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Socio-demographic Characteristics of Tuberculosis Patients in Public Health Facilities in Lagos State, Nigeria

Olalekan Moses Olayemi [1,*], Juliana P Michael [1], Adeniyi K Adeneye [2]

[1] Library & Information Communication Technology Department, Nigerian Institute of Medical Research, Lagos, Nigeria
[2] Public Health & Epidemiology Department, Nigerian Institute of Medical Research, Lagos, Nigeria

[*] ***Corresponding Author:*** Library & Information Communication Technology Department, Nigerian Institute of Medical Research, Lagos, Nigeria. Email: lekus2000@yahoo.com

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Abstract

Background: Tuberculosis (TB) continues to pose a significant global health challenge and is one of the leading causes of death from an infectious disease. The socio-demographic status of patients with TB has a crucial role in the transmission, control, and management of the infection.

Objectives: This study was undertaken to examine socio-demographic characteristics evident among TB patients in some selected public health facilities in Lagos State, Nigeria.

Methods: A survey design was adopted for this study. A multistage sampling technique was employed to select study participants from the three senatorial districts of the State. A questionnaire was used to collect the data. A total of 310 TB patients were sampled for the study. The collected data were analysed using SPSS software, version 23.

Results: The study findings revealed that the majority of the participants were male, married, and educated up to secondary school level. The findings also revealed that most of the study participants were young adults in their economically productive age and self-employed. Moreover, a high proportion of the participants were low-income earners, living in a single room and frequently using commercial buses as a means of transportation to the DOTS Centre.

Conclusions: This study highlights the prevalent characteristics of TB patients and should guide further research and identify the target group when intervention is needed.

Keywords: Directly Observed Treatment Short Course, Patient, Public Health Facilities, Socio-demographic Characteristics, Tuberculosis, Nigeria

1. Background

Tuberculosis (TB) remains one of the most serious public health challenges globally, especially in developing countries. Tuberculosis is an airborne disease, typically transmitted when individuals with active infections cough, sneeze, speak, or spit, releasing tuberculosis bacilli into the air. Transmission is therefore particularly high in crowded and poorly ventilated environments (1, 2). More than 95% of deaths from tuberculosis occur in low - and middle - income countries, making it one of the five leading causes of death (3).

In 2017, Nigeria ranked as the second most affected country by tuberculosis in Africa, after South Africa. The disease continues to pose a significant public health challenge in Nigeria, a country of more than 200 million people. The country currently ranks 10th among the 22 high TB burden countries of the world and is the highest in Africa. As of 2018, the prevalence of the tuberculosis scourge in Nigeria is between 400,000 and 450,000 cases, the highest in Africa and sixth globally (4). Due to the COVID -19 pandemic, Lagos State has emerged as the epicenter of tuberculosis in Nigeria (4, 5).

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Socio-demographic characteristics are believed to shape individuals' behaviour by influencing their perception of symptoms and treatment. It also has a wide range of effects on health by influencing opportunities, individual beliefs, attitudes, and values when making life-course decisions. As such, socio-demographic characteristics may be a surrogate for exposure to TB and its management-living conditions and lifestyle (6).

This study is hinged on the Andersen behavioural model, which provides a framework for examining socio-demographic and behavioural factors that influence patients' health-seeking. The model suggests a sequence of three factors that predict health care use: Predisposing factors, enabling factors, and health care need (7). The predisposing component explains an individual's disposition to utilise health services prior to their sickness. Thus, predisposing factors contribute to the fact that certain individuals seek and use health care services more often than others due to their personal characteristics. This group of factors includes gender, age, marital status, ethnicity, and attitudes. Enabling factors are the conditions and resources that facilitate or act as barriers to health-seeking and the use of healthcare services. They include income, availability and access to service, and access to free service. Need factors are the physical conditions or symptoms that necessitate healthcare seeking and service (8).

