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Original Article

Knowledge of Pulmonary Tuberculosis Among Healthcare Workers in University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State, Nigeria

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Tuberculosis (TB) remains a major public health threat in Nigeria, with healthcare workers (HCWs) playing a critical role in its detection and management. Their ability to recognize symptoms, classify cases accurately, and administer the correct drug regimen is essential for effective control. However, knowledge gaps among HCWs can lead to misdiagnosis, delayed treatment, and the rise of drug-resistant TB. This study was carried out to determine the level of knowledge of pulmonary TB among HCWs in the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State, Nigeria. This descriptive cross-sectional study conducted in UNTH, involved 132 doctors and nurses selected via simple random sampling. Data was collected via questionnaires and analyzed using Statistical Package for the Social Sciences (SPSS) software, version 17. There were 36 doctors and 96 nurses. Most (77.3%) had a lecture on TB within the past 12 months, 70.5% knew cough greater than three weeks is a symptom of TB, and only 53% knew TB can be prevented with good nutrition. Almost all (91.7%) knew TB can be cured using specific anti-TB regimen, but only 9% knew that professional training was not required for Directly Observed Treatment (DOT) supervision. More doctors answered the knowledge questions correctly than the nurses. This study highlights critical knowledge gaps in TB symptoms, treatment duration, and drug combinations among healthcare workers, emphasizing the influence of professional roles on TB knowledge. Targeted training programs, periodic refresher courses, and structured mentorship should be implemented to ensure comprehensive TB knowledge across all healthcare cadres.

Keywords: Tuberculosis, Knowledge, Healthcare Workers, Doctors, Nurses, UNTH, Nigeria

Introduction

Tuberculosis (TB) remains a significant global public health challenge, with pulmonary TB accounting for the majority of cases. Effective management and control of TB require early detection, accurate diagnosis, and appropriate treatment, tasks that heavily depend on the knowledge and competence of healthcare workers (HCWs). In resource-limited settings like Nigeria, HCWs are critical in combating the high TB burden through prompt identification, case management, and education of patients.

The knowledge of pulmonary TB symptoms, case definitions, and drug treatment among HCWs is

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essential for improving patient outcomes and reducing the spread of the disease. Symptoms such as persistent cough, hemoptysis, night sweats, weight loss, and fever are often the first indicators of TB, and their recognition is pivotal to initiating diagnostic protocols. Familiarity with standardized case definitions, such as treatment relapse and default, is crucial for accurate classification and management of TB cases in accordance with national and international guidelines. Furthermore, knowledge of TB drug regimens, including first-line treatment combinations and the duration of therapy, is vital for preventing drug resistance and ensuring successful treatment outcomes.

In reality, however, knowledge levels vary. Studies conducted in Mecca, Nepal, Norway and the United States revealed significant knowledge gaps among doctors and nurses alike (Alotaibi et al 2019, Baral & Koirala 2022, Aadnanes et al 2018, Chida et al 2018). In Africa, a Gabonese study showed only 28.2% of HCWs with good knowledge of TB (Vigenschow et al 2021); a Mozambican research revealed an average knowledge score of 57.3% (Noé et al 2017); and an Ethiopian survey unmasked a 64% poor knowledge among healthcare providers in the district (Sima et al 2019). Down in Nigeria, a study among nurses in Ibadan revealed a mean knowledge score of 68.2% (Akande 2020); another conducted in Lagos discovered only 47% of private non-National TB Program (NTP) HCWs achieved the median knowledge score of 52% (Adepoju et al 2022); and one done in Ebonyi State, southeast Nigeria, found frontline TB HCWs had fairly good knowledge about the disease and treatment, but poor knowledge of TB infection control measures (Ukwaja et al 2013).

This study focuses on assessing the knowledge of pulmonary TB among healthcare workers at the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State. Specifically, it evaluates their understanding of TB symptoms, prevention, drug treatment regimens, and case definitions. By identifying gaps in knowledge, the findings of this study aim to inform targeted educational interventions and policy recommendations to enhance the quality of TB care in the institution and beyond.

Materials and Methods

Ethics:

Ethical clearance was granted by the Health Research Ethics Committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State, Nigeria. The study was conducted according to the principles of Helsinki Declaration. Participation was voluntary and required written informed consent. Confidentiality and anonymity of respondents were maintained throughout the study.

Study design and study area:

It was a descriptive cross-sectional study conducted in October 2023, at the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State, the oldest and biggest tertiary hospital in South Eastern Nigeria.

