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Predictors of Knowledge of Childhood Tuberculosis among Parents attending Outpatient Clinic in Federal Medical Center, Birnin Kudu, Jigawa State

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Abstract

Background: Childhood tuberculosis (TB) is a major global public health concern contributing to significant child morbidity and mortality in Nigeria. Early diagnosis and prompt treatment are linked to public awareness of the disease. Parents play a crucial role in recognizing symptoms and seeking care for their children; however, limited knowledge about TB undermines control efforts. This study aimed to assess the level and predictors of TB knowledge among parents attending the Federal Medical Center, Birnin Kudu, Jigawa State. **Methodology:** This was a descriptive cross-sectional study that used a structured, pre-tested questionnaire. Information collected included socio-demographic characteristics and knowledge of TB transmission, symptoms, prevention, and treatment. Data were analyzed using descriptive statistics, and multiple regression analysis was applied to identify predictors of good TB knowledge. **Results:** A total of 196 parents were recruited with a mean age of 33.05 $\pm$ 9.07 years. Only 27% had good knowledge of TB. Educational status at the post-primary level (AOR = 2.2, 95% CI = 1.9–3.1), male gender (AOR = 1.9, 95% CI = 1.4–3.2), employment status (AOR = 3.9, 95% CI = 3.9–5.4), and Hausa-Fulani ethnicity (AOR = 0.39, 95% CI = 0.14–0.48) were significant predictors of good knowledge of TB. **Conclusion:** There is suboptimal knowledge of TB among parents in Birnin Kudu. Female gender, post-primary education, and ethnicity were found to influence the knowledge of TB. Targeted community health education and advocacy are urgently needed to improve TB literacy. Furthermore, integrating TB education into maternal and child health services and school health programs could enhance early case detection, reduce transmission, and advance Nigeria's TB elimination goals.

Keywords: Parental knowledge; Childhood; Paediatric; Tuberculosis; Predictors; Jigawa; Nigeria

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Introduction

Nigeria is one of the four countries—alongside Indonesia, India, and China—with the highest burden of childhood tuberculosis (TB). The annual number of TB cases accounted for by children has been on the rise globally, with an estimated 192,000 child deaths reported in 2019 Maphalle et al., 2022. Nigeria ranks among the 30 high TB-burden countries globally and contributes significantly to the disease's incidence and mortality in sub-Saharan Africa. The national TB incidence is 219 per 100,000 population, and children constitute about 6% of reported cases World Health Organization, 2025. The persistent transmission of TB in Nigeria is fueled by poverty, overcrowding, limited access to healthcare, and low public awareness of the disease Ukoaka et al., 2024.

Knowledge of TB is a crucial determinant of early health-seeking behavior, adherence to treat-

ment, and reduction in disease transmission. Parents, as primary caregivers, play an essential role in recognizing TB symptoms in children and family members, seeking timely medical care, and supporting treatment adherence. However, misconceptions about TB causation, transmission, and curability remain widespread in many communities, resulting in delayed diagnosis and increased spread of infection Bashorun et al., 2020.

Good knowledge of TB has been reported among parents in Pakistan, Indonesia, and the Philippines, with significant gaps in knowledge among respondents in Thailand. Similar trends have been observed in Nigeria, where, despite ongoing awareness campaigns, knowledge about TB remains suboptimal among the general public and caregivers Aliyu, 2019; Asuke et al., 2022; Junaid et al., 2021; Oladele et al., 2020. Low case detection and inadequate knowledge about TB due to poor awareness creation remain major challenges facing TB control efforts in Nigeria.

Knowledge of TB in Nigeria also shows regional variation. Studies from Lagos Oladele et al., 2020, the South-West, and North-Central regions Bisallah et al., 2018 reported relatively good knowledge, whereas findings from Kano in the North-Western region revealed low levels of awareness Aliyu, 2019. The northern regions, particularly rural and semi-urban communities, often exhibit lower awareness due to educational inequalities, cultural barriers, and limited exposure to health information. Factors consistently associated with higher knowledge levels include female gender, post-secondary education, and urban residence Adane et al., 2017; Asuke et al., 2022; Ismail & Josephat, 2014; Oladele et al., 2020.

