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Original Research Article

Predictors of knowledge, attitude and perception of diphtheria infection and vaccination among medical students in Abubakar Tafawa Balewa University, Bauchi North-Eastern Nigeria

Abubakar Musa[1]*, Usman Abba[2], Esther Adesina Oluwatobi[3], Aishat Haruna Ojochenemi[3], Abel Acheneje Abutu[3], Muhammad Bashar Jibril[4], Mohammed Kabir Abdullahi[5]

[1]Department of Community Medicine, Abubakar Tafawa Balewa University and Abubakar Tafawa Balewa University
[2]Ministry of Health Damaturu, Yobe State, Nigeria
[3]College of Medical Sciences, Abubakar Tafawa Balewa University, Bauchi, Nigeria
[4]Department of Community Medicine, Amadu Bello University, Zaria, Nigeria
[5]Department of Obstetrics and Gynaecology, Abubakar Tafawa Balewa University and Abubakar Tafawa Balewa

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***Correspondence:**
Dr. Abubakar Musa,
E-mail: habusari81@gmail.com

ABSTRACT

Background: Diphtheria is a highly contagious infection caused by *Corynebacterium diphtheriae* and other strains that affect respiratory system. Commonly transmitted through inhalation of airborne droplets or handling contaminated items. The main stay of prevention is vaccination. Hence, this study assessed the level of knowledge, attitude and perception of diphtheria infection and vaccination among medical students in Abubakar Tafawa Balewa University Bauchi State, Northeastern Nigeria.
Methods: A cross-sectional descriptive study was carried out among 210 Medical students in Bauchi State from April to November, 2024. A stratified sampling technique, semi-structured self-administered questionnaire were used and the data was analyzed using SPSS version 23.0.
Results: The mean age among the respondents was 21±3. The study reveals poor knowledge 60.5%, then 90.5% and 99% of respondents had positive attitude and perception towards diphtheria infection and vaccination respectively. Age, religion and level of study were found to be statistically associated with knowledge of diphtheria infection with p=0.001, p=0.001 and p=<0.001 respectively. Age, religion and level of study remained independent predictors of knowledge of diphtheria infection and vaccination.
Conclusions: The knowledge of diphtheria infection and vaccination among the respondents was poor with positive attitude and perception. Age, religion and level of study were the factors associated with knowledge of diphtheria infection. Age, religion and level of study remained independent predictors of knowledge of diphtheria infection and vaccination. There is need to strengthen campaign for diphtheria vaccination targeting students to prevent them from the infection and its effects.

Keywords: Attitude, Bauchi, Diphtheria, Knowledge, Perception

INTRODUCTION

Diphtheria is a highly contagious and potentially fatal infection caused by *Corynebacterium diphtheriae* and occasionally by *Corynebacterium ulcerans* and *Corynebacterium pseudotuberculosis* strains. Transmission of diphtheria is common through inhalation of airborne droplets, sneezing, coughing or handling

contaminated items. The bacterium primarily causes an acute respiratory infection, forming a firmly adherent throat pseudo-membrane in the throat, pharynx, and tonsils, causing a swollen neck ("bull neck").[1] The pathogenesis of *Corynebacterium diphtheriae* is based on its ability to produce diphtheria toxin that can cause extensive damage to the organs and may lead to death if untreated. The toxigenic effects of *Corynebacterium diphtheriae* are mainly due to a lysogenic bacteriophage carrying the diphtheria toxin gene (tox) gene that affects protein synthesis. Therefore, the toxin causes inflammation of the upper respiratory tract mucosal surfaces, nerves and heart lesions, leading to symptoms such as sore throat, fever, breathing difficulties, heart rhythm problems and rarely membranous pharyngitis. Systemic infections such as myocarditis and neuropathy are also associated with diphtheria toxin, thus increasing morbidity and mortality.[2,3]

Vaccines is a suspension that contains microorganism in a weakened, live or killed state or proteins or toxins from the organism while vaccination is the administration of a vaccine to help the immune system develop immunity from a disease. Vaccination is one of the most powerful preventive health-interventions leading to improvement of survival rates and the reduction of disease burden. The effectiveness of vaccination has been proven overtime by regression and even clearance of many vaccines preventable diseases and so it can be said to be one of the most successful public health interventions, although outbreaks of vaccine preventable diseases also shows the importance of proper vaccination counselling.[4]

Diphtheria and tetanus vaccines are the most commonly used vaccines worldwide and generally considered successful in the monoprophylaxis for both preventable infection diseases, also due to the relatively high vaccination rate of children and regular booster immunization in adulthood. While a monovalent vaccine against tetanus is usually used for booster or post-exposure vaccination after an injury, the diphtheria vaccine is available only as part of combined vaccines.

