCES:

1. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, Jha P, Campbell H, Walker CF, Cibulskis R: Global, regional, and national causes of child mortality in 2008: a systematic analysis. The lancet 2010, 375:1969-87.
2. WHO U: UNFPA. Maternal and neonatal tetanus elimination by 2005. Strategies for achieving and maintaining elimination. World Health Organisation 2000.
3. Vandelaer J, Birmingham M, Gasse F, Kurian M, Shaw C, Garnier S: Tetanus in developing countries: an update on the Maternal and Neonatal Tetanus Elimination Initiative. Vaccine 2003, 21:3442-5.
4. LaForce FM, Steinglass R, Griffiths M, Narayanan I, Sanghvi T, Sogunro R, Ickx P: A better future for children: Progress toward World Summit goals for health and nutrition. Published by the Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development 2001.
5. Fikree FF, Azam SI, Berendes HW: Time to focus child survival programmes on the newborn: assessment of levels and causes of infant mortality in rural Pakistan. Bulletin of the World Health Organization 2002, 80:271-6.
6. Whitman C, Belgharbi L, Gasse F, Torel C, Mattei V, Zoffmann H: Progress towards the global elimination of neonatal tetanus. World health statistics quarterly Rapport trimestriel de statistiques sanitaires mondiales 1991, 45:248-56.
7. Organization WH: Maternal and neonatal tetanus elimination by 2005: strategies for achieving and maintaining elimination. Geneva, Switzerland: World Health Organization; 2000.
8. Organization WH: Progress towards the global elimination of neonatal tetanus, 1990–1998. Wkly Epidemiol Rec 1999, 74:73-80.
9. Boggs M, Bradley P, Storti C: Communication for immunization campaigns for maternal and neonatal tetanus elimination. A guide to mobilizing demand and increasing coverage. 2006.
10. Organization WH: Maternal and neonatal tetanus elimination by 2005. Strategies for achieving and maintaining elimination. 2010.
11. Lambo JA, Nagulesapillai T: Neonatal tetanus elimination in Pakistan: progress and challenges. International Journal of Infectious Diseases 2012, 16:e833-e42.
12. Organization WH: Review of National Immunization Coverage 1980–2008. 2009.
13. Organization WH: Immunization surveillance, assessment and monitoring. 2004.
14. Afridi NK, Hatcher J, Mahmud S, Nanan D: Toxoid vaccination status among females of reproductive age in Peshawar. JCPSP 2005, 15:391-5.
15. Zeb A, Zaidi S, Jehan I: Knowledge attitude and practices of reproductive age females about tetanus toxoid vaccine: a pilot study. Journal of the College of Physicians and Surgeons Pakistan 2006, 16:791-3.
16. Hasnain S, Sheikh N: Causes of low tetanus toxoid vaccination coverage in pregnant women in Lahore district, Pakistan. Eastern Mediterranean Health Journal 2007, 13:1142-52.
17. Ismail K, Sarmad R, CH MA: Assessment of knowledge about prophylaxis of neonatal tetanus among traditional birth attendants. Biomedica 2007, 23.
18. Nusrat Nisar NAaFM: Tetanus toxoid vaccination coverage among pregnant women at tertiary care hospital, sindh pakistan. Gynaecology & Obstetrics 2010, 16:272-5.
19. Naeem M, Khan M, Abbas SH, Adil M, Khan A, Naz SM, Khan MU: Coverage and factors associated with tetanus toxoid vaccination among married women of reproductive age: a cross sectional study in Peshawar. J Ayub Med Coll Abbottabad 2010, 22:136-40.
20. Agresti A: An introduction to categorical data analysis: Wiley New York, 1996.
21. Perry H, Weierbach R, Hossain I, Islam R: Tetanus toxoid immunization coverage among women in zone 3 of Dhaka city: the challenge of reaching all women of reproductive age in urban Bangladesh. Bulletin of the World Health Organization 1998, 76:449.
22. Suleman O: Mortality from tetanus neonatorum in Punjab (Pakistan). Pakistan pediatric journal 1982, 6:152-83.
23. Lambo JA, Memon MI, Khahro ZH, Lashari MI: Epidemiology of neonatal tetanus in rural Pakistan. JPMA 2011, 61.
24. National Bureau of Economic Research. (2006). Education and health: evaluating theories and evidence.