

Research Article

Knowledge, Awareness and Attitude: Reasonable TT Immunization Dose uptake amongst pregnant women in Non Profit Health Facilities in Northern Uganda

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Abstract — The purpose of the study was to assess the impact of the awareness raising, sensitization, knowledge enhancement and education by a not for profit Teboke Mission Health Centre II on participant pregnant mothers who attend ante natal clinics at Teboke Mission HC II on reasonable tetanus toxoid Immunization dose uptake in the health facility. In the past 18 months from 2023, the health facility conducted knowledge enhancement, awareness raising and attitude change initiatives targeting maternal and neonatal tetanus. In this study, pregnant mothers who had received two and above tetanus toxoid Immunization were considered as having received reasonable tetanus toxoid dose. The facility-based, cross-sectional study was conducted over a period of three months targeting 90 pregnant women. The study found out that about 80% of the pregnant mothers were receiving the doses actively due to education, sensitization and awareness about the tetanus toxoid Immunization, its importance, safety, and accessibility. Overall, there is a significant relationship between knowledge, awareness and attitude of pregnant women and Tetanus Toxoid Immunization in Teboke Mission HC II. The knowledge enhancement, awareness raising and education resulted in positive attitude change and enhanced knowledge and awareness for the pregnant women in Apac District thereby increasing the need to attain reasonable Tetanus Toxoid Immunization dose uptake at Teboke Mission Health Centre II during and after pregnancy.

Keywords— Immunization, Tetanus Toxoid, Maternal, Neonatal, Knowledge, Attitude Change

1. Introduction

Teboke Mission Health Centre II (Teboke Mission HC II) is Not for Profit private health facility located in Apac District whose objective is; To provide preventive, promotive and outpatient curative health services, outreach care and emergency deliveries for the Local Community of Apac District in Northern Uganda. Teboke Mission HC II creates awareness in the community through various communication strategies including radio education, community sensitization, oral literature and home visits amongst others. In the past 18 months from 2022, the health facility has been conducting knowledge enhancement, awareness raising and attitude change initiatives targeting maternal and neonatal tetanus.

Commonly known as lockjaw, tetanus is an acute and infectious disease caused by bacterium *Clostridium tetani*, commonly found in contaminated soil. The bacterium which morphs into a neurotoxin on entrance alters the structure or function of the nervous system causing muscle spasm which is tetanus most obvious symptom (1), (2). The diseases have a case fatality rate of 70%-100%(3), generalized tetanus is the leading cause of neonatal tetanus deaths consequential to the contamination of the umbilical cord during excision and

management. Neonatal tetanus (NT) occurs within the first 28 days of life of the newborn, maternal tetanus occurs during pregnancy or within 6 weeks of the end of pregnancy with disregard to pregnancy ending with birth, miscarriage or abortion. Tetanus cases occur due to inadequate vaccination or partial vaccinations on exposure hence increased morbidity and mortality (4),(5).

The purpose of the study was to assess the impact of the awareness raising, sensitization, knowledge enhancement and education by Teboke Mission HC II on participant pregnant mothers who attend ante natal clinics at Teboke Mission HC II on reasonable tetanus toxoid dose vaccination uptake in the health facility which is representative of Apac District in Northern Uganda. The findings here will inform planning of tetanus toxoid vaccination programs towards the elimination of maternal and neonatal tetanus in Apac District.

1.1 Problem Statement

Despite relatively high coverage, inequities in access to vaccination has been noted and remains one of the enduring challenges in several districts of Uganda (6). Several reasons have been advanced for the low coverage including lack of

knowledge, place for immunization and attitudes towards vaccines (7). Factors like antenatal care visit, wealth index, women’s employment, maternal age at delivery also has bearing on successful TT immunizations by mothers (8),(9). Increasing knowledge and awareness about maternal and neonatal tetanus is an important precondition to improve the increase of tetanus toxoid coverage.

The Expanded Program on Immunization(EPI) recommends five doses of TT Vaccine for all women of child bearing age which is sufficient to protect mothers during all her entire child bearing years. However, the efforts have fallen short in that it has marginally achieved the desired aims living behind significantly higher number of child bearing age mothers lacking knowledge and awareness on the benefit of atleast three doses (reasonable TT vaccine dose) immunization against maternal and neonatal tetanus (10).

1.2 Main Objective

To evaluate the impact of awareness raising and attitude change interventions amongst the pregnant women on reasonable dose of tetanus toxoid vaccine uptake at Teboke Mission Health Centre II.

1.3 Specific Objective(SO)

SO 1: To determine the influence of knowledge and awareness amongst pregnant mothers on reasonable tetanus toxoid vaccination dose uptake at Teboke Mission Health Centre II.

SO 2: To determine the impact of positive attitude towards maternal vaccination amongst pregnant mothers on reasonable tetanus toxoid vaccination dose uptake at Teboke Mission Health Centre II.

1.4 Research Questions

- i. Does knowledge and awareness amongst the pregnant mothers influence the uptake of reasonable tetanus toxoid vaccination dose at Teboke Mission Health Centre II?
- ii. Does attitude change amongst the pregnant mothers impact the uptake of reasonable tetanus toxoid vaccination dose uptake at Teboke Mission Health Centre II?

