

# Tetanus Toxoid Vaccination Coverage and Associated Factors among Pregnant Women in Duguna Fango District, Southern Ethiopia

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## ABSTRACT

Two doses of maternal tetanus toxoid vaccination to pregnant women can reduce much of neonatal tetanus infection. However, low level of this immunization coverage often due to missed opportunities is a problem in Ethiopia. Therefore, this study aimed to assess tetanus toxoid vaccination coverage during pregnancy and associated factors among women in Duguna Fango district, Southern Ethiopia. We conducted a community based survey in April, 2016 involving 462 women. A multi-stage cluster sampling was used to select the study participants. Data was collected by using interviewer administered questionnaire, entered in Epi info version 3.5.4, and analyzed in SPSS version 20. Bivariate and multivariate logistic regression was applied to identify predictors after adjusting for potential confounders. We reported Adjusted Odds Ratio (AOR) with 95% confidence intervals (CI). About 69.3% women who had child birth in the last one year had two and more tetanus toxoid vaccination. Women who received advice on tetanus toxoid vaccination [AOR=7.15 (CI: 3.29, 15.52)], recent child birth at health facility [AOR=1.87(CI= 1.22, 2.87)], and good knowledge on tetanus toxoid vaccination [AOR=2.45(1.59, 3.75)] were independent predictors for tetanus toxoid vaccination coverage in this study. About 49.4% of children who were born in the last pregnancy were protected from tetanus at birth. Institutional delivery, maternal knowledge and health workers advice on tetanus vaccination were major predictors for tetanus toxoid vaccination coverage among women in their recent pregnancy. Tetanus toxoid vaccination and institutional delivery should be strengthened for women to protect their children at birth against neonatal tetanus.

**Key words:** Tetanus Toxoid; vaccination; immunization; missed opportunities

## INTRODUCTION

Two and more doses of Tetanus Toxoid (TT<sup>2+</sup>) vaccination to pregnant women can prevent neonatal tetanus; often called protection at birth. [1,2] In many countries, tetanus toxoid vaccination is integrated to maternal health care whereby at least two doses of the vaccine can be given to pregnant women during Antenatal Care (ANC) visits. [3] Achievements of

optimal ANC would imply better TT<sup>2+</sup> coverage when missed opportunities are limited. [4] Globally in 2013, about 82% of newborns were protected at birth through maternal TT immunization; [5,6] whereas in Ethiopia in 2016, more than 51% of women had their last birth not protected against neonatal tetanus; [4] and also did not manage to achieve neonatal tetanus elimination target for 2015. [7] In this country, though

there have been tremendous progress in maternal health care, still 78% of pregnant women did not get optimal ANC. [4] On the other hand, many women who happened to visit for the care often miss the opportunity for TT vaccination; mainly due to limitations in health care system. [8] This is explained mainly due to low tetanus toxoid immunization coverage coupled with high proportion of unskilled child birth attendance. [6] Despite several studies were conducted in Ethiopia on antenatal care service utilization, tetanus toxoid vaccination coverage and its predictors; however, was unknown in rural Duguna Fango district, Southern Ethiopia. Therefore, the objective of this study was to assess tetanus toxoid vaccination coverage and associated factors in the study area with the intention to strengthen evidence on TT vaccination coverage and to identify missed opportunities in addressing women's immunization status. The findings of this study might add operational evidence on progress towards tetanus elimination in the study area.

## **MATERIALS AND METHODS**

### **Study setting and design**

Duguna Fango is one of 12 rural districts in Wolaita zone, Southern Ethiopia. It has 26 rural and 6 semi-urban kebeles (the lowest administrative unit of government). A projected total population of the area was about 122,316 for the year 2016. Among them about 29,000 women were in reproductive age (15-49 years), and about 4,232 were the expected pregnancies. Five health centres, one primary hospital, and 31 health posts provide ANC service including TT vaccination. We implemented a community based cross-sectional study involving randomly selected 462 women who had given at least one birth within the past one year prior to the survey in April, 2016. Women aged 15-49 years who gave child birth within the last one year prior to the survey were the source population and randomly selected women who gave birth

within the last one year were study population.

