Original Research Article

Awareness and Status of Tetanus Toxoid Immunization among Female Undergraduate Students in a Nigerian University.

Comment [h1]: Vaccination?

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ABSTRACT

Aims: The study aimed to determine the level of awareness and status of tetanus toxoid (TT) vaccination among female undergraduates in Port Harcourt.

Study design: This was a cross sectional descriptive study carried out among female undergraduate students.

Place and Duration of Study: The study was carried out in University of Port Harcourt from 1st to 31st of May 2014.

Methodology: A pre-tested questionnaire was administered to 512 female students selected through a Multi-Staged sampling technique. Information sought included socio-demographics, awareness of TT vaccine, knowledge of the vaccination campaign for women of childbearing age and TT vaccination status. Data was analyzed using epi info version 7.1.3.3.

Results: A total of 512 students participated in the study; mean age was 22± 2.79 years. Four hundred and eighty five (94.7%) and 409 (79.9%) students had heard of tetanus and TT vaccine respectively. Commonest sources of information were health workers. 33.8% knew the target population for the TT vaccination campaign and 18.2% knew that the correct number of doses of TT is 5 doses. Two hundred and ninety eight (58.2%) and 10 (2%) students had received at least 1 dose and 5 doses of TT respectively. Students who had knowledge of the target population for TT vaccination campaign (OR=2.1362, p=0.003) and those who were confident in the effectiveness of TT (OR=2.4074,p=0.000) were twice more likely to receive at least a dose of TT vaccine.

Conclusion: There was poor knowledge of TT vaccination campaign for women of childbearing age and very poor coverage of TT5 among the female undergraduate students in Port Harcourt. Female undergraduate students should be reached during TT vaccination campaigns.

Keywords: [Tetanus toxoid, Female undergraduates, Students, Port Harcourt }

1. INTRODUCTION

Maternal and neonatal tetanus (MNT) is a public health problem which has continued to plague most countries in the developing world, despite the availability of an effective vaccine [1]. Tetanus is an acute, infectious, non-communicable disease with a high case fatality rate, Caused by Clostridium tetani [2]. The World Health Organization reported that globally, 49,000 newborns died of this disease in 2013 alone [1]. Tetanus kills one newborn every eleven minute or approximately 134 babies every day [3]. A significant number of women also die every year due to maternal tetanus [1]. Most of these deaths occur in Africa and in East and Southern Asia among populations with limited or no access to health care services and information related to safe birthing practices, with poor socio-economic status and low literacy rate [1].

Due to international and regional efforts which were directed at eliminating maternal and neonatal tetanus, 35 countries were certified free of the disease between 2000 and June 2014 [1,3]. However, maternal and neonatal tetanus still remains a public health threat in 24 countries including Nigeria [4,5,6,7,8]. In one study done in Nigeria, neonatal tetanus accounted for 20.9% of the total neonatal deaths recorded [9].

The major predisposition to this disease is lack of maternal vaccination with Tetanus Toxoid vaccine, coupled with deliveries conducted by untrained caregivers in an unhygienic environment and with unhygienic birth practices [1,4]. These conditions allow the tetanus spores to contaminate maternal wounds during child birth and the umbilical cord at the time it is cut or dressed after delivery [1,2,4].

The major means of preventing maternal and neonatal tetanus recommended by WHO is the vaccination of women of childbearing age (15 to 49 years) with 5 doses of tetanus toxoid vaccine as early as possible [1,10,11]. The vaccine schedule is as follows: First dose (TT1) is to be administered at first contact, 2nd dose (TT2) at 4 weeks after the first dose, TT3 6 months after TT2, TT4 1 year after TT3 and TT5 is given 1 year after TT4 [10]. The complete 5 doses is expected to provide lifelong protection for the would be mother and also provide

adequate partial immunity for her unborn baby against neonatal tetanus [1]. Available data showed that the uptake of the vaccine by women of childbearing age in Nigeria has been poor.[12,13]. As part of the strategy to enhance the uptake of the vaccine in Rivers State, three phases of maternal and neonatal tetanus elimination campaign targeted at women of child bearing age were launched in Rivers State from 2009 to 2010 [14]. Following these numerous campaigns which had been carried out in Rivers State, this present study therefore aimed to assess the level of awareness and status of tetanus toxoid vaccination among female undergraduates in Port Harcourt.

