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Predisposing factors and cost Implications of pulmonary tuberculosis in patients attending federal medical centre Makurdi, Nigeria

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The predisposing factors and the cost implications of pulmonary tuberculosis (TB) in patients attending Federal Medical Centre, Benue State, Makurdi, was investigated. Information on socio-economic and demographic characteristics of the patients was obtained using a structured questionnaire. The female had a higher (56.5%) number of TB patients than the male (43.5%). Most of the TB patients were married (52%). A larger percentage had tertiary education (34%). Majority of the TB patients were civil servants (41%) and 78.5% earned less than ₦ 100,000 monthly. Those living in flats and bungalows made up a greater percentage of TB patients, and majority (55%) of them had more than five persons in their households (reflecting family size). It was also observed that many of the patients (54.5%) ate together or shared cutleries and about one-half (49.5%) of the patients reported that they were sleeping together on same bed with family members. In terms of house location most of the TB patients lived in North Bank (25.5%) and Wadata (22.5%). Mostly children (31.5%) and wives (30.5%) were affected by the TB disease; the proportion of affected husbands and relatives were lower. Many (71.5%) reported that they did not have health insurance and had stopped work because of TB ailment. Majority of the TB patients made substantial out-of-pocket expenses: up to 57.5% spent more than ₦500 on transport per visit, 52% spent more than ₦2000 on complementary test while 75.5% spent above ₦2000 on non-TB tests. From the findings of this study, it may be necessary to provide an enabling environment that facilitates treatment completion such as isolation of patients and adequate ventilation. A shorter treatment regimen eliminating visits to the healthcare should be encouraged.

Key words: Predisposing factors, cost, tuberculosis (TB), Makurdi.

INTRODUCTION

Tuberculosis (TB) is an infectious disease usually caused by the bacterium *Mycobacterium tuberculosis* (MTB) (WHO, 2005). Tuberculosis is spread through the air when people who have active TB cough, spit, speak, or

sneeze (CDC, 2012). According to the World Health Organization (WHO), the global incidence of TB was 9 million in 2005, 13.7 million in 2010 (WHO, 2009). Approximately one-third of the world's population has been infected with *M. tuberculosis*, with new infections occurring in about 1% of the population each year (WHO, 2009). TB is a serious public health problem in Nigeria. Nigeria has an estimated prevalence of nearly 900,000 TB cases, and the second highest TB disease burden in Africa, ranking 5th among the 22 high TB burden countries in the world (WHO, 2010). The Nigerian Medical Association (2013) reports that Benue State is one of the States with the highest TB infection rate in the country. The disease mostly affects those between 25 to 34 years (36.6%) with Lagos, Kano, Oyo and Benue states being the states with the highest level of infections (NMA, 2013). The World Health Organization (WHO) estimated that over 13 million people have TB (WHO, 2010).

Many people in the developing world contract tuberculosis because of compromised immunity due to HIV infection and other factors such as malnutrition, overcrowding, lack of control measures, poor treatment and the high cost of therapy (WHO, 2010). Many studies have shown a strong association between poverty and TB and have demonstrated that the poor have a higher risk of TB infection; they have a higher prevalence of the disease, have worse outcomes and display worse TB care-seeking behaviors (Lonnroth et al., 2010; Fabricant et al., 1999; Elender et al., 1998). Many studies have assessed the association between poverty and TB, but only very few have assessed the direct financial burden TB treatment and care can place on households (Dim and Dim, 2013). Although financial difficulties is the reason for implementing a free-of-charge strategy on TB diagnosis and treatment but TB patients still faces huge out-of-pocket expenses (Ukwaja et al., 2012; Sanou et al., 2004). Financial constraint is known to lead to non-adherence to TB medication, delays or slower recovery and could result in drug resistance (Chang et al., 2004). Studies have evaluated the direct cost incurred by TB patients to be from fees, transport and food during TB treatment (Umar et al., 2012). It was also observed that TB patients also experience indirect cost such as job losses or opportunities forgone as a result of TB ailment (Umar et al., 2013; Ukwaja et al., 2012).