In Jigawa State, available data on parental knowledge of TB are scarce, despite the region's high TB burden and predominantly rural population. This study, therefore, assessed the level of knowledge of TB among parents attending the Federal Medical Center, Birnin Kudu, Jigawa State, and identified sociodemographic predictors of good knowledge. The findings are expected to inform targeted health education strategies, guide policy formulation, and strengthen community-based TB control initiatives to reduce the burden of TB in Nigeria.

Methods

Study Design and Setting

This hospital-based cross-sectional study was conducted at the Federal Medical Centre, Birnin Kudu, Jigawa State, from February to July 2023. Jigawa State ranks as the eighth state with the highest tuberculosis (TB) burden in Nigeria, with a Bacille Calmette-Guérin (BCG) vaccination coverage rate of 66.4% ICF, 2025.

Sample Size Determination

The minimum sample size was calculated using the standard formula Araoye, 2003:

$$n = \frac{Z^2 pq}{d^2}$$

Where:

- n = desired sample size
- Z = standard normal deviation corresponding to the 95% confidence interval (1.96)
- p = 0.132 (proportion of guardians with good knowledge of childhood TB in Thailand, 13.2%) Jirapaiboonsuk & Chapman, 2010
- $q = 1 - p$
- d = degree of accuracy, set at 5% (0.05)

Substituting the values:

$$n = \frac{(1.96)^2 \times 0.132 \times 0.868}{(0.05)^2} = 176$$

However, a total of 196 parents were included in the study to improve precision and account for possible non-response.

Sampling Technique

A systematic random sampling technique was employed to select study participants from the clinic register. The list of all children visiting the clinic each day served as the sampling frame. On average, approximately 1,000 patients were seen per month. The sampling interval (k) was calculated as:

$$k = \frac{1000}{196} = 5$$

Every fifth parent on the register was therefore selected until the required sample size was obtained.

Data Collection Instrument

Data were collected by trained interviewers using a standardized, interviewer-administered questionnaire. The tool was adapted from the World Health Organization's *Guide to Developing Knowledge, Attitude and Practice Surveys* World Health Organization, 2008 and previous studies. The questionnaire included sections on socio-demographic characteristics and knowledge, attitudes, and perceptions regarding TB.

The instrument was initially developed in English, translated into Hausa (the predominant local language), and pre-tested among a random sample of parents at the hospital to assess clarity, reliability, cultural acceptability, and sensitivity. Respondents in the pre-test were excluded from the main study.

Knowledge of TB was assessed using seven major questions covering TB symptoms, transmission, prevention, risk factors, curability, treatment, and cost. Some questions had multiple response options, producing 14 total knowledge items. Each correct response was scored as one point, while incorrect or "don't know" responses were scored as zero. Following previous studies, participants scoring ≥50% were categorized as having *good knowledge*, while those scoring below 50% were categorized as having *poor knowledge*.

Data Analysis

Data were initially entered into Microsoft Excel for cleaning and subsequently analyzed using IBM SPSS Statistics version 20. Descriptive statistics such as frequencies, percentages, means, medians, and standard deviations were computed as appropriate. The Chi-square test was used to assess associations between categorical variables.

Bivariate analyses examined the relationship between socio-demographic factors and TB knowledge levels. Variables with $p < 0.2$ were entered into a multivariate logistic regression model using a block entry method. Crude and adjusted odds ratios (OR, AOR) with 95% confidence intervals (CI) were computed to identify predictors of TB knowledge. The level of statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Health Ethics and Research Committee of the Federal Medical Centre, Birnin Kudu. Informed consent was obtained from all participants prior to data collection. Confidentiality was strictly maintained, and non-personal identifiers were used throughout data handling and analysis.

Results

Socio-demographic Characteristics of Respondents

A total of 196 respondents participated in the study. Of these, 70.9% were females, and the mean age was 33 years. Over half (52%) of the respondents had no formal education. The median (interquartile range, IQR) monthly income was ₦6,000 (₦20,000). The difference in median income between males and females was statistically significant ($p < 0.001$, 95% CI = 95–119). Table 1 presents the socio-demographic characteristics of the respondents.

Knowledge of Childhood Tuberculosis

Only 27% of the study participants demonstrated good knowledge of tuberculosis (TB). The mean knowledge score among males (5.3 ± 3.2) was higher than that of females (4.5 ± 3.0); however, this difference was not statistically significant ($p = 0.078$, 95% CI = 4.3–9.7).

