

Tetanus Toxoid Immunization, Drop-Out Rates and Determining Factors Among Women in a Niger Delta Community, Nigeria

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Abstract

Tetanus infection is of global importance and a cause for concern in the Sub-Saharan region where infection is endemic. Despite the WHO global effort to eradicate Maternal and Neonatal Tetanus (MNT), Nigeria remained among the 19 countries yet to achieve this goal set by 2015, therefore the need to assess the tetanus toxoid (TT) immunization status, drop-out rates and its determinants among women in Alakahia Obio/Akpor LGA, Rivers State, Nigeria. This study was a descriptive cross-sectional study carried out in August 2016 among 276 pregnant women and women who had given birth in the last one year. Participants were recruited using a cluster sampling method and were interviewed with an interviewer-administered questionnaire structured from the WHO cluster form for TT immunization. Data was summarized using descriptive statistics and analysed with binary logistic regression using SPSS version 20. The study showed high access to TT immunization (91%) but increasing drop-out rates from TT1 to TT5 (3.1%, 82.8%, 100%, and 100% respectively). Bivariate analysis showed that age, parity and mother's education significantly affected TT immunization coverage ($P < 0.001$, $p < 0.001$ and $p = 0.011$ respectively). When the odds ratio was adjusted, only age (OR=0.096; 95% CI for OR=0.034-0.270; $p < 0.001$) and parity (OR=9.667; 95% CI for OR=3.161-29.563; $p < 0.001$) remained significantly associated with immunization status. Women in Alakahia community lack adequate TT immunization coverage as shown by their high drop-out rates. This calls for improvement on the awareness and immunization coverage in this community even from adolescent age, which will make MNT elimination achievable.

Keywords

Neonatal Tetanus, Immunization, Tetanus Toxoid, Niger Delta

1. Introduction

Tetanus infection is a preventable disease that has been eliminated in several parts of the world via hygienic delivery practices and ultimately TT immunization. Nigeria however remains among the 19 countries yet to achieve the World Health Organization's 2015 NNT elimination goal [1]. Nigeria still ranks high in tetanus infection prevalence and contributes to about 90% of the global burden of the infection [1], with an incidence in the range of up to 20 per 1000, which is very high

when compared to other African countries [1]. In Rivers State, from 1995 till date, 114 cases of post neonatal tetanus, and 313 cases of NNT have been reported [2].

Tetanus infection can affect any age group, however much emphasis is placed on women of the reproductive age (WRA) group to help protect them from tetanus infection and also their unborn babies from the fatal course of the disease in the neonatal period. This dual protection is majorly brought about by adequate TT immunization coverage as neonates are protected by the transfer of antibodies against tetanus infection from an adequately immunized mother [1].

The World Health Organization (WHO) recommends five doses of TT immunization for WRA group to protect against NNT and to proffer life-long immunity to women and the level of protection against tetanus is increased at each subsequent dose [3]. Studies in this part of the world however have shown that most women do not receive adequate doses of TT immunization and this has hampered the achievement of elimination [4-6].

This paper therefore investigates the immunization status of women in Alakahia community, to know the drop-out rates of TT immunization and the factors that affect their TT immunization status.

2. Methods

2.1. Study Protocol

This study was carried out in a Niger Delta community located at Alakahia in Obio/Akpor Local Government Area, Rivers State, Nigeria.

Ethical clearance was obtained from the Research Ethics Committee of University of Port Harcourt before commencement of the study. Permission was obtained from the village chiefs, village heads and husbands of these women. Informed consent was gotten from the women and the reason for the study was explained to them in the local language that they understood.

All information collected from these women was securely kept in the official database, and data access was restricted to authorized persons.

2.2. Participants

Study participants included women who had given birth in the last one year and pregnant women in Alakahia community. They were mainly house wives and traders. Inclusion criteria included all the women who had given birth in the last one year and all pregnant women irrespective of their gestational age.

2.3. Sample Collection and Study Procedure

Study participants were recruited using a cluster sampling method. Data was collected using an interviewer-administered questionnaire structured from the WHO cluster form for TT immunization [7].

The study was carried out over 4 weeks. Two research assistants were trained by the researcher on how to administer questionnaires to study participants. Their homes were visited mostly in the evening when members of the house-holds and participants were met at home. An average of 10-15 participants were recruited per day till the sample size was met.