2. Related Work

14% of neonatal deaths is caused by neonatal tetanus in developing countries consequential to incomplete tetanus immunization thereby rendering the pregnant women partially protected (11). With 44% of the worldwide disability adjusted life years, the African Region has the highest incidences of tetanus (12). Furthermore, other challenges including unsafe deliveries, unhygienic umbilical cord excision practices are also contributory to neonatal deaths (13).

Similarly, an estimated three quarters of a million cases of neonatal tetanus are prevented worldwide as a result enhanced maternal immunization with tetanus toxoid vaccine (14).

Like other countries in Sub-Saharan Africa, the leading cause of neonatal death s are sepsis/pneumonia, tetanus, diarrhea, prematurity and birth (15). Additional studies conducted it was observed that the immunization of pregnant women and infants with tetanus toxoid vaccine led to a decrease in tetanus mortality by 87% (16). An analytic study shows that tetanus toxoid vaccination of pregnant women with atleast two doses reduces neonatal mortality by 94% (17).

Previous studies also indicate that there is a significant effect of knowledge on the uptake of tetanus toxoid immunization (18). Significant knowledge amongst pregnant women is sufficient to attain reasonable tetanus toxoid dose of immunization (19). Knowledge was critical in the determination of tetanus toxoid vaccination status in pregnant women with enhanced self-awareness increasing the completion of tetanus toxoid vaccine completion (20).

Knowledge and awareness often refer to the broad information and perceptions that human beings possess and show. Women with significant awareness were very helpful in scaling up the knowledge that led to the consequent reduction of doubts to conduct vaccinations (21).A psychological tendency to view a particular object or behavior with a degree of favor or disfavor is referred to as an attitude (22). In the evaluation of interventions like education and awareness raising, attitude data is critical.

3. Theory/Calculation

The theory of planned behavior(TPB) postulated by Azjen, states that attitudes are significantly correlated to behavioral intentions (23). The theory is the basis on which the upcoming conceptual framework is generated.

From the discussion and extensive literature review, the upcoming conceptual framework is formulating to organize and direct the research. The Figure below shows that independent variable is the awareness raising and attitude change intervention components. The dependent variable is the uptake of reasonable tetanus toxoid vaccination dose.

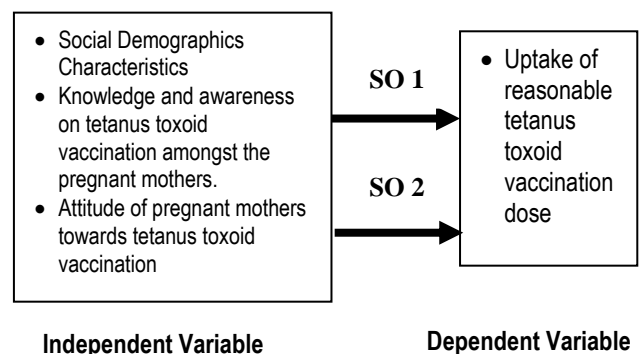


Figure 1: Conceptual Framework

Based on this conceptual framework, the researchers develop the research hypotheses for the study. Thus, from the above discussion, the following hypotheses are postulated:

I. Null hypothesis H01:

Knowledge and awareness amongst pregnant mothers on Tetanus Toxoid vaccination INFLUENCE reasonable vaccine dose uptake at Teboke Mission Health Centre II.

II. Alternate hypothesis HA1:

Knowledge and awareness amongst pregnant mothers on Tetanus Toxoid vaccination DOES NOT INFLUENCE reasonable vaccine dose uptake at Teboke Mission Health Centre II.

III. Null hypothesis H02:

Attitudes amongst pregnant mothers on Tetanus Toxoid vaccination IMPACTS reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II.

IV. Alternate hypothesis HA2:

Attitude amongst pregnant mothers on Tetanus Toxoid vaccination DOES NOT IMPACT reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II

4. Experimental Method/Procedure/Design

Study Area:

The study was conducted at Teboke Mission Health Centre II, a Not for Profit private health facility located in Apac District in Northern Uganda.

Study Design:

The health facility based cross-sectional analysis study assessed the influence and impact of knowledge, awareness and the impact of positive attitudes on tetanus toxoid vaccination uptake (24).

Study Period:

The study was conducted over a period of three months from February 2024 to May 2024.

Study Population and Participants:

The health facility based, cross-sectional study targeted 90 pregnant women attending antenatal clinic and had delivery services at Teboke Mission Health Centre II. Prior to conducting the research, Teboke Mission Health Centre II had implemented a community awareness, education and sensitization activities on maternal and neonatal tetanus to atleast 500 women in the villages surrounding the health facility. To further deepen the knowledge there was also radio programs and oral literature (music dance and drama activities) on the radio and in the villages surrounding the health facility.