### **Sample size and sampling procedure**

Sample size was computed anticipating 83.7% TT<sup>2+</sup> proportion which was taken from a similar study in selected Ethiopian zone, [9] 95% confidence level, design effect of 2, 5% level of precision, and 10% for non-response rate. Finally the calculated sample size was 462 women. We used multi-stage cluster sampling technique to select study participants. Out of 32 kebeles in the district 10 were selected by simple random sampling (two urban and eight rural). We then proportionally assigned the sample to the 10 kebeles based on number of child births in each kebele; which was obtained from the district health offices. Households with eligible women were numbered and selected by systematic random sampling technique. Data was collected until the required sample was achieved. Where more than one eligible mother in a household existed, one was selected using lottery method. Women who lived at least 2 years in the area and gave birth within one year prior to the date of data collection were included. Those women who were seriously ill, those with disabilities of speech or hearing, and mentally ill were excluded.

### **Variables and definitions**

Primary outcome variable in our study was two or more tetanus toxoid (TT<sup>2+</sup>) vaccination status while the secondary outcome variable was infants protected at birth from neonatal tetanus.

Socio-demographic and economic characteristics of mothers (age, residence, occupation, educational status, marital status, and religion); maternal health service related factors (ANC visits, place of delivery, tetanus toxoid vaccine utilization, and cord care for home delivery) were some of covariates. Women who answered at least average of questions related tetanus toxoid were categorized as good knowledge and

those who answered below average were categorized as having poor knowledge. [10]

### Data collection and analysis

An interviewer administrated questionnaire which was adapted from related tools was used to collect data. [11-14] The tool was pre-tested in 5% of the sample and relevant modifications were made on questionnaire. For women who had vaccination card, dates of vaccination were recorded from the cards; however, for those who had no card verbal response was considered for number of doses. Intensive training was given for 10 data collectors and 4 supervisors on contents of the questionnaire, field methods and ethics. Daily supervision was done during data collection period. Then data was entered in Epi info version 3.5.4 and cleaned and analyzed in SPSS version 20. Descriptive statistics ie frequency and proportion, univariate and multivariate analysis were done. Variables with p-value less than a yardstick cut-off point 0.25 in univariate analysis were considered for logistic regression. Odds ratio with 95% confidence interval was used to look for association. After controlling potential confounders in multivariate logistic regression, adjusted odds ratio (AOR) with 95%CI were used to declare statistically significant association.

### Ethics approval and consent

Ethical clearance was obtained from the ethical review committee of Wolaita Sodo University College of Health Sciences and Medicine. Letter of cooperation was taken from Wolaita zone Health Department to Duguna Fango district health office and then to each kebele administrative units. Verbal consent was obtained from the study participants and confidentiality was assured for all the information provided.

## RESULTS

### Socio demographic characteristics

A total of 462 women who delivered within one year before the survey were interviewed making response rate of 100%.

About 426 (92%) of the respondents were in the age group between 15-34 years, 377(81.6%) resided in rural, 438(95%) were married, 333(72%) attended formal education, 304 (65.8%) were protestant by religion, 371 (80.3%) were house wife by occupation and 448 (97%) were Wolaita by ethnicity. (Table 1)

**Table 1. Socio demographic characteristics of study women in Duguna Fango district, Southern Ethiopia, 2016**

Variable(n=462)	Frequency	Percent
Age		
15-24	146	31.6
25-34	280	60.6
35-49	36	7.8
Residence		
Rural	377	81.6
Urban	85	18.4
Marital status		
Married	438	95
Single	3	0.6
Divorce	11	2.4
Widowed	10	2.2
Educational status		
No formal education	129	28
Formal education	333	72
Religion		
Protestant	305	66
Orthodox	129	27.9
Catholic	28	6.1
Ethnicity		
Wolaita	448	97
Others	14	3
Occupation		
House wife	371	80.3
Others	91	19.7
Presence of TV/Radio		
Yes	209	45.2
No	253	54.8

