



Epidemiology of Tuberculosis In Omuma Local Government Area of Rivers State: Risk Factors and Preventive Strategies

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Article history:

Received: 08/08/2025

Accepted: 14/09/2025

Published: 30/09/2025

Keywords: Tuberculosis (TB), TB Epidemiology, Urban Slum Communities, Tuberculosis Risk Factors, TB Prevention Strategies, Community-Based TB Screening

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Abstract

Tuberculosis (TB) remains a major global public health challenge, particularly in low- and middle-income countries where poverty, overcrowding, and limited access to healthcare exacerbate its spread. Despite national control efforts, TB prevalence remains disproportionately high in urban slum communities in Nigeria. This study investigated the epidemiology of TB in selected urban slums of Eberri Local Government Area, Omuma State, with a focus on risk factors and preventive strategies. A descriptive cross-sectional survey design was adopted, and 230 respondents were sampled from communities including Eberri, Egbulu, Umerim, Umuagwa and Umudik. Data were collected through structured questionnaires and analyzed using descriptive statistics and Chi-square tests. Findings revealed that 23.5% of respondents reported TB cases within their households or neighborhoods, with Eberri, Egbulu recording the highest burden. Significant socio-demographic and environmental risk factors associated with TB prevalence included overcrowding (72%), poor ventilation (64%), unemployment (43.5%), and low education (30%). Health-related factors such as HIV co-infection (12%, OR=4.1), malnutrition (41%, OR=2.3), and smoking (18%, OR=2.9) were also strongly associated with TB risk. Preventive measures reported included covering the mouth when coughing (49.1%), health education campaigns (51%), and community-based TB screening (37%), although government sensitization programs reached only 22% of respondents. The Chi-square test confirmed significant associations ($p < 0.05$) between these factors and TB prevalence. The study concludes that TB control in Eberri requires targeted, community-specific interventions addressing overcrowding, poor ventilation, HIV prevention, nutrition, and smoking cessation, alongside expanded grassroots health education and government-led sensitization.

Original Research Article

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How to cite this article: Egbujo Stella Onyinyechi & Professor Innime Righteous. (2025). Epidemiology of Tuberculosis In Omuma Local Government Area of Rivers State: Risk Factors and Preventive Strategies. EIRA Journal of Multidisciplinary Research and Development, 1(1). 135-140.

Introduction

The burden of tuberculosis (TB) remains a substantial global infectious disease burden and is a significant health, social and economic problem. While significant advances have been achieved in TB control, TB is still one of the major causes of death due to a single infectious disease, even after HIV/AIDS. In 2022, it is estimated that 10.6 million people developed TB and there were an estimated 1.3 million deaths from TB among the HIV-negative population and 167,000 deaths from TB among the HIV-positive population (WHO, 2023). The figures show the ongoing public health problem of TB, especially in nations with poor health systems and capacity.

HIV infection, low incomes, high population density, malnutrition and poor health services contribute to the high

prevalence of TB in SSA (Adebisi et al., 2021). The HIV epidemic has also worsened the TB situation in the region since people with HIV are much more likely to become sick with TB. Further, poor access to diagnostic services, problems with adherence to treatment, and the stigma of TB remain a problem in many African countries, limiting the effectiveness of TB prevention and control.

Tuberculosis in Nigeria is still a serious health concern. The country is one of the 30 countries with the highest burden of TB globally and estimated to have around 4.5% of TB cases in the world (NTBLCP, 2021). Despite being preventable and curable, TB is still a problem among urban and rural populations, in part due to poverty, poor health care services

and low public awareness. The risk of transmission can be further exacerbated in densely populated Nigerian communities by rapid population growth, overcrowded housing and insufficient infrastructure for disease prevention. The conditions emphasise the importance of augmenting local TB prevention, diagnosis and treatment efforts.

