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Dropout Rate of Tetanus Toxoid Immunization and Associated Factors among Reproductive Age Group of Women in Debrebirhan Town, Amhara Region, Northern Ethiopia

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Abstract

Background: Tetanus is a severe disease that kills one new born every eleven minutes or 134 babies each day. To prevent the infection of both mother and the newborn, tetanus toxoid immunization is given to pregnant women and women of child bearing age in Ethiopia. However, little data is available on the dropout of tetanus toxoid immunization among the reproductive age group of women in the study area.

Methods: with the objective of to assess the drop out of tetanus toxoid immunization and its associated factors among the reproductive age group of women in Debrebirhan Town, Amhara region, Ethiopia, a community based cross-sectional study was conducted from March 1 to 30, 2017 on systematically sampled 422 study subjects. The data was collected using interviewer administered pretested questionnaires and the collected data was entered into Epi-data version 3.1.5, then, exported to SPSS version 20 for analysis. Descriptive statistical analysis was done and frequency distributions displayed, mean and standard deviations were calculated. Then, bivariate and multivariate logistic regression analysis was done to identify the association between independent and dependent variables.

Result: The study showed that the dropout rate of tetanus toxoid was 72.3% of which tetanus toxoid vaccine 5th accounts for 29.8% of the drop out. Knowledge of the importance of TT vaccine, number of required doses for full immunization, its schedules, educational status and occupational status of the study participants were found to be significantly associated with dropout rate of TT immunization.

Conclusion: The prevalence of dropout rate of tetanus toxoid immunization was high in the study area and Knowledge of the importance of TT vaccine, number of required doses for lifelong protection and, its schedules, educational and occupational status were found to be significantly associated with TT immunization dropout rate.

Keywords: Tetanus toxoid; Immunization; Dropout rate; Vaccine; Health care

Abbreviations ANC: Ante-Natal Care; CBAW: Child Bearing Age Women; DTP: Diphtheria, Tetanus & Pertussis; EDHS: Ethiopian Demographic and Health Survey; EPI: Expanded program on Immunization; EHNRI: Ethiopia Health and Nutrition Research Institute; HEW: Health Extension Worker; MCH: Maternal and Child Health; MNT: Maternal and Neonatal Tetanus; MOH: Ministry Of Health; NNT: Neo-Natal Tetanus; PI: Principal Investigator; SIA: Supplementary Immunization Activities; TBA: Traditional Birth Attendant; TT: Tetanus Toxoid; TTI: Tetanus Toxoid Immunization; UNICEF: United Nation International Children's Education Fund; WHO: World Health Organization

Introduction

Tetanus Toxoid is one of the vaccines used to prevent tetanus. Females are more exposed to the risk of tetanus, especially during unsafe home delivery or abortion by untrained birth attendance and suffer from puerperal tetanus thus, tetanus toxoid (TT) is administered to women of reproductive age (15-49 years) groups to protect them and their new born babies from tetanus [1,2]. The majority of mothers and new born dying of tetanus live in Africa and Southern and East Asia, generally in areas scarred by poverty, poor medical infrastructure or humanitarian crises, as well, where women are poor, have little access to health care, and have little information about safe delivery practices [3]. Once the disease is contracted, the fatality rate can be as high as 100% without hospital care and between 10%-60% with hospital care. The true extent of the tetanus death is not known as many new born and mothers die at home and neither the birth nor the death is reported [4]. Immunization is unquestionably one of the most cost-effective and lifesaving public health interventions that can be used to protect children from vaccine-preventable diseases [5]. Among deaths due to diseases preventable by vaccines currently recommended by WHO, tetanus accounts for 10% (213,000) and 13% (180,000) of mortality in all age group and neonates respectively [1].