The bivalent vaccine against diphtheria and tetanus indicated for both booster and primary vaccination in adults contains a reduced amount of diphtheria toxoid. Some countries require the booster dose to be repeated every 10–15 years, either with a bivalent or combined vaccine containing both toxoids. Implementation of the original program of booster immunization against tetanus at a regular interval of 10–15 years was changed by Slovak legislation in 2008 when it was expanded to include a booster dose of a bivalent vaccine against diphtheria and tetanus.[5,6]

From the late 1940s through the 1990s, vaccination against pertussis, diphtheria and tetanus with a combined diphtheria and tetanus toxoids and whole-cell pertussis (DTP) vaccine was recommended by CDC'S advisory committee on immunization practices (ACIP) in United States for infants and young children. Receipt of DTP was commonly associated with local adverse events (e.g., redness, swelling and pain at the injection site) and less commonly with serious adverse events .Because of safety concerns about the whole-cell pertussis component of DTP, diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccines were developed and subsequently replaced doses of DTP in the 1990s.Since 1997, infants and young children(2months-6years) have been recommended to receive a 5-dose series of DTaP which involves 3 primary doses given at age 2, 4 and 6months,1 booster dose at age 15-18 months and another booster dose at age 4-6 years.

In 2005, ACIP recommended that adolescents and adults (11-18 years) receive a single dose of a tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine. After receipt of Tdap, adolescents and adults are recommended to receive a booster dose of tetanus and diphtheria toxoids (Td) vaccine every 10 years or when indicated for wound management. In 2012, in an effort to reduce the burden of pertussis in infants, ACIP recommended a dose of Tdap for women during each pregnancy preferably at 27-36 weeks of gestation.[6–8]

The essential programme on immunization began in 1974.Combination diphtheria vaccines were introduced as part of this programme and it's given most often with vaccines for disease such as (Tetanus, Pertussis, Haemophilus influenzae, Hepatitis B), These combined vaccines is known as PENTA. The case fatality in Europe had dropped to about 15% during the First World War, mainly as a result of widespread use of diphtheria antitoxin (DAT) treatment. Diphtheria epidemics also ravaged Europe during the Second World War, causing about 1 million cases and 50,000 deaths in 1943.In 1970s, before these vaccines become easily accessible and used worldwide, an estimated 1 million cases of diphtheria including 50,000-60,000 deaths occurred each year in low and middle-income countries.[9,10]

The annual number of reported cases of diphtheria (laboratory or clinically confirmed or epidemiologically linked) in countries with poor routine vaccination coverage has remained relatively unchanged over the last 11 years. According to the most recent estimate, about 14% of children are left with no or incomplete vaccination indicting that there are pockets of unvaccinated children in all countries.

Case-fatality rates exceeding 10% have been reported especially where DAT is unavailable with most cases occurring during cold season in regions with temperate climates whereas transmission takes place throughout the year in warmer climates. In the period 2011-2015, India had the largest total number of reported cases each year, with a 5-year total of 18350 cases, followed by Indonesia and Madagascar with 3203 and 1633 cases respectively while the South-East Asia region was the source of 55-99% of all reported cases each year during this period.

There is a significant under reporting of cases to WHO, particularly from many African and Eastern Mediterranean countries. Outbreaks of respiratory diphtheria have been reported in several countries, including Nigeria in 2011.[11,12]

In November 2017, the largest diphtheria outbreak of this century emerged among Rohingya refugees in Kutupalong camp, Bangladesh but 2018, the WHO recorded 16,611 reported cases. As of June 2019, 8640 cases and 45 deaths have been reported. This is the latest in a series of large outbreaks associated with political unrest, including ongoing outbreaks in Venezuela (1904 suspected cases,164 deaths), Yemen (1907 suspected cases, 98 deaths) and Haiti (808 probable cases, 107 deaths).[13,14]