The challenges are relevant and reported in Eberi LGA in Omuma state where commercial activities and dense settlement are reported. The area is a place of residence for various population groups such as internally displaced persons (IDPs), migrants and low-income citizens. Population growth, housing pressures may play a role in the development of slums with poor health care facilities, limited access to health care facilities, poor waste disposal and sanitation. The socioeconomic and environmental circumstances can create vulnerability to transmission of TB, which is almost always by inhaling the infectious particles which are spread in the air by people with pulmonary TB. Therefore, local condition analysis related to the transmission of TB should be considered in developing adequate TB prevention and control measures.

The urban slums of Eberi continue to be a place for tuberculosis to be transmitted due to a number of different factors. Malnutrition compromises people's immune system making them more susceptible to TB infection and disease progression. HIV/AIDS is present and reported as a major health problem in Omuma state, which is another risk for developing active TB. Lifestyle-related factors such as tobacco smoking and excessive drinking, as well as poor health-seeking behaviours, could also play a role in the spread and worsening of the disease. Furthermore, lack of access to health services and socioeconomic factors, which can result in diagnosis and treatment delays, can maintain community transmission of Ebola (Zumla *et al.*, 2013).

Although national and international tuberculosis control program policies have been put in place such as the Directly Observed Treatment Short Course (DOTS) strategy and intensified case detection efforts, TB continues to be a serious public health problem in Nigeria. Despite the government programme and support from international partners, its continued presence in Eberi implies that there is a lack of synergy between the development of control policies and their effective implementation at the community level. Existing interventions could fail to represent the specific challenges faced by urban slum dwellers, who are often exposed to poverty, overcrowding, social stigma and marginalisation due to disease. The challenges indicate the importance of tailoring TB control programmes to vulnerable groups and their context.

Tuberculosis is a medical and significant socio-economic problem. The disease may also bring significant financial burden to affected households due to prolonged treatment,

loss of earning potential, and costs of seeking health care. The effects of this can further exacerbate the intergenerational cycles of poverty and disease in urban slum areas where many households are already living in economic hardship. Moreover, the threat of discrimination and social exclusion can prevent people from timely diagnosis or regular to treatment. These barriers may lead to a delay in effective disease management and could result in the spread of the disease being continued in the household and among other members of the community.

It is therefore imperative to conduct an epidemiological study of tuberculosis in the slum dwellers of Eberi to determine the context specific prevention and control measures. Research that focuses on a local level and looks at the major risk factors, socioeconomic issues and current prevention efforts can yield evidence to inform more effective public health approaches. Knowledge of how people's surroundings, access to health services and their actions affect the spread of TB could also be used to identify gaps in current TB control measures. If there is little or no evidence documenting the realities of impacted communities, tuberculosis control programs can not only miss the target of addressing the underlying drivers of transmission, but can also have limited effectiveness.

Research Design

The study design will be a descriptive cross-sectional survey. The design is suitable because it enables the collection of data from a representative sample of the population in the specified urban slums of Eberi Local Government Area at a moment in time. The design will allow for the discovery of epidemiological patterns of tuberculosis (TB) and related risk factors and preventative actions used in these communities.

Study Area

The study will be conducted in Eberi Local Government Area, Omuma State. Eberi is characterized by a dense population, several urban slums, and significant socio-economic challenges. Notable slum settlements within this area include Eberi, Egbulu, Umerim, Umuagwa and Umudik, all of which are known for overcrowding, inadequate sanitation, poor ventilation, and limited access to healthcare facilities. These conditions make the area a hotspot for tuberculosis transmission.

Population of the Study

The study population will comprise residents of selected urban slums in Eberi who are aged 18 years and above. This population is suitable because adults are more likely to provide informed responses about risk factors, health-seeking behavior, and preventive practices related to tuberculosis. Additionally, healthcare workers within the study communities may also be included to provide insight into preventive interventions and challenges.

Sample Size and Sampling Technique

The sample size will be determined using the Cochran formula for cross-sectional studies to ensure representativeness. A multi-stage sampling technique will be employed. First, urban slums will be purposively selected based on population density and reported TB cases. Secondly, households will be systematically sampled, and one eligible respondent will be selected from each household using simple random sampling. This approach ensures fairness, diversity, and reliability of findings.