2. MATERIAL AND METHODS

This was a descriptive cross-sectional study carried out among female undergraduate students of the University of Port Harcourt from 1st to 31st of May 2014. The University of Port Harcourt is the largest Federal tertiary institution in Rivers State, Southern Nigeria. Records show that as at the 2013 / 2014 session, there were 11,526 male and 9,674 female regular undergraduate students.

The sample size for this study was calculated using the formula [15] for estimating minimum sample size for descriptive studies when studying proportions with an entire population size < 10 000 using a population size of 9,674 female students in the University

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Where:

Comment [h2]: cross check

$$n_0 = \frac{Z^2(pq)}{E^2}$$

n = minimum sample size

p= Prevalence of 46.7% reported by Bamidele and Umoh [16]

q= 100 – p

E= Margin of error tolerated at 5%

Z= 1.96 at 95% confidence level

$$n_0 = \frac{1.96^2 \times 46.7 \times (100-46.7)}{5^2} = 382$$

$$n = \frac{382}{1 + \frac{(382 - 1)}{9,674}}$$

Thus minimum sample size of 368 was calculated.

Allowance for attrition (30%) = 115

Minimum sample size = 368 + 115 = 483

However 560 questionnaires were distributed to students that were recruited for the study. A multi – staged sampling technique was used to recruit the students. The students were first stratified into the eight major Faculties and Colleges of the University and the total number of female students in each faculty or college was determined from the school records. One department was randomly chosen from each of the eight faculties / colleges. From the chosen departments, an academic grade level was chosen by simple random sampling technique. According to the proportion of female students in each faculty or college, a specific number of female students were selected by simple random technique. In faculties or colleges where the selected grade level did not have sufficient number of females required for that faculty, a second grade level was chosen by simple random sampling technique to the complete the process of randomly selecting female students for that faculty. However 12 (2.1%) students did not give consent, another 36 (6.4%) did not return their questionnaires and were excluded from the study. Eventually 512 students participated in the study.

The questionnaire used for the study was designed by the researchers and it was reviewed by a panel of specialist Paediatric consultants to ascertain the face validity. It was structured; self-administered and pretested by administering it to 40 students in a department not

included in the study, after which ambiguous questions were removed or modified. Information sought included socio-demographics, awareness of tetanus and tetanus toxoid (TT) and vaccination status.

Data was analyzed using the Epi Info version 7.1.3.3 (CDC, Atlanta Georgia, USA) statistical software. Bivariate analysis involved the use of Chi-Square for testing the significance of associations between categorical variables. Logistic regression was carried out for multivariate analysis. The level of significance was set at $p<0.05$.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethics Committee of the University of Port Harcourt and University of Port Harcourt Teaching Hospital.

3. RESULTS

A total of 512 female students participated in the study. The age of the respondents ranged from 15 to 31 years with a mean age of 22 ± 2.79 years. A total of 405 (79.1%) of the respondents were less than 25 years of age, while 107 (20.9%) were 25 years and above.

Of the 512 respondents, 485 (94.7%) had heard about tetanus while 27 (5.3%) had not. Up to 172 (33.6%) respondents heard about tetanus from a health worker, 150 (30.9%) from school lessons, 67 (13.8%) heard about tetanus from the media, 40 (8.2%) from the media and family members and 30 (6.2%) heard about tetanus from family members alone. A total of 409 (79.9%) of the respondents had heard about tetanus toxoid while 103 (20.1%) had not. Concerning the correct response as to the target population for tetanus toxoid vaccination campaigns, 173 (33.8%) of the respondents correctly answered “women of childbearing age”. Sixty four (12.5%) answered “pregnant women only”, 15 answered “married women only” and 260 (50.8%) had no idea.