The majority of participants (90.8%) had heard of TB. The most common sources of information were radio, family and friends, and healthcare workers. Approximately three-quarters of respondents (74.5%, 146/196) reported that their last child had received the Bacille Calmette-Guérin (BCG) vaccine. See Table 2.

Predictors of Knowledge of Childhood Tuberculosis

Bivariate analysis showed significant associations between knowledge of TB and several factors, including age group, gender, educational level, employment status, and state of residence. In multivariate logistic regression analysis, the predictors of good knowledge were:

- Educational status at post-primary level (AOR = 2.2, 95% CI = 1.9–3.1)

- Male gender (AOR = 1.9, 95% CI = 1.4–3.2)
- Being employed (AOR = 3.9, 95% CI = 3.9–5.4)
- Hausa–Fulani ethnicity (AOR = 0.39, 95% CI = 0.14–0.48)

Table 1: Socio-demographic characteristics of respondents (n = 196)

Variable	Freq (n)	Percent (%)
Gender		
Male	57	29.1
Female	139	70.9
Age group (years)		
18–24	42	21.4
25–44	129	65.8
45–65	25	12.8
Educational status		
None	102	52.0
Primary	41	21.0
Secondary	41	21.0
Post–secondary	12	6.0
Marital status		
Married	180	91.8
Divorced or widowed	16	8.2
Ethnicity		
Hausa–Fulani	183	93.4
Others	13	6.6
Main source of income		
Farming	55	28.1
Trading	96	49.0
Salaried	5	2.5
Unemployed	40	20.4
Religion		
Islam	190	96.9
Christianity	6	3.1
Monthly income (₦)		
Less than 5,000	69	35.2
5,000–20,000	96	49.0
21,000–50,000	10	5.1
51,000–80,000	5	2.6
More than 80,000	16	8.2

Table 2: **Knowledge of childhood TB among the participants**

Variable	F(n)	(%)
Heard of TB		
a) Yes	178	90.8
b) No	18	9.2
Information source*		
a) Radio	133	68.6
b) Family/friends	133	68.6
c) Health workers	104	53.8
d) TV	31	15.8
e) Others	6	3.1
Cause of TB*		
a) Bacteria/germs	24	12.2
b) Dust/smoke	20	10.2
c) Cold air	17	8.7
d) Food shortage	16	8.4
e) Spiritual	14	7.2
f) Don't know	105	53.3
Transmissible		
a) Yes	123	62.8
b) No	13	6.6
c) I don't know	60	30.6
Transmission*		
a) Airborne	109	55.9
b) Sharing utensils	27	13.8
c) Shaking hands	28	14.4
d) I don't know	29	14.9
TB preventable		
a) Yes	92	46.9
b) No	23	11.7
c) I don't know	81	41.3
TB prevention*		
a) BCG vaccination	41	21.1
b) Avoid infected person	33	15.0
c)No overcrowding	42	21.5
d) Ventilated room	19	9.7
e) Close mouth cough	29	14.8
f) Not shake infected person	25	12.8
Common symptoms*		
a) Cough	112	57.1
b) Weight loss	98	50.0
c) Fever	83	42.3
d) Sputum	76	38.8
e) I don't know	75	38.2
Is TB treatable?		
a) Yes	143	73.0
b) No	9	4.6
c) I don't know	44	22.4
Cost of TB treatment		
a) Free	52	26.7
b) Costly	24	12.3
c) I don't know	119	61.0

Note: * = Multiple response question. F = Frequency.

Table 3: Predictors of Good Knowledge of Childhood TB

Characteristics	Crude OR	Adjusted OR	95% CI	*p*-value
Age	1.0	0.9	0.4–2.19	0.45
Males vs Females	1.5	1.9	1.4–3.2	0.04
Ethnicity	2.8	1.39	1.14–1.45	<0.001
Post-primary education	1.9	2.2	1.9–3.1	<0.001
Employed	3.5	3.9	3.2–5.4	<0.001

OR = Odds Ratio; CI = Confidence Interval

These variables were found to be statistically significant predictors of good knowledge of childhood TB. A summary of these findings is provided in Table 3.

Discussion

Overall, only 27% of the respondents demonstrated good knowledge of childhood tuberculosis (TB). This poor level of knowledge highlights a substantial information gap among parents, which poses a challenge to early case detection, treatment adherence, and TB control efforts within the community. The low level of knowledge observed may be attributed to limited education, rural residency, inadequate community health campaigns, and prevalent misconceptions about the disease. Indeed, this study found that misconceptions regarding TB were common among respondents.