Sample Size and sampling:

For the period of over three months, out of a total of 243 who visited the facility the research targeted 90 pregnant women. Well aware that they are the direct and indirect beneficiaries of the previous awareness raising activities, a simple purposive sampling methods were used to select the representative for the study. The actual data collection resulted in 90 respondents.

Method of data collection:

The data collection tool was the questionnaire due to the fact that it almost dictates the type of responses expected based on the questions presented to the respondent (25). The Likert scale questionnaires had responses using between two to five scales. Other methods included literature/desk review and health facility documents, record and reports. The questionnaire collected responses from the sample pregnant mothers including social and demographics characteristics, data related to knowledge and awareness on TT vaccination amongst pregnant women and data for attitudes of pregnant mothers towards TT vaccination. To determine the uptake of TT vaccine at the health facility, responses was sought for number of doses of TT vaccine received and where received from.

5. Results and Discussion

5.1. Descriptive Statistics

Table 1: Age of Respondents

Age	Frequency	Percent	Cumulative Percent
17	1	1.1%	1.1%
18	2	2.2%	3.3%
19	3	3.3%	6.7%
20	2	2.2%	8.9%
21	3	3.3%	12.2%
22	5	5.6%	17.8%
23	4	4.4%	22.2%
24	3	3.3%	25.6%
25	6	6.7%	32.2%
26	5	5.6%	37.8%
27	6	6.7%	44.4%
28	6	6.7%	51.1%
29	8	8.9%	60.0%
30	10	11.1%	71.1%
31	6	6.7%	77.8%
32	1	1.1%	78.9%
33	3	3.3%	82.2%
34	4	4.4%	86.7%
35	6	6.7%	93.3%
36	1	1.1%	94.4%
37	2	2.2%	96.7%
38	3	3.3%	100.0%
Total	90	100.0%	

More than half of the respondents (52.40%) are between age group of 25-31 years old. The study also revealed that incidences of child mother do occur the study area with 1 child mother as a respondent (age= \leq 18 Years Old). Almost one quarter (22.2%) of the pregnant mothers were 32 years and older with more than half of the age group 35 years or older. The eldest of the respondents was 38 years old.

Table 2: Level of Education

Level of Education	Frequency	Percent	Cumulative Percent
No Formal Education	16	17.78%	17.78%
Primary	35	38.89%	56.67%
Secondary	27	30.00%	86.67%
Tertiary	12	13.33%	100.00%
Total	90	100.0%	

Nearly one fifth (17.8%) of the respondents never attended any school. This signifies an improvement in literacy levels whereby the 2014 National Population and Housing Census 2014 reveals that Females aged 18 years and above who were illiterate by then are 38% (26). The percentage of mothers who have studied secondary school is 30.00% which is sharp increase as evidenced with the 2014 census which rated at 2.9%.

Table 3: Marital Status

Marital Status	Frequency	Percent	Cumulative Percent
Married	43	47.8%	47.8%
Divorced	12	13.3%	61.1%
Single	12	13.3%	74.4%
Cohabiting	23	25.6%	100.0%
Total	90	100.0%	

Nearly three-quarters (73.4%) of the respondents are either married (47.8%) or cohabitating (25.6%) this is an improvement from the 2014 National Population and Housing Census 2014 reveals that Persons aged 18 and above who are married is 69.7%. In the study area culture, a token dowry is advanced as an acceptance for responsibility of a pregnant woman by a man. In most cases the couple are considered married by the cultural leaders. This forms over 90% of those ones living in cohabitation. Therefore, the statistics is in agreement with the census of 73.4% as married respondents.

Table 4: Occupation of the Respondents

Occupation	Frequency	Percent	Cumulative Percent
Unemployed	20	22.22%	22.22%
Self-Employed	27	30.00%	52.22%
Civil Servant	6	6.67%	58.89%
Peasant	37	41.11%	100.00%
Total	90	100.0%	

In rural areas, majority of women are peasants (41.11%) and self-employed mainly on small agribusiness and service business (30%), a very significant number are unemployed (22.2%) and the civil servants (6.67%) are mainly primary school teachers and local government sub-county staffs.

Table 5: Monthly Income of the Respondents

Income(UGX)	Frequency	Percent	Cumulative Percent
Less than 50,000	20	22.2%	22.2%
50,001-200,000	32	35.6%	57.8%
200,001-350,000	13	14.4%	72.2%
350,001-500,000	14	15.6%	87.8%
Above 500,000	11	12.2%	100.0%
Total	90	100.0%	

About three-quarters (72.2%) live on less than one dollar a day which is reminiscent of rural women in sub-Saharan Africa. Over one-fifth (22.2%) of the respondents earn a paltry USD 12 monthly.

Table 6: Distance from Home to Teboke Mission HC II

Distance(KM)	Frequency	Percent	Cumulative Percent
0.5-1	11	12.2%	12.2%
2- 5	51	56.7%	68.9%
6- 9	24	26.7%	95.6%
Over 10	4	4.4%	100.0%
Total	90	100.0%	

Over two thirds (68.9%) live within 5 Kilometers of the Health Centre II and the rest over 6 Kilometers of which (4.4%) live over 10 Kilometers. The statistics of the district indicates that in 2014, households that are 5 km or more to the nearest health facility, whether public or private is 38.9% compared to the study finding of 31.1%. This improvement can be attributed to the establishment of Teboke Mission HCII in 2015.

