

Original Article

## Predictors of tuberculosis knowledge among mothers of under-fives, seen at Bingham University Teaching Hospital, Jos Nigeria

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### Abstract

**Introduction:** Globally, tuberculosis still remains a disease of public health concern and accounts for high morbidity and mortality particularly in developing countries, where it is fuelled by a number of factors.

**Methodology:** Through a cross-sectional descriptive study, this study aims to determine the predictors of knowledge about TB among 261 mothers of children under 5 years of age attending Child Welfare Clinic, Bingham University Teaching Hospital, Jos, Plateau State, Nigeria.

**Results:** The mean age of the mothers was  $31.54 \pm 5.28$  years, and 249 (98.4%) aware of TB. About two-third having sufficient knowledge and positive attitude regarding TB. Significant statistical association was found between knowledge and attainment of post-secondary education (OR 4.0; 95% CI 12.09, 7.63;  $p < 0.001$ ), monthly income  $\leq 25,000$  naira (OR 2.18; 95% CI 1.02, 4.65;  $p = 0.042$ ), monthly income  $> 51,000$  naira (OR 3.24; 95% CI 1.43, 7.31;  $p = 0.005$ ), women engaged in business (OR 0.43; 95% CI 0.22, 0.83;  $p = 0.012$ ) and possessing positive attitude (OR 3.87; 95% CI 2.16, 6.93;  $p < 0.001$ ) in the univariate analysis. However, in the multivariate logistic regression, it was only attitude that was found to be a predictor of TB knowledge of mothers.

**Conclusions:** TB knowledge among the mothers was high, only attitude regarding thoughts and beliefs about TB was found as an independent predictor of TB knowledge. With the positive influence of attitude on knowledge among the mothers, it is recommended that this be strengthened for sustenance to prevent further infection.

**Key words:** Mother's knowledge; tuberculosis; Jos.

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### Introduction

Globally, tuberculosis (TB) still remains a disease of public health concern. It is a major cause of ill-health and ranks as one of the top ten causes of mortality worldwide [1]. TB is also one of the most infectious diseases globally afflicting mankind with debilitating poverty [2].

Nigeria ranked 6<sup>th</sup> in the world and 1<sup>st</sup> in Africa, among the 30 countries with the highest burden of TB [1]. The Nigerian National Tuberculosis and Leprosy Control Programme (NTLCP) is saddled with the responsibility of the country's TB control. However, despite its efforts through the adoption of the WHO Directly Observed Treatment Short Course (DOTS) strategy as the backbone for TB control, a significant knowledge gap regarding TB still exists. Another important strategy in the fight against TB is through vaccination with Bacillus Calmette-Guérin (BCG) which is an important prevention strategy for the

disease in endemic countries [3]. Childhood TB, particularly among children under five is an indication of the disease in an adult [4].

A mother's knowledge of TB is crucial as they are an important group of caregivers and occupy a position of importance in child-health, particularly with reference to TB care and prevention. They will also contribute in a long way to help achieve the End TB strategy of 90% reduction in TB mortality, 80% decrease in TB incidence and reducing catastrophic cost among TB-associated households by 2030 compared to 2015 [5]. However, a study revealed that poor knowledge regarding the mode of transmission has contributed to the continuous spread of the disease [6]. Myths and misconceptions about the disease are also among the factors that have been associated with the spread of TB [7,8].

Despite the fact that there are several studies on TB knowledge in Nigeria, some studies [9,10], have

consistently reported that women lacked sufficient knowledge regarding mode of transmission and the signs and symptoms of TB. In some instances, women were even more likely to be unaware of TB disease than men. These findings are consistent with the findings from other studies, which revealed that women lacked sufficient knowledge about TB [11-13] hence they often engage in activities that could help spread the disease. This supports the fact that mothers that lacked knowledge about TB were more likely to engage in risky practices like not presenting a child for BCG vaccination at the appropriate time, exposing a child to a chronically coughing adult, and keeping the child in a poorly ventilated environment, which can lead to further spread of the disease.