### Knowledge of women on tetanus vaccination

About 432(93.5%) of the study participants reported that they heard of the disease tetanus and 340(73.6%) of them knew that tetanus is one of Expanded Program on immunization (EPI) preventable disease. This study showed that 368(79.7%) of women knew how the disease tetanus is acquired and 379(82%) knew that how it could be prevented but only 174(37.7%) knew minimum number of doses required during pregnancy to prevent neonatal tetanus. The overall knowledge status of the women on tetanus vaccination in our study was categorized as good for 263(56.9%) of study participants. (Table 2)

Table 2 Women's knowledge about tetanus toxoid vaccination in Duguna Fango district, Southern Ethiopia, 2016

Variables (n=462)	Frequency (%)	COR(95% CI)
Heard of the disease tetanus		
Yes	432(93.5)	3.73(1.74,7.96)
No	30(6.5)	1
Know tetanus is one of EPI preventable diseases		
Yes	340(73.6)	5.02(2.19,11.47)
No	122(26.4)	1
Know how is tetanus acquired		
Yes	368(79.7)	3.01(1.79,5.26)
No	94(20.3)	1
Know how is tetanus prevented		
Yes	379(82)	0.89(0.08,9.86)
No	83(18)	1
Know number of TT doses required during pregnancy		
Yes	174(37.7)	7.51(3.79,14.85)
No	288(62.3)	1
Knowledge status		
Good knowledge	263(56.9)	2.94(1.95,4.42)
Poor knowledge	199(43.1)	1

### Maternal health service utilization and TT vaccination status

About 369 (79.9%) of the women had antenatal care visit. Among those women who visited health facility for antenatal care 148(40.1%) utilized antenatal care service for at least four times. Among those women who visited ANC during last pregnancy, 329(87.8%) received advice on tetanus toxoid vaccination. In this study, 277 (60.0%) women gave birth of their last

child at home; 40(14.4%) had malpractice on cord care which could predispose their infants for neonatal tetanus. Among those women who visited antenatal clinic during last pregnancy, 329(87.8%) got advice on tetanus toxoid vaccination and 228(54.7%) of them took the vaccine for two and more times. The overall prevalence of children protected at birth in this study was 228(49.4%). (Table 3)

Table 3 Maternal health service utilization among women in Duguna Fango district, Southern Ethiopia, 2016

Variables	Frequency	Percent
ANC visit for the recent pregnancy		
Yes	369	79.9
No	93	20.1
Place of ANC service (n=369)		
Health Post	117	31.7
Health Centre	113	30.6
Hospital	64	17.3
Combination of all	75	20.4
Number of visit to health facility (n=369)		
< four visits	221	59.9
≥ four visits	148	40.1
Got advice on TT		
Yes	329	87.8
No	40	12.2
Vaccinated TT during last pregnancy (n=369)		
Yes	301	81.6
No	68	18.4
Number of doses (n=301)		
One	73	24.3
Two & more	228	75.7
Child protected at birth (n=462)		
Yes	228	49.4
No	234	50.6
Source information on vaccination		
Card	164	35.5
History	298	64.5
Place of delivery		
Home	277	60
Health facility	185	40
What were put on cord during home delivery		
Substance(butter, cow dung, etc)	40	14.4
Nothing	237	85.6

### Factors associated with Tetanus Toxoid vaccination

In this study, age of the women, place of recent birth, advice on tetanus toxoid vaccination and level of maternal

knowledge on tetanus toxoid vaccination have shown statistically significant association on bivariate analysis; however, maternal age did not maintain its association in multivariate analysis. (Table 4)