Table 7: Number of Children

Children	Frequency	Percent	Cumulative Percent
Less than 3	58	64.4%	64.4%
4 - 6	28	31.1%	95.6%
7 - 10	4	4.4%	100.0%
Total	90	100.0%	

95.6% have 6 children or less which is agreement with the average number of children in rural sub-Saharan households. Less than 10% are still looking after up to 10 children in their households. Most of the women still have 3 or less children due to age factor and improvement in family planning education in antenatal clinics.

Table 8: Religion of the Respondent

Religion	Frequency	Percent	Cumulative Percent
Catholic	29	32.2%	32.2%
Anglican	32	35.6%	67.8%
Muslim	10	11.1%	78.9%
Born Again	19	21.1%	100.0%
Total	90	100.0%	

Just over 10% of the respondents are Moslems reflecting the general demographic patterns within the sub-region of majority Christians.

5.2. Knowledge and awareness on Tetanus Toxoid Vaccination

Table 9: Ever Heard about Maternal and Neonatal Tetanus from Teboke Mission HC II

Ever Heard	Frequency	Percent	Cumulative Percent
Yes	78	86.67%	87.67%
No	12	13.33%	100.0%
Total	90	100.0%	

Nearly nine tenths (87.67%) have heard of Maternal and Neonatal Tetanus from the health facility reflecting the impact of the awareness raising and education sensitization programs. Some heard through the Radio programs and friends and responded in the negative due probably to ignorance about the place of message delivery i.e. over the radio in contrast to from the health facility albeit the same personnel delivering the same messages but through different

mediums. In respect to the role of the radio program. Previous studies recommend that the internet and social media is important for immunization (27),(28). Mothers consider the internet as the second most reliable source after medical workers (29).

Table 10: Seriousness of Maternal and Neonatal Tetanus

Agree	Frequency	Percent	Cumulative Percent
Not at All	13	14.4%	14.4%
Somehow Agree	23	25.6%	40.0%
Agree	15	16.7%	56.7%
Strongly Agree	39	43.3%	100.0%
Total	90	100.0%	

Less than one sixth (14.4%) still unaware of the seriousness of Maternal and Neonatal Tetanus. Further probing revealed that a significant number of them are coming to the health facility for the second order of birth after delivering through the traditional birth attendants during their maiden birth order. Previous studies support the above finding by asserting that education has great influence on the level of awareness on tetanus toxoid immunization (30),(31).

Table 11: Ever Heard about Tetanus Toxoid Vaccine

Ever Heard(TT)	Frequency	Percent	Cumulative Percent
Yes	85	94.4%	94.4%
No	5	5.6%	100.0%
Total	90	100.0%	

94.4% of the pregnant mothers have ever heard about tetanus toxoid vaccination further underpinning previous observations of the education programs over the radio and oral literature including sensitization workshops. Studies indicate that there is significant improvement of maternal awareness about maternal, neonatal tetanus and tetanus toxoid vaccination consequential to sustained antenatal clinic visits (32).

Table 12: Where Heard about Tetanus Toxoid Vaccine

Agree	Frequency	Percent	Cumulative Percent
Ante Natal Clinic	60	66.7%	66.7%
Teboke Mission Sensitization and Radio Program	11	12.2%	78.9%
Friend and Family	14	15.6%	94.4%
Never Heard at All	5	5.6%	100.0%
Total	90	100.0%	

About four-fifth (78.9%) of the respondents heard about tetanus toxoid vaccine from or through the health facility. Friends and families provided information to atleast 15.6% of the respondents living a paltry 5.6% as those who have never heard about tetanus toxoid.

Table 13: Believe That Tetanus Toxoid Vaccine is Important

Believe	Frequency	Percent	Cumulative Percent
Don't Believe	11	12.2%	12.2%
Believe	66	73.3%	85.6%
Strongly Believe	13	14.4%	100.0%
Total	90	100.0%	

87.7% of the respondents (79 pregnant women) believe that tetanus toxoid vaccine is very important. Atleast a consistent average of 10% continue to disbelieve about maternal and neonatal tetanus and prescribed measures to curb the prevalence.

Table 14: Effectiveness of Tetanus Toxoid Vaccine

Effectiveness	Frequency	Percent	Cumulative Percent
Don't Believe	11	12.2%	12.2%
Believe	66	73.3%	85.6%
Strongly Believe	13	14.4%	100.0%
Total	90	100.0%	

87.7% of the respondents agree that tetanus toxoid vaccine is effective. This is reflective of the change in attitude which underpins the analysis of the second research question below.