Diphtheria is a treatable disease with timely administration of antimicrobial therapy and tetanus toxoids/diphtheria antitoxin. It is also important to note that other vaccines exist and have led to a reduction in active diphtheria cases in the world. Across the world diphtheria has a high case fatality ratio of 5 and 10% in areas with high vaccination rate. But, in low-income nations of Asia and Africa, low vaccination coverage uptake including low hygiene and poor sanitation have led to the increased resurgence of diphtheria cases with more cases reported ever year. In such regions, the case-fatality ratio in children under five and adults above 40 years has been approximated to be as high as 20%.[15,16]

As of November 26, 2023, a total of 22,842 suspected cases of diphtheria and 779 deaths have been reported from Nigeria, Guinea, Niger, Mauritania and South Africa with 83.9% of cases and 73.5% of deaths, Nigeria is the most affected country. The WHO reported an alarming number of cases in Nigeria with overall risk of diphtheria assessed as high at the national level. Since the beginning of 2023, out of 1439 suspected cases, 557 cases (39%) have been confirmed, with 73 deaths among these cases, raising the case fatality ratio to 13% in this region. WHO has identified 21 of the 36 states and the Federal Capital Territory as severely affected by the diphtheria outbreak. This ongoing outbreak is mainly observed in children aged 2 to 14, particularly in the Kano state. According to the Nigeria Centre for Disease Control (NCDC), only a fraction of the cases was fully vaccinated with the diphtheria-tetanus-pertussis (DTP3) vaccine, indicating the considerable role of the vaccine in control of this disease.[17]

According to WHO and NCDC, some of the reasons contributing to the increased outbreak of diphtheria case in Nigeria are low vaccine uptake and coverage , notably for the third dose of the vaccine ,and in areas ravaged by militancy and terrorism, low resources and unavailability of diphtheria antitoxin generally affects the availability and uptake of the required doses at the appropriate time; lack of clinical and epidemiological studies to rapidly identify isolate and treat individuals affected; there's also limited public health measures to hamper the spread of diphtheria. The factors stated are based on epidemiological reports of diphtheria by experts in the field. Epidemiological information by NCDC from the year 2015 to 2023 reflects a history of poor representation of data and information and poor coverage of vaccination, which have consistently led to dramatic outbreaks in Nigeria .18 with this perspective in mind, and a look at the information available, notable difference is observed year in and year out.

This is reflected in 2023 where a dramatic outbreak of about 553 confirmed cases and 73 deaths was reported. Which was said to have started in Kano state in December of 2022, cases were also reported from Lagos, Yobe and Osun States .but in the year 2021, limited number of cases about 160 was reported, with majority reported from, Kano, Bauchi and Yobe also in the year, 2020 and 2019, only 245 and 157 cases were reported from about 25 States in the country, with the majority Katsina, Zamfara and Kano States, in 2018, a large diphtheria outbreak was recorded, with 176 confirmed cases and 22 fatalities reported in states of Adamawa, Bauchi, Borno and Kano.

Considering the contrasting reports on number of recorded cases a similar pattern is observed in case fatality rates that was reported by NCDC with significant difference. No cases was reported in the year 2020 and in 2021, only 5% CFR was reported and recorded, Nigeria's primary age group trends from 2020 to 2023 was observed and noted to be highest in children under the age of 15, with the most severely affected age group being children between the age of 5 and 14 years, spanning between 30th June to 31st August 2023, 5898 suspected cases were reported from about 59 LGAs in 11 states in Nigeria. The majority (99.4%) of suspected cases were reported from the northern states of Kano (1816), Katsina (234), Yobe (158), Bauchi (79), Kaduna (45) and Borno (33).[17,19]

Since physicians play a key role in vaccination advocacy, the importance of structural training regarding vaccination cannot be overstated. Vaccinations are particularly important for medical students as medical students come into contact with infectious diseases early. Immunity against vaccine-preventable diseases is therefore vital for medical students to ensure their own protection and also the protection of vulnerable patients.[20] Medical students are future health care providers and importance of their knowledge, positive attitude and high acceptance of interventions like vaccination cannot be undermined. Experience with vaccines before and during medical school may impact these future physician's recommendations.[21]

This topic gains particular importance in times of Diphtheria outbreak and the subsequent booster vaccine due to the scepticality of a significant proportion of the population about the vaccine despite the health threats.

