

Knowledge and Attitude of Parents in Jos to Diphtheria and Its Mental Health Consequences

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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 its mental health consequences among parents and teachers of a school in Jos, Plateau State.*

Methods: *A cross-sectional descriptive study was carried out among 120 parents and teachers in Jos, Plateau state in September, 2026. A semi-structured self-administered questionnaire were used and the data was analyzed using SPSS version 23.0.*

Results: *Majority of the respondents are aged between 35 - 54 years (63.1%) with a mean age of the respondents as 42.3 (+ 3). There were more females (62.3%) than males with majority of the respondents being married (73.5%.) There was good level of knowledge of diphtheria among the respondent with positive attitude and perception towards diphtheria infection and vaccination respectively. Age, occupation and gender were found not to have a statistically significant association with knowledge of diphtheria infection with $p < 0.001$. Level of education was however significantly associated with good knowledge and attitude to diphtheria and its mental health consequences.*

Conclusions: *The knowledge of diphtheria infection and vaccination among the respondents was good with positive attitude and perception.. There is need to strengthen awareness campaign for diphtheria vaccination to prevent the infection and its effects on mental health.*

Keywords: *Diphtheria, Knowledge, Perception, mental consequences, Jos.*

I. 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}.

Diphtheria and its neurological and neuropsychiatric complications are almost a forgotten entity by present day physicians. Neurological involvement is recognized as one of the most severe complications of diphtheria. Neurological complications parallel the severity of primary infection and are multiphasic in onset. Exotoxin of *Corynebacterium diphtheriae* is responsible for the neurological manifestations⁴.

Diphtheritic polyneuropathy is recognized as one of the most severe complications of diphtheria caused by exotoxin of *C.diphtheriae*. The term "diphtheritic polyneuropathy" encompasses all neurological symptoms⁵.

The toxin effects on the central nervous system has been linked to neurodevelopmental and mental

illnesses in later life including delays in developmental milestones as well as delayed brain development.

The Nigeria centre for disease control highlighted the direct and indirect Mental/Neurological Manifestations of diphtheria in its disease bulletin thus:

When psychological or mental status changes occur during a diphtheria infection, they are usually secondary to severe systemic illness rather than a direct psychiatric disorder:

Encephalitis and CNS Inflammation: Rare cases of direct central nervous system involvement—such as encephalitis or cerebral lesions—can manifest with confusion, altered mental status, or personality changes.

Systemic Toxicity and Hypoxia: Severe systemic toxicity, high fever, or respiratory failure/airway obstruction can lead to acute delirium, extreme anxiety, restlessness, or lethargy.

Delayed Complications: Extremely rare delayed neurological or systemic states (like subacute sclerosing-type presentations or profound post-infectious weakness) have historically noted secondary emotional or cognitive shifts, speech and language delays as a patient struggles with a prolonged, debilitating recovery⁶.

The Vaccine 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 weakened, live or killed state or proteins or toxins from the organism 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.⁷.

The case fatality in Europe has dropped significantly from a very high rate 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 countries⁸.

In Nigeria, 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), The combined vaccine is known as PENTA.

The burden of diphtheria has long been reduced in developed countries, while significant successes continue to be reported in low- and middle-income countries⁹. Nigeria has endured several diphtheria outbreaks over the last decades, mirroring a sub-optimal immunity across several demographics within the country¹⁰.

In Northern Nigeria, cases of diphtheria are routinely reported, indicating poor vaccine coverage among children. Since 2022, there has been a re-emergence of diphtheria as a public health concern in Nigeria, with outbreaks reported across several states, including Plateau State. An estimated seven million people remain unvaccinated and are at risk for infection in the country, especially people living in the Northern part of the country. In 2023, Nigeria recorded an unusual increase in the number of confirmed cases of diphtheria, where a total of 5898 suspected cases were reported from 59 local government areas in 11 states across Nigeria¹¹.

Nigeria is currently experiencing another outbreak of diphtheria in September, 2026. In Zamfara state, the Director of public health, Dr Yusuf Haske disclosed that there were 347 cases with 44 deaths which led the

state to postpone school resumption. Also, in September, 2026, there is an ongoing outbreak of diphtheria infection in Plateau State with 117 cases and 15 deaths reported in Jos North Local Government. There are also reported cases in Wase, Bassa and Jos South Local Government Areas. This necessitated the closure of all schools in the state as a precautionary measure by government.