5.3. Attitudes of Pregnant Mothers Towards Tetanus Toxoid Vaccination

Table 15: Doses of Tetanus Toxoid Vaccine to Provide Complete Protection

Doses	Frequency	Percent	Cumulative Percent
One	4	4.4%	4.4%
Two	4	4.4%	8.9%
Three	17	18.9%	27.8%
Four	35	38.9%	66.7%
Five	20	22.2%	88.9%
Not Sure	10	11.1%	100.0%
Total	90	100.0%	

84.4% of the pregnant women are aware that atleast two to five doses of tetanus toxoid is required. This is one the areas that was emphasized by the sensitization, education and awareness raising initiatives. It is appropriate to concede that two or three dose course of tetanus toxoid to pregnant mothers provides protection against neonatal deaths (33).

Table 16: Extent of Agreement on the importance of Tetanus Toxoid Vaccine

Agree	Frequency	Percent	Cumulative Percent
Don't Know	7	7.8%	7.8%
Disagree	2	2.2%	10.0%
Agree Moderately	44	48.9%	58.9%
Agree	27	30.0%	88.9%
Agree Exceptionally	10	11.1%	100.0%
Total	90	100.0%	

90% of the surveyed pregnant mothers agreed on the importance of Tetanus Toxoid Vaccine. The findings of this study showed that the majority of the participants were very confident that the Tetanus Toxoid Vaccine is important, safe,

and effective and that the disease itself is serious in accordance with a study conducted globally in 2018 which indicated that East Africa region are more likely to perceive positively the safety and effectiveness of vaccines at 92% and 90% respectively (34).

Table 17: Extent of Agreement on the Safety of TT Vaccine

Agree	Frequency	Percent	Cumulative Percent
Don't Know	7	7.8%	7.8%
Disagree	2	2.2%	10.0%
Agree Moderately	44	48.9%	58.9%
Agree	27	30.0%	88.9%
Agree Exceptionally	10	11.1%	100.0%
Total	90	100.0%	

90% of the surveyed pregnant mothers agreed on the safety of Tetanus Toxoid Vaccine.

Table 18: Recommending Tetanus Toxoid Vaccine Uptake

Recommend	Frequency	Percent	Cumulative Percent
Yes	66	73.3%	73.3%
No	24	26.7%	100.0%
Total	90	100.0%	

About three-quarters of the respondents (73.3%) would recommend uptake of tetanus toxoid vaccine to the pregnant women highlighting the importance of friends and family in the awareness raising initiatives.

Table 19: Doses of Tetanus Toxoid Vaccine Received

Doses	Frequency	Percent	Cumulative Percent
Not at All	9	10.00%	10.00%
One	12	13.33%	23.33%
Two	40	44.44%	67.78%
Three	18	20.00%	87.78%
Four or More	11	12.22%	100.00%
Total	90	100.0%	

At least three quarters (76,67%) of the pregnant mothers have received the recommended two or more doses with 12.2% having received four or more doses. In 2019, 65% of pregnant women received two doses of the tetanus vaccine during their pregnancy (35). This is indicative of the influence of education and sensitization of the pregnant mothers who attend the ANC at Teboke Mission HCII. There are various factors that affect vaccination uptake; for example, in Somalia, concerns about vaccine safety and limited knowledge were mentioned to have affected vaccine uptake among the pregnant women (36).

5.4. Research Questions

The following section, presents the results of this study. The results are presented according to the research questions asked in this study through regression models. Multiple linear regression was used to estimate the relationship between the many independent variables and one dependent variable i.e. Uptake of TT Vaccine at LRRH.

The formula for a multiple linear regression is:

$$Y = B_0 + B_1X_1 + \dots + B_nX_n + \epsilon$$

- Y= the predicted value of the dependent variable
- B₀ = the y-intercept (value of y when all other parameters are set to 0)
- B₁X₁= the regression coefficient= (B₁) of the first independent variable (X₁) (a.k.a. the effect that increasing the value of the independent variable has on the predicted y value) = do the same for however many independent variables you are testing
- B_nX_n = the regression coefficient of the last independent variable
- ε = model error (a.k.a. how much variation there is in our estimate of Y)

Correlational Analysis:

Research Question(a)

Does knowledge and awareness amongst the pregnant mothers influence the uptake of reasonable tetanus toxoid vaccination dose at Teboke Mission Health Centre II?

The relevant hypothesis for the regression analysis is assumed as;

I. Null hypothesis H01:

Knowledge and awareness amongst pregnant mothers on Tetanus Toxoid vaccination INFLUENCE reasonable vaccine dose uptake at Teboke Mission Health Centre II.

II. Alternate hypothesis HAI:

Knowledge and awareness amongst pregnant mothers on Tetanus Toxoid vaccination DOES NOT INFLUENCE reasonable vaccine dose uptake at Teboke Mission Health Centre II.

Table 20: Model Summary (Doses of TT Vaccine received)

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.57	0.33	0.29	0.93

In the table above R-value (0.57) represents the correlation between the dependent and independent variable. It is required that the difference between R-square and Adjusted R-square be minimum. In this case, the value is 0.29, which is not far off from 0.33. Therefore, the above model summary table is satisfactory to proceed with the next step.