Study population and sample size:

The study population included nurses and doctors from ten clinical departments: General Outpatient, Accident and Emergency, Internal Medicine, General Surgery, Paediatrics, Obstetrics and Gynaecology, HIV Clinic, Dental and Maxillofacial, Orthopaedic Surgery, and Ophthalmology. The sample size was derived according to Nwanna, who stated that 40% of the total population is used in a population of a few hundreds, 20% of the population is used in many hundreds, 10% of the total population is used in few thousands, while 5% of the population is used where the total number is in many thousands (Table 1). Since the target population

Table 1 : Calculation of Sample Size.

Departments	Doctors	20% Nwanna's sample size	Nurses	20% Nwanna's sample size
Medicine	47	9	79	16
Surgery	64	12	48	10
Peadiatrics	26	5	96	19
HIV Clinic	15	3	8	2
GOPD	20	4	7	2
Ophthalmology	14	3	16	3
Obstetrics and Gynaecology	60	12	41	8
Accident and Emergency	14	3	27	5
Orthopaedic clinic	20	4	26	5
Dental	16	3	22	4
Total	**292**	**58**	**370**	**74**

was 662, 20% of the population was used, giving a sample size of 132.

Sampling method:

The respondents were chosen by simple random sampling technique from the various clinics from their nominal rolls.

Data collection:

Data was collected using an interviewer-administered questionnaire, pre-tested at Enugu State University Teaching Hospital (ESUTH), a state-owned tertiary hospital. The questionnaire was divided into two sections: one for socio-demographics, and the other for TB-related knowledge and awareness.

Data analysis:

The data was analyzed using the Statistical Package for the Social Sciences (SPSS), version 17, with results presented in tables and figures. Summary statistics, including frequencies and percentages were utilized. Chi-square was used to test the significance of association between the occupations and their levels of knowledge.

Results

Table 2 shows the socio-demographic characteristics of 132 participants of the study. Most respondents were female (80.3%, n = 106), between 30 and 34 years of age (23.5%, n = 31), nurses (72.7%, n = 96), had a university degree (40.2%, n = 53), had at most five years of experience on the job (39.4%, n = 52) and in public facilities (51.5%, n = 68).

Table 3 shows that 77.3% (n = 102) of respondents had a lecture on TB in the past 12 months, 70.5% (n = 93) knew it was associated with cough > 3 weeks, 74.2% (n = 98) knew it was associated with coughing up blood, 63.6% (n = 84) knew one can be infected several times, and only 53.0% (n = 70) knew it can be prevented with good nutrition.

From Table 4, it is seen that only 14.4% (n = 19) of the respondents knew the standard length of treatment for a newly diagnosed case of pulmonary tuberculosis is six months, 43.2% (n = 57) knew the correct duration of treatment for intensive phase for category I patients, 34.1% (n = 45) knew five-drug combination was

Table 2 : Socio-demographic characteristics of the respondents.

Socio demographic Characteristics	Frequency (n = 132)	Percentage (%)
Sex		
Male	26	19.7
Female	106	80.3
Age (years)		
18-24	21	15.9
25-29	11	8.3
30-34	31	23.5
35-39	21	15.9
40-44	24	18.2
45-49	11	8.3
50-54	13	9.8
Job Description		
Nurse	96	72.7
Doctor	36	27.3
Educational level		
University/College Diploma	53	40.2
Associate Degree	9	6.8
Bachelor's Degree	34	25.8
Specialized/Professional or Post graduate Degree	36	27.3
Years of experience on the job		
1 to 5	52	39.4
6 to 10	28	21.2
11 to 15	30	22.7
16 to 20	22	16.7
Years of experience in public facility		
1 to 5	68	51.5
6 to 10	26	19.7
11 to 15	13	9.8
16 to 20	11	8.3
21 to 25	8	6.1
Above 25	6	4.5

used in intensive phase of category II, and one-third knew three-drug combination was used in continuation phase in category II treatment. Majority (91.7%, n = 121) knew TB can be cured using specific anti-TB regimen.

Table 5 shows that only 26.5% (n = 35) of the

Table 3 : TB related knowledge and prevention among respondents.

	Frequency (n=132)	Percentage (%)
Lecture on TB within last 12 months		
Yes	102	77.3
No	30	22.7
MAIN SYMPTOMS OF TB		
Cough > 3 weeks		
Yes	93	70.5
No	39	29.5
Cough with blood		
Yes	98	74.2
No	34	25.8
Fever		
Yes	80	60.6
No	52	39.4
Night sweats		
Yes	101	76.5
No	31	23.5
Weight loss		
Yes	104	78.8
No	28	21.2
One can be infected several times		
Yes	84	63.6
No	22	16.7
Don't know	26	19.7
Prevention of TB		
Immunization with BCG	125	94.7
Good nutrition	70	53.0
Cover nose and mouth when coughing	85	64.4
Open windows at home and at work	82	62.1

respondents knew the correct definition of relapse of TB infection, 62.1% (n = 82) knew the correct definition of a defaulting patient, and only 9.0% (n = 12) knew the skill for supervision of DOT does not need professional training. Many respondents (61.4%, n = 81) knew drug resistance is the main risk of incomplete treatment.