For lifelong protection from tetanus a woman needs a total of five TT doses and at least two doses of TT vaccine (TT1 and TT2), to get some protection against tetanus at birth [2]. On the other hand for effective utilization of the service, having information or education on TT immunization is very important. A cross sectional study in Kenya

showed that there is significant association between having health information and tetanus toxoid immunization status. Concerning the source of TT immunization information, 33.6% participants heard from a health workers, 30.9% from school, 13.8% from mass media, 8.2% from both mass media and family members and the remain 6.2% heard from family members alone [6].

However, the issue of dropout rate is a challenge for the EPI program at large and tetanus toxoid immunization in particular. Studies show that a number of countries experience dropout rate in TT vaccines among reproductive age groups. For example, in Bangladesh to Bemanda most of rural women never received TT5 and 55.6% have dropped because various factors like lack of awareness poor education and socio-economic conditions [7]. A study conducted in Kenya revealed that there was dropout rate of 29% between the first and the second dose of tetanus toxoid immunization [6]. In Ethiopia Expanded Program on Immunization (EPI) baseline report shows nearly 74% of mothers had received two doses of TT but only 18% of mothers completed their TT vaccination schedule [5]. A cross-sectional study conducted on women of reproductive age showed that the overall dropout for TTI was 55.6% for TT1-TT5, which reflected that 55.6% women who received TT1 didn't get fully immunized for life-long protection against tetanus. The dropout rate was 5.3% for TT1-TT2, 14.7% for TT2-TT3, 20.2% for TT3-TT4 and the highest i.e. 31.1% was for TT4-TT5 [6].

Another study conducted in Peshawar on the coverage and factors associated with tetanus toxoid vaccination among married women of reproductive age, showed that 55.6% completely vaccinated, 22.4% incompletely vaccination, and 22.0% never vaccinated. Demographic Health Survey conducted in Bangladesh revealed that Drop-out from TT1 and TT2 were only 3-11%, but those from TT1 to TT5 were 70-82% [8]. Similarly, study conducted in Federal Medical Centre, Umuahia, Abia State, South East Zone, Nigeria showed that dropout of TT1/TT2 ranged from 14% in 2011 to 28% in 2009 [9]. Concerning the factors associated with tetanus toxoid immunization dropout rate, study conducted in Kenya revealed that age was significantly associated with TT immunization status of women [6].

Additionally, the DHS 2011 of Ethiopia showed that women age of 20-34 years was found to be more likely to have received two or more tetanus injections than women under the age of 20 or 35-49 [10]. Another cross-sectional study revealed that married women were three times more likely to be engaged in tetanus toxoid vaccine than single women [11]. Other studies showed that correct knowledge of the complete dose of TT, attitude of mothers towards TT immunization, were significantly associated with receiving the complete dose of TT [12,13]. Another study conducted in India showed that woman's education is an important determinant of health-seeking behavior and positively influenced the likelihood of TT vaccination. In the study, it was shown that higher education levels were associated with higher up take of TT immunization and complete TT vaccine when compared to those with no education [14].

As to the reported reasons for not having completed TT vaccines were lack of awareness, not knowing the time of TT vaccination and fear of side effect, not knowing the need to return for 2nd and 3rd dose, lack of awareness of need and importance of TT immunization, lack of motivation, lack of faith in immunization, postponing till another time, rumors, place of vaccination too far. time of immunization inconvenient, not informed of outreach dates, family problems and perceived health staff unfriendly, being busy, misconception, cultural belief, absence of TT vaccines were some of the reasons for the TT vaccine drop out [6-8,13,15]. Though there are some reports on the overall coverage of EPI in Ethiopia, there is little data on TT immunization dropout rate at this study area. Therefore, the purpose of this study was to determine the TT immunization dropout rate and its associated factors among reproductive age group of women in Debreberhan town.