The socio-demographic characteristics of patients with tuberculosis differ in different parts of the world due to variations in custom, beliefs, attitude, and quality of health-care delivery services, among other factors. Different studies have documented the socio-demographic characteristics of patients with tuberculosis in many countries (9-11). However, the available literature predominantly focuses on clinical outcomes such as diagnosis, treatment success, and drug resistance, with comparatively limited attention given to the socio-demographic circumstances in which TB patients live and seek care. This gap is particularly evident in Lagos State, where there is a paucity of studies examining socio-demographic characteristics of TB patients attending public health facilities, despite the State having the highest burden of tuberculosis in Nigeria and consistently accounting for approximately 11% of the country's registered TB cases each year (12, 13). There is a need to understand the characteristics of tuberculosis patients receiving treatment, as this may aid the modification of the strategies to fight the scourge (14).

2. Objectives

Therefore, this study aimed at identifying the socio-demographic characteristics prevalent among tuberculosis patients in some selected public health facilities in Lagos State, Nigeria.

3. Methods

The research adopted a cross-sectional survey design, and a multi-stage sampling technique was used to select the primary sample unit.

3.1. Study Population

The population of the study were 918 TB patients accessing treatment during the study in some selected public DOTS Centres in Lagos State, Nigeria. The study sites were DOTS Centres - six secondary/tertiary hospitals and six Primary Health Care (PHC) facilities that cut across the three senatorial districts of the State.

3.2. Sampling and Sample Size

The study employed a multi-stage sampling technique to select the study participants. In the first stage, all the three Senatorial Districts in Lagos State were included (Lagos East, Lagos Central, and Lagos West). In the second stage, a simple random sampling technique using balloting was used to select two Local Government Areas (LGAs) from each Senatorial District. In the third stage, purposive sampling was used to select two DOTS Centres with the highest TB patient load in each of the selected LGAs. This approach was adopted because several DOTS Centres had relatively few TB patients. Subsequently, a total of twelve DOTS Centres were included in the study. In the fourth stage, stratified proportionate sampling was applied to distribute the sample across the twelve DOTS Centres based on the population of TB patients in each Centre. To ensure an adequate representation of the study population, a total of 310 TB patients were determined using the Taro Yamane formula.

3.3. Study Variables

To operationalize the variables based on Andersen's behavioral model, predisposing factors were categorized as gender, age, marital status, and family size. Enabling factors include occupation, education

attainment, and income level, while need factors are symptoms, illness, and health status, which is TB.

3.4. Inclusion and Exclusion Criteria

The main inclusion criteria comprised registered patients with pulmonary tuberculosis who had been on treatment for more than two months, were aged 18 years and above, and mentally capable of giving informed consent. The exclusion criteria included pregnant women, patients with extrapulmonary tuberculosis, severely ill patients, and TB patients who did not provide consent.

3.5. Study Instrument

A questionnaire developed through a review of related literature was used to collect the data. To ensure the validity of the research instrument, face, content, and construct validity were used. The questionnaire was scrutinised by three experts (a public health consultant, a medical sociologist, and a statistician).

3.6. Data Analysis

Data were obtained through copies of the questionnaire, which was administered to the respondents at the DOTS Centers after obtaining necessary approvals and informed consent. The data collected was coded and analysed using the Statistical Package for Social Sciences (SPSS) - version 23. Descriptive statistical methods such as frequency distribution, percentages, mean, and standard deviation were employed to analyse the data. Finally, the information obtained was summarized and presented in tables for better understanding.

4. Results

Out of the 310 questionnaires distributed to the TB patients, only 298 were correctly completed and validated for analysis. The demographic information of the respondent includes gender, age, marital status, family type, family size, type of residence, highest educational attainment, occupational status, person al income per month and mode of transportation to the DOTS Centre. The socio-demographic characteristics analyses are presented in Table 1.

The results of the study, as shown in Table 1, indicate that 199 (66.8%) were male, and 99 (33.2%) were female. This suggests that tuberculosis is more common among males than females in Lagos State, Nigeria. Hence, the DOTS Centers in Lagos State are male-dominated with tuberculosis. Furthermore, most of the patients, 109 (37.5%), were aged 30 - 40 years, whereas the least (2.1%) were older than 66 years. The overall mean age was 35.87 years (SD 11.95). From the result, this outcome suggested that most tuberculosis patients under study are still in their prime age, young and energetic.