The WHO calculates that the average TB patient loses three to four months of work time and up to 30% of yearly household earnings (WHO, 2013a, b). Kemp et al. (2007) observed that patients spend about US$13 on treatment which is equivalent to about 18 days wages. In another study by Umar et al. (2012) he estimated time value for the hours spent seeking treatment for hospitalized and non-hospitalized patients was US$333.30 and US$79.13, respectively. These suggests that many households would be unable to cope with TB treatment without certain coping strategies like selling or leasing their assets as well as borrowing of loans (Laokri et al., 2013; Ukwaja et al., 2013; Collins et al., 2013).

The costs typically measured, referred to as direct costs, include transport costs to and from the health facility and any costs for medication or consultation incurred by individuals while seeking care (Ataguba, 2011). Indirect costs are costs associated with the time lost while being unable to work due to seeking care, or being too ill to work. These are used to capture the productivity and economic costs an individual or household incurs as a result of being ill or spending time seeking treatment (Barter et al., 2012; Drummond et al., 2007; Russell, 2004).

The purpose of this study is therefore to describe and estimate the predisposing factors and the cost implications of TB infection.

MATERIALS AND METHODS

Study area

Study area was Makurdi in Benue State. Makurdi Metropolis is located in North Central Nigeria along the River Benue. It lies at Latitude: 7° 43' 32" N and Longitude: 8° 33' 51" E. Makurdi is the capital of Benue State and covers an area of 34,059 km² and an estimated population of 500,797. Federal Medical Centre Makurdi, is the only hospital rendering the direct observation therapy (DOT) in the State, people from all over the State and beyond go there to get treatment.

Study design

This study was a three month hospital based cross-sectional survey which was carried out at the direct observation therapy (DOT) centre of Federal Medical Centre (FMC), Makurdi, Benue State, Nigeria.

Data collection techniques

Pre-structured questionnaires were administered to 200 patients confirmed to have pulmonary tuberculosis and attending the DOT centre for treatment.

The questionnaire comprised of three sections: section A, B and C. Method used was based on filling a questionnaire from three parts; demographic and socio-economic data of the patients, direct and indirect costs of TB infection.

Data preparation

Section A was designed to obtain demographic and socio-economic data of the patients such as age, sex, marital status, occupation, educational status, monthly income and the habits and living conditions of the patient. Section B had to do with the indirect costs of the patients such as the distance travelled by the patient to the health centre, time taken to reach the health centre, health insurance and the effect of TB ailment on the patient or household. while Section C dealt with the direct costs or the out-of-pocket expenditures of the patients and which included the money spent on transportation, non TB tests and drugs such as cough syrup,

Table 1. Socio-economic characteristics of tuberculosis patients.

Studied parameter	Frequency	Percentage
Sex		
Female	113	56.5
Male	87	43.5
Marital status		
Married	104	52.0
Single	96	48.0
Educational qualification		
Polytech/COE	68	34.0
University Degree	58	29.0
Secondary	57	28.5
Primary	17	8.5
Occupation		
Civil servants	82	41.0
Businessmen	51	25.5
Unemployed	35	17.5
Others	32	16.0
Monthly income (₦)		
50,000 to 10,000	65	32.5
10,000 to 50,000	63	31.5
>100,000	43	21.5
<10,000	29	14.5
House type		
Flats	47	23.5
Bungalow	45	22.5
Self-contained	40	20.0
Multi-tenants	37	18.5
Thatch house	26	13.0
Storey building	5	2.5

vitamins and antibiotics.

Data analysis

Data were entered using the Statistical Package (SPSS) to describe relevant variables. Descriptive statistics such as frequencies and percentages were used for categorical variables while Means and Standard deviations were used for continuous variables. All financial calculations were in the Nigerian currency (₦).

Ethical clearance

Ethical clearance was sought and given at FMC, Makurdi for the study. Informed consent was obtained from the participating patients. Patients names were not required and were not recorded.