Method and Materials

A community based cross sectional study was done from March 1-30, 2017, with the objective to identify the dropout rate of tetanus toxoid immunization and its associated factors on systematically sampled 422 reproductive age group of women in Debrebirhan Town, Amhara Region, Northern Ethiopia. The town is located at 130 kilometers Northeast of Addis Ababa on the way to Dessie-Mekele road. To select the study units first the total reproductive age group of women population in the households of the entire nine Kebeles (the lowest administrative units) of Debrebirhan town were enumerated which was found to be 18210. Then, the sample size for each Kebele was proportionately allocated based on the respective reproductive age population in each kebele. Then, systematic sampling technique was used to select study subjects in the respective kebeles.

Data was collected using interviewer administered pre-tested semi structured questionnaire by three trained data collectors through face to face interview. The instrument consisted of n socio-demographic characteristics (age, marital status, number of children, educational status, occupational status), knowledge related items (the importance of TT Vaccine, the number of TT dose required for lifelong protection, the time interval between each TT injections (doses).

Before the actual data collection ethical clearance was obtained from Jimma University Institutional review board (IRB) to Debreberhan town administrative authorities, and verbal consent was obtained from the study participants, privacy and confidentiality was maintained. To maintain consistency, the interviewer-administered structured questionnaire was first translated from English to Amharic, the native language of the study area, and was retranslated back to English by professional translators. To ensure reliability and validity of the instrument, pre-test was done on 5% of the sample in in Shewarobit town, quality of data was monitored through day-to-day checkup of the collected data for completeness by two field supervisors, and data was cleared and checked for consistence before analysis.

The collected data was cleared, coded, and entered into Epi-data version 3.1 statistical software and then, exported to Statistical Package for Social Sciences (SPSS) version 20 for analysis. Descriptive statistics, including frequencies, percent and measures of central tendencies were computed. Variables with pv<2.5 in bivariate analysis were included in multivariate analysis, to identify factors associated with drop out of TT immunization at significance level of pv<0.05, with confidence interval of 95% and α=0.5%.

Result

Socio-demographic characteristics

Overall, 408 subjects have participated on the study out of 422 intended sample making the response rate 96.6%. The study showed that majority 183 (44.9%) were between the age of 25-35, followed by age>35 years 121 (29.7%), with mean age of 30.8 ± 7.36, and 291 (71.3%) were belong to the Amhara followed by 73 (17.9%) Oromo

ethnic group. As to educational status, 117 (28.7%) were collage and above, followed by 105 (25.7%) high school (9-12 grade). By occupation, majority 112 (27.5%) were housewives, by religion 325 (79.7%) were orthodox, 246 (60.3%) married and majority, 130 (31.9%) had monthly income 3371-5000 Ethiopian birr (Table 1).

Variables	Frequency (No.)	Percentage (%)
Age		
≤ 24	104	25.5
25-35	183	44.9
>35	121	29.7
Ethnicity		
Amhara	291	71.3
Oromo	73	17.9
Tigray	22	5.4
Gurage	19	4.7
Others*	3	0.7
Education status		
Unable to read and write	94	23
Able to read and write	55	13.5
Elementary (1-8 grade)	37	9.1
High school (9-12)	105	25.7
Collage and above	117	28.7
Occupational status		
Housewife	112	27.5
Student	77	18.9
Government employee	63	15.4
Non-governmental employee	67	16.4
Merchant	64	15.7
Daily labourer	25	6.1
Religion		
Orthodox	325	79.7
Muslim	36	8.8
Protestant	28	6.9
Catholic	19	4.7
Marital status		
Married	246	60.3
Single	114	27.9
Divorced	27	6.6
Widowed	21	5.1

Monthly income		
≤ 2000	118	28.9
2001-3370	86	21.1
3371-5000	130	31.9
>5000	74	18.1

Table 1: Socio-demographic characteristics of study participants in Debrebirhan Town, Amhara Region, North Ethiopia, 2017 (n=408) (Other*silte).

