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A Cross-Sectional Observational Study Probing Post COVID-19 Pandemic Prevalence of Tuberculosis in Bayelsa State: Yenagoa LGA as a Case Study

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Abstract: ***COVID-19 pandemic disrupted uptake of health services and programs for diseases of public health relevance like Malaria, Tuberculosis, HIV/AIDS, and Immunization. This study aimed at investigating the post COVID-19 pandemic prevalence of Tuberculosis in Bayelsa State. It is a cross-sectional observational study involving sample collection from 384 respondents. The GeneXpert machine was used to examine samples for TB infection. A well-structured questionnaire was used to elicit information on gender, educational status, age, state of residence, among other information. This study recorded a TB prevalence of17.7%. The results further indicated that less females (5.7%) than males (12.0%) were infected with TB (p<0.05), whereas 30-39 years age group recorded the highest TB prevalence (p>0.05). Statistically significant association exists between TB prevalence and both levels of education (X^2=15.855, df=4, p-value = 0.005), and employment status (X^2=12.904, df=2, P-value = 0.002). TB is still a public health issue in Yenagoa, Bayelsa State. Though, it was observed that the TB clinics in Yenagoa were structurally well-built to support prevention of infectious diseases, plus strict adherence to infection prevention and control practices, more needs to be done on facility-based TB education, including enforcement of routine TB screening services at the healthcare centers.***

Keywords: Bayelsa State, Tuberculosis, Healthcare, TB Prevalence, TB Prevention, Disease Control

1. Introduction

Tuberculosis (TB) has continued to be a significant global public health concern, caused by the bacterium Mycobacterium tuberculosis. TB does not only affect the lungs, but the kidneys, meninges and the bones can also be infected (WHO, 2020). On the other hand, when a person has tuberculosis infection without showing symptoms, it is called Latent TB Infection (LTBI). It can progress to active TB disease if the immune system becomes weakened due to various factors (WHO, 2020). Untreated TB disease can be life-threatening. TB is an airborne infectious disease, with individuals with lung TB releasing TB bacteria into the air through coughing, sneezing, or spitting. Inhaling even a few of these bacteria can lead to infection. Fortunately, tuberculosis can be treated and prevented (CDC, 2016; WHO, 2019). While only a small percentage of individuals infected with MTB (Mycobacterium tuberculosis) will develop active TB disease, the risk is significantly higher for those with compromised immune systems. Scientific reports show that LTBI affects a quarter of the global population (WHO, 2019).

Yenagoa serves as the capital of Bayelsa, an oil-rich state in the Niger Delta. Despite having some of the largest reserves natural gas and of crude oil in the nation, it nonetheless struggles with poverty and pollution brought on by oil spills. Yenagoa is surrounded by mangroves, marshes, and tropical rain forests and is primarily reachable by boat. These elements may make residents more susceptible to a range of illnesses and health hazards, including tuberculosis. There was an increase in TB case notification between 2018 and 2019, with 60/100,000 population for the country and 38/100, 000 population for Bayelsa State in 2019 (NTBLCP, 2020). This is despite historically poor TB case detection and reporting in the state. The prevalence of tuberculosis in the state was estimated to be 49% by GeneXpert alone (Enoch, Silas, Pius, & Nwozuke, 2021). But as of 2019, Bayelsa State had expanded the reach of its TB services by incorporating 43 additional DOTS centers into its already-existing DOTS facilities. An average of seven (7) suspected cases and one (1) confirmed case of TB were present in each of the new DOTS centers. Similar improvements have been made in patient access to GeneXpert TB tests, childhood TB notification, DOTS Centers reporting rate, DR-TB case finding, TB/HIV collaboration, and Public-Private-Mix (PPM), which has assisted in improving TB case notification from the private health sector (NTBLCP, 2020). In Yenagoa, the USAID-funded SHOPS Plus project piloted private sector TB initiatives between 2020 and 2021.