Low levels of TB knowledge among parents have also been reported elsewhere Jirapaiboonsuk & Chapman, 2010; Suhada et al., 2015, emphasizing that knowledge deficits remain a widespread challenge in developing countries despite ongoing health education efforts. This finding contrasts with reports from Jos, North-Central Nigeria Asuke et al., 2022, the Philippines, and Indonesia Putra et al., 2020; Saputra et al., 2020, where higher levels of parental knowledge were observed. The disparity may be due to the higher educational attainment and greater exposure to health education programs in those settings compared to Birnin Kudu, where more than half of respondents lacked formal education.

Radio, family and friends, and healthcare workers were the primary sources of information on TB among respondents—similar to findings reported in previous Nigerian studies Adane et al., 2017; Babatunde et al., 2015; Oladele et al., 2020. This underscores the role of media, social networks, and health professionals as effective channels for disseminating information on TB awareness, prevention, and transmission. However, limited access to healthcare services and poor health-seeking behaviors may further restrict exposure to accurate TB information.

Interestingly, 74% of respondents who had heard of TB were aware that the disease can occur in children. This proportion is higher than previously reported Jirapaiboonsuk & Chapman, 2010; Uz et al., 2014, possibly reflecting modest improvements in TB-related health education in recent years. About half of the respondents also knew that TB is transmitted through the air when an infected person coughs or sneezes—consistent with previous research Oladele et al., 2020; Solliman et al., 2012. However, studies from India have reported significantly higher awareness levels (82.7%) Rohit et al., 2020, possibly due to higher literacy rates and better access to health information.

Regarding prevention, less than half (46.9%) of the respondents knew that TB can be prevented. The most commonly mentioned preventive measures were avoiding overcrowding (21.9%), BCG vaccination (21.1%), and covering the mouth while coughing (14.8%). Comparable findings have been reported from Kinshasa (14.2%) Aketi et al., 2017, Bangladesh (11%) Uz et al., 2014, and Indonesia (30%) Putra et al., 2020. In contrast, 48.7% of respondents in Iran knew that BCG vaccination prevents TB Behnaz et al., 2014. The relatively low awareness of BCG's preventive role, despite high vaccine uptake, highlights a knowledge–practice gap. Health education programs should therefore not only promote vaccination but also emphasize its rationale and benefits to foster informed health behaviors.

Cough, fever, and weight loss or failure to gain weight were the most commonly identified symptoms of TB, aligning with findings from other Nigerian and African studies Balogun et al., 2019; Datiko et al., 2019; Luba et al., 2019; Tobin et al., 2013. However, one-third of respondents could not identify any symptoms, similar to reports from Kinshasa Aketi et al., 2017. Adequate knowledge of TB symptoms strongly influences early health-seeking behavior Balogun et al., 2019, highlighting the need for sustained community sensitization.

Most respondents knew that TB is treatable, but only one-quarter were aware that TB treatment is free. Misconceptions and reliance on non-conventional therapies have been reported elsewhere Joshi et al., 2022; Oladele et al., 2020. Correct knowledge that TB is curable can improve confidence in treatment, increase service uptake, and reduce stigma, enabling reintegration of treated patients into the community.

In this study, increasing age, post-primary education, male gender, and employment were significant predictors of good TB knowledge. These findings are consistent with previous studies Adane et al., 2017; Asuke et al., 2022; Konda et al., 2016, reinforcing the importance of education and socioeconomic empowerment, particularly among women, to enhance health literacy and outcomes.

Limitations

As a hospital-based study, the findings may not be generalizable to the wider population. Furthermore, the cross-sectional design limits causal inference between predictors and knowledge outcomes.

Conclusion

This study demonstrated suboptimal knowledge of TB among parents in Birnin Kudu, with education, gender, and ethnicity emerging as significant predictors. Persistent misconceptions highlight the need for intensified and culturally sensitive awareness campaigns. Public health authorities should implement targeted TB education programs focusing on women, parents with limited education, and marginalized ethnic groups. Integrating TB education into routine health services, such as immunization, maternal and child health programs, and school health curricula could improve community understanding and early case detection. Additionally, leveraging mass media and engaging community and faith leaders can enhance message dissemination and promote behavioral change. Strengthening household-level health literacy remains a cornerstone for achieving Nigeria's TB elimination targets and improving community health outcomes.

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