The Healthcare workers (HCWs) and undergraduate medical students may be at greater risk of diphtheria than the general population in endemic settings and outbreaks. Although, there's no known record of health care worker's diphtheria related death so far in Nigeria which can be attributed to the establishment of Diphtheria public health advisory but special attention should be paid to them as they are still at risk of occupational exposure to Corynebacterium diphtheria.[22,23] This study assessed the knowledge, attitude and perception of medical students on diphtheria infection and vaccination in Abubakar Tafawa Balewa University, Bauchi State, Northeastern-Nigeria.

METHODS

Study design

A cross-sectional study design was used.

Study area

Bauchi State is a state in the North–east geopolitical zone of Nigeria.[40] based on 2023 population estimate, the projected population of Bauchi state was 8,670,000 with a growth rate of 3.88%. As a major agriculture- based state.[40]

Bauchi State has three Universities, of which two belong to the federal government and one to the state. The federal universities are ATBU and FUHSA, while the state university is BASUG. Abubakar Tafawa Balewa university (ATBU) is located in Bauchi, It was established in 1980 and the college of medicine offers Bachelor's degree in medicine and surgery which is a 6-year course.[40]

Study population

The study population was the registered students of College of Medical Sciences of Abubakar Tafawa Balewa University, Bauchi who spent at least one session in the college and excluded those that were not around during the study.

Sample size

The minimum sample size was determined by using Fischer's formula: n=Z2pq/d2 after adding 10% non-response and Cochran's correction formula the minimum sample size was 210.

Sampling technique

A stratified sampling technique and proportionate allocation was used to select the participants of the study and also a systematic sampling technique was used to determine the sampling interval by dividing the number of participants by the sample size allocated proportionately to the level of study.

After calculating the sampling interval, the first participant was identified by selecting a random number between one and the sampling interval using simple random sampling by balloting. Subsequent participants were then identified by adding the sampling interval to the serial number of the first sampled participant.

Study instruments

A pretested semi-structured self-administered questionnaire that was adapted from similar studies was used to collected data from April to November, 2024 with the following sections: Socio-demographic data, Knowledge, Attitude and Perception on diphtheria infection and vaccination and uptake of diphtheria booster dose. [27,30]

Ethical considerations

Introductory letter was obtained from the department of Community Medicine alongside an application letter was presented to the head of each level. Ethical clearance was requested from the Health Research Ethics Committee of ATBU and adhered to Helsinki declaration.

Statistical analysis

Data was appropriately sorted out, cleaned and coded in the excel spread sheet after which it was entered into a Statistical Product and Service Solutions software (version 23.0).

At the level of univariate analysis, frequency tables, proportions, percentages and charts were used to present the independent variables while quantitative variables were summarized with mean and standard deviation (S.D).

Statistically significant association between the dependent and independent variables was analyzed using the Pearson chi-square or Fischer's exact test with a significance level fixed at 95% confidence interval and a p value of<0.05.

Logistic regression analysis was used to determine the predictors of knowledge, attitude and perception of diphtheria infection and vaccination by recruiting the variables that were significant at bivariate level with p value<0.05 considered as statistically significant.

RESULTS

Majority of the respondents are aged 18-27 with percentage of 90.5%, Males with percentage of 53.3%, Hausa/Fulani with 52.9%, practice Islam with 61.4%, Unmarried with 91.4%, Level of income (>30,000) of 51.9% and 100level with 29.5%. Majority of the respondents have poor level of knowledge (60.5%) and 39.5% have good level of knowledge. Majority of the respondents have positive perception (99%) while (1.0%)

have negative perception. There is a statistically significant association between age, religion, level of study with knowledge of diphtheria infection and vaccination among medical students. There is no statistically significant association between socio-demographic data and attitude of diphtheria infection and vaccination. There is no statistically significant association between any of the socio-demographic data and perception of diphtheria infection and vaccination.

Respondents' that are≤24years are 80% less likely to have good knowledge, those that practice Islam are almost 3 times more likely to have good knowledge and 100L are 96% less likely to have knowledge about diphtheria infection and vaccination compared to other levels.