2. Review of Literature

Higher values for tuberculosis treatment failure and prevalence rate have been reported during COVID-19 era than the pre-COVID-19 era in Rivers State, (Patrick, F.2022). Household TB transmission, treatment and diagnostic services, and TB prevention and control programs were impacted by the economic and health crises brought on by the COVID-19 pandemic and the public health strategies aimed at curbingits transmission. According to Alene et al. (2020), the significant disruption that the pandemic has generated on a worldwide scale, makes it crucial to take into account the possible effects on the prevention and control of common endemic diseases that may be even more harmful to human health than COVID-19 itself. In a study conducted by Patrick et al. (2020), there was a statistically significant correlation between the number of tuberculosis cases before

and during Covid-19, with a 95% confidence range of P = 0.024. COVID-19 had a negative influence on TB control in a number of ways, including by accelerating the spread of the disease inside the home, delaying TB diagnosis and treatment, worsening treatment outcomes, and raising the chance of acquiring drug-resistant TB. The long-and short-term implications of COVID-19 on national and international economy will definitely have an impact on TB programs (Alene et al., 2020).

The recommendation or mandate that people remain at home until the crisis was under control is one of the steps adopted by nations to stop the spread of COVID-19 (Anderson et al., 2020; Xiao &Torok, 2020). While this action reduces the spread of COVID-19 throughout the community, it may also make it easier for TB to spread within households. One of the risk variables that contributes to the transmission of TB at the household level is continuous contact with infected persons (Acua-Villaordua et al., 2018). Acua-Villaordua, et al. (2018) found that home exposure intensity enhanced the risk of tuberculosis (TB) infection and sickness among household members. Due to the lengthy incubation period of TB, the effects of increased household transmission of TB are most likely to be seen in the next years when there may be a rise in TB cases (Ragonnet et al., 2019; McCreesh & White, 2018). The diagnosis and beginning of treatment will both be delayed as a result of each of these variables. The COVID-19 pandemic made TB incorrect diagnosis and low case finding rate even more of an issue for TB interventions (WHO, 2019).

In order to supplement government initiatives for TB prevention, detection, and treatment, other non-governmental organizations (NGOs), notably Breakthrough Action, are putting TB programs into place in Bayelsa State. The unreported cases of TB continue to act as a reservoir for the spread of the illness in Nigeria. Identifying the unaccounted-for cases of TB has continued to be the uppermost primacy for TB control in Nigeria because, if untreated, one infectious TB case can infect around 15–20 individuals annually. Malnutrition, HIV infection, smoking, problematic alcohol use, and diabetes are all risk factors for TB, according to the NTBLCP's 2019 annual report. All of these are pervasive socioeconomic and public health issues in Bayelsa State. For example, a cross-sectional study that examined the prevalence of diabetes, pre-diabetes, and related risk factors among 323 residents of chosen communities in Yenagoa LGA of Bayelsa State revealed that the prevalence of both conditions was high, coming in at 8.4% for diabetes and 3.7% for pre-diabetes (Kasia, Oyeyemi, Opubiri, & Azonobi, 2020).

There is no doubt that COVID-19 pandemic has already hampered TB prevention and control measures. There haven't been many forums for exchanging TB research and knowledge in 2020, including seminars, workshops, and annual conferences. For instance, World Tuberculosis Day, which is observed annually on March 24 to generate money for TB control initiatives and increase the general knowledge of TB controls and prevention, has been canceled in a number of nations. The COVID-19 virus has had a significant impact on vaccination regimens, particularly the BCG vaccine used to prevent TB in children (UN, 2020). Additionally, COVID-19 may have an impact on TB preventive medication, which is frequently provided to high-risk individuals to stop latent TB from turning into active TB (WHO, 2020).

The world's efforts to eradicate TB by 2035 have been impacted by the global COVID-19 pandemic in a number of ways. This is because; numerous elements that influence screening and diagnostics services also have an impact on TB preventative and control initiatives. It is therefore important to reassess the current prevalence of TB in Bayelsa State in the era of post COVID-19. This study will enlighten researchers, those who develop guidelines, and decision-makers on the current burden of TB disease particularly in Yenagoa LGA.