Table 1 shows the relationship between the knowledge of the target population for TT and some variables. Correct knowledge of the target population for TT was significantly higher

among the older age group (*P* = 0.013) and those in Medical faculties (*P*= 0.001). A significantly increasing trend in the proportion of respondents with correct knowledge of the TT target population was also noticed with advancing year of study (*P*= 0.001).

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Table 1: Relationship between knowledge of tetanus toxoid target population and some variables

		Correct Knowledge of Tetanus Toxoid target population				
Variable		**Yes N (%)**	**No N (%)**	**Total N**	**Odds Ratio**	**P value**
Age group	**<25 years**	126 (31.1)	279 (68.9)	405	0.576	0.013*
	≥25 years	47 (43.9)	60 (56.1)	107		
Year of study	**One**	39 (26.5)	108 (73.5)	147	1.000	
	Two	45 (25.3)	133 (74.7)	178	1.067	<0.001*
	Three	14 (29.8)	33 (70.2)	47	0.851	
	Four	31 (33.3)	62 (66.7)	93	0.722	
	Five	3 (100.0)	0 (0.0)	3	0.000	
	Six	41 (93.2)	3 (6.8)	44	0.026	

College / Faculty	**Medical**	46 (71.9)	18 (28.1)	64	6.459	<0.001*
	Non - medical	127 (28.4)	321 (71.6)	448		

* = significant

Only 93 (18.2%) of the respondents knew that the complete number of shots for TT was 5 shots. Other respondents gave various answers from 1 – 4 and 319 (62.3%) had no idea

Table 2 shows the relationship between the knowledge of the complete dose of TT and some variables. Correct knowledge of the complete dose of TT was significantly higher among the older age group *(P* = 0.001) and those in Medical faculties (*P*=0.001).

Table 2: Relationship between knowledge of tetanus toxoid complete dose and some variables

		Correct Knowledge of Tetanus Toxoid complete dose				
Variable		**Yes N (%)**	**No N (%)**	**Total N**	**Odds ratio**	**P value**
Age group	**<25 years**	53 (13.1)	352 (86.9)	405	0.252	<0.001*
	≥25 years	40 (37.4)	67 (62.6)	107		
Year of study	**One**	14 (9.5)	133 (90.5)	147	1.000	
	Two	24 (13.5)	154 (86.5)	178	1.481	<0.001*
	Three	5 (10.6)	42 (89.4)	47	1.313	

	Four	9 (9.7)	84 (90.3)	93	1.018	
	Five	1 (33.3)	2 (66.7)	3	4.750	
	Six	40 (90.0)	4 (9.1)	44	95.000	
College / Faculty	**Medical**	39 (60.9)	25 (39.1)	64	11.382	<0.001*
	Non – medical	54 (12.0)	394 (88.0)	448		

* = significant

When a logistic regression analysis was done of the same variables relating to correct knowledge of target population for TT and the complete dose of TT as shown in Table 3, there was no statistically significant difference noticed between variables.

Table 3: Logistic regression analysis of factors relating to Correct knowledge of Tetanus Toxoid target population and complete dose

	Correct Knowledge of:					
	Target population for TT			**Complete dose of TT**		
Term	**Odds Ratio**	**Confidence Interval**	**P-Value**	**Odds Ratio**	**Confidence Interval**	**P-Value**
Age group (<25 / ≥25 years)	0.7281	1.2887	0.276	1.5829	3.1188	0.184
Faculty (Non medical / Medical)	1.4676	4.9799	0.5383	1510913	>1.012	0.96
Year of study (Reference: Five)						
One	0	>1.012	0.9596	0.1285	2.236	0.15

Comment [h3]: confidence interval is usually a range

Comment [h4]: As above

Comment [h5]: Better two decimals. Occasionally three decimals for P values like 0.001. Tables will be less congested. Modify accordingly for the others if accepted.