Table 21: ANOVA (Doses of TT Vaccine received)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	35.76	5	7.15	8.21	0.000
Residual	73.13	84	0.87		
Total	108.89	89			

Generally, 95% confidence interval or 5%(0.05) level (P-value/ Sig value) of the significance level has been chosen for this study. In the above table the P-value/ Sig value is 0.000 implying that the result is significant. F-ratio value greater than 1 yields an efficient model. In the above table, the value is 8.21. These results above estimate that as the p-value of the ANOVA table is below the tolerable significance level, thus there is a possibility of rejecting the null hypothesis in further analysis.

Table 22: Coefficients (Doses of Tetanus Toxoid Vaccine received)

	B	Std. Error	Beta	t	Sig.
(Constant)	6.21	0.95	0.00	6.53	0.000
Ever Heard about Maternal and Neonatal Tetanus from Teboke Mission HC II	-0.33	0.32	-0.10	-1.03	0.308
Agree about Seriousness of Maternal and Neonatal Tetanus	0.25	0.10	0.25	2.44	0.017
Ever Heard about Tetanus Toxoid Vaccine	-1.98	0.52	-0.41	-3.79	0.000
Where Heard about Tetanus Toxoid Vaccine	-0.16	0.12	-0.13	-1.35	0.179
Believe That Tetanus Toxoid Vaccine is Important for Pregnant Women	-0.54	0.23	-0.25	-2.36	0.021

The coefficient table 22 shows the strength of the relationship i.e. the significance of the variable in the model and magnitude with which it impacts the dependent variable. Based on the significant value the null hypothesis is rejected or not rejected. If Sig. is < 0.05, the null hypothesis is rejected. If Sig. is > 0.05, then the null hypothesis is not rejected. If a null hypothesis is rejected, it means there is an influence. However, if a null hypothesis is not rejected, it means there is no influence.

Table 23: Coefficients Interpretation (Doses of Tetanus Toxoid Vaccine received)

Independent Variable	Sig.	Hypothesis Testing Result at 95% confidence interval	Interpretation
Ever Heard about maternal and neonatal tetanus from Teboke Mission HC II	0.308	Null Hypothesis not rejected (0.308 > 0.05)	No significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to hearing about maternal and neonatal tetanus from Teboke Mission HCII.
Agree about Seriousness	0.017	Null Hypothesis	A significant influence on reasonable Tetanus

of Tetanus		Rejected (0.017<0.05)	Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the seriousness of maternal and neonatal tetanus.
Ever Heard about Tetanus Toxoid Vaccine	0.000	Null Hypothesis Rejected (0.000 <0.05)	A significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the Tetanus Toxoid Vaccine.
Where Heard about TT Vaccine	0.179	Null Hypothesis not rejected (0.179 > 0.05)	No significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to where the importance of tetanus toxoid vaccine was heard from.
Believe That TT Vaccine is Important for pregnant women	0.021	Null Hypothesis Rejected (0.021 <0.05)	A significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the importance of Tetanus Toxoid Vaccine for pregnant.
Ever Heard about maternal and neonatal tetanus from Teboke Mission HC II	0.308	Null Hypothesis not rejected (0.308 > 0.05)	No significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to hearing about maternal and neonatal tetanus from Teboke Mission HCII.
Agree about Seriousness of Tetanus	0.017	Null Hypothesis Rejected (0.017<0.05)	A significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the seriousness of maternal and neonatal tetanus.
Ever Heard about Tetanus Toxoid Vaccine	0.000	Null Hypothesis Rejected (0.000 <0.05)	A significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the Tetanus Toxoid Vaccine.

In the foregoing analysis, the awareness about their seriousness of maternal and neonatal tetanus had a significant influence on reasonable Tetanus Toxoid vaccine dose uptake

at Teboke Mission Health Centre II ($p=0.017 < 0.05$). The study also found out that there is a significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about Tetanus Toxoid Vaccine ($p=0.000 < 0.05$). There is also a significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the importance of Tetanus Toxoid Vaccine for pregnant mothers ($p=0.021 < 0.05$). This is in line with studies conducted in Kenya and South Africa that mentions that a significant barrier to maternal vaccination is vaccination safety concerns and fear of side effects (37), (38). The barrier has been surmounted by the education and sensitization drives.

Research Question(b)

Does attitude change amongst the pregnant mothers impact the uptake of reasonable tetanus toxoid vaccination dose uptake at Teboke Mission Health Centre II?

The relevant hypothesis for the regression analysis is assumed as;

III. Null hypothesis H02:

Attitudes amongst pregnant mothers on Tetanus Toxoid vaccination IMPACTS reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II.

IV. Alternate hypothesis HA2:

Attitude amongst pregnant mothers on Tetanus Toxoid vaccination DOES NOT IMPACT reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II

Table 24: Model Summary (Doses of Tetanus Toxoid Vaccine received)

R	R Square	Adjusted R Square	Std. Error of the Estimate
.68	.46	.43	.83

In the table above R- value is 0.68(greater than 0.4) is therefore taken for further analysis. The difference between R-square and Adjusted R-square be minimum. In this case, the value is 0.43, which is not far off from 0.46. Therefore, the above model summary table is satisfactory to proceed with the next step.