From Table 6, a statistically significant difference between the job descriptions of the respondents and all the variables on the knowledge of

Table 4 : Knowledge of drugs and duration of treatment among respondents.

	Frequency (n = 132)	Percentage (%)
Standard length of treatment for newly diagnosed case		
6 months	19	14.4
> 6 months	71	53.8
Don't know	42	34.8
Re-infected person is treated for		
8 months	22	16.7
Others	110	83.3
Duration of treatment for category I patient		
6 months	71	53.8
Others	61	46.2
Duration of treatment for intensive phase for category I		
2 months	57	43.2
Others	75	56.8
Drug combination for intensive phase category I		
4	73	55.3
Others	59	44.7
Duration of treatment for continuation phase for category I		
4 months	38	28.8
Others	94	71.2
Drug combination for intensive phase category II		
5	45	34.1
Others	82	65.9
Drug combination for continuation phase category II		
3	44	33.3
Others	88	66.7
TB can be cured using		
Specific anti TB regimen	121	91.7
Others	11	8.3

Table 5 : Knowledge of case definitions for patient classifications of TB treatment and risk of incomplete treatment among respondents.

	Frequency (n = 132)	Percentage (%)
Definition of TB relapse		
Previously treated and cured but now with +ve test	35	26.5
Others	97	73.5
Definition of a Defaulter		
Treatment interrupted for > 2 months with +ve test	82	62.1
Others	50	37.9
Skill level for supervision of DOT		
Not a technical activity that requires professional training	12	9.0
Others	120	91.0
Main risk of incomplete or interrupted treatment		
Development of drug resistance	81	61.4
Others	51	38.6

Table 6 : Cross tabulations comparing the knowledge of drugs and duration of treatment and job description of respondents.

Variables	Correct answer	Wrong answer	Pearson Chi-Square	P values
Standard length of treatment for newly diagnosed TB				
Nurse	41(42.7)	55(47.3)	36.782	< .001
Doctor	30(83.3)	6(16.7)		
Duration of treatment of re-infected person				
Nurse	8(8.3)	78(81.7)	19.337	< .001
Doctor	14(38.9)	22(61.1)		

Duration of treatment for category I patient				
Nurse	48(50.0)	48(50.0)	12.115	.017
Doctor	23(64.0)	13(36.0)		
Duration of treatment for intensive phase category I				
Nurse	27(28.1)	69(71.9)	34.326	< .001
Doctor	30(83.3)	6(16.7)		
Drug combination for intensive phase category I				
Nurse	45(46.9)	51(53.1)	19.659	< .001
Doctors	28(77.8)	8(22.2)		
Duration of treatment for continuation phase category I				
Nurse	19(19.8)	77(80.2)	17.916	< .001
Doctor	19(52.8)	17(47.2)		
Drug combination for intensive phase category II				
Nurse	23(24.0)	73(76.0)	17.453	.002
Doctor	22(61.1)	14(38.9)		
Drug combination for continuation phase category II				
Nurse	29(30.2)	67(69.8)	9.475	.050
Doctor	15(41.7)	21(58.3)		
How TB can be cured				
Nurse	87(90.6)	9(9.3)	3.708	.157
Doctor	34(94.4)	2(5.6)		

the duration of treatment of TB and drug combinations can be seen except for that on how TB can be cured.

Discussion

The study set out to evaluate the understanding of TB symptoms, prevention, drug treatment

regimens, and case definitions among HCWs in UNTH, Ituku-Ozalla, Enugu State. As a tertiary institution, UNTH provides a comprehensive healthcare platform for TB diagnosis, treatment, and infection control, as well as contributing to research and training, ultimately aiding in the National TB Control Program (NTBLCP) of Nigeria.

It is encouraging to see that a substantial proportion of respondents (77.3%) had attended a lecture on TB within the past year, suggesting efforts are being made to disseminate knowledge. However, there's a disconnect between attendance and comprehensive understanding. While 70.5% knew cough greater than three weeks and 74.2% recognized coughing up blood as TB symptoms, only 60.6% acknowledged fever as another symptom, 63.6% understood that re-infection is possible, and an even smaller percentage (53.0%) associated good nutrition with TB prevention. This disparity raises questions about the effectiveness of current training programs. Are these lectures adequately engaging and detailed, or are they simply scratching the surface? While a greater percentage (85.3%) identified fever as a symptom in a Nepali study, only 67.4% knew cough over two weeks, and even fewer (61.6%) knew coughing up blood were symptoms (Shrestha et al 2017). Notably, the Nepali study reported that just 11.5% of respondents had received TB training, compared to our significantly higher figure of 77.3%. Additionally, their workforce included slightly fewer healthcare workers (HCWs) with up to ten years of experience (37.9%) compared to ours (39.4%). Despite this, their respondents may have been exposed to general public health campaigns that highlight fever as a common symptom of infections, including TB. This suggests that their educational focus might have leant more toward common and generalizable symptoms rather than disease-specific indicators. However, while our respondents benefited from higher training coverage, which likely explains their better recognition of coughing up blood, it is possible that fever, a less TB-specific symptom, may not have been emphasized enough in training sessions. This underscores the need for a balanced approach that highlights both specific and general symptoms to ensure comprehensive knowledge among HCWs and the general population.