Comment [h6]: Use two decimals

Comment [h7]: ?cross check please

Comment [h8]: ? cross check please

Two	0	>1.012	0.9595	0.1805	3.0593	0.2358
Three	0	>1.012	0.9605	0.2316	4.4518	0.3321
Four	0	>1.012	0.9606	0.1165	2.0655	0.1428
Six	0	>1.012	0.9712	13863545	>1.012	0.96

Comment [h9]: Not clear

Comment [h10]: Real?

Comment [h11]: ?

Concerning the effectiveness of TT, 309 (60.4%) thought it was effective, 32 (6.2%) thought it was not and 171 (33.4%) had no idea.

A total of 298 (58.2%) of the respondents had received at least one dose of TT and 214 (41.8%) had not received any at all. The most common occasion on which TT was received was after an injury (57.7%), routine (32.6%) and during antenatal care (10.1%).

Figure 1 shows the reasons for not receiving any dose of TT. Most of the respondents who did not receive any dose of TT had no reason for not doing so. The next popular reason seen among 59 of the respondents was not being aware.

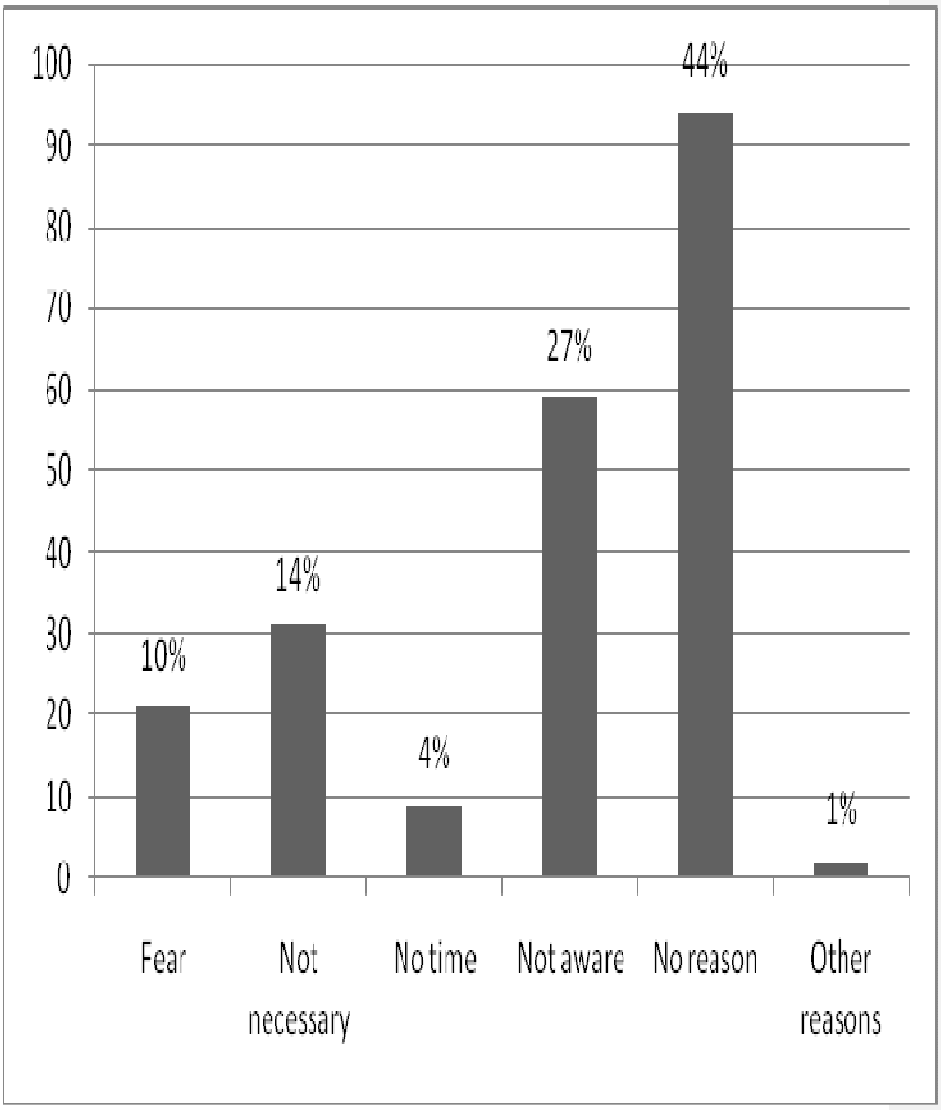

Figure 1: Reasons for not receiving tetanus toxoid vaccination.