Table 1 also revealed that 152 (51.0%) of the TB patients were married, 1.0% were separated, and 1.7% were divorced. The large number of married people accessing treatment in the DOTS Centres in Lagos State, may imply that tuberculosis is highly prevalent among married persons in Lagos State but less noticeable among the separated and divorced people.

The result on family type revealed that 224 (75.8%) of the participants were monogamous, while 24.2% (74) were in polygamous families. The result also shows that a majority of the participants, 101 (33.9%), have about 3-5 children, while those with more than six children, 18 (6.0%), were the least. On average, tuberculosis patients in the DOTS Centers in Lagos State, Nigeria, had a family size of 2.17. The results also revealed that those living in one room constitute a greater percentage, 119 (39.9%), while the least, 2 (0.7%), lived in a duplex. This implies that tuberculosis is prevalent among those that live in a single-room apartment.

Table 1 also shows that a majority of the patients, 140 (47.0%), had secondary education, while only a few, 28 (9.4%), had no formal education. This result shows that a small number of tuberculosis patients at the DOTS Centers lacked formal education. The result could also indicate that the tuberculosis patients in the study area have basic educational qualifications. The occupational distribution shows that the majority of the patients, 148 (49.7%,) were self-employed, with the smallest group, 2 (0.7%) being unemployed. This result showed that many of the participants in the study are engaged in one form of business or the other.

The results on monthly personal income show that 129 (43.3%) of the tuberculosis patients earned less than ₦30,000, whereas 11 (3.7%) earned between ₦60,000 - ₦89,999. The large number of low-income earners in the DOTS Centers in Lagos State, Nigeria, may imply that tuberculosis is highly prevalent among low-income persons in Lagos State but less obvious among high-income persons. Hence, this outcome may reflect the difficult financial situation of TB patients receiving treatment in the DOTS Centers in Lagos State, Nigeria. Six out of every ten persons (65.1%) indicated

Table 1. Participants' Socio-demographic Characteristics

Predisposing Factors	Frequency (%)
Demographic Variables	
Gender	
Male	199 (66.8)
Female	99 (33.2)
Total	298 (100)
Age (y)	
18 - 29	102 (35.1)
30 - 41	109 (37.5)
42 - 53	53 (18.2)
54 - 65	21 (7.2)
> 66	6 (2.1)
Mean age in years (SD)	35.87 (± 11.95)
Marital status	
Single	125 (41.9)
Married	152 (51.0)
Divorced	05 (1.7)
Widow/widower	13 (4.4)
Separated	03 (1.0)
Total	298 (100)
Family type	
Monogamous	224 (75.8)
Polygamous	74 (24.2)
Total	298 (100)
No. of children/family size	
None	97 (32.6)
1 - 2	80 (26.8)
3 - 5	101 (33.9)
> 6	18 (6.0)
Missing value	2 (0.7)
Mean of family size	2.17
Total	298 (100)
Type of residence	
One room	119 (39.9)
A Room and Parlour	74 (24.8)
Self-contained flat	39 (13.1)
Two/three rooms	56 (18.8)
Duplex	2 (0.7)
Others (on the street / homeless, on the water, slum areas)	8 (2.7)
Total	298 (100)
Enabling factors	
Highest educational qualification	
No formal education	28 (9.4)
Primary	41 (13.8)
Secondary	140 (47.0)
University/tertiary	89 (29.9)
Total	298 (100)
Occupation status	
Self-employed	148 (49.7)
Civil servant	19 (6.4)
Private organization worker	51 (17.1)
Retired	09 (3.0)
Student	40 (13.4)
Unemployed	2 (0.7)
Others (pastor, clergy, corpers, drivers, housewives)	29 (9.7)
Total	298 (100)
Personal Income per month [N444 ($1)]	
< N30,000	129 (43.3)
N 30,001 - N 59,999	70 (23.5)
N 60,000 – N 89,999	25 (8.4)
More than N 90,000	11 (3.7)
No income	63 (21.1)
Total	298 (100)
Mode of transportation to DOTs	
Private vehicle	19 (6.4)
Commercial bus	194 (65.1)
Commercial vehicle	23 (7.7)
Motorcycle	38 (12.8)
Bicycle	11 (3.6)
Others (trekking, tricycle, boat)	13 (4.4)
Total	298 (100)

commercial bus as the means of transportation to the DOTS Centers, while those who boarded bicycles and commercial vehicles to the DOTS Centers were 3.6% and 7.7%, respectively. This finding suggests that many of the participants in the study area incur some expenses during their visit to DOTS Centers.