Tuberculosis burden in Nigeria still remains high among children less than 14 years of age, accounting for 8% of the burden [10]. Considering the fact that mothers have an important role in the upbringing of their children, it is pertinent that they have sufficient knowledge regarding TB so as to contribute in the control of childhood TB. This study is therefore aimed at assessing the predictors of knowledge about TB among mothers of children under five years of age, attending Child Welfare Clinic at Bingham University Teaching Hospital in Jos Plateau State, Nigeria.

## **Methodology**

### *Study area*

This study was conducted in Bingham University Teaching Hospital (BHUTH) located in Jos North local government area, which is one of the seventeen local government areas (LGAs) in Plateau State, Nigeria. It extends over an area of 291 square kilometres and is the most populated LGA with an estimated population of 4,39,217 [14] (National Population Commission 2006). Jos North consists of twenty political wards and is inhabited by diverse ethnic groups including Berom, Anaguta, Mwaghavul, Rukuba, Afizere, Ngas, Irigwe, and others.

BHUTH is one of the tertiary hospitals in Plateau State. It is a 250-bed hospital that provides a range of services for people within the state and neighbouring states: Nasarawa, Kaduna, Bauchi, Gombe, Benue, Adamawa, and the Taraba State. One of the clinical services provided by the hospital is the Child Welfare Clinic which attends to the health problems of children under five and provides mothers opportunities for health education. Besides the clinical service offered, the hospital serves as a teaching hospital for the training of undergraduate medical students of Bingham

University and it is also an accredited site for postgraduate training of doctors in family medicine.

### *Study design*

This was a cross sectional study, carried out among mothers attending the child welfare clinic in Bingham University Teaching Hospital.

### *Study population*

The study participants were mothers within the reproductive age group (15-49 years) who had at least one child below the age of 5 years. Mothers outside the reproductive age bracket or those who refused to give consent were excluded from the study.

### *Data Collection*

Data collection and enrolment of mothers of children under five in the Child Welfare Clinic (CWC) was conducted by a nurse and a medical student who were trained by the researchers on the distribution and collection of the questionnaire. On each clinic day, after the mothers had received a health talk, they were approached to obtain consent to participate in the study. All mothers that arrived at the clinic between 8.00 a.m. (clinic opening time) and 2.00 p.m. (clinic closing time) were approached to participate. Those who were eligible and gave a verbal consent to participate were administered the questionnaire. All participants completed the questionnaire in English language.

### *Instrument*

A self-administered questionnaire was adapted from a standard tool developed by the World Health Organization (WHO) in conjunction with the Stop-TB partnership [15] to fit the local context. It was pre-tested among five mothers with children under five at the General Outpatients' Department (GOPD) of the hospital prior to the study and content was modified and finalized for use. The components of the questionnaire comprised of (a) socio-demographic characteristics of participating mothers attending child welfare clinics, (b) their knowledge, and (c) attitude towards tuberculosis. Twenty-one (21) questions covering the cause of TB, prevention, and control were used to assess the mothers' knowledge. Each correct question was accorded a point and no point was given when the response was wrong. Based on the questions that were correctly answered, knowledge scores were obtained by adding up all correctly answered questions for each mother. A score of nine (9) which was the median score was used as the cut-off. Those with scores below the median were adjured to have had insufficient

knowledge while those with scores equal or greater than the median value were termed to have had sufficient knowledge.

Eight (8) questions on thoughts and beliefs of the participants on TB were used to determine their attitude. Each appropriate attitude was scored one point and the median value of five (5) was used as the cut-off point. Those with scores less than five were termed to have negative attitude while those with score five and above, adjudged to have positive attitude.

*Sampling technique*

Total population of mothers who met the eligibility criteria were recruited as they presented at the clinic on first-come-first-recruited basis, and this was carried out through a determined period of three (3) months and during each clinic day. A register of recruited participants was kept avoiding double recruitment. At the end of the period, 261 mothers had been recruited and had questionnaires administered.