Understanding the knowledge and perception of diphtheria among residents is important as it would allow the design of effective risk communication strategies to support the outbreak response and improve routine immunization uptake. However, no study has assessed the level of knowledge of diphtheria, its mental health implications and attitude of parents to towards diphtheria in Plateau state. .

Thus, this study aimed to determine the knowledge , attitude to and perception of diphtheria and its mental health implications among parents of B.A Academy in Jos, Plateau State, Nigeria,

II. METHODOLOGY

Study design

A cross-sectional study design was used.

Study area

Jos , the capital city of Plateau State is located in the North central part of Nigeria.

There are many schools in Jos metropolis B.B Academy, one of the largest schools located in the city centre in Jos was selected for this study.

The school comprises of Crèche, Play class, Pre-nursery, Nursery, Primary and Secondary sections. The school also has a well- organized Parents – Teachers Association (PTA) which has its membership comprising of all parents of the pupils/ students and all teachers in the school. The PTA is well organized, with elected leaders.



Map of Nigeria showing Plateau state.

Study population.

The study population comprises all the members of the Parents Teachers Association (PTA) of B. B Academy Jos.

Sample size.

From the population of parents and teachers, all those who consented to participate in the study were recruited for the study.

Study instruments.

A pretested semi-structured self-administered questionnaire was used to collected data from the respondents during a PTA meeting held in the second week of September, 2026. The questionnaire contains the following sections: Socio-demographic data, Knowledge, Attitude and Perception on diphtheria infection and vaccination. It also contains a section which assessed knowledge of mental health consequences of diphtheria.

Face and content validity were established by three lecturers in the College of Health Sciences, University of Jos, Nigeria, while reliability was established using the test-retest method on ten parents and teachers who were not part of the study population

Ethical considerations.

A letter was written to the Plateau state Ministry of Education requesting for permission for this study which was granted . Application for permission to conduct the study was also written to the Chairman of the PTA of the school who approved it.

Data collection was done once during the PTA meeting of September. 2026. After explaining the rationale for the study to the members during the PTA meeting, Written informed consent forms were provided to all those who consented to participate .

Measurement of variables

Statistical analysis

Data was appropriately sorted out, cleaned and coded and entered into a Statistical Product and Service Solutions software version 23

Data were analyzed using descriptive statistics of frequency, percentage, mean, and standard deviation In this study, the independent variables were the socio-demographic characteristics all measured as categorical variables. The dependent variables were levels of knowledge and perceptions of diphtheria

III. RESULTS.

Majority of the respondents are aged between 35 -54 years who constituted 63.1% of the sample with a mean age of the respondents as 42.6 (+ 3). There were more females (62.3%,) those married constituted 73.5%, Majority of the respondents have good level of knowledge (70.0%) and positive perception if diphtheria,

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency	Percent
Age group		
15-24	12	11.3
25-34	18	16.9
35-44	26	24.5
45-54	42	39.6
55-64	8	7.5
65+	0	0
Sex		
Male	40	37.7
Female	66	62.3

Marital Status		
Single	21	19.8
Married	78	73.5
Widowed	4	3.7
Divorced	3	2.8
Education		
None	0	0
Primary	8	7.5
Secondary	42	39.6
Tertiary	56	52.8
Occupation		
Unemployed	10	9.1
Farming	31	29.2
Business/trading	27	25.4
Teaching	23	21.7
Civil servant	8	7.5
Other	7	6.4

Table 2: Knowledge of diphtheria and its mental health consequences among respondents

Knowledge item	Frequency	Percent
Ever heard of diphtheria		
Yes	66	62.4
No	14	13.3
Don't know	26	24.3
Causes of diphtheria		
Germ	92	86.7
Weather	6	5.8
Don't know	8	9.5
Is there an ongoing epidemic of diphtheria in Plateau State?		
Yes	69	65.0
No	7	6.6
Don't know	9	8.4
Age group routinely vaccinated		
Newborns	59	55.6
Children below 2years	22	20.7
Children aged 10 -14 years	12	11.3
Adults	3	2.4
Don't know		
It can damage the brain		
Yes	35	33.0
No	15	14.1

Don't know	56	52.9
It alters mental function		
Yes	32	30.1
No	12	11.3
Don't know	62	58.6
Causes emotional changes		
Yes	18	16.9
No	7	6.6
Don't know	81	76.5