3. Materials and Methods

3.1 The Study Location.

Between the latitudes of 4^0 15^1 North and $5^0 23^1$ South is where Bayelsa State is located. It is also located between the longitudes of 5^0 22^1 West and 6^0 45^1 East. Rivers state borders the west and south; Delta state borders the east; and the Atlantic Ocean borders the southernmost areas. With a population of 524, 400, or 0.31% of the State's total population as of the 2006 census, Yenagoa LGA is 742 square kilometers (sq. km) in area. Only 4 LGA headquarters, Sagbama, Yenagoa, Ogbia, and Kaiama, are accessible by road in the 75% riverine state. Only water transportation is available to get to the rest (Bayelsa State Ministry of Health, 2010). Bayelsa State's capital is Yenagoa LGA (Figure 1). It houses many of the primary health centers, secondary hosptials and tertiary health facilities in the state. As a result, many people travel from other LGAs for clinic attendance in Yenagoa. Most of the donor-funded TB projects were implemented in Yenagoa LGA also.

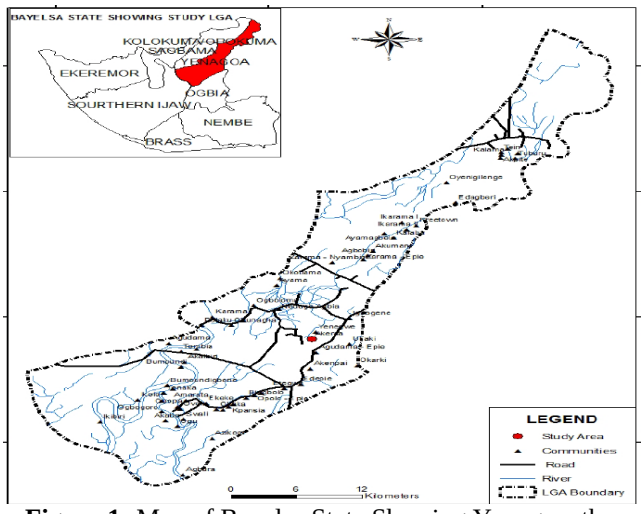

Figure 1: Map of Bayelsa State Showing Yenagoa, the Study Area

3.2 Study Design and Setting

This is a cross-sectional observational study, conducted at the Tuberculosis and Leprosy Referral Hospital (TBL), Igbogene in Yenagoa LGA, to ascertain the prevalence of

tuberculosis in the Post-COVID-19 Pandemic era in the State.

3.3 Study Population (Participants)

The study population is made up of 384 consenting individuals (176 males and 208 females) between the ages of 2 and 100 years old.

3.4 Inclusion & Exclusion Criteria

The Subjects between the ages of 2 and 100 years who voluntarily consented to participate in the study and scored at least one point in the TB screening exercise, were included. Subjects who refused to give their consent or withdrew their consent to participate or under 2 years old and over 100 years old were excluded. Those known to be actively on anti-TB medications at the time of the screening, were excluded.

3.5 Sampling Technique and Sample Size

Simple Random Sampling Technique was deployed in recruiting 384 eligible participants attending clinic at TBL Igbogene, over the period of two months. The sample size was calculate using the sample size formula:

$n= ((Z)^2 *P *q) /d^2$, Where "**n**" is the desired sample size, "**Z**" is the standard normal deviate, which is typically set at 1.96 or roughly 2.0 and corresponds to a 95% (0.05) level of confidence, "**P**" is the estimated proportion of the target population that possesses a particular characteristic (tuberculosis infection in this case), when unknown, 50% (that is p = 0.5) is usually used, "**q**" = 1.0-p, and "**d**" is the degree of accuracy, which is typically set at 0.05 (Agyare et al., 2021). Applying the above formula, the sample size was calculated to be three hundred and eighty four (384).