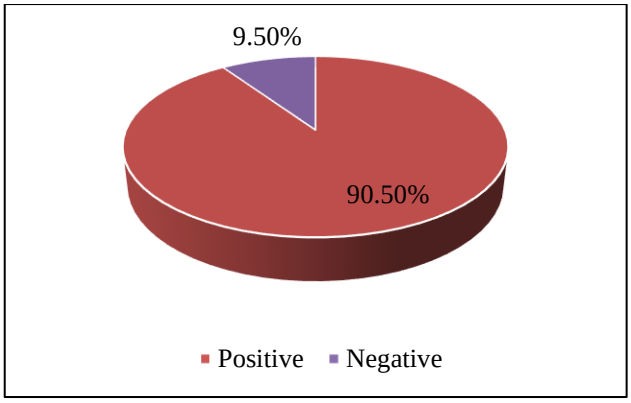

Figure 2: Attitude grading of diphtheria infection and vaccination among respondents.

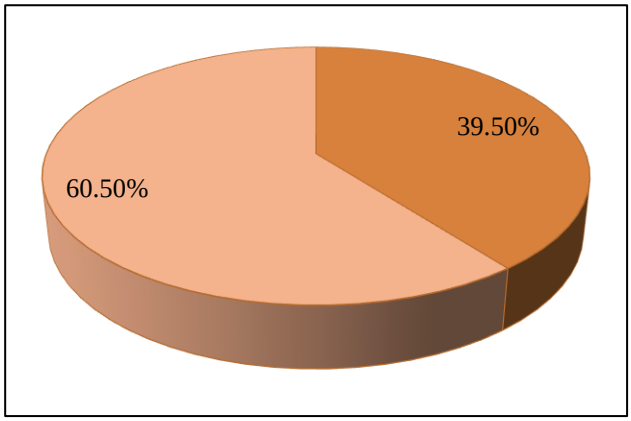

Figure 1: Level of knowledge of diphtheria infection and vaccination among respondents.

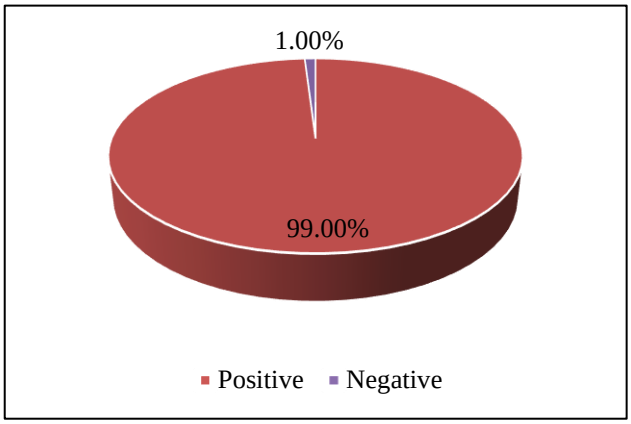

Figure 3: Perception of diphtheria infection and vaccination among the respondents.

Table 1: Socio-demographic characteristics of the respondents.

Variables	Frequency (n=210)	(%)
Age group (in years)		
≤17	9	4.3
18-27	190	90.5
28-37	11	5.2
Mean age±SD	21±3	
Gender		
Male	112	53.3
Female	98	46.7
Ethnic group		
Hausa/Fulani	111	52.9
Yoruba	23	11.0
Igbo	14	6.7
Others	62	29.5
Religion		
Islam	129	61.4
Christianity	81	38.6
Marital status		
Married	18	8.6
Unmarried	192	91.4
Level of income		
<10,000	34	16.2

Continued.

Variables	Frequency (n=210)	(%)
10,000-20,000	67	31.9
>30,000	109	51.9
Level of study		
100	62	29.5
200	31	14.8
300	40	19.0
400	49	23.3
600	28	13.3

Table 2: Socio-demographics data associated with knowledge of diphtheria infection and vaccination among medical students.