2.4. Statistical Analysis

Data was analysed using the statistical package for social scientists (SPSS) version 20. The Socio-demographic and other variables were presented as frequency tables. Bivariate analysis was done using a chi-Square test for testing the

significance of associations between categorical variables. Binary Logistic Regression was carried out for multivariate analysis. The level of significance was set at $p < 0.05$ and 95% confidence interval.

3. Results

3.1. Socio-demographic Characteristics

Two hundred and fifteen (77.9%) of the women were more than 30 years old with a mean age of 36.36 ± 4.38 and 61 women (22.1%) were less than or equal to 30 years. Two hundred and seventy-three women (98.9%) were married while only 3 women (1.1%) were single. One hundred and sixty-one of these women (58.3%) had less than four children, while 115 women (41.7%) had four or more children. Women who had more than primary level of education were 197 (75%), and those that had primary level of education or less were 69 (25%). One hundred and ninety-nine (72.1%) of their husbands had more than primary level of education and 77 (27.9%) had primary level of education or less.

Majority of the women were house wives (39.5%), while those that had a source of income were mainly traders (33.7%) and artisans (26.4%) and majority of their husbands were artisans (36.6%) (Table 1).

Table 1. Socio-demographic characteristics of women in Alakahia community.

Socio-demographic variables	Frequency (n = 276)	Percent
Age		
≤30 years	61	22.1
>30 years	215	77.9
Mean ± SD (years)	36.36 ± 4.38	
Marital Status		
Single	3	1.1
Married	273	98.9
Parity		
< Four	161	58.3
≥ Four	115	41.7
Religion		
Christianity	274	99.3
Muslim	2	0.7
State of Origin		
Abia	19	6.9
Akwa Ibom	54	19.6
Anambra	27	9.8
Benue	4	1.4
Delta	37	13.4
Enugu	24	8.7
Imo	32	11.6
Osun	3	1.1
Rivers	76	27.5
Level of Education of the women		
≤ Primary	69	25.0
> Primary	197	75.0
Occupation of the women		
House wife	109	39.5
Trader	93	33.7
Artisan	73	26.4
Civil servant	1	0.4
Husband's Level of Education		
≤ Primary	77	27.9
> Primary	199	72.1
Husband's occupation		

Socio-demographic variables	Frequency (n = 276)	Percent
Business man	65	23.6
Trader	81	29.3
Artisan	101	36.6
Civil servant	8	2.9
Banker	11	4.0
Taxi driver	8	2.9
Others	2	0.7

Table 3. Drop-out rates.

TT doses	Frequency	Percent	Drop-out rates
TT 1	251	90.9%	
TT 2	243	88%	TT1 – TT2 = 3.2%
TT 3	43	15.6%	TT1 – TT3 = 82.8%
TT 4	0	-	TT1 – TT4 = 100%
TT 5	0	-	TT1 – TT5 = 100%

3.2. Tetanus Toxoid Immunization Coverage

Majority of the respondents attended ANC at a tertiary hospital (48.9%); 69 (25.0%) attended ANC at the General hospital while 72 (26.1%) attended the Primary health care (PHC) centre. Two hundred and fifty-one women (90.0%) had received at least a dose of TT immunization, while 5 women (9.1%) had not received any dose of TT immunization. Of the 251 women who had received TT immunization, 200 of them (79.7%) had two doses, 43 (17.1%) had three doses and 8 (3.2%) had one dose of TT immunization. None of the women completed the WHO recommended five doses of TT immunization (Table 2).

Table 2. TT immunization coverage among women in Alakahia community.

TT immunization coverage	Frequency (n = 276)	Percent
Registered and attended ANC Clinic in previous pregnancy		
Yes	276	100.0
No	0	0.0
Facility registered for ANC Clinic in previous pregnancy		
Tertiary Hospital	135	48.9
General Hospital	69	25.0
Primary Health Care Centre	72	26.1
Private Hospital	0	0.0
TBA Homes	0	0.0
Facility registered for ANC Clinic in present pregnancy		
Presently not pregnant	111	40.3
Tertiary Hospital	100	36.2
General Hospital	32	11.6
Primary Health Care Centre	23	8.3
Private Hospital	6	2.2
TBA Homes	4	1.4
Immunization cards sited		
Yes	108	39.1
No	168	60.9
Had received TT Immunization		
Yes	251	90.9
No	25	9.1
Number of doses of TT Immunization received		
One dose	251	90.9
Two doses	243	88
Three doses	43	15.6
Completed TT Immunization dosage according to WHO recommendation		
Yes	0	0.0
No	276	100

3.3. Drop-Out Rates

This study showed a progressive decrease in percentage TT immunization coverage: 90.9%, 88%, 15.6%, 0.0% and 0.0% respectively. Drop-out rates progressively increased: 3.2% to 82.8% to 100% (Table 3)

3.4. Reasons for Not Taking/Completing Immunization

Out of the 25 women who did not receive a dose of TT immunization, majority of them (52%) did not take the immunization because they were not aware of the need or importance of TT immunization, while 12 women (48%) were aware of the need for immunization but did not give any other reason for not being immunized. The women did give any other reason for not being immunized (Table 4).