RESULTS

The socio-economic characteristics of TB patients

The socio-economic characteristics of TB patients are shown in Table 1. Socio-economic information on two hundred tuberculosis patients were obtained. Most of the TB patients interviewed were female (56%); and only 43.5% were male. Married patients (52%) were more in number than the singles (48%). Most of the TB patients (34%) had OND/HND as their highest academic qualification, followed by University graduates (29%) and the infection was least in those with Primary School certificate (8.5%). Civil servants accounted for the highest proportion (41%) of TB patients studied, followed by the businessmen (25.5%). Those who were unemployed and

Table 2. Predisposing factors among tuberculosis patients.

Social habits	Frequency	Percentage
No of persons in the household		
1-5	75	37.5
6-10	110	55
11-14	15	7.5
Sleep together on same bed		
No	103	51.5
Yes	97	48.5
Eat together or use the same cup		
Yes	109	54.5
No	91	45.5
Household location		
High level	59	29.5
North bank	51	25.5
Wadata	45	22.5
Judges quarters	27	13.5
Others	18	9.0
Household position		
Child	63	31.5
Wife	61	30.5
Relative	39	19.5
Husband	37	18.5

other occupational groups made up the least proportion.

A high percentage of patients earned between ₦10,000 to ₦100,000 as monthly income. Those living in flats and bungalows made up a greater percentage of TB patients (20.0 to 23.5%), followed by those who had thatch houses or lived as tenants (13.0 to 18.5%).

Predisposing factors of TB patients

Table 2 depicts the predisposing factors of TB patients. Majority (55%) of them had more than five persons in their household and more number of the patients (51.5%) were not sleeping. It was also observed that a higher percentage of the patients (54.5%) ate together or shared cutleries. Mostly children (31.5%) and wives (30.5%) were found among the TB patients studied. Proportions of husbands and relatives affected by the disease were smaller.

Indirect cost associated with TB treatment

The indirect cost associated with TB treatment is summarized in Table 3. A higher percentage lived near the health care unit (51%), spent less than 30 min (44.5%) to reach the health care centre while 17% spent above one hour to get there. Majority of the patients had no health insurance (71.5%). Those who stopped work because of the ailment were 62.5%. Adherence to treatment was also high among the patients as a higher number of the patients adhered to treatment (64%) while only a few admit that they did not adhere to treatment (36%) due to one reason or the other.

Direct cost of TB patients

The out-of-pocket expenditure of TB patients was also determined (Table 4). More number of the TB patients spent above ₦500 on transportation to the health care. Those who spent above ₦2000 on complimentary were also more than those who spent below ₦2000 on complementary test.

Expenditure on non-TB drugs was high as a higher number of TB patients (75.5%) spent above ₦2000 on non-TB drugs, lower percentage (24.5%) spent below ₦2000. Money spent on daily feeding was also high. (47.5%) spent above ₦100 on daily feeding. A smaller number of the patients (23.5%), spent above ₦3000 on

Table 3. Indirect costs incurred by tuberculosis patients.

Cost Implication	Frequency	Percentage
Distance from healthcare		
Near	102	51.0
Far	98	49.0
Time to reach healthcare		
0 to 30 mins	89	44.5
31 mins - 60 mins	77	38.5
above 1hour	34	17.0
Health insurance		
No	143	71.5
Yes	57	28.5
Hospitalization		
No	139	69.5
Yes	61	30.5
No of days on hospitalization		
0	139	69.5
1-5	38	19.0
6-10	19	9.5
11-17	4	2.0
No of visits to clinic		
Twice a month	106	53.0
Once a month	51	25.5
Once a week	43	21.5
Effect on work		
Stopped work	125	62.5
Did not stop work	75	37.5
Adherence to treatment		
Yes	128	64.0
No	72	36.0

hospitalization and only 8% spent below ₦3000 on hospitalization. As high as 60% of the TB patient complained of spending so much on treatment while only 40% did not complain.

Total out-of-pocket expenditure incurred by TB patients

Total out-of-pocket expenditure incurred by TB patients or cost burden of TB patients attending F.M.C Makurdi is summarized in Table 5. The out-of-pocket expenditure of TB patients per visit to F.M.C, Makurdi, is as follows: Transportation ranged from ₦150 to ₦550, non TB drugs

was between ₦1,000 to ₦3,000, complementary exams ₦1,000 to ₦3,000, feeding ₦300 to ₦1,500 and money spent on hospitalization was around ₦4,000 per day.

