

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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Received date: August 17, 2017; Accepted date: August 22, 2017; Published date: August 30, 2017

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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 TT1 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 $p < 0.05$ in bivariate analysis were included in multivariate analysis, to identify factors associated with drop out of TT immunization at significance level of $p < 0.05$, with confidence interval of 95% and $\alpha = 0.05$.

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). 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 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

| 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.

Acknowledgement

Authors would like to express their deepest gratitude to Jimma University, Institute of health, faculty of health sciences, and department of nursing and midwifery for their support and funding to carry out this study and accomplish the project. Furthermore, we would like to extend our gratitude to Debrebirhan town health Office and health extension workers for their cooperation and provision of necessary data for accomplishment of the project work. We also would like to thank the study participants for their willing to participate in the study.

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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