Table 4 shows the relationship between having received at least a dose of TT vaccination and some variables. Being in a medical department (p < 0.001), being confident in the effectiveness of TT (*P*= 0.001), a higher year of study (*P*= 0.001), correct knowledge of TT target population (*P*=0.001) and correct knowledge of the complete dose of TT (*P*=0.001) were significantly associated with receiving at least a dose of TT.

Table 4: Relationship between receiving tetanus toxoid vaccination and its determinants

		Received Tetanus Toxoid vaccination				
Variable		**Yes N (%)**	**No N (%)**	**Total N**	**Odds Ratio**	**P value**
Age group	**<25 years**	231 (57.0)	174 (43.0)	405	0.793	0.298
	≥25 years	67 (62.6)	40 (37.4)	107		
Year of study	**One**	72 (49.0)	75 (51.0)	147	1.000	
	Two	100 (56.2)	78 (43.8)	178	0.749	<0.001*
	Three	28 (59.6)	19 (40.4)	47	0.651	
	Four	55 (59.1)	38 (40.9)	93	0.662	
	Five	3 (100.0)	0 (0.0)	3	0.000	
	Six	40 (90.9)	4 (9.1)	44	0.096	
College / Faculty	**Medical**	52 (81.2)	12 (18.8)	64	3.558	<0.001*
	Non - medical	246 (54.9)	202 (45.1)	448		
Confidence in effectiveness of TT	**Yes**	215 (69.6)	94 (30.4)	309	0.302	< 0.001*
	No	83 (40.9)	120 (59.1)	203		

Comment [h12]: ?

Knowledge of tetanus toxoid target population	**Correct**	133 (76.9)	40 (23.1)	173	3.506	<0.001*
	Wrong	165 (48.7)	174 (51.3)	339		
Knowledge of tetanus toxoid complete dose	**Correct**	72 (77.4)	21 (22.6)	93	3.506	<0.001*
	Wrong	226 (53.9)	193 (46.1)	419		

* = significant

Out of the 298 respondents that received at least a dose of TT, 10 (3.4%) had received 5 complete doses (2.0% of the total number of respondents), 15 (5%) had received 4 doses, 41 (13.8%) had received 3 doses, 85 (28.5%) had received 2 doses and 84 (28.2%) had received only TT1.

Table 5 shows the relationship between receiving the complete dose of TT and some variables. The older age group (p = 0.022), being confident in the effectiveness of TT (*P* = 0.047), correct knowledge of TT target population (*P*=0.001) and correct knowledge of the complete dose of TT (*P*=0.001) were significantly associated with receiving the complete dose of TT.

Table 5: Relationship between receiving complete dose of tetanus toxoid vaccination and its determinants

		Received complete dose of Tetanus Toxoid vaccination				
Variable		**Yes N (%)**	**No N (%)**	**Total N**	**Odds Ratio**	**P value**
Age group	**<25 years**	5 (1.2)	400 (98.8)	405	2.928	0.022*
	≥25 years	5 (4.7)	102 (95.3)	107		
Year of study	**One**	3 (2.0)	144 (98.0)	147	1.000	
	Two	3 (1.7)	175 (98.3)	178	0.823	0.371