3.6 Data Collection Technique

In order to gather information about the 384 participants' age, sex, education level, and place of residence, among other data, well-structured questionnaires were given to them. After completing the questionnaire, each patient had a throat swab sample collected immediately at the hospital, which was then analyzed in the lab for tubercle bacillus. The most senior Medical Laboratory Scientist in the hospital's microbiology unit collected the throat swab samples in the lab. The results were compiled and combined in Microsoft Excel, and the level of significance was set at 0.05 for the analysis using SPSS version 21.

3.6.1Preparation of Sample

The participants' tuberculosis status was assessed using the GeneXpert System, which has thermal and optical modules, self-contained disposable cartridges, computer system software barcode scanners, and optional accessories like printers and UPS.0.5% hypochlorite were used to disinfect the work space. Next, a label was attached to each GeneXpert MTB/RIF cartridge that contains the sample ID. The specimen was kept in a sputum collection container that is leak-proof. The sputum collection container's lid was then unscrewed, the sample was mixed with Sample Reagent in a 2: 1 (v/v) ratio, and the cover screwed back on. The mixture was vigorously mixed and incubated at room temperature for as long as it takes for no discernible sputum clumps to appear.

3.6.2 Preparation of the Cartridge

Aspiration of the liquefied sample into the sterile transfer pipette up to the minimum mark (that is 2ml) where the meniscus was, was ensured. The sample was then gradually inserted into the GeneXpert MTB/RIF cartridge's open port. The cover of the cartridge was snapped shut and securely in place; while ensuring that within 30 minutes after putting the sample to the cartridge, the test was started.

3.6.3 Testing and Reporting Results

By clicking the "CREATE TEST" button, the GeneXpertDx System window opened. The GeneXpert MTB/RIF cartridge's barcode was then scanned as soon as the scan Cartridge Barcode dialogue box appeared. The test began and lasted 2 hours. The test results were then displayed when "VIEW RESULTS" button was clicked on the GeneXpertDx System window. The following are possible test results to be displayed: "MTB Not Detected" or "MTB Detected"; and "Rif Resistance Not Detected" or "Rif Resistance Detected" on the designated sections.

3.6.4 Data Processing and Analysis

Microsoft Excel was used for data collection, storage, and data cleaning and sorting. In order to help identify data entry issues immediately, an excel template was created especially for this use. After importing the data from Excel into SPSS version 21, codes were created for all relevant variables and documented. The descriptive statistical function of SPSS was utilized to complete the frequency tables and charts, and Chi-Square analytical procedures were used for the inferential statistical analysis.

3.7 Ethical Considerations

The Ethical Approval was gotten from the Health Research and Ethics Committee of Bayelsa State Ministry of Health (SMoH), Yenagoa (**Approval Number:** BSHREC/Vol.1/22/05/02). An Informed Consent Form was developed, clarified and presented to patients and/or caregivers (for children less than 18 years of age). Only willing participants were taken into the study on a fully voluntary and cost-free basis. We do not have any conflict of interest in this study.

4. Results and Discussion

4.1 Results

This study included a total of three hundred and eighty four (384) subjects accessing health care at the Tuberculosis and Leprosy Referral Hospital, Igbogene, Yenagoa, Bayelsa State. The study participants had a mean age of 31.6 ± 6.8 years and were categorized based on sex (gender), 176 (45.8%) male and 208 (54.2%) female subjects. The description of the places of residences of the subjects (N=384) showed that greater percentage of them, 257 (66.9%) live in small (10 x 10 ft) apartments, followed by 111 (28.9%) in medium (12 x 12 ft) apartments and 16 (4.2%) in large (14 x 16 ft) apartments. However, TB prevalence based on place of residence was not statistically significant (X^2=3.515, df=2, P-value = 0.182). In terms of the highest level of education (N=384), 222 (57.8%) had WASSCE, 108 (28.1%) had FLSC, 29 (7.6%) had B. Sc., 21 (5.5%) had OND and only four (4) one percent (1.0%) had HND. There was a statistically significant association between TB prevalence and Levels of education (X^2=15.855, df=4, p-value = 0.005), and employment status (X^2=12.904, df=2, P-value = 0.002). When asked about previous contacts with known TB patients, 100% of the respondents have neither had previous contacts with any TB patient nor knew anybody cured from TB or taking TB treatment. Nonetheless, this study was focused on the prevalence of TB through molecular detection of MTB using a GeneXpert machine. The results are presented in **Tables 1-2** and **Figures 2-6** below.