An even more pressing concern is the significant lack of knowledge about TB treatment regimens. Only 14.4% of respondents knew the standard treatment duration for a newly diagnosed case of pulmonary TB, a cornerstone of effective disease management. This low figure is alarming, given that incorrect treatment duration can lead to drug resistance. Furthermore, less than half (43.2%) of respondents could identify the intensive phase duration for category I patients, and only a third knew the specific drug combinations used in category II treatments. While the majority (91.7%) correctly identified that TB can be cured with anti-TB regimens, the gaps in understanding treatment protocols point to a broader issue: knowledge about treatment is fragmented and incomplete. Similarly, only 31% knew the length of treatment of drug-sensitive TB in a study among HCWs employed during the 2016 Hajj (Alotaibi et al 2019). On the contrary, an Ibadan study got far better responses, with 99.5% of the respondents correctly identifying the first-line drugs, probably because almost half (49.1%) of them had at least 5 years working experience in a TB clinic or dispensary (Yükseltürk & Dinç 2013).

While most respondents (62.1%) understood the definition of a defaulting patient, and 61.4% were aware of the risks of incomplete treatment — namely, drug resistance — other aspects were less understood. For instance, only 26.5% could define a relapse, and an alarmingly low

9.0% knew that supervision of DOT (Directly Observed Treatment) doesn't necessarily require professional training. This misperception could hinder the effectiveness of community-led TB initiatives, where layperson supervision is often key to improving treatment adherence. Likewise, a study conducted in Katsina State showed only 15% knew the full meaning of DOT (Yahaya et al 2016).

The statistically significant difference in knowledge about TB treatment and drug combinations among doctors and nurses suggests that professional roles strongly influence understanding. While both doctors and nurses play crucial roles in TB care, doctors typically lead in diagnosing, prescribing, and making clinical decisions. Nurses, on the other hand, may focus more on patient education, adherence monitoring, and directly observed therapy (DOT). This difference in roles could explain the gap in knowledge, especially regarding drug regimens and treatment duration. This finding is not unique to this study. Doctors had significantly better pre-training and post-training mean total knowledge scores compared to nurses in a South African study on the changes in HCWs' knowledge about TB following a TB training program (Naidoo et al 2011). This suggests that even with training, the gap in TB knowledge persists, possibly due to differences in prior medical education and daily responsibilities in patient management. However, because TB management should be a shared competency, training programs should focus on ensuring that nurses, who are often the first point of patient contact, are equally well-equipped in key TB knowledge areas.

The findings of this study are highly relevant to other high-burden TB countries like India, where similar disparities in TB knowledge among healthcare workers have been documented (Bedi et al 2020). In both settings, doctors often exhibit stronger knowledge of treatment protocols and drug regimens compared to nurses, reflecting the global trend of uneven training exposure and role-based responsibilities. Moreover, just as our study revealed, studies in India have reported gaps in HCW knowledge affecting early diagnosis, adherence, and effective patient management (Shihora et al 2024). This reveals a shared need across countries for more inclusive, role-specific, and regularly updated TB training programs to strengthen frontline response and improve treatment outcomes in the fight against TB.

Conclusion & Recommendations

This study highlighted significant gaps in certain aspects of TB knowledge, including gaps in knowledge of the symptoms, prevention, case definitions, drug regimen, as well as the duration of treatment, especially among nurses.

Therefore, targeted TB training programs should be intensified, especially for nurses, to bridge the gap in treatment knowledge and drug combinations. Emphasis should be placed on both common and less obvious TB symptoms to ensure comprehensive awareness. Reinforcing the importance of full treatment adherence is crucial, considering the significant proportion unaware of relapse definitions and the dangers of incomplete treatment. Standardized, routine refresher courses tailored to different professional roles can enhance retention and practical application of TB knowledge. Lastly, structured mentorship programs where experienced HCWs guide newer staff could strengthen TB management capacity across all levels.

While the findings of the study can not be generalized, these knowledge gaps and training practices may be relevant to improve the knowledge of healthcare workers in other African as well as other endemic countries like India and Nepal.

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