	Three	1 (2.1)	46 (97.9)	47	1.043	
	Four	0 (0.0)	93 (100.0)	93	0.000	
	Five	0 (0.0)	3 (100.0)	3	0.000	
	Six	3 (6.8)	41 (93.2)	44	3.512	
College / Faculty	**Medical**	3 (4.7)	61 (95.3)	64	3.098	0.118
	Non - medical	7 (1.6)	441 (98.4)	448		
Confidence in effectiveness of TT	**Yes**	9 (2.9)	300 (97.1)	309	0.165	0.047*
	No	1 (0.5)	202 (99.5)	203		
Knowledge of tetanus toxoid target population	**Correct**	9 (5.2)	164 (94.8)	173	18.548	<0.001*
	Wrong	1 (0.3)	338 (99.7)	339		
Knowledge of tetanus toxoid complete dose	**Correct**	7 (7.5)	86 (92.5)	93	11.287	<0.001*
	Wrong	3 (0.7)	416 (99.3)	419		

* = significant

Table 6 shows the logistic regression analysis of some variables relating to receiving tetanus toxoid vaccination by the respondents. After adjusting for various factors, only confidence in effectiveness of tetanus toxoid vaccine (OR = 2.4074, P = 0.000, Confidence Interval =3.5982) and the correct knowledge of the target population for tetanus toxoid (OR = 2.1362, P = 0.003, Confidence Interval = 3.5426) significantly influenced receiving at least a dose of tetanus toxoid among the respondents. No factor was found to be significantly associated with the completion of the 5 doses of TT vaccine.

Comment [h13]: For example [OR=2.14; 95% CI(1.32 - 4.70); P=0.003]

Table 6: Logistic regression analysis of factors relating to receiving Tetanus Toxoid vaccination

Variable	Received at least a dose of TT vaccination			Received complete dose of TT vaccination		
	Odds Ratio	Confidence Interval	P-Value	Odds Ratio	Confidence Interval	P-Value
Age group (<25 / ≥25 years)	0.8543	1.4297	0.549	2.4585	10.5855	0.2272
Faculty (Non medical / Medical)	0.9538	2.9627	0.9348	1.7767	8.843	0.4827
Confidence in effectiveness of tetanus toxoid (Yes / No)	2.4074	3.5982	0.000*	1.6147	15.238	0.6757
Knowledge of tetanus toxoid target population (Correct / Wrong)	2.1362	3.5426	0.0033*	8.4928	90.535	0.0764
Knowledge of tetanus toxoid complete dose	1.2547	2.523	0.5243	0.3082	1.6145	0.1636

* = significant

4. DISCUSSION

Nigeria is one of the five countries said to be responsible for half of the global neonatal deaths [17] and the country is also among the 24 countries in which maternal and neonatal tetanus is still a public health threat [4], contributing significantly to the neonatal deaths in the

country [9]. Our results indicate that majority of our respondents were aware of the existence of tetanus and tetanus toxoid vaccine, corroborating the finding in a previous study [18]. This high level of awareness may be attributable to the high educational qualification of the respondents. The fact that the Commonest source of information was health workers, followed by classroom lessons, demonstrates the important role health facilities and schools can play in dissemination of health information to the general public.

Interestingly, despite the three phases of the maternal and neonatal tetanus elimination campaigns which were carried out in Rivers State in the recent past [14], our respondents still exhibited a very poor knowledge of the programme. Only one third of the respondents knew that the tetanus toxoid vaccination campaign is targeted at women of childbearing age. More than half of the respondents did not know the target population, while 15.4% of the respondents were under the misconception that it is targeted at married women only or pregnant women only. Similarly, a very small proportion (18.2%) of the respondents knew that the complete dose for tetanus toxoid is 5 doses. This poor knowledge of the tetanus toxoid vaccination programme and the high level of misconception about the target population may have contributed to the poor up-take of the vaccine by women of childbearing age in Nigeria, as has been previously reported [12].

In this study, correct knowledge of the target population and the correct number of doses of tetanus toxoid to be administered are positively associated with being older in age, higher academic level and being in the Faculty of Medicine. This is not surprising because it shows the positive relationship between higher educational attainment and general knowledge about disease prevention. Students in Faculty of Medicine may have received detailed information about the tetanus toxoid vaccination programme in course of their academic pursuits and were therefore operating at a higher knowledge level compared to the students from other faculties. Basher [19] also reported similar findings among medical students India. The study further showed that majority (60.4%) of the students thought that TT is effective in preventing tetanus. This confirms the report of Naeem et al who made similar observations

[20], though in the previous study, a higher proportion (89.5%) of respondents thought TT was effective.