Source of information, patterns of TT immunization and its dropout rate among the study participants

The study showed that the dropout rate of tetanus toxoid immunization among reproductive age group of Debreberhan town was 72.3% among which 88 (29.8%) was for TT5, and all the study participants have heard about TT immunization. Regarding the source of information on tetanus toxoid immunization, where majority 264 (64.7%) heard from health workers followed by from school 88 (21.6%), 8.1% from mass media, and 5.6% from community. As to the place where the participants got the immunization, 42.6% at health center, 23.3% school, 22.5% hospital, 5.9% health post and 5.6% at outreach sites. Concerning the knowledge of time interval between each TT injection, only 38 (9.3%) of the study participants responded correctly (Table 2).

Variables	Frequency (No.)	Percent (%)
Source of information for TT Immunization taken		
Patterns of TT immunization		
TT1	97	23.8
TT2	94	23
TT3	93	22.8
TT4	88	21.6
TT5	36	8.8
Knowledge on importance of TT immunization		
To protect self alone from Tetanus	84	20.6
To protect new born alone during pregnancy and delivery	132	32.4
To protect both, self and child from tetanus	84	20.6
I don't know	108	26.5
Knowledge on number of TT immunizations needed for lifelong protection		
One	34	8.3
Two	123	30.1
Three	18	4.4
Four	49	12
Five	98	24
I don't know	86	21.1

Table 2: Source of information and Knowledge on TT immunization among study participants in Debrebirhan Town, Amhara Region, North Ethiopia, 2017 (n=408).

Regarding the total dose of Tetanus Toxoid immunization taken, ninety seven (23.8%) have taken TT1 and 36 (8.8%) took five dose of Tetanus Toxoid immunization. On the knowledge of the advantages of TT immunization, majority 132 (32.4%) reported that TT immunization is important to protect new born alone during pregnancy and delivery and concerning the number of doses for

lifelong protection majority 123 (30.1%) said two doses of TT immunization (Table 2).

Reasons for TT vaccine dropout

The reasons for dropout of TT vaccination were, not knowing the time of TT immunization 214 (72.5%), forgetting 187 (63.4%), and lack of active follow up of defaulters 116 (39.3%), fear of side effect 92 (31.2%) were the major reasons given by respondents (Tables 3 and 4).

Reasons for dropout of TT vaccination	Frequency (No.)	Percentage (%)
Family problem	54	18.3
Being busy	70	23.7
Perception that staff are unfriendly	37	12.5
Don't know the time of each TT immunization schedule	214	72.5
There is no active follow up of defaulters	116	39.3
Fear of side effect	92	31.2
Postponed time of immunization until another time	22	7.5
No faith in immunization	17	5.8
Frequency of health visits are limited	20	6.8
Rumors	3	1
Cultural belief	7	2.4
Misconceptions	28	9.5
Forgetting	187	63.4
Other**	2	0.7

Table 3: Reasons for TT vaccine dropout among study participants in Debrebirhan Town, Amhara Region, North Ethiopia, 2017 (n=295) ().

Variables	TT immunization dropout		AOR	P-value	95% CI
	Yes (%)	NO (%)			
Age in years					
≤ 24	82(27.8%)	22(19.5%)	1		
25-35	110(37.3%)	73(64.6%)	0.368	0.08	0.120-1.126
>36	103(34.9%)	18(15.9%)	0.932	0.912	0.265-3.276
Education level of women					
Cannot read and write	80(27.1%)	14(12.4%)	1		
Only Read and write	47(15.9%)	8(7.1%)	0.209	0.040**	0.047-0.929
Elementary (1-8 grade)	28(9.5%)	9(8.0%)	0.403	0.284	0.076-2.129
High school (9-12)	74(25.1%)	31(27.4%)	0.136	0.001**	0.041-0.446
Collage and above	66(22.4%)	51(45.1%)	0.088	0.0001**	0.028-0.281
Marital status					
Single	92(31.2%)	22(19.5%)	1		
Married	164(55.6%)	82(72.6%)	4.961	0.054	0.970-25.359