*Data analysis*

Analysis of data was carried out using IBM SPSS statistics for windows Version 25.0 Armonk, NY: IBM Corp. Descriptive statistics and frequency tables were used to summarize respondents’ socio-demographic characteristics while categorical variables were compared using chi-square. Univariate analysis was used to test for association between the socio-

demographic and other factors associated with knowledge of tuberculosis using chi-square at 95% confidence interval (CI). Adjusted odds ratio (AOR) and 95% CI were estimated in multivariate binary logistic regression model. This also included variables that were known to be associated with knowledge in the univariate analyses at *p* value ≤ 0.2. Two-sided significance test was used at *p* value < 0.05 considered to be statistically significant.

*Ethical consideration*

Ethical clearance was obtained from Bingham University Teaching Hospital Ethical Research Committee, and consent obtained from individual participants after due explanation of study was provided. Permission was sought from the management of the teaching hospital. Confidentiality of information collected from participants was ensured by non-inclusion of respondents’ names on questionnaire. However, codes were used to indicate respective participants and to a master-list. This was to ensure that any previously recruited participant is easily recognized and double recruitment could be avoided.

**Results**

*Socio-demographic characteristics of mothers with children under five years of age*

With a mean age of 31.54 ± 5.28 years, 138 (62.4%) of the 261 mothers of under-five children in the study were in the age group of 27-38 years (Table 1). Those with post-secondary education were 209 (80.1%), while 52 (19.9%) had secondary education or less. More than half (153, 56.5%) of the mothers were not earning any monthly income, followed by (40, 14.8%) earning between 26,000-50,000 Nigerian naira. Most of the mothers (249, 99.2%) had vaccinated their last child with BCG.

Most mothers (249, 98.4%) were aware of TB with the commonest source of this information being health care workers (131, 51.8%). On aetiology of TB, 192 (73.6%) mothers knew that TB was caused by a bacterium. However, cold air, hot climate, shortage of food, and dust were wrongly mentioned as causes of TB. The most common symptoms known were cough for 2 or more weeks (184, 70.5%), followed by sputum with blood (77, 29.5%) (Table 2).

Two hundred and forty-five (95.0%) mothers could correctly indicate that TB can be transmitted from one person to another and the majority of mothers knew that it can be transmitted through the air when a person with TB sneezes or coughs. Some other methods of transmission of concern mentioned included through

**Table 1.** Socio-demographic characteristic of mothers with children under five years of age.

| <b>Variables</b>                    | <b>n (%)</b> |
|-------------------------------------|--------------|
| <b>Age (years) n = 221</b>          |              |
| 18-23                               | 55 (24.9)    |
| 28-37                               | 138 (62.4)   |
| 38-47                               | 28 (12.7)    |
| <b>Religion (n = 259)</b>           |              |
| Christianity                        | 251 (96.9)   |
| Islam                               | 7 (2.7)      |
| <b>Occupation (n = 236)</b>         |              |
| Business                            | 83 (35.1)    |
| Civil servant                       | 77 (32.6)    |
| Housewife                           | 41 (15.6)    |
| Others                              | 30 (12.7)    |
| Trader                              | 5 (2.1)      |
| <b>Educational status (n = 261)</b> |              |
| ≤ Secondary                         | 52 (19.9)    |
| > Secondary                         | 209 (80.1)   |
| <b>Marital status (n = 261)</b>     |              |
| Married                             | 252 (96.6)   |
| Single                              | 9 (3.4)      |
| <b>Monthly income (Naira)</b>       |              |
| No income                           | 153 (56.5)   |
| ≤ 25,000                            | 39 (14.4)    |
| 26,000-50,000                       | 40 (14.8)    |

handshakes (12, 4.6%) and eating from the same plate (17, 6.5%) (Table 2).