5. Discussion

In view of the communicable nature of tuberculosis, examining the socio-demographic characteristics is critical for interpreting the observed patterns of TB occurrence and the factors influencing exposure,

health-seeking behavior, and access to care. The socio-demographic characteristics of the gender distribution revealed that a majority of the participants were male. This finding indicates a higher rate of tuberculosis infection among males than females. Similar trends have been reported globally, suggesting that males are disproportionately affected by TB. This could also mean that the males report for diagnosis and treatment at a greater rate than females. Quick response to TB or any ailment outside the immediate household is usually poor among females when compared to males, especially in a culture where the former need to seek permission or financial assistance before seeking treatment. Another probable explanation for this male predominance could be that men are more engaged in social and labour activities than women in many countries, resulting in increased tuberculosis transmission and infection. This is due to the fact that males are more likely to engage in risk behaviors such as smoking, alcohol consumption, and drug addiction, which have been identified to often trigger tuberculosis. This finding is similar to a study conducted by Hendrik et al. (15) and Ochonma et al. (16) done in Indonesia and Nigeria, respectively, who reported that more males than females were being infected with tuberculosis. However, this contradicts the findings of Omotowo, Ekwueme and Omotowo et al. (17) and Osahon and Okolo (18), who reported that females were the most infected with TB in Nnewi and South East, Nigeria, respectively.

The study further showed that the participants had a mean age of 35.87 years, indicating that tuberculosis is more prevalent among young adults attending the DOTS Centers. This result supported the findings of Onazi et al. (19), Ochonma et al. (16), Kastien-Hilka et al. (20) that most TB patients were in the productive years of their lives in Nigeria and South Africa, respectively. Hutahaean (21) buttressed that those who are young are at a higher risk of contracting tuberculosis and may easily transmit the disease due to mobility, resulting in an increase in TB prevalence. Meanwhile, the high proportion of TB cases in this age group poses profound and far-reaching consequences that extend beyond individual health, including reduced work capacity and lower productivity. This outcome underscores the importance of targeting TB prevention, early detection, and treatment adherence programmes on young adults in order to minimize transmission and socio-economic impacts.

With respect to marital status, the results show that a majority of the TB patients receiving treatment in DOTS Centers in Lagos State were married. Married adults often live in shared households, which can increase TB transmission. This outcome suggests that most of these individuals likely have family support, which can provide both emotional and logistical assistance for treatment adherence, potentially enhancing their motivation and ability to attend regular treatment sessions. However, they may also face additional social and economic pressures, particularly if they are the primary “breadwinners” with caregiving responsibilities or financial burdens, which could complicate their focus on treatment and recovery. The result supported the findings of Duyan et al. (22), conducted in Turkey, and Patel et al. (23), conducted in India, which found that the majority of their participants were married.

On the family type, the findings showed that a majority of the participants were monogamous, and a majority of the participants have approximately 3 - 5 children, while the average number of family members among tuberculosis patients in the DOTS Centers in Lagos State, Nigeria, is 2.17. While the large size and presence of children may provide social support and help to mediate psychological stress that tends to overwhelm coping capability for TB patients, TB burden can, however, increase the workload on family breadwinners, thereby inhibiting their ability to work and generate income to care for other family members. In addition, when one member of a household is a carrier or infected with TB, all other members are at risk because the disease is contagious in nature.