Table 25: ANOVA (Doses of Tetanus Toxoid Vaccine received)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	50.35	5	10.07	14.45	0.000
Residual	58.54	84	0.70		
Total	108.89	89			

In the above table, it is 0.000(< 0.05) implying that the result is significant. F-ratio value greater than 1 yields an efficient model. In the above table, the value is 14.45. These results above estimate that as the p-value of the ANOVA table is below the tolerable significance level, thus there is a possibility of rejecting the null hypothesis in further analysis.

Table 26: Coefficients (Doses of Tetanus Toxoid Vaccine received)

	B	Std. Error	Beta	t	Sig.
(Constant)	3.36	0.71	0.00	4.73	0.000
Effectiveness of Tetanus Toxoid Vaccine	-0.41	0.19	-0.19	-2.12	0.037
Doses of Tetanus Toxoid Vaccine to Provide Complete Protection	0.06	0.08	0.07	0.81	0.419
Extent of Agreement on the importance of Tetanus Toxoid Vaccine	0.80	0.18	0.71	4.51	0.000
Extent of Agreement on the Safety of Tetanus Toxoid Vaccine	-0.37	0.16	-0.33	-2.30	0.024
Recommending Tetanus Toxoid Vaccine Uptake	-0.89	0.27	-0.36	-3.35	0.001

Table 27: Coefficients Interpretation (Doses of Tetanus Toxoid Vaccine received)

Independent Variable	Sig.	Hypothesis Testing Result at 95% confidence interval	Interpretation
Effectiveness of Tetanus Toxoid Vaccine	0.037	Null Hypothesis Rejected ($0.037 < 0.05$)	A significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the effectiveness of tetanus toxoid vaccine
Extent of Agreement on the importance of TT Vaccine	0.000	Null Hypothesis Rejected ($0.000 < 0.05$)	A significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the importance of tetanus toxoid vaccine
Doses of TT Vaccine to Provide Complete Protection	0.419	Null Hypothesis not rejected ($0.419 > 0.05$)	No significant impact reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes towards protective TT dosage.
Extent of Agreement on	0.024	Null Hypothesis	A significant impact on reasonable Tetanus

the Safety of TT Vaccine		Rejected (0.024 <0.05)	Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the safety of tetanus toxoid vaccine
Recommending TT Vaccine Uptake	0.001	Null Hypothesis Rejected (0.001 <0.05)	A significant impact on recommending reasonable Tetanus Toxoid vaccine dose uptake due to attitudes about tetanus toxoid vaccine
Extent of Agreement on the importance of TT Vaccine	0.000	Null Hypothesis Rejected (0.000 <0.05)	A significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the importance of tetanus toxoid vaccine
Doses of TT Vaccine to Provide Complete Protection	0.419	Null Hypothesis not rejected (0.419 > 0.05)	No significant impact reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes towards protective TT dosage.
Extent of Agreement on the Safety of TT Vaccine	0.024	Null Hypothesis Rejected (0.024 <0.05)	A significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the safety of tetanus toxoid vaccine
Recommending TT Vaccine Uptake	0.001	Null Hypothesis Rejected (0.001 <0.05)	A significant impact on recommending reasonable Tetanus Toxoid vaccine dose uptake due to attitudes about tetanus toxoid vaccine

It is appropriate to ascertain that the level of knowledge positively or negatively influences person's attitude (39). This study reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the effectiveness of tetanus toxoid vaccine ($p=0.037 <0.05$). The study also reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the importance of tetanus toxoid vaccine ($p=0.000 <0.05$).

Further the study reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the safety of tetanus toxoid vaccine ($p=0.024 <0.05$). A person's attitude is consequential to a psychological process, it cannot be observed directly but must be inferred from what is said or done (40). The tetanus toxoid uptake as inferred is dependent

upon maternal perceptions and attitudes towards immunization amongst others. There is also a significant impact on recommending reasonable vaccine dose uptake at Teboke Mission Health Centre II due to recommendations about tetanus toxoid vaccine ($p=0.001 <0.05$). It can be deduced that the positive attitudes about the tetanus toxoid is contributory to the number of respondents who are willing to recommend uptake to fellow pregnant mothers.

6. Conclusion and Future Scope

The study found out that about 80%(76.67%) of the pregnant mothers were receiving the doses actively due to education, sensitization and awareness about the tetanus toxoid vaccine, its importance, safety, and accessibility. This finding elucidates on the vaccine hesitance attitudes of women in developing countries whereby most of them have no evidence of education sensitization and awareness raising about tetanus toxoid vaccination (41),(42). Overall, there is a significant relationship between knowledge, awareness and attitude of pregnant women on Tetanus Toxoid Immunization in Teboke Mission HC II. The knowledge enhancement, awareness raising and education resulted in positive attitude change and enhanced knowledge and awareness for the pregnant women in Apac District thereby increasing the need to attain reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II during and after pregnancy.