Regarding the prevention of TB, a majority (248, 96.5%) knew that TB could be prevented and most known methods of prevention were, through the covering the mouth and nose when coughing or

**Table 2.** Knowledge on Tuberculosis.

| <b>Knowledge determinants</b>                           | <b>n (%)</b> |
|---|--------------|
| Have you heard about TB (Yes)                           | 249 (98.4)   |
| <b>Source of information</b>                            |              |
| Health workers  | 131 (51.8)   |
| Electronic media (TV, radio)                            | 84 (33.2)    |
| Family, friends, colleagues                             | 56 (22.1)    |
| Newspaper and magazines                                 | 25 (9.9)     |
| IECs (Brochures, posters)                               | 31 (12.3)    |
| Teachers  | 25 (9.9)     |
| Religious leaders                                       | 5 (2.0)      |
| <b>Causes of TB</b>                                     |              |
| Bacteria / Germs  | 192 (73.6)   |
| Cold air  | 22 (8.4)     |
| Others  | 13 (5.0)     |
| Dust  | 10 (3.8)     |
| Hot climate   | 5 (1.9)      |
| Shortage of food  | 4 (1.5)      |
| <b>Signs and Symptoms of TB</b>                         |              |
| Cough for 2 or more weeks                               | 184 (70.5)   |
| Sputum with blood                                       | 77 (29.5)    |
| Weight loss   | 57 (21.8)    |
| Fever and sweats at night                               | 49 (18.8)    |
| Chest pain  | 41 (15.7)    |
| Loss of appetite  | 33 (12.6)    |
| others  | 5 (1.9)      |
| <b>Transmission of TB</b>                               |              |
| Person to another? (Yes)                                | 245 (95.0)   |
| <b>Ways TB can be transmitted</b>                       |              |
| Through the air when a person with TB sneezes or coughs | 218 (83.5)   |
| Through sharing cups                                    | 44 (16.9)    |
| Through eating from same plate                          | 17 (6.5)     |
| Through touching items in public places                 | 12 (4.6)     |
| Through handshakes                                      | 12 (4.6)     |
| Don't know  | 6 (2.3)      |
| <b>Prevention of TB</b>                                 |              |
| It is preventable (Yes)                                 | 248 (96.5)   |
| <b>Prevention of TB transmission</b>                    |              |
| Covering the mouth and nose when coughing and sneezing  | 212 (81.2)   |
| Avoid sharing cup with patients                         | 55 (21.1)    |
| Use separate room for the patient                       | 38 (14.6)    |
| Through good nutrition                                  | 23 (8.8)     |
| Avoid hand shaking                                      | 7 (2.7)      |
| Don't know  | 6 (2.3)      |
| others  | 2 (0.8)      |
| <b>Known cure for TB</b>                                |              |
| Use of drugs given by health facilities                 | 237 (90.8)   |
| Praying   | 8 (3.1)      |
| Don't know  | 8 (3.1)      |
| Herbal remedies   | 2 (0.8)      |
| Self-medication   | 2 (0.8)      |
| Home rest without medicine                              | 2 (0.8)      |

**Table 3.** Knowledge and attitude of respondents.

| <b>Variables</b> | <b>n (%)</b> |
|------------------|--------------|
| <b>Attitude</b>  |              |
| Less positive    | 68 (26.1)    |
| Positive         | 193 (73.9)   |
| <b>Knowledge</b> |              |
| Insufficient     | 107 (40.8)   |
| Sufficient       | 155 (59.2)   |

sneezing (212, 81.2%), using a separate room for a patient (38, 14.6%).

Two hundred and thirty-seven mothers believed that TB can be cured if the TB patient regularly used the drugs given at a health facility (Table 2). About 155 (59.2%) of these mothers had sufficient knowledge of tuberculosis as shown by their score of above the median cut-off (Table 3).