The United Nations International Children's Fund (UNICEF), World Health Organization (WHO) and United Nations Population Fund (UNFPA) recommended that in high risk countries such as Nigeria, 90% of women of childbearing age should receive TT to achieve and maintain elimination of maternal and neonatal tetanus [1,10]. In this study, only 58.2% of the respondents had received at least one dose of TT, showing that Nigeria still has a long way to go in this fight to eliminate maternal and neonatal tetanus. It also supports the statement of UNICEF that only 60% of babies born in Nigeria are protected at birth (PAB) against tetanus [21]. This result however compares favourably with the 3.1%, 39.8% and 55.6% reported by Orimadegun [13] in South Western Nigeria, Qadir et al. [17] and Naeem et al[19] in Pakistan. It is however lower than the 70.9% reported among medical students in Mymensingh, India by Basher [19] and 68% reported by Singh et al. [22] in rural North India. These differences in observation maybe due to differences in level of awareness, knowledge of tetanus toxoid vaccination programme for women of childbearing age and the sample size.

The study further indicate that the most common occasion for receiving TT among the respondents was following an injury. Routine vaccination was the second most common reason for receiving TT. Orimadegun et al [13] also had similar observation in Western Nigeria. The results in this study also showed that majority of the respondents who did not receive TT had no reason for not doing so; the next commonest reason was lack of awareness. This shows that with adequate community awareness campaign aimed at increasing the knowledge of women of childbearing age about the danger of maternal and neonatal tetanus and the need to prevent the disease by receiving 5 doses of TT vaccination, the rate of vaccination may improve and Nigeria may meet the 90% target needed for the elimination of maternal and neonatal tetanus [1].

The study further revealed the very poor status of TT5 vaccination coverage among the respondents. Only 3.4% of the respondents who received at least one dose of TT received the complete 5 doses, i.e.2% of all the respondents. This finding explains why Nigeria is still burdened with the problem of maternal and neonatal tetanus. The poor knowledge of the respondents on TT vaccination programme for women of childbearing age may have affected their uptake of the vaccine. Studies from other developing countries also reported a very poor TT5 vaccination coverage among women of childbearing age [18, 19].

Bivariate analysis showed that being in the medical faculty, being older in age, higher year of study, being confident in the effectiveness of TT, having correct knowledge of the target population and the complete dose of TT vaccine were positively associated with receiving TT vaccination. However, after multivariate logistic regression analysis, only being confident in the effectiveness of TT vaccine in preventing tetanus and the knowledge of the target population of TT vaccination campaign significantly influenced receiving at least one dose of the vaccine. This highlights the important role health education in schools, health facilities and the mass media can play in boosting TT vaccination coverage by women of childbearing age.

The first limitation of the study is that the information sought is based on self-report and is subject to over or under reporting. Secondly vaccination received during childhood and the adolescent period may not be easily remembered in adulthood. Thirdly, medical students were included in the study. These students operated at a higher knowledge level due to their training compared to students from other faculties.

5. Conclusion

There was a high level of awareness about tetanus and tetanus toxoid vaccine but poor knowledge of the tetanus toxoid vaccination programme for women of child bearing age among female undergraduate students in Port Harcourt. There was also very poor coverage of TT5 among the students. Students who had knowledge of the target population of the TT

vaccination campaign and those who had confidence in the effectiveness of TT vaccine in preventing tetanus were twice more likely to receive at least one dose of TT vaccine compared to their counterparts who lacked such knowledge and also lacked confidence in the effectiveness of the vaccine. .

Future campaigns should also target female undergraduate students in university campuses. The students should be educated on the danger of maternal and neonatal tetanus, the availability of a safe and effective vaccine and the vaccination schedule for women of childbearing age.

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