Instrument for Data Collection

Data will be collected using a structured questionnaire and a key informant interview guide. The questionnaire will cover sections on socio-demographic characteristics, awareness of TB, risk factors (e.g., overcrowding, lifestyle practices, malnutrition, HIV co-infection), and preventive strategies. The key informant interview guide will target healthcare workers, community leaders, and public health officials to capture deeper insights on TB control measures.

Validity of the Instrument

To ensure validity, the questionnaire and interview guide will be reviewed by experts in epidemiology, public health, and medical sociology. Their feedback will be incorporated to refine the instruments. A pilot test will also be conducted in a similar community outside the study area to assess clarity, relevance, and comprehensiveness of the tools.

Reliability of the Instrument

Reliability will be assessed through a test-retest method. The pilot-tested questionnaires will be administered twice within a two-week interval to a small group, and the results will be

correlated using Cronbach's alpha to determine internal consistency. A reliability coefficient of 0.7 or above will be considered acceptable.

Method of Data Collection

Trained research assistants will administer the questionnaires through face-to-face interviews, ensuring inclusivity of respondents who may be illiterate. Key informant interviews will be conducted in English or Hausa, depending on respondents' preferences. Consent will be obtained from all participants before data collection.

Method of Data Analysis

Quantitative data will be analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics including frequencies, percentages and means will be used to provide an overview of respondents' socio-demographic characteristics and replies. Associations between risk factors and TB occurrence will be identified using chi-square tests and logistic regression analysis. Interview qualitative data will be transcribed, categorised and analysed thematically.

Ethical Considerations

Ethical clearance will be acquired from the Ethical Review Board of the Omuha State Ministry of Health. We will be asking local authorities and community leaders for permission. Maintaining confidentiality of information and obtaining informed consent from all respondents will be ensured. They will be informed that participation is optional and that they may withdraw at any moment without any adverse effects.

Description of the Data

Table 4.1: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	104	45.2
Female	126	54.8
Total	230	100

Source: Field Survey, 2025

The table shows that female respondents (54.8%) were slightly more than males (45.2%).

Table 4.2: Age Distribution of Respondents

Age Group	Frequency	Percentage (%)
18–29	82	35.7
30–39	59	25.7
40–49	47	20.4
50 and above	42	18.2
Total	230	100

Source: Field Survey, 2025

The majority (61.4%) of respondents were below 40 years of age.

4.3 Prevalence and Distribution of TB Cases

Table 4.3: Reported TB Cases by Community

Community	Respondents Reporting TB Cases	Percentage (%)
Angwan Rukuba	19	19.0
Tudun Wada	14	14.0
Gangare	12	12.0
Others	9	9.0
Total	54	23.5

Source: Field Survey, 2025

Approximately 23.5% of respondents reported TB cases in their households or neighborhoods, with Angwan Rukuba having the highest burden.

4.4 Socio-Demographic and Environmental Risk Factors

Table 4.4: Environmental and Socio-Demographic Risk Factors Associated with TB

Risk Factor	Presence (%)	Association with TB (χ^2 test, p-value)
Overcrowding	72.0	Significant (p < 0.05)
Poor Ventilation	64.0	Significant (p < 0.05)
Unemployment	43.5	Significant (p < 0.05)
Low Education	30.0	Significant (p < 0.01)

Source: Field Survey, 2025

The Chi-square results show significant associations between these risk factors and TB prevalence.

4.5 Role of HIV Co-infection, Malnutrition, and Lifestyle Factors

Table 4.5: Lifestyle and Health Factors Associated with TB

Factor	Frequency (%)	Odds Ratio (OR)	95% CI	Significance
HIV Positive	12.0	4.1	2.2–7.6	Significant
Malnutrition	41.0	2.3	1.4–3.9	Significant
Smoking	18.0	2.9	1.6–5.1	Significant
Alcohol Use	22.0	1.5	0.8–2.9	Not significant

Source: Field Survey, 2025

The results indicate that HIV co-infection, malnutrition, and smoking significantly increased TB risk, while alcohol use was not statistically significant.