#### *Predictors of Tuberculosis knowledge among mothers with children under five years of age*

The univariate analysis showed that having attained more than secondary education (OR 4.0; 95% CI 12.09, 7.63;  $p < 0.001$ ), having a monthly income less than or equals 25,000 naira (OR 2.18; 95% CI 1.02, 4.65;  $p = 0.042$ ) and monthly income greater than 51,000 naira (OR 3.24; 95% CI 1.43, 7.31;  $p = 0.005$ ), women engaged in business (OR 0.43; 95% CI 0.22, 0.83;  $p = 0.012$ ) and having a positive attitude regarding thoughts and beliefs about tuberculosis (OR 3.87; 95% CI 2.16, 6.93;  $p < 0.001$ ) had increased odds of possessing sufficient knowledge about TB (Table 2).

When these variables were entered into the multivariate analysis model, after adjusting for likely confounders, only one variable, i.e., having a positive attitude regarding thoughts and beliefs about TB, was significantly associated with more odds of having sufficient knowledge of TB among mothers with children under five (Table 4).

## **Discussion**

The BCG vaccination status of children under five (U5) in this study was quite high. This was not surprising considering the fact that the study was conducted at the child welfare clinic. It is expected that most of the women who visited the clinic would have presented their children for vaccination as immunization is one of the services offered by the CWC. In addition, with the educational level of most of the mothers, it is expected that mothers with high educational level would present their children for immunization. The hospital being a private teaching hospital, is likely to have most of its clientele from the middle and higher socio-economic class and they are

more likely to access immunization services. The importance of BCG vaccination cannot be overemphasised as it guarantees the protection of children particularly from life-threatening TB disease. Targeted interventions at improving and sustaining TB knowledge of mothers of U5 children through policies will contribute to reducing the burden of TB and help attain United Nations Sustainable Developmental Goal (UNSDG) 3.

In this study, most mothers were aware of TB and the most common source of information were health care workers. This high rate of awareness is commendable and is consistent with the findings of Tobin *et al.* [16]. This could be explained by the significant number of mothers with post-secondary education and the staff who delivered health talks on clinic days. However, it is a matter of concern that a quarter of the mothers did not know that TB was caused by a bacterium despite the high awareness rate. This further reinforces the fact that awareness does not translate to knowledge. This poor knowledge of bacteria as the cause of TB has also been reported by other studies [16-21] and this highlights the need for health care workers to be purpose-driven at educating these mothers to correct the misconceptions and myths surrounding TB and encourage positive-health seeking behaviour. This will also help to prevent the dissemination of erroneous information that may be an enabler of stigmatisation of TB patients.

As far as TB signs and symptoms, prevention, and treatment were concerned, a significant number of the mothers knew the most common presenting symptom and the most common way to prevent the spread of TB disease. The mention of cough for 2 or more weeks is consistent with findings from a number of studies [16,22-24] as the most known symptom. This could be ascribed to the reported sources of information, among which of importance are health care workers, media, family, and friends. However, there was poor knowledge of other symptoms like chest pain and loss of appetite. This could have been due to non-intentional omission of such symptoms during health talks and this is consistent with findings from other studies [16,25]. Regarding TB treatment, a significant number of the mothers knew that the disease could be cured by appropriate use of drugs given at health facilities. This could probably be attributed to fact that during health talk sessions, it is one of the messages being consistently put forward to the mothers. This finding is consistent with the findings of studies by Melaku *et al.* [23].

A significant number of mothers in this study had sufficient knowledge of TB and this is consistent with studies done elsewhere [26-27] although it differs from the findings of Tobin *et al.* [16]. The high level of knowledge could be due to the multiple sources of information, as reported, and the fact that a number of mothers had received at least secondary education. Additionally, a good number of the mothers in this

**Table 4.** Multivariate logistic regression analysis of factors independently associated with mothers’ knowledge of Tuberculosis.