Table 1: Sex (Gender) Disaggregation of TB Prevalence in Yenagoa

Sex (Gender)	TB Test result?		Total
	MTB Not Detected	MTB Detected	
Male	130 (73.9%)	46 (26.1%)	176 (100.0%)
Female	186 (89.4%)	22 (10.6%)	208 (100.0%)
Total	316 (82.3%)	68 (17.7%)	384 (100.0%)

Table 2: Age Group Disaggregation of TB Prevalence in Yenagoa

Age Group	TB Test Result		Total
	MTB Not Detected	MTB Detected	
<10	33 (97.1%)	1 (2.9%)	34 (100.0%)
10-19	33 (84.6%)	6 (15.4%)	39 (100.0%)
20-29	46 (74.2%)	16 (25.8%)	62 (100.0%)
30-39	60 (75.9%)	19 (24.1%)	79 (100.0%)
40-49	40 (75.5%)	13 (24.5%)	53 (100.0%)
50-59	46 (82.1%)	10 (17.9%)	56 (100.0%)
60-69	33 (94.3%)	2 (5.7%)	35 (100.0%)
70-79	15 (93.8%)	1 (6.3%)	16 (100.0%)
80-89	6 (100.0%)	0 (0%)	6 (100.0%)
90-99	4 (100.0%)	0 (0%)	4 (100.0%)
Total	316 (82.3%)	68 (17.7%)	384 (100.0%)