The study outcome indicated that the majority of the participants lived in a single room. In urban settings, limited affordable housing options often force low-income individuals into small, shared spaces, demonstrating how socio-economic and environmental factors contribute to TB prevalence. This finding suggests that the chances of infecting other people living in a single room may be high. This is because many TB patients shared the same beds, ate together, and even shared house utensils, which can aid in the spread of the disease. Tuberculosis patients who live in a small house with a large family member tend to have less space and privacy; thus, they aid transmission of the disease (24). It is generally known that the risk of tuberculosis infection rises with proximity to an index case. As a result, the risk of TB infection among contacts

of TB cases is anticipated to be higher than in the general population. This finding is inconsistent with the result of the study done by Odone et al. (25) that TB was more prevalent in those who lived in better-built houses at the household level in Malawi. Similarly, this outcome is inconsistent with the result of Vange et al. (26), who conducted a study in Nigeria and reported that the majority of the study participants (TB patients) lived in flats and bungalows. This finding could be attributed to the fact that the majority of their study participants were civil servants, implying that they have a steady source of income that afford them to live in luxury houses.

The outcome of this study shows that a large proportion of the participants were educated up to the secondary educational level. This indicates that the level of education among the study participants is quite high; thus, it is expected that it will be easy for them to comprehend or receive health information that can lead to behavioral changes and improve their health-related quality of life. It is widely assumed that people with a reasonable level of education have a lower risk of TB infection, while those with no formal education have a higher risk of TB. Meanwhile, individuals with secondary education may work in occupations that expose them to crowded environments, increasing their vulnerability to TB. Level of educational attainment has been identified as a significant predictor of symptom identification and treatment. This finding is similar to a study conducted in Nigeria by Omotowo et al. (14, 17), and Onazi et al. (19), who all reported that those infected with tuberculosis patients as their study participants were educated up to the secondary educational level. However, this outcome contradicts the findings of Kisaka et al. (27), who reported that the majority of their respondents (TB patients) had no formal education in Uganda.

The study also found that the majority of the participants assessing treatment in the DOTS Centers were self-employed in one occupation or the other. This may be alluded to by the fact that self-employed individuals (business people) are often exposed to a larger number of people and tend to move around more frequently, which predisposes them to a higher risk of tuberculosis infection. Moreover, the nature of work and responsibilities may contribute to delayed healthcare-seeking, increasing the likelihood of TB detection at treatment Centers. This finding contradicts the results of Ochonma et al. (16), who conducted a study in Nigeria and discovered that the majority of their participants (TB patients) do not have paid employment.

The findings revealed that a large number of the participants were low-income earners. Tuberculosis is often linked to poverty, and the additional expenditures incurred during treatment often create significant impediments to patients' capacity to access and receive complete TB care. Additionally, poor living conditions and inadequate nutrition weaken immunity, making individuals more susceptible to TB. Patients' decisions to seek healthcare services may be influenced by factors such as proximity to health-care Centres and their income. Reis' (6) study outcome in the Democratic Republic of Timor-Leste indicated that sufficient income is a key component of TB treatment, because those with enough money are more likely to have enough means to pay for transportation and other treatment-related expenses, thereby increasing the likelihood of completing treatment. This outcome is inconsistent with the findings of Boccia et al. (28), who found that TB infection was most prevalent in the wealthiest individuals in Zambia. This outcome is also inconsistent with the result of Onazi et al. (19), conducted in Nigeria, who found out that a little less than half (48.4%) of their study participants were not earning income. Furthermore, the outcome also contradicted the finding of Atif et al. (29) in Malaysia, who reported that the majority of patients with pulmonary TB have sufficient income.

The result of this study showed that many of the participants relied on public transportation as a means of transportation to DOTS Centres. It is possible that patients may be receiving treatment at facilities distant from their place of residence. Perhaps, one of the reasons many TB patients prefer to receive treatment away from their communities is the stigma and discrimination commonly associated with TB, particularly for individuals co-infected with HIV/AIDS, as treatment elsewhere offers greater anonymity. The risk associated with using commercial buses is that many TB patients hardly used their face masks while in public, probably due to the fear of stigmatization. As a result, many end up infecting more people. Findings of Feske et al. (30), carried out in Houston, Harris County, United States of America, revealed that weekly bus usage of public transportation was linked to a higher incidence of tuberculosis. Hassan et al. (2) asserted that TB thrives more in an overcrowded and poorly ventilated environment, which has been identified to characterise