Divorced	22(7.5%)	5(4.4%)	7.954	0.045**	1.044-60.614
Widowed	17(5.8%)	4(3.5%)	3.684	0.19	0.525-25.868
Occupation					
House wife	98(33.2%)	14(12.4%)	1		
Student	62(21.0%)	15(13.3%)	0.582	0.461	0.138-2.455
Government employer	16(5.4%)	47(41.6%)	0.158	0.003**	0.046-0.545
Private employer	53(18.0%)	14(12.4%)	0.947	0.932	0.274-3.273
Merchant	42(14.2%)	22(19.5%)	0.536	0.312	0.160-1.793
Daily labourer	24(8.1%)	1(0.9%)	22.095	0.023**	1.523-20.5
Monthly income in Birr					
≤ 2000	102(34.6%)	16(14.2%)	1		
2001-3370	70(23.7%)	16(14.2%)	0.896	0.861	0.970-25.359
3371-5000	85(28.8%)	45(39.8%)	0.403	0.132	1.044-60.614
>5000	38(12.9%)	36(31.9%)	0.2	0.017	0.525-25.868

Table 4: Socio-demographic variables associated with tetanus toxoid immunization dropout among study participants in Debrebirhan Town, Amhara Region, North Ethiopia, 2017 (n=408) (**p-value less than 0.05 considered as statically significant).

Factors associated with TT vaccine dropout

The study showed that the educational status of the reproductive age group of women was associated with TT immunization status indicating that women of college and above were 91.2% less likely to dropout TT immunization when compared to those who are illiterates with (AOR: 0.088, p-value: 0.0001, 95% CI: 0.028-0.281). As to marital status, divorced women were 8 times more likely to drop out TT vaccine when compared to those of singles with (AOR: 7.954, p-value: 0.045, 95% CI: 1.044-60.614).

Government employees were 84.2% less likely to drop out TT immunization with (AOR: 0.158, p-value: 0.003, 95% CI: 0.046-0.645) and daily labour were 22 times more likely to drop out TT immunization (AOR: 22.095, p-value: 0.023, 95% CI: 1.523-320.5) when compared to those of house wives, and women having history of pregnancy were 82.6% less likely to dropout TT immunization when compared to those having no history of pregnancy (Table 5).

Variable	TT immunization dropout		AOR	P-value	95% CI
	Yes	NO			
History of pregnancy					
No	129(43.7%)	25(22.1%)	1		
Yes	166(56.3%)	88(77.9%)	0.174	0.017**	0.042-0.732
Knowledge of importance of TTI					
To protect self alone from Tetanus	49(16.6%)	35(31.0%)	0.129	0.001**	0.039-0.421
To protect new born alone	101(34.2%)	31(27.4%)	0.35	0.067	0.114-1.077
To protect both, self and child	50(16.9%)	34(30.1%)	0.072	0.0001**	0.021-0.250
I don't know	95(32.2%)	13(11.5%)	1		
Knowledge of the time interval between each TT injections					
No	278(94.2%)	92(81.4%)	1		
Yes	17(5.8%)	21(18.6%)	0.129	0.001**	0.039-0.426

Knowledge of Number of TT injections needed for full vaccination					
One	27(9.2%)	7(6.2%)	2.56	0.721	0.480-13.664
Two	102(34.6%)	21(18.6%)	1.224	0.752	0.350-4.290
Three	15(5.1%)	3(2.7%)	4.731	0.183	0.481-46.546
Four	40(13.6%)	9(8.0%)	1.821	0.406	0.443-7.487
Five	47(15.9%)	51(45.1%)	0.255	0.014**	0.085-0.761
I don't know	64(21.7%)	22(19.5%)	1		

Table 5: Association between history of pregnancy, knowledge on TT immunization and TT immunization dropout among study participants in Debrebirhan Town, Amhara Region, North Ethiopia, 2017 (n=408) (**p-value less than 0.05 considered as statically significant).