Table 4. Women's reasons for not taking TT immunization.

Reasons for not taking TT Immunization (n=25)	Yes (%)	No (%)
Not aware of need for immunization	13 (52.0)	12 (48.0)
Not aware of need to return for subsequent doses	0 (0.0)	25 (100.0)
Did not know the place or time of immunization	0 (0.0)	25 (100.0)
Fear of side effects	0 (0.0)	25 (100.0)
Immunization process was postponed	0 (0.0)	25 (100.0)
Cultural reasons	0 (0.0)	25 (100.0)
Religious reasons	0 (0.0)	25 (100.0)
Negative rumours	0 (0.0)	25 (100.0)
Vaccines were not available	0 (0.0)	25 (100.0)
Was too busy	0 (0.0)	25 (100.0)
Had family problems	0 (0.0)	25 (100.0)
Couldn't visit health facility because was ill	0 (0.0)	25 (100.0)
Visited health facility but was not given immunization	0 (0.0)	25 (100.0)
Waiting time was too long	0 (0.0)	25 (100.0)

Some of the reasons the respondents gave for not completing their immunization included: not being aware of the need to go back for subsequent doses which was the main reason among 91 (36.3%) of these women; 85 of the women (33.9%) said they were not aware of the need for the immunization. More than 60% of them did not give any other reason for not completing their TT immunization (Table 5).

Table 5. Reasons for not completing TT immunization.

Reasons for not completing TT Immunization (n=251)	Yes (%)	No (%)
Not aware of need for immunization	85 (33.9)	166 (66.1)
Not aware of need to return for subsequent doses	91 (36.3)	160 (63.7)
Did not know the place or time of immunization	0 (0.0)	25 (100.0)
Fear of side effects	0 (0.0)	25 (100.0)
Immunization process was postponed	0 (0.0)	25 (100.0)
Cultural reasons	0 (0.0)	25 (100.0)
Religious reasons	0 (0.0)	25 (100.0)
Negative rumours	0 (0.0)	25 (100.0)
Vaccines were not available	0 (0.0)	25 (100.0)
Was too busy	0 (0.0)	25 (100.0)
Had family problems	0 (0.0)	25 (100.0)
Couldn't visit health facility because was ill	0 (0.0)	25 (100.0)
Visited health facility but was not given immunization	0 (0.0)	25 (100.0)
Waiting time was too long	0 (0.0)	25 (100.0)

3.5. Relationship Between the TT Immunization Status of Mothers and Their Socio-demographic Status

It was found that the age, parity and educational status of the mothers was significantly associated with their TT immunization status. Among the women who had been immunized, 47 (18.7%) were 30 years or less while 204 (81.3%) were above 30 years of age and this difference in

age was statistically significant ($p < 0.001$). TT immunization was significantly higher among women who had less than four children than among women with four children or more (755; 61.8% and 96; 38.2% respectively; $p < 0.001$), and also, TT immunization was significantly lower among mother's with at most primary education as compared with those with secondary or tertiary education (68; 27.1% and 183; 72.9%; $p = 0.011$) (table 6).

Table 6. Relationship between TT immunization and socio-demographic status of these women.

	Have been immunized against TT		χ^2	p-value
	No (%)	Yes (%)		
Age				
≤30 years	14 (56.0)	47 (18.7)	18.348	<0.001
>30 years	114 (44.0)	204 (81.3)		
Marital Status				
Single	0 (0.0)	3 (1.2)	0.302	0.583
Married	25 (100.0)	248 (98.8)		
Parity				
<4	6 (24.0)	155 (61.8)	13.332	<0.001
≥4	19 (76.0)	96 (38.2)		
Religion				
Christian	25 (100.0)	249 (99.2)	0.201	0.654
Muslim	0 (0.0)	2 (0.8)		
Mother				
≤ Primary	1 (4.0)	68 (27.1)	6.466	0.011
> Primary	24 (96.0)	183 (72.9)		
Father				
≤ Primary	6 (24.0)	71 (28.3)	0.208	0.423
> Primary	19 (76.0)	180 (71.7)		