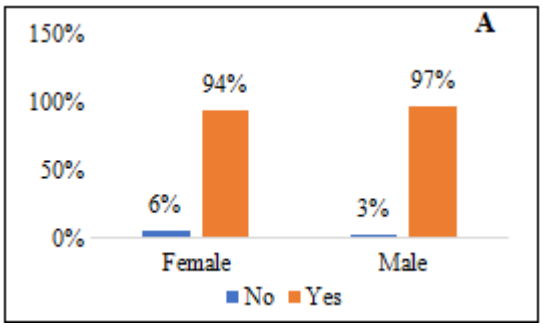

Figure 2: Access to TB Services in Yenagoa

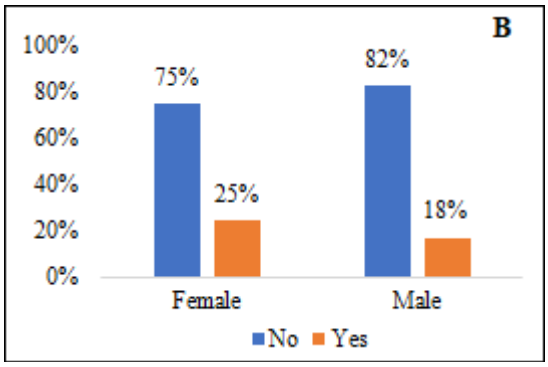

Figure 3: Integration of TB Education Services at Health Facilities

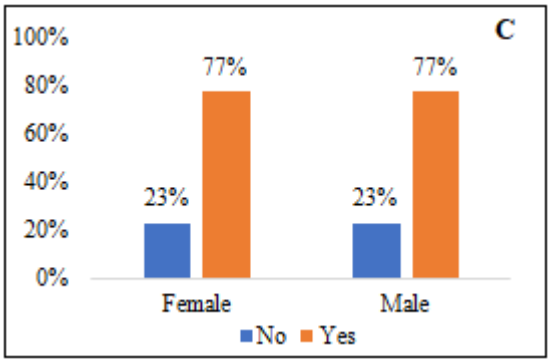

Figure 4: Presence of TB prevention campaigns in the last six months

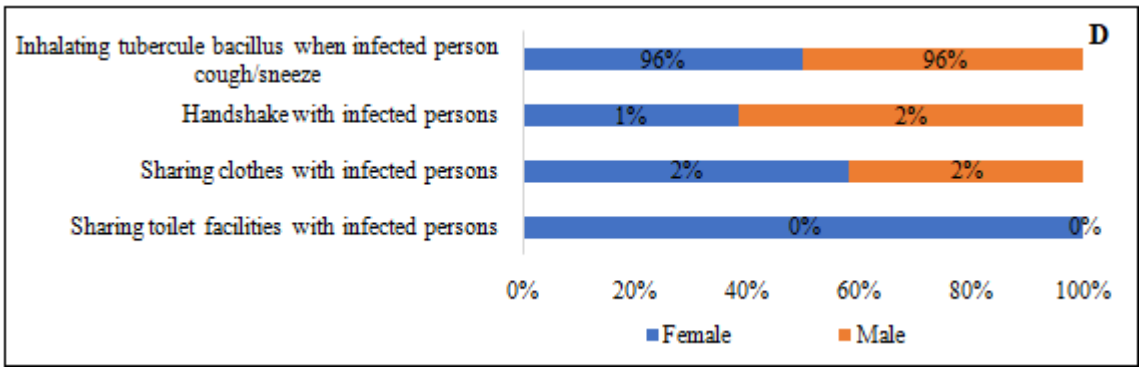

Figure 5: Knowledge of participants on TB infection routes

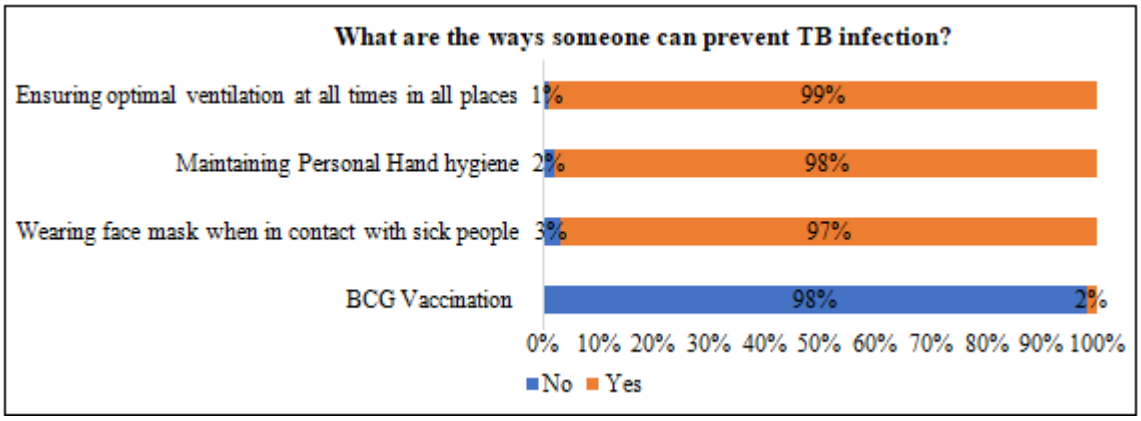

Figure 6: Chart Showing Knowledge of Participants on how TB Infection can be prevented

4.2 Discussion

According to the study's findings, Yenagoa currently has a tuberculosis prevalence of more than seventeen percent (17.7%), following the COVID-19 pandemic (**Table 1**). This is lower than the twenty-two percent (22.9%) prevalence found in a study conducted at the TB Referral Hospital, Yenagoa (Ikuabe & Ebuenyi, 2018), over nineteen percent (19.3%) obtained at the Federal Medical Center (FMC) Yenagoa in a study that was similar to this one and involved four hundred fifty-six (456) patients (Etim & Briyai, 2017), but higher than the ten percent (10.3%) prevalence in another study, conducted by Azuonwu, Ihua, and Kpomasiruchi (2017), to investigate the incidence of rifampicin-resistant tuberculosis strains among patients utilizing medical services at the FMC Yenagoa in Bayelsa State.