Furthermore, study participants who have the knowledge of the importance of TT vaccine to protect both self and new born from tetanus were 92.8% less likely to drop out TT vaccine with (AOR: 0.072, p-value: 0.0001, 95% CI: 0.021-0.250) when compared to those who don't have the knowledge. Similarly, women who know the time interval between each TT vaccine injection were 87.1% less likely drop out TT vaccine when compared to those who didn't have the knowledge (AOR: 0.129, p-value: 0.001, 95% CI: 0.039-0.426 (Table 5).

Discussion

The study showed that the TT immunization dropout rate among the reproductive age group of women in Debreberhan town was 72.3%. The finding of this study is greater than the figure in Bangladesh which accounted (55%) [7]. The possible explanation for this difference might be related to the differences in socio-demographic characteristics, degree of awareness, culture and beliefs towards immunization. As to the factors associated with TT immunization, the study showed that educational status of study participants was associated with TT immunization dropout rates with women who can read write (AOR: 0.209, p-value: 0.040, 95% CI: 0.047-0.929), elementary school (AOR: 0.136, p-value: 0.001, 95% CI: 0.041-0.446) and college and above (AOR: 0.088, p-value: 0.0001, 95% CI: 0.028-0.281), were 79.1%, 86.4% and 91.2% less likely to drop out TT immunization respectively. The findings of this study was found to be consistent with the findings of a study conducted in India [14].

The study also showed that government employees were 84.2% less likely to drop out TT immunization (AOR: 0.158, p-value: 0.003, 95% CI: 0.046-0.645) and those who are daily labours were 22 time more likely to drop out TT vaccine (AOR: 22.095, p-value: 0.023, 95% CI: 1.523-320.5) when compared to house wives. This finding was found to be consistent with the findings of the study done in rural community of Bangladesh and Cameron [7,13]. Women having history of pregnancy were 82.6% less likely drop out TT vaccine when compared to those who don't have pregnancy history. This finding was consistent with the study conducted in Bahirdar [11]. The explanation may be linked to the fact that those who have history of pregnancy might have exposure to information, or education and counselling on TT immunization by health care providers during antenatal care. On the other hand, divorced women were 8 times more likely to drop out TT vaccine when compared to singles (AOR: 7.954, p-value: 0.045, 95% CI: 1.044-60.614). This might be related to lack of support and motivations by divorced women when compared to those of married ones.

Moreover, women who knew the time interval between each TT vaccine injection were 87.1% less likely to drop out TT vaccine (AOR: 0.129, p-value: 0.001, 95% CI: 0.039-0.426) when compared to those who didn't know and women who knew the required number of TT vaccine for lifelong protection were 74.5% less likely to drop out TT immunization (AOR: 0.255, p-value: 0.014 95% CI: 0.085-0.761) when compared to those without the knowledge. This finding supported by studies conducted in Bamenda [13] and women who knew the required doses of TT vaccine for lifelong protection were 74.5% less likely to dropout TT immunization when compared to those who didn't know it (AOR: 0.255, p-value: 0.014 95% CI: 0.085-0.761. This finding was found to be consistent with the study conducted in Nigeria [12].

Conclusion

The prevalence of dropout rate of tetanus toxoid immunization was high in the study area and knowledge of the importance of TT vaccine, number of required doses for lifelong protection and, its schedules, educational and occupational status were found to be significantly associated with TT immunization dropout rate.

Limitation

The study does not address the causal relationships and cannot be generalized to the national population because of its small scale study features.

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Authors' Contributions

KD: Reviewed the literatures and formulated the concept; TD: Data analysis and coordination of the project; FY: Participated in designing the methods and drafting and editing the manuscript.

Competing Interest

The authors would like to declare that there is no any conflict of interest in any aspect of the manuscript and/or others.

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