Variables	Good (%)	Poor (%)	X^2	P value
Age (in years)				
≤24	52 (25)	113 (54)	20.662	0.001
>24	31 (15)	14 (6)		
Gender				
Female	35 (17)	63 (30)	1.116	0.291
Male	48 (23)	64 (30)		
Marital status				
Unmarried	73 (34.8)	119 (56.7)	2.117	0.146
Married	10 (4.8)	8 (3.8)		
Ethnic group				
Hausa/Fulani	40 (19)	71 (34)	4.671	0.198
Yoruba	10 (5)	13 (6)		
Igbo	3 (1)	11 (5)		
Others	30 (15)	32 (15)		
Religion				
Islam	42 (20)	39 (19)	8.384	0.004
Christianity	41 (19)	88 (42)		
Level of study				
100	13 (6)	49 (24)		
200	9 (4)	22 (11)	46.566	<0.001
300	9 (4)	31 (15)		
400	28 (13)	21 (10)		
600	24 (11)	4 (2)		

Table 3: Socio-demographics data associated with attitude of diphtheria infection and vaccination among medical students.

Variables	Positive (%)	Negative (%)	X^2	P value
Age (in years)				
≤24	151 (72)	14 (7)	0.962*	0.389
>24	39 (19)	6 (2)		
Gender				
Female	90 (43)	8 (3)	0.395	0.530
Male	100 (48)	12 (6)		
Marital status				
Unmarried	175 (83)	17 (9)	1.166*	0.390
Married	15 (7)	3 (1)		
Ethnic group				
Hausa/Fulani	99 (47)	12 (6)	1.775*	0.624
Yoruba	20 (10)	3 (1)		
Igbo	14 (7)	0 (0)		
Others	57 (27)	5 (2)		

Continued.

Variables	Positive (%)		Negative (%)	X^2	P value
Religion					
Islam	116 (55)	13 (6.2)	0.119	0.73	
Christianity	74 (35)	7 (3.3)			
Level of study					
100	59 (28)	3 (1)			
200	28 (13)	3 (1)	6.654*	0.134	
300	35 (17)	5 (2)			
400	46 (23)	3 (1)			
600	22 (11)	6 (2.8)			
Monthly income					
≤10,000	30 (14)	4 (1)		0.696	
10,000-20,000	62 (31)	5 (2)	0.679*		
30,000	98 (47)	11 (5)			

*Fischer's exact test

Table 4: Socio-demographics data associated with perception of diphtheria infection and vaccination among medical students.

Variables	Positive (%)	Negative (%)	X^2	P value
Age (in years)				
≤24	164 (78)	1 (0.5)	0.979*	0.383
>24	44 (21)	1 (0.5)		
Gender				
Female	97 (46)	1 (0.5)	0.009*	>0.99
Male	111 (53)	1 (0.5)		
Marital status				
Unmarried	191 (91)	1 (0.5)	4.422*	0.164
Married	17 (8)	1 (0.5)		
Ethnic group				
Hausa/Fulani	110 (52)	1 (0.5)	1.532*	>0.99
Yoruba	23 (11)	0 (0)		
Igbo	14 (7)	0 (0)		
Others	61 (29)	1 (0.5)		
Religion				
Islam	127 (60)	2 (1)	1.268*	0.376
Christianity	81 (39)	0 (0)		
Level of study				
100	62 (29)	0 (0)		
200	31 (15)	0 (0)	4.126*	0.165
300	39 (19)	1 (0.5)		
400	49 (23)	0 (0)		
600	27 (13)	1 (0.5)		

*Fischer's exact test

Table 5: Logistic regression showing the predictors of knowledge of diphtheria infection and vaccination among medical students.

Variables	Odd ratio	(95%) CI	P value
Age group (in years)			
≤24	0.2	0.102-0.423	<0.001
>24	1		
Religion			
Islam	2.9	1.5-5.7	0.012
Christianity	1		
Level of study			

Continued.

Variables	Odd ratio	(95%) CI	P value
100	0.04	0.01-0.14	<0.001
200	1		
300			
400			
600			

DISCUSSION

This study assessed the knowledge, attitude and perception of diphtheria infection and vaccination among medical students of College of Medical Sciences, Abubakar Tafawa Balewa University, Bauchi across its two campuses in Gubi and Yelwa. Out of 210 respondents, (90.5%) fall between age of 18-27 with a mean age of (21±3) which is similar to a study done among medical students in Saudi-Arabia which had 182 respondents with an age range of 20-27 with a mean age of (23.1±1.5).[32] Majority of the respondents are unmarried (91.4%), while a high percentage of the gender are males with (53.3%) the dominant ethnic group are Hausa/Fulani (52.9%) while the religion is predominated by Islam(61.4%).