The age, parity and educational status of the mother were significantly associated with TT immunization coverage. Women who were 30 year or less had about 18% less likelihood of been immunized as compared with their counterparts above 30 years of age (OR=0.181; 95% CI for OR=0.077-0.424; $p < 0.001$). Similarly, women with less than four children were about 5 times more likely to be immunized than those with four children or more (OR=5.113; 95% CI for OR=1.972-13.253; $p = 0.001$), and women with at

most primary education were about 9 times more likely to be immunized than their counterparts with secondary and tertiary education (OR=8.918; 95% CI for OR=1.183-67.204; $p = 0.034$). When the odds ratio was adjusted to take care of confounders, only age (OR=0.096; 95% CI for OR=0.034-0.270; $p < 0.001$) and parity (OR=9.667; 95% CI for OR=3.161-29.563; $p < 0.001$) remained significantly associated with immunization status (Table 7).

Table 7. Bivariate logistic regression.

Variable	Logistic Regression for Unadjusted OR			Logistic Regression for Adjusted OR		
	B	OR (95% CI for OR)	p-value	B	AOR (95% CI for AOR)	p-value
Age						
≤30	-1.709	0.181 (0.077 – 0.424)	<0.001	-2.341	0.096 (0.034 – 0.270)	<0.001
>30						
Parity						
<4	+1.632	5.113 (1.972 – 13.253)	0.001	+2.269	9.667 (3.161 – 29.563)	<0.001
≥4						
Mothers Education						
≤Primary	+2.188	8.918 (1.183 – 67.204)	0.034	+1.990	7.314 (0.909 – 58.846)	0.061
>Primary						

4. Discussion

For MNT elimination (i.e. less than one NT case per 1000 live births) to be achieved in every district, WHO recommends 5 doses of TT immunization among women of child-bearing age.[1] One of the ways to achieve this is by adequate TT immunization coverage. Nigeria is still one of

the 19 countries yet to achieve MNT elimination due to low immunization coverage which has been shown in this study.

Access to TT immunization means receiving at least a dose of TT immunization [8, 9]; this study show that 91% of women had access to TT immunization which is high and could be accepted as adequate. This also reflects a high level of awareness about TT immunization in this community. A study in Pakistan by Qadir et al [10] among university

females reported 39.8% access to TT immunization. A similar study among undergraduates done in Port Harcourt, Rivers State reported that 58.2% of respondents had received at least a dose of TT immunization [11]. Another study by Adiege et al [5] in Lagos reported 55.6% of women had received at least a dose of TT immunization. Sule et al [12] also reported TT immunization coverage of 45.2% (during pregnancy) and 48.9% (post-surgery) among women of child-bearing age. This study showed a higher percentage of access to TT immunization which could be attributed to study population having up to 60% of pregnant women. Pregnancy and child-birth has a positive impact on health seeking behaviours and TT immunization. This was reflected in the study by Owa and Makinde [4] in Ile-Ife with a high coverage of 74.6% of at least one dose TT immunization among women with children aged 0-12 months during their pregnancy period. Being a retrospective study could have contributed to a lower coverage when compared to the findings of this study. Studies in Bangladesh and Pakistan also showed high access to TT immunization; 85% and 95% respectively [8, 9]. When compared to this study, a higher level of access reported in Pakistan by Riaz et al despite a low sample size of 80 could be attributed to all the women being pregnant. On the contrary a study in Ibadan, Nigeria by Orimadegun et al [6] reported much lower immunization coverage of 4.6% among 851 respondents. Their low TT coverage when compared to this study can be attributed to their study population which consisted of secondary school adolescents who also had received immunization one year prior to their study; and most of the immunization was post-injury. The high level of access to TT immunization in this study can serve as a strong avenue to take a step further in educating these women on the proper TT schedule and motivating them to participate in MNT elimination.