The Ugandan national coverage for tetanus toxoid second dose is below the 80% target, with the National coverage among pregnant women at only 49% in 2011 (43). The low uptake can be partly attributed to limited knowledge among pregnant women, their poor attitude about tetanus toxoid immunization, their failure to attend all antenatal visits, knowledge on the importance of tetanus toxoid vaccination for pregnant mothers. The study also revealed that incidences of child mother do occur the study area with 1 child mother as a respondent (age= ≤ 18 Years Old). The cumulative percentage of females who have studied secondary school is 86.67% nearly agreeing with the 2014 census that females aged 15 and above whose highest level of education completed is below S.4 is 93.7%. Nearly three-quarters (73.4%) of the respondents are either married (47.8%) or cohabitating (25.6%). The reference 2014 National Population and Housing Census 2014 reveals that Persons aged 18 and above who are married is 69.7%.

About three-quarters (72.2%) live on less than one dollar a day which is reminiscent of rural women in sub-Saharan Africa. The statistics of the district indicates that in 2014, households that are 5 km or more to the nearest health facility, whether public or private is 38.9% compared to the study finding of 31.1%. 95.6% have 6 children or less which is agreement with the average number of children in rural sub-Saharan households. Most of the women still have 3 or less children due to age factor and improvement in family education in antenatal clinics.

Nearly nine tenths (87.67%) have heard of Maternal and Neonatal Tetanus from the health facility reflecting the impact of the awareness raising and education sensitization

programs. Some heard through the Radio programs and friends. Studies also recommended that the internet and social media is important for immunization ((28), (29).

A significant number of the pregnant mothers are coming to the health facility for the second order of birth after delivering through the traditional birth attendants during their maiden birth order. Previous studies assert that education has great influence on the level of awareness on tetanus toxoid immunization (30), (31). Pregnant mothers have ever heard about tetanus toxoid vaccination further underpinning previous observations of the education programs over the radio and oral literature including sensitization workshops (32). 84.4% of the pregnant women are aware that at least two to five doses of tetanus toxoid is required (33). At least three quarters (76,67%) of the pregnant mothers have received the recommended two or more doses with 12.2% having received four or more doses.

Only 65% of the pregnant women received two doses of the tetanus vaccine during their pregnancy in 2019(35). This is indicative of the influence of education and sensitization of the pregnant mothers who attend the ANC at Teboke Mission HCII.

There are various factors that affect vaccination uptake; for example, in Somalia, concerns about vaccine safety and limited knowledge were mentioned to have affected vaccine uptake among the women (36). This study also found out that there is a significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about Tetanus Toxoid Vaccine ($p=0.000 <0.05$). There is also a significant influence on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to awareness about the importance of Tetanus Toxoid Vaccine for pregnant mothers ($p=0.021 <0.05$) in line with previous studies (37), (38).

This study reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the effectiveness of tetanus toxoid vaccine ($p= 0.037 <0.05$). The study also reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the importance of tetanus toxoid vaccine ($p= 0.000 <0.05$). Further the study reveals that there is a significant impact on reasonable Tetanus Toxoid vaccine dose uptake at Teboke Mission Health Centre II due to attitudes about the safety of tetanus toxoid vaccine ($p=0.024 <0.05$). It can be deduced that the positive attitudes about the tetanus toxoid is contributory to the number of respondents who are willing to recommend uptake to fellow pregnant mothers. Tetanus toxoid uptake for pregnant mothers is influenced by knowledge, education, information media, husband support, and availability of tetanus toxoid for two times of immunization in the third trimester of pregnancy (44).

Knowledge was critical in the determination of tetanus toxoid vaccination status in pregnant women with enhanced self-awareness increasing the completion of tetanus toxoid

vaccine completion (Triratnasari, 2013). Women who have awareness initiatives were very helpful to increase the knowledge and reduce doubts to conduct immunization (21). A positive attitude triggers a behavior of pregnant women to conduct tetanus toxoid immunization (Wirda in Triratnasari, 2017).

At least two-third (76.67%) of the pregnant mothers have received the recommended two or more doses with 12.2% having received four or more doses. Majority of the pregnant mothers have received at least two doses. The significant uptake coupled with 73.3% recommending tetanus toxoid points to a positive attitude due to the awareness raising (45), (46). In this study there was a 76.67% coverage of reasonable dose of tetanus vaccine (at least two doses and not more than five), nearly twice the national coverage amongst the pregnant women nationally pointing to the fact that one more of the barriers outline above has been addressed by the education and sensitization initiatives by the health facility, hence increase in coverage. An average of over 80% of responding pregnant women were knowledgeable about maternal and neonatal tetanus (MNT), seriousness of MNT, ever heard about tetanus toxoid vaccine, its importance, effectiveness, optimal doses, safety of tetanus toxoid vaccination and the seriousness of tetanus disease in agreement with previous studies (45), (46).

Data Availability

The researcher utilized minimal qualitative data because of a lack of finances, time, and manpower. So, the author recommends further investigation into the influence and impacts of the above factors. Regarding the study's geographical location, the study was restricted only to Teboke Parish in Teboke Sub-County, Apac District in Northern Uganda. It would be very interesting to repeat this in other parts of the region and county.

Conflict of Interest

The author don not have any conflict of interest.

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