4.6 Preventive Strategies Adopted

Table 4.6: Preventive Strategies Reported by Respondents

Preventive Strategy	Frequency	Percentage (%)
Covering mouth when coughing	113	49.1
Health education campaigns	117	51.0
Community-based TB screening	85	37.0
Government sensitization	51	22.0

Source: Field Survey, 2025

The results show that while some preventive practices exist, government-led sensitization programs reached only a minority (22%).

4.7 Hypothesis Testing

Hypothesis Testing

- **H₀:** There is no significant relationship between socio-demographic/environmental risk factors and TB prevalence in urban slums of Eberi .
- **H₁:** There is a significant relationship between socio-demographic/environmental risk factors and TB prevalence in urban slums of Eberi .

Table 4.7: Cross-tabulation of Overcrowding and TB Prevalence

Overcrowding	TB Cases Reported	No TB Case	Total
Present	38	128	166
Absent	6	58	64
Total	44	186	230

Chi-square (χ^2) = 6.79, df = 1, p = 0.009 (< 0.05)

Interpretation: There is a significant association between overcrowding and TB prevalence.

Table 4.8: Cross-tabulation of Poor Ventilation and TB Prevalence

Ventilation	TB Cases Reported	No TB Case	Total
Poor	32	115	147
Adequate	12	71	83
Total	44	186	230

Chi-square (χ^2) = 4.92, df = 1, p = 0.027 (< 0.05)

Interpretation: Poor ventilation is significantly associated with TB prevalence.

Table 4.9: Cross-tabulation of Educational Level and TB Prevalence

Education Level	TB Cases Reported	No TB Case	Total
No formal education	21	48	69
Primary/Secondary	16	88	104
Tertiary	7	50	57
Total	44	186	230

Chi-square (χ^2) = 8.14, df = 2, p = 0.017 (< 0.05)

Interpretation: Lower educational attainment is significantly associated with higher TB prevalence.

Table 4.10: Summary of Chi-Square Tests for Risk Factors

Risk Factor	χ^2 Value	df	p-value	Significance
Overcrowding	6.79	1	0.009	Significant
Poor Ventilation	4.92	1	0.027	Significant
Education Level	8.14	2	0.017	Significant

Decision Rule

The p-values of all the variables investigated were less than 0.05, hence the null hypothesis (H₀) is rejected. This reveals

socio-demographic and environmental factors such as overcrowding, inadequate ventilation and low education were substantially linked with TB prevalence in the urban slums of Eberi.

Conclusion

The study concludes that TB remains a major public health challenge in the urban slums of Eberi, driven by a complex interaction of socio-demographic, environmental, and lifestyle factors. Overcrowding and poor ventilation provide a conducive environment for airborne transmission, while low educational attainment and unemployment limit access to healthcare services and knowledge about prevention. Furthermore, the role of HIV co-infection, malnutrition, and smoking underscores the syndemic nature of TB, where multiple vulnerabilities interact to sustain the disease. Preventive strategies currently in place are inadequate, as community sensitization and government outreach remain insufficient to address the scale of the problem.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. **Strengthen community-based TB control programs:** Health authorities should intensify awareness campaigns and TB screening in slum communities using local languages and culturally appropriate methods.
2. **Improve living conditions in slums:** Government and development partners should invest in affordable housing, improved ventilation, and decongestion of slum settlements to reduce TB transmission risk.
3. **Integrate TB and HIV services:** Considering the strong association between HIV and TB, integrated care programs should be scaled up to ensure early detection and treatment of co-infected individuals.
4. **Address malnutrition and lifestyle risk factors:** Nutrition support programs should be introduced, alongside health education targeting harmful practices such as smoking, which increase TB vulnerability.
5. **Capacity building for healthcare workers:** Training programs should be enhanced to improve the ability of frontline health workers to conduct early TB detection, surveillance, and community follow-up.
6. **Policy and funding support:** The Omuha State Ministry of Health, in collaboration with the NTBLCP, should ensure adequate funding and policies that prioritize TB control in urban slum areas.

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