| Variables                 | Unadjusted OR    |           | Adjusted OR      |           |
|---------------------------|------------------|-----------|------------------|-----------|
|                           | 95% CI           | p value   | 95% CI           | p value   |
| <b>Age</b>                |                  |           |                  |           |
| 18-27                     | 1                |           | 1                |           |
| 28-37                     | 1.22 (0.64-2.32) | 0.531     | 1.01 (0.43-2.36) | 0.969     |
| 38-47                     | 1.11 (0.43-2.81) | 0.824     | 0.86 (0.28-2.64) | 0.801     |
| <b>Job category</b>       |                  |           |                  |           |
| Civil servant             | 1                |           | 1                |           |
| House wife                | 0.54 (0.28-1.19) | 0.130     | 1.63 (0.57-4.66) | 0.361     |
| Trader                    | 0.28 (0.04-1.18) | 0.183     | 0.20 (0.01-2.42) | 0.208     |
| Business                  | 0.43 (0.22-0.83) | 0.012*    | 0.71 (0.31-1.59) | 0.411     |
| Others                    | 0.85 (0.34-2.1)  | 0.728     | 1.28 (0.39-4.14) | 0.679     |
| <b>Educational status</b> |                  |           |                  |           |
| ≤ Secondary               | 1                |           | 1                |           |
| > Secondary               | 4.0 (2.09-7.63)  | < 0.001** | 2.24 (0.95-5.31) | 0.065     |
| <b>Monthly income</b>     |                  |           |                  |           |
| No income                 | 1                |           | 1                |           |
| ≤ 25,000                  | 2.18 (1.02-4.65) | 0.042*    | 2.73 (0.92-8.09) | 0.069     |
| 26,000-50,000             | 1.62 (0.79-3.32) | 0.180     | 1.27 (0.51-3.12) | 0.596     |
| > 51,000                  | 3.24 (1.43-7.31) | 0.005**   | 1.81 (0.65-4.99) | 0.251     |
| <b>Attitude</b>           |                  |           |                  |           |
| Less positive             | 1                |           | 1                |           |
| Positive                  | 3.87 (2.16-6.93) | < 0.001** | 3.89 (0.65-8.24) | < 0.001** |

OR: Odds Ratio; CI: Confidence Interval; p-value 0.05; \*: Significant association 95% CI; p < 0.05; \*\*Very significant association at p < 0.01.

study had a positive attitude towards TB which may have encouraged seeking out more information about the disease and how to prevent it. The increased and widespread awareness created by the TB control programs at all levels via print-media, electronic-media and even social-media in an effort to achieve the End TB strategy could have contributed to the result observed in this study [28]. The finding of this study however contrasts the low level of attitude that was reported by Tobin *et al.* [16].

The multivariate logistic regression analysis revealed that job category, educational status, monthly income, and attitude of mothers of U5 were associated with sufficient knowledge of TB. However, similar to the findings of a study conducted in India [29] it was only attitude that was a predictor of sufficient TB knowledge. This translates to the fact that female empowerment is significant at predicting the TB knowledge of a mother.

This study is not without its limitations. This was a hospital-based study and findings may not be completely reflective of the knowledge and attitude of mothers in the larger community. A community based study would be necessary in order to have deeper insight into the community factors that may be associated with knowledge and attitude towards TB. Additionally, this study was carried out at a private tertiary hospital that mothers from a lower socio-economic class may not be able to access; the knowledge and attitude from the lower societal strata has therefore not been reflected.

## Conclusions

This study revealed that the awareness and knowledge of TB was high among mothers of children under five years of age. Albeit, some mothers still had misconceptions about the cause of TB and routes of transmission.

Overall, attitude regarding thoughts and beliefs about TB was an independent predictor of knowledge of TB. The positive influence of attitude on TB knowledge among the mothers, calls for improved strategies to increase health-literacy level about TB, with special attention on information delivery methods that will reinforce positive health-seeking behaviour among mothers and other members of the community. This will help contribute to the global control of TB.

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## Authors' contributions

Sunday Asuke contributed to conception, study design, data collection, implementation, analysis and writing of the manuscript. Haroun Omeiza Isah contributed to the conception, study design, analysis and writing of the manuscript. Adenike Oluwayemisi Jimoh contributed to the conception, study design and review of manuscript. Timothy Achema was involved in collection of data and reviewed the manuscript. All authors read, reviewed and approved the manuscript.

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