The percentage of respondents with monthly income of 30,000 is (51.9%). The population of respondents in this study cuts across various classes 100 level through 600 level exempting 500 level with 100 level dominating with a percentage of 29.5%, 200l with 14.8%,300 level with 19%,400 level with 23.5% and 600 level with 13.4% as against other studies from other countries which did not include 100 level in their study. These studies involved only 2nd through to 6th year students with 4th year students (24.6%) having the highest response as against this study which involved 1st year to 6th year students, with the 1st year students having the highest response followed by the 4th year students (23.5%) who have a similar response to the study conducted in France.[5,32,36,40]

This study shows that majority of the respondents have poor knowledge (60.5%) while 39.5% of respondents have good knowledge of diphtheria infection and vaccination in terms of awareness, route of transmission, signs and symptoms, diphtheria vaccine schedule for infants and adults as well as consequences for not getting vaccinated. A study conducted among non-health care workers in North-west Nigeria found out that only 19.8% of the respondents were aware of diphtheria as against 39.5% of the respondents in our study.[32]

Another study conducted among Saudi medical students on Vaccination revealed that there is poor level of knowledge on mandatory vaccination which included diphtheria vaccination amongst 2nd year to 4th year students while 5th and 6th year had good level of knowledge and similar studies done in other countries such as Pakistan, France, Italy, Canada which had 10.5%, 36%, 63.2% and 55% respectively as good knowledge which increased progressively with consecutive years of medical school.[5,22,30,36,39] Studies involving diphtheria awareness and knowledge among medical students in Africa and Nigeria are limited, lacking or insufficient. The commonest source of information is from Colleagues (50.9%) and Lecturers/Health-care workers (13%) as compared to similar studies done in other countries.

Overall, 90.5% of the respondents have positive attitudes towards diphtheria infection and vaccination Age, Gender, Ethnic group, marital status, monthly income and Level of study have no significant association with attitude in comparison with studies in other countries. A study done in Saudi Arabia recorded a significant association between level of knowledge and attitude which is similar to what was recorded in our study.[32] Studies conducted did not show any correlations between higher knowledge and positive attitude, however, studies conducted in Austria, Canada and Germany showed a significant correlation between higher knowledge and positive attitudes.[21,28,31]

Despite the low level of knowledge among the respondents of the study, it revealed that 99% have positive perception towards diphtheria infection and vaccination which is similar to a study conducted among non-health care workers in North-western Nigeria.[33] Both studies noted positive perception among the respondents and there was no statistically significant association between socio-demographics factors and perception in both studies which reflect similar results gotten from studies conducted in other countries such as France, Mexico and Austria.[26-28]

In this study, it was recorded that 53% of the respondents are not aware of their last diphtheria vaccine uptake, 35.7% had their last uptake at infancy while 11.3% had diphtheria vaccine uptake at adolescent and adulthood as against a study done among the populace of Kaduna, North-western Nigeria which had 92% of their respondents take their last diphtheria uptake at infancy and 11.3% at adolescent to adulthood age group.[32]

One of the factors affecting diphtheria vaccine uptake is lack of awareness and nonchalant attitude amongst the respondents which contributed to the poor uptake of diphtheria vaccine booster doses.[33] In a study conducted among adolescents in Ibadan, South-western Nigeria, it was observed that Nigerian adolescents are poorly protected from vaccine-preventable diseases because there is no active and focused immunization program targeted towards adolescent age group.[34] This also

explains the findings in our study where a high percentage of respondents had good level of knowledge on childhood diphtheria vaccination but paucity of knowledge regarding the adult booster vaccination.

The were social desirability bias from the respondents as some of them weren't given an objective response.

CONCLUSION

The knowledge of diphtheria infection and vaccination was poor among the respondents. Most of the respondents have positive attitude and perception towards diphtheria infection and vaccination. Age, religion and level of study were the factors associated with knowledge of diphtheria infection and vaccination but there was no statistically significant association with attitude and perception. Age, religion and level of study remained independent predictors of knowledge of diphtheria infection and vaccination. There is need to strengthen campaign for diphtheria vaccination targeting students to prevent them from the infection and its effects.

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