Out of the 91% of women that have access to TT immunization in this study, 88% received two doses of TT immunization, 15.5% received three doses while none had four and five doses of the TT immunization showing a progressive decline in immunization coverage. This drop in coverage as the number of doses increases was also reported by Adiege et al [5]; 55.6%, 40.8%, 11.2%, 5.1%, 3.6% for TT1, TT2, TT3, TT4 and TT5 respectively. Lower percentage coverage is attributed to the "difficult-to-reach" swamp area in their study. Drop-out rates from TT1 to TT2, TT1 to TT3, TT1 to TT4 and TT1 to TT5 in this study were 3.1%, 82.8%, 100% and 100% respectively. Although majority of women in this study agree that three doses of TT immunization is required to prevent NNT infection and give long-lasting immunity, more than 80% did not go ahead to receive TT3, one of the major reasons being that they did not see any need to go back for further doses. Not seeing the need to complete immunization further reflects the poor knowledge of proper TT immunization schedule. A study in Bangladesh by Perry et al [8] also reported increasing drop-out rates from TT1 to TT5. Another study by Islam et al [13] among women in a rural community in Bangladesh where illiteracy was a major factor showed a similar increase in drop-out rate as TT dose

increase. Similarly, Adiege et al [5] reported a progressive increase in drop-out rates of 26.6%, 79.8%, 90.8% and 93.5% respectively; a major contributing factor being the location of the study area. A similar decline with increasing number of doses was also reported by Alex Hart and Okoh [11] with only 3.4% respondents completing TT5. Unlike the very low TT4/TT5 coverage in previous studies, none of the women received TT4 and TT5 doses in this study. This vividly portrays the poor and inadequate TT immunization coverage found in this study. This increase in drop-out rate in this study reflects the reason for non-attainment of MNT elimination till date and the dire need for proper education.

Our study showed that the only reason for not taking TT immunization is lack of awareness on the importance of TT immunization; no other reason was given by respondents. This portrays lack of knowledge of tetanus and its prevention. This is a glaring issue that needs urgent attention. Seger et al [14] and Roosihermiatie et al [15] showed the effects of knowledge on TT immunization. Roosihermiatie et al [15] concluded that women who knew about the use of TT immunization were 2.15 times more likely to be immunized than those that do not. Wilson et al [16] also concluded that low knowledge was a cause of low TT immunization in developing countries. Kadimba [17] also showed a positive correlation with knowledge and TT immunization among Zambian women. Similarly, Alex-Hart and Okoh [11] reported lack of awareness as the only reason for not being immunized but only in 5% of respondents. This could be due to higher level of education. Amongst other reasons, Adiege et al [5] and Naeem et al [18] also reported lack of awareness as the major reason for not being immunized (65.8% and 40.5% respectively).

Again the only reason for not completing TT immunization in this study was not being aware of the need to go back to take the immunization. This means that if these women are taught the importance of TT immunization in protecting not only them and their babies, but indirectly protecting the community [19], they would be motivated to complete their immunization.

Socio-demographic factors that significantly affected TT immunization coverage in this study were age and parity. Women above the age of 30 were more likely to be immunized; this is possibly due to the likelihood of marriage, pregnancy and child-birth during this period. Shafiq et al [20] showed the effects of marriage and pregnancy on TT immunization coverage. Their study subjects were grouped into three: unmarried women, married non-pregnant women and married pregnant women. They reported that married pregnant women were more immunized than married non-pregnant women who were even more immunized than the unmarried ones. A study in Port Harcourt, Nigeria [9] also reported increased awareness in older age groups, thus a higher percentage of TT immunization coverage. Perry et al [8] showed a similar relationship with age and TT immunization coverage although this relationship varied depending on the number of TT immunization doses received (one or two) and on the type of analysis being carried out (bivariate or multivariate). This implies that there is need for

a broad-based campaign to reach the younger age group and promote access to TT immunization as well as to promote the completion of all five TT doses in Alakahia. Parity was another significant factor in TT immunization coverage in this study. Women with more than four children tend to feel familiar with pregnancy process, thus tend to neglect completing TT immunization doses. Similarly, Sule et al [12] reported a significant relationship with parity and immunization coverage. Maternal level of education significantly affects TT immunization as reported by Perry et al [8] and Raiz et al [9], however in this study; it became insignificant when confounders were eliminated.

5. Conclusion

Assess to TT immunization is high among women in Alakahia but there is a progressive increase in drop-out rates which is very high and even up to 100% and the only reason there is for not taking TT immunization was lack of awareness; other factors that affected immunization status were pregnancy, age and parity. There is need to strengthen the education of the women in this community on TT immunization with emphasis on proper schedule which can be achieved via radio jingles, ante-natal clinics, village meetings and also secondary school settings where younger females are taught about NT and TT immunization, and also implementation of early immunization before pregnancy. An early start will thus improve our routine TT immunization coverage. It is also expedient that government, stakeholders and health providers channel more of their resources and initiatives towards improving the awareness and knowledge of tetanus and its prevention in our communities.

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