Table 3. Perception of Diphtheria and its mental health consequences among respondents

Perception	Agree N(%)	Disagree N(%)	Neutral N(%)
Every child can contract diphtheria	66(62.2)	30(28.3)	10(9.4)
Vaccine protects against diphtheria	82(77.3)	11(10.3)	13(12.2)
My child can take diphtheria vaccine	98(92.4)	4 (3.7)	4(3.7)
Diphtheria is no longer in Nigeria	41 (38.6)	56 (52.8)	9(8.5)
It can be treated with home remedies	18 (16.9)	58 (54.7)	40(37.7)
It causes delayed brain development	29 (27.3)	22 (20.7)	55(51.8)

Table 5. Factors associated with Knowledge on diphtheria and its mental health consequences

Variable	Good (%)	Poor (%)	χ^2	P-value
Age group				
15-24	9(8.4)	3(2.8)	3.067	0.403
25-34	12(11.3)	6(11.3)		
35-44	20(18.8)	6(5.6)		
45-54	32(30.1)	9(8.4)		
55-64	6(5.6)	2(1.8)		
65+	0(0.0)	0(0.0)		
Sex				
Male	24(22.6)	16 (15.1)	0.926	0.336
Female	46(43.4)	20(18.8)		

Marital status				
Single	19 (7.5)	2 (1.8)	0.312	0.112
Married	64(60.4)	14 (13.2)		
Widowed	3(2.8)	1 (0.9)		
Divorced	1 (0.9)	2 (1.8)		
Education				
None	0 (0)	0(0)	5.065*	0.138
Primary	2(1.8)	6 (5.6)		
Secondary	31(29.2)	11(10.4)		
Tertiary	43 (40.5)	13(12.2)		
Occupation				
None	7 (5.9)	3 (2.7)	0.522	0.410
Farming	18(16.3)	13(12.3)		
Trading/bussiness	22 (20.8)	5 (4.1)		
Teaching	23 (21.6)	0 (0)		
Civil servant	7 (6.3)	1(0.9)		
Others	2 (1.8)	5(4.2)		

IV. DISCUSSION.

The study found that majority of the respondents 62.4% have heard of diphtheria and 65% were aware of the current outbreak, . A similar study that examined awareness of vaccine-preventable diseases among rural and urban residents in Lagos State, only 15.7% of rural and 18.0% of rban residents mentioned diphtheria.¹¹

Another study conducted among 64 clients in Kaduna metropolis noted that respondents knew about diphtheria, with up to 28.0% being aware of diphtheria vaccine booster dose¹².

Studies involving diphtheria awareness and knowledge among parents and teachers in Nigeria are limited, Even among the respondents who had an awareness of diphtheria, the study revealed poor knowledge of its causes and mental health consequences

Studies conducted elsewhere in Asia have noted a similar pattern of poor knowledge of diphtheria. In Indonesia, for instance, a study conducted among parents of elementary school pupils in North Jakarta reported that only 24 (21.8%) parents could be classified as having good knowledge of diphtheria.¹³

Poor knowledge among community members could exacerbate the threat and worsen the impact of the epidemic, as well as loss of trust in the government's ability to protect communities against vaccine-preventable diseases.¹⁴

Except for level of education which was significantly associated with knowledge of diphtheris, , this study found no other significant association between other socio-demographic characteristics and knowledge or perception of diphtheria. This differs from observations made in Enugu State, South Eastern Nigeria, and Indonesia, where several factors, including maternal education levels, gender and marriage were associated with knowledge of diphtheria.^{15,16..}

Even though the study is limited by the fact that it is conducted within only one school, it has the strength of interviewing up to seventy percent of the people in the group and thus gives a valid insight into knowledge and perception of parents and teachers towards Diphtheria and can potentially influence policies on behaviour change and risk communication strategies, especially during outbreaks.

V. CONCLUSION

During this ongoing outbreak of diphtheria in Plateau State, this study found a high level of awareness and knowledge of diphtheria among the parents and teachers of this particular school. Among those who were aware of the disease, the perception of the disease was good, with many willing to allow their children to receive the vaccine.

The study recommends effective health education and public enlightenment campaigns on the cause, routes of transmission, predisposing factors, mental health consequences and preventive measures against diphtheria to be instituted by the Plateau State Government. Future research can explore qualitative design to explore contextual factors responsible for the perception and acceptability or uptake of Diphtheria vaccines.

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