The prevalence rate determined by this study is also greater than 12% (Wali, Effiong & Agujiobi, 2019) and 11% (Wasihun, Hailu, & Dejene, 2021) in Enugu State and Eastern Amhara, Ethiopia, respectively. Generally, the observed TB prevalence is considered high, despite the improved public awareness of and knowledge of TB prevention techniques, attributable to the governments and relevant stakeholders' increased case detection efforts. Through the public-private-mix (PPM) program, which gave private health facilities, community pharmacy (CPs), and Private Patent Medicine Vendors (PPMVs) the authority to identify TB presumptive and link them to local DOTS Clinic, there has been improved access to TB services in Yenagoa (**Figure 2**).

According to Onyechege et al. (2022), there are socioeconomic factors that influence the prevalence of TB. A few of these variables are sex, age, income, education, the standard of one's housing, and final consumption expenditure (FCE). Although the highest TB prevalence was reported for the age group of 30 to 39 years (**Table 2**), this discovery was not statistically significant ($p>0.05$). In contrast, investigations by Singh, Kashyap, & Puri (2018) and Li, et al. (2021) discovered that older persons had a statistically significant greater TB prevalence than middle-aged people. Additionally, this study demonstrates that co-morbidities among study participants grew with age. Only 9% of participants in the 30–39 age range disclosed having a known medical condition, which is comparable to the findings of Bates, Marais, and Zumla (2015), who found that older people are more likely to have co-morbid health conditions, which increases TB susceptibility. The care of TB and other comorbidities including diabetes, high blood pressure, obesity, asthma, lung diseases, heart diseases, impaired renal and hepatic functions are complicated by the immunological functions that decline as we age. For better TB diagnosis, treatment, and management of associated consequences, elderly individuals need tertiary level medical facilities. The high frequency of self-medication among the elderly in Bayelsa State and the diagnostic hold-up brought on by atypical presentations that mimic other illnesses are factors in the rise in TB prevalence among the elderly. However, due to a poor road system and poor health seeking behavior, Bayelsa State's elderly population has trouble traveling to the hospitals.

According to the current findings, more than sixty-six percent (66.9%) of the patients classified their home as small, one hundred and eleven (111) or 28.9% described it as medium, and just sixteen (16) or almost four percent

(4.2%) described it as large. This shows that the majority of Yenagoa's inhabitants' social demographic characteristics, including their congested living conditions, favor the development of tuberculosis, which raises the disease's prevalence. These results support Millet et al. 's (2013) finding that TB has been linked to low-income and poverty-stricken environments. Additionally, Patrick et al. (2016) emphasized that the frequent assemblage of people with recognized risk factors contributes to higher TB prevalence by predisposing them to higher TB infection rates as a result of crowded housing, as seen in the current study. Typically, a person's place of residence, income level, and employment status are all interconnected.

In addition, it was discovered that 57.8% of respondents had completed secondary school (WASSCE), compared to 128 respondents, or 28.1%, who had completed primary school (FLSC), 7.6% who had completed a B. Sc., and only 1% who had completed a Higher National Diploma (HND). Although education level may not have much of an impact on TB susceptibility, it does improve people's capacity to make the right behavioral changes that can lessen exposure to TB infection. Obuku et al. (2012) state that good TB education and understanding also aid in dispelling outdated beliefs and misconceptions about TB transmission routes. The prevalence of tuberculosis and educational attainment were statistically significantly correlated in this study (p-value = 0.005).

Self-employed individuals had a higher TB prevalence than employed and jobless individuals. People who are unemployed have the danger of having little income, which directly affects TB susceptibility. The outcome of this study may, nonetheless, have some bearing on how associations play a part in the spread of TB. Self-employed people in Yenagoa engage in small businesses, fishing, farming and other petty trades that make them mingle with a lot of people with little or no Infection Prevention and Control (IPC) measures in place. This is in line with the results obtained in New Delhi, India by Imam et al., (2021) where TB prevalence was higher amongst the semi-skilled workers compared to the full-skilled employed people. Semi-skilled workers usually undertake menial jobs, this affects their income levels negatively and their ability to keep up with required healthy practices, including the condition of their residence.