**Table 4 Bivariate and multivariate logistic regression for factors associated with tetanus toxoid vaccination status in Duguna Fango district, Southern Ethiopia, 2016**

Variable	Number (%)	COR(95% CI)	AOR(95% CI)
Age of mother			
15-24	146(31.6)	1.96(1.92,2.58)	1.46(0.64,3.34)
25-34	280(60.6)	1.78(1.54,2.82)	1.19(0.56,2.59)
35-49	36(7.8)	1	1
Place of delivery			
Health facility	185(40)	1.73(1.16,2.59)	1.87(1.22,2.87)
Home	277(60)	1	1
Got advice on TT			
Yes	329(87.8)	8.31(3.93,17.54)	7.15(3.29,15.52)
No	40(12.2)	1	1
Maternal knowledge status on TT			
Good knowledge	263(56.9)	2.94(1.95,4.42)	2.45(1.59,3.75)
Poor knowledge	199(43.1)	1	1

### DISCUSSION

The study was conducted to assess TT<sup>2+</sup> coverage (by history and card) and associated factors among women who gave birth within the past one year prior to data collection in Southern Ethiopia. The proportion of women who received sufficient doses of tetanus toxoid vaccination to protect their last birth against neonatal tetanus was 228 (49.4%). This finding is in line with EDHS 2016 report which is 49 percent. However, it is higher than the study conducted in Turkey (47%) and lower than the survey conducted in Pakistan, India, Ghana, Tigray and Hadiya zone which ranges from 70 to 94%. [15-19] The reason for the difference might be the difference in sample size, in social and cultural differences. Thus attempts should continue to achieve the WHO standard such that all women and their newborn babies should be protected against tetanus.

Study participants who delivered their last child in the health facility were more likely got two and more doses of tetanus toxoid than those mothers who delivered their last child at home [AOR = 1.87, (95 % CI = 1.22, 2.87)]. A study conducted in Indonesia, reveals maternal health service utilization (basically antenatal care and delivery service) enhance TT vaccination. [20] This might be due to the fact

that maternal contact to health workers gave an opportunity to utilize the service. Therefore, fostering antenatal care service and institutional delivery utilization should be a priority agenda to eliminate maternal and neonatal tetanus in the study area.

Those mothers who received advice on tetanus toxoid vaccination during antenatal visit were about 7 times more likely got two and more doses of the vaccine than those mothers who did not get the advice [AOR = 7.15, (95 % CI = 3.29, 15.52)]. A systematic review of different literature conducted on maternal vaccination; [21] reveals health care workers recommendation and advice has significant effect on utilization of tetanus toxoid vaccination. Thus, health workers need to give time to convey advice to mothers and provide two doses of tetanus toxoid vaccination one month apart during pregnancy so as to prevent nearly all tetanus infections in both mothers and their newborn children.

Those mothers with good knowledge status on tetanus toxoid vaccination were 2.45 times more likely got two and more doses of tetanus toxoid than those mothers with poor knowledge status [AOR = 2.45, (95 % CI = 1.59, 3.75)]. This finding is in line with the study conducted in Indonesia such that having knowledge on tetanus

toxoid tended to have a higher chance of receiving the vaccine. [20] Thus providing information to mothers on benefits, timing and frequency of tetanus toxoid vaccination should be strengthened using variety of methods.

In this study there might be recall bias for doses taken among women who lack vaccination card and there may also be interviewer bias during data collection period.

## CONCLUSIONS

About half (49.4%) of women who gave birth made their young children protected at birth from neonatal tetanus infection. Institutional delivery, maternal knowledge and health workers advice on tetanus vaccination were major predictors for utilization of tetanus toxoid vaccination among women in their recent pregnancy. Behaviour change communication on institutional delivery and tetanus toxoid vaccination should be strengthened for women to protect their children at birth against neonatal tetanus.

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