some of the present study area. This result also suggested that most of the study participants incurred some expenses towards their transportation to DOTS Centers. TB patients' visits to health facilities may vary depending on the distance covered; as such, lack of financial resources for transportation could lead to treatment defaults. Transportation cost is a real cost, which most times is the only cost which tuberculosis patients could not avoid. The financial burden of such cost during treatment may impair health-related quality of life among low-income earners. Apart from disrupting their daily activities/job during clinic visits/appointment day(s), it is likely to have an impact on their income/earnings, particularly for those with lower income. In many low- and middle-income countries, many people depend on daily income to survive. In resource-limited settings, where income is mostly generated solely based on daily effort, the demand may affect patients' chances of attending the clinic and adhering to treatment regimens accordingly. This outcome corroborates the findings of Yahaya et al. (31) study in Nigeria, which reported that a majority of the patients incurred cost during treatment as a result of transportation. Given the length of time required to treat tuberculosis, this could be a significant obstacle. As a result, patients who do not complete their treatment run the danger of infecting people in their environment and relapsing with tuberculosis.

5.1. Limitations

While the findings offer valuable insights, the outcome of this study should be interpreted with caution due to several inherent limitations. This study was limited to tuberculosis patients receiving treatment at government-designated DOTS Centers in Lagos State, Nigeria. Consequently, the findings may not be generalizable to DOTS Centers in other parts of the country. Finally, the study used only descriptive statistics because it focused only on socio-demographic factors of the patients; hence, the causal relationship could not be ascertained. Despite its limitations, the outcomes of this study draw policymakers' attention to the prevalent socio-demographic characteristics observed among TB patients in selected public health facilities in Lagos State, Nigeria.

5.2. Conclusions

Tuberculosis remains a major threat that has a negative impact on patients' health-related quality of life around the world. There is still a paucity of studies regarding the underlying mechanisms linking socio-economic characteristics of TB patients with the rising cases of infection reported in the country. Investigating the relationship between various socio-demographic factors and health is becoming increasingly important, particularly among patients with chronic illnesses and long-term treatments like tuberculosis. The study findings revealed that pulmonary TB was prevalent among males, married people and those educated up to secondary school level. The findings also revealed that most of the study participants were young adults in their economically productive age and self-employed. Furthermore, a high proportion of the participants belong to low-income earners, who are more vulnerable to tuberculosis infection due to poverty, ignorance, and a lack of healthcare services. This study's findings reinforce Andersen's behavioral model by demonstrating how social and economic factors can profoundly shape health-seeking behavior. It emphasizes the role of individual perceptions and cues to action, and underscore the need for targeted interventions that could enhance accessibility, affordability, and awareness of TB services for high-risk populations. The findings of this study emphasize the need for TB control strategies that go beyond clinical management to address underlying social determinants. Furthermore, increasing community outreach, enhancing equitable access to TB services, and incorporating social protection measures into national and state TB programmes are essential for reducing disease burden and transmission. This study highlights the prevalent characteristics/profile of TB patients and should guide further research and identify the target group when intervention is needed.