Access to TB services such as clinical screening (for TB presumptive identification), laboratory diagnosis and commencement of patients on free anti-TB drugs have positive effects on TB prevention and control efforts. The COVID-19 pandemic negatively impacted on the above TB services between 2020 and 2021 in Bayelsa State, where most of the molecular GeneXpert machines were dedicated to testing samples for COVID-19 infection. This may have contributed to the higher TB prevalence despite the laudable TB programs in the state.

The incorporation of methodical screening for TB into outpatient departments (OPDs) of health facilities is possible by ensuring adequate knowledge of the apparent high burden of TB, stakeholder consciousness of one another's interests and values, proper training of the healthcare workers, suitable work schedules, systematic performance management, and cohesive outreach of TB case-finding services (Zulu, 2022).

As opposed to facility-based TB prevention activities, community campaign approaches to TB prevention and control are more commonly used in Yenagoa (**Figure 3**). As previously mentioned, even though there is good access to and availability of TB DOTS clinics, including skilled medical staff, TB testing equipment, drugs, and other TB related commodities, uptake of these services is suboptimal due to poor integration of TB preventive services like TB screening into the routine assessments provided to all clinic attendants in the study area. Many healthcare facilities currently solely screen symptomatic clinic visitors for TB, which results in missing TB cases. According to Cattamanchi, et al. (2015), inadequate hospital and service administration coordination results in decreased TB service delivery and uptake at the health institutions. This explains the study's findings that, despite the fact that most of the necessary resources were available and easily accessible, more than 76% of the patients did not obtain either TB screening or health education during their previous clinic visits (**Figure 3**). Although Yenagoa's TB clinics are structurally sound and strictly adhere to infection prevention and control (IPC) practices, more needs to be done to promote facility-based TB education, including the implementation of regular TB screening services at the medical facilities. The fact that 77% of the patients reported receiving TB prevention messages or witnessing TB sensitization campaigns outside the health facilities within the previous six months (**Figure 4**) further shows that the State Ministry of Health, non-governmental organizations (NGOs), and other health authorities/agencies are doing reasonably well. In comparison, just 27% of the community in a research conducted similarly by Alphonsus et al. (2020) in the Niger Delta Region reported having some knowledge about tuberculosis (TB). However, in this study, 96% of the participants had decent knowledge of TB transmission and prevention methods (**Figures 5 – 6**), which is higher than the findings of three other studies: 54% in Ethiopia (Kasa, Minibel, &Bantie, 2019), 62% in Iran (Amiri et al., 2017), and 87.7% in Kabul, Afghanistan (Essar et al., 2022). This success rate may beowing to the points that this research involved mostly city residents and that successful TB prevention initiatives were implemented by numerous stakeholders in Yenagoa outside of facility-based TB prevention and control efforts. However, 98% of the respondents do not know that Bacille Calmette-Guerin (BCG) Vaccination can help in preventing childhood TB and TB in adults at high risks of contracting the infection. (**See Figure 6**). This may be due to vaccine apathy widely reported in Yenagoa or poor health education on various available vaccines by the health workers at health facilities.

5. Conclusion

In Yenagoa, this post COVID-19 pandemic evaluation of the prevalence of tuberculosis reveals that TB is quite a significant public health issue in the state, at a prevalence rate of 17.7%. Being the most affected population, TB programs strategically targeting men and all people within the age bracket of 30 to 45, will likely increased TB case

detection rate as part of efforts geared towards reducing its prevalence. Increasing accessing and availability of TB DOTS clinics will play more effective roles in the fight against TB, if deliberate attempts are made at ensuring high uptake of TB services, through the integration of TB clinical screening for all clinic attendants. More TB prevention, diagnosis and treatment projects are still required in Bayelsa State.

6. Future Scope

Established on the findings from this study, I do recommend that:

1) A comprehensive research on attitude, knowledge and practice as it relates to TB services delivery and uptake in Bayelsastate, should be conducted. This will help to unravel bottle necks in TB program implementation.
2) A retrospective cohort study to determine the Treatment Success Rate (TSR) of TB patients that underwent TB therapy over the years should be undertaken.

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