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Footnotes

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References

1. Webber R. *Communicable diseases: a global perspective*. 2012. https://doi.org/10.1079/9781845939397.0000.
2. Hassan AO, Olukolade R, Ogbuji QC, Afolabi S, Okwuonye LC, Kusimo OC, et al. Knowledge about Tuberculosis: A Precursor to Effective TB Control-Findings from a Follow-Up National KAP Study on Tuberculosis among Nigerians. *Tuberc Res Treat*. 2017;**2017**:6309092. [PubMed ID: 29075531]. [PubMed Central ID: PMC5624149]. https://doi.org/10.1155/2017/6309092.
3. World Health Organization. *Tuberculosis*. 2017. Available from: https://www.afro.who.int/news/tuberculosis.
4. Muanya C, Akpunonu S. Tuberculosis spreading, becoming untreatable in Nigeria, experts warn. *The Guardian Newspaper*. 2019;**25**(3).
5. Onyedika-Ugoeze N. *11,000 new TB cases identified in Lagos, Ogun, Osun, Oyo in one year*. Guardian Newspaper; 2021. Available from: https://guardian.ng/news/11000-new-tb-cases-identified-in-lagos-ogun-osun-oyo-in-one-year/.
6. Reis J. Factors associated with medication adherence among tuberculosis patients in Timor-Leste [thesis]. Brisbane. *Queensland Univ Technol*. 2016.
7. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 1995;**36**(1):1-10. [PubMed ID: 7738325].
8. Başar D, Öztürk S, Cakmak İ. An application of the behavioral model to the utilization of health care services in Turkey: A focus on equity. *Panoeconomicus*. 2021;**68**(1):129-46.
9. Raza A. Socio-demographic Patterns of Tuberculosis Patients, Experience of a Tertiary Care Medical College Hospital of Bangladesh. *Journal of Lung, Pulmonary & Respiratory Research*. 2016;**3**(6). https://doi.org/10.15406/jlprr.2016.03.00104.
10. Bhawalkar J, Khedkar D, Lanjewar B, Landge J, Ghonge S. Socio-Demographic Factors Associated with Tuberculosis Cases Registered Under RNTCP in an Urban Area of Pune, Maharashtra. *National Journal of Community Medicine*. 2018;**9**(2):130-4.
11. Kumari A, Sharma PK, Kansal D, Bansal R, Kumari S. Socio-demographic profile of multi-drug resistant tuberculosis patients and its association with severity of adverse drug reactions in DOTS plus centre at tertiary hospital in Himachal Pradesh, India. *International Journal of Basic & Clinical Pharmacology*. 2018;**7**(12). https://doi.org/10.18203/2319-2003.ijbcp20184843.
12. Lagos State Government. *Tuberculosis control program*. 2017. Available from: https://health.lagosstate.gov.ng/tuberculosis-control-program/.
13. Adejumo OA, Daniel OJ, Abdur-Razzaq HA, Shogbamimu YO, Femi-Adebayo T, Adepoju VA, et al. Trend of tuberculosis case notification and treatment outcome in Lagos State, Nigeria: a 5-year retrospective study. *Trans R Soc Trop Med Hyg*. 2017;**111**(7):300-7. [PubMed ID: 29165702]. https://doi.org/10.1093/trstmh/trx060.
14. Adinma ED, Azuike EC, Nwabueze SA, Nnebue CC, Azuike ED, Obi DC, et al. Characterization of Tuberculosis Cases Presenting in a Tertiary Healthcare Facility in South-Eastern Nigeria. *Open Journal of Preventive Medicine*. 2014;**4**(9):723-9. https://doi.org/10.4236/ojpm.2014.49082.
15. Hendrik, Perwitasari DA, Mulyani UA, Thobari J. Measuring quality of tuberculosis patient using St George respiratory questionnaire (SGRQ) instrument in Yogyakarta. *J Ilmu Farmasi dan Farmasi Klin*. 2015;**28**:28-34.
16. Ochonma OG, Azuike EC, Mgbokwere MC, Ekwueme OC. Examining the influence of socio-demographics including geographical factors on the knowledge and possible use of tuberculosis treatment Centre: A cross-sectional study of patients in a developing country. *Int J Health Pharm Res*. 2017;**3**:40-9.
17. Omotowo B, Ekwueme OC, Aghaji MN. Tuberculosis control mechanisms and contact tracing: knowledge and practice among TB patients at DOT centres is Southeast Nigeria. *Sci Rep*. 2012;**9**:1.
18. Osahon PT, Okolo UI. Health-related quality of life of tuberculosis patients assessing treatment in a tertiary health facility in South East Nigeria. *Journal of Pharmaceutical and Allied Sciences*. 2017;**14**(4):2578-83.
19. Onazi O, Gidado M, Onazi M, Daniel O, Kuye J, Obasanya O, et al. Estimating the cost of TB and its social impact on TB patients and their households. *Public Health Action*. 2015;**5**(2):127-31. [PubMed ID: 26400384]. [PubMed Central ID: PMC4487475]. https://doi.org/10.5588/pha.15.0002.
20. Kastien-Hilka T, Rosenkranz B, Sinanovic E, Bennett B, Schwenkglenks M. Health-related quality of life in South African patients with pulmonary tuberculosis. *PLoS One*. 2017;**12**(4). e0174605. [PubMed ID: 28426759]. [PubMed Central ID: PMC5398494]. https://doi.org/10.1371/journal.pone.0174605.
21. Hutahaean LM. Factors Affecting Life Quality of Pulmonary Tuberculosis Sufferers at Sanglah Hospital Denpasar. *IOSR Journal of Nursing and Health Science*. 2013;**2**(5):30-4. https://doi.org/10.9790/1959-0253034.

22. Duyan VELİ, Kurt B, Aktas Z, Duyan GC, Kulkul DO. Relationship between quality of life and characteristics of patients hospitalised with tuberculosis. *International journal of tuberculosis and lung disease*. 2005;**9**(12):1361-6.
23. Patel PG, Ramanuj V, Bala DV. Assessment Quality of Life (QoL) of TB patients registered in Tuberculosis units of Ahmedabad Municipal Corporation area by using WHO Short Form-36. *Scholars J Appl Med Sci*. 2014;**2**(6F):3303-6.
24. Baranowska-Rataj A, de Luna X, Ivarsson A. Does the number of siblings affect health in midlife? Evidence from the Swedish Prescribed Drug Register. *Demographic Research*. 2016;**35**:1259-302. https://doi.org/10.4054/DemRes.2016.35.43.
25. Odone A, Crampin AC, Mwinuka V, Malema S, Mwaungulu JN, Munthali L, et al. Association between socioeconomic position and tuberculosis in a large population-based study in rural Malawi. *PLoS One*. 2013;**8**(10). e77740. [PubMed ID: 24204945]. [PubMed Central ID: PMC3804525]. https://doi.org/10.1371/journal.pone.0077740.
26. Vange O, Umeh EU, Azua ET. Predisposing factors and cost Implications of pulmonary tuberculosis in patients attending federal medical centre Makurdi, Nigeria. *African Journal of Microbiology Research*. 2019;**13**(27):474-82. https://doi.org/10.5897/ajmr2017.8722.
27. Kisaka SM, Rutebemberwa E, Kasasa S, Ocen F, Nankya-Mutyoba J. Does health-related quality of life among adults with pulmonary tuberculosis improve across the treatment period? A hospital-based cross sectional study in Mbale Region, Eastern Uganda. *BMC Res Notes*. 2016;**9**(1). 467. [PubMed ID: 27756438]. [PubMed Central ID: PMC5070115]. https://doi.org/10.1186/s13104-016-2277-y.
28. Boccia D, Hargreaves J, De Stavola BL, Fielding K, Schaap A, Godfrey-Faussett P, et al. The association between household socioeconomic position and prevalent tuberculosis in Zambia: a case-control study. *PLoS One*. 2011;**6**(6). e20824. [PubMed ID: 21698146]. [PubMed Central ID: PMC3117783]. https://doi.org/10.1371/journal.pone.0020824.
29. Atif M, Sulaiman SA, Shafie AA, Asif M, Sarfraz MK, Low HC, et al. Impact of tuberculosis treatment on health-related quality of life of pulmonary tuberculosis patients: a follow-up study. *Health Qual Life Outcomes*. 2014;**12**:19. [PubMed ID: 24528499]. [PubMed Central ID: PMC3925792]. https://doi.org/10.1186/1477-7525-12-19.
30. Feske ML, Teeter LD, Musser JM, Graviss EA. Including the third dimension: a spatial analysis of TB cases in Houston Harris County. *Tuberculosis (Edinb)*. 2011;**91 Suppl 1**:S24-33. [PubMed ID: 22094150]. https://doi.org/10.1016/j.tube.2011.10.006.
31. Yahaya SS, Olorukooba AA, Lawal A, Abdurrahman H. Accessibility and utilization of tuberculosis dots services among patients attending primary health care facilities in katsina state. *International Journal of Infectious Diseases*. 2016;**53**. https://doi.org/10.1016/j.ijid.2016.11.236.