Patient's monthly income ranged between ₦5,000 and ₦200,000 while total expenditure was between ₦2,450 and ₦10,900 per visit. Total expenditure was increased if the number of visits was increased. For patients at the intensive phase of treatment which was twice a month, total expenditure could be ₦2,450 X 2 = ₦4,900. For those who spent as high as ₦10,900 on treatment, total expenditure could be ₦10,900 X 2 = ₦21,800. Mean monthly income was ₦77,550.00 while mean total expenditure was ₦4971.50. Standard error of monthly income was ₦4,860.48 and standard error of total

Table 4. Out-of-pocket expenditure among tuberculosis patients.

Cost implication	Frequency	Percentage
Money spent on transport		
Above ₦500	115	57.5
200 to ₦ 500	67	33.5
Below ₦ 200	18	9.0
Money spent on treatment		
High	120	60.0
Low	80	40.0
Money spent on complementary test		
Above ₦2000	104	52.0
Below ₦ 2000	96	48.0
Money spent on non-TB drugs		
Above ₦ 2000	151	75.5
Below ₦ 2000	49	24.5
Money spent on daily feeding		
Above ₦ 1000	95	47.5
₦500 to ₦ 1000	84	42.0
₦200 to ₦ 500	21	10.5
Money spent on hospitalization		
₦0	137	68.5
Above ₦ 3000	47	23.5
Below ₦3000	16	8.0

Table 5. Total out-of-pocket expenditure incurred by TB patients.

Expenditure	Range	Mean	Std. Error
Monthly income (₦)	5000.00 - 200000.00	77550.00	4860.49
Transport (₦)	150.00 – 550.00	234.00	8.36
Non TB drugs (₦)	1000.00 – 3000.00	1490.00	60.98
Complementary exams (₦)	1000.00 – 3000.00	1960.00	70.83
Feeding (₦)	300.00 – 1500.00	615.00	26.24
Money spent on hospitalization (₦)	0.00 – 4000	672.50	82.56
Total expenditure (₦)	2450.00 – 10900.00	4971.50	139.11

expenditure was ₦139.11.

DISCUSSION

The main objective of this study was to estimate and describe the predisposing factors and cost implications of TB infection in Makurdi Metropolis. It was discovered in this study that majority of the TB patient falls among those with lower levels of education (polytechnic 34%) and this agrees with the study of Rundi (2010), that lack of education and ignorance are major factors facilitating the spread of the disease. Among occupation of the patients, civil servants (41%) and businessmen (25.5%) had higher number of TB patients than the unemployed (17.5%) and other occupational groups (16%). It is believed that the civil servants and businessmen are always exposed to a larger number of people and also have the tendency to travel to various places thereby placing them at a higher risk of contracting TB. This is in

conformity with the reports of WHO (2010); Kumar et al. (2007); Peter et al., (2009). They reported that overcrowding and travelling are risk factors in the spread of the disease.

Poverty had also been linked to a greater risk of infection, poorer patients outcomes as well as affecting health seeking behavior (Harris et al., 2011; Oxlade and Murray, 2012; Wingfield et al., 2014). In this study, it was discovered that patients who earned between ₦10,000 to ₦100,000 had higher prevalence of TB infections than those who earned above ₦100, 000. It was also observed that a higher number of TB cases were found among those living in high level (29.5%) and Wadata (22.5%). Majority of the TB patients were also found among those living in flats (23.5%) and bungalows (22.5%). The above are characteristics of people who belong to the low socio-economic class of people and agrees with studies of Zumla et al. (2013), Fabricant et al. (1999) and Elender et al. (1998) which shows strong association between poverty and TB. These studies reported that the poor has a higher prevalence of the disease, this is because they are most vulnerable to acquiring TB. According to Ukwaja et al. (2012), malnutrition, overcrowding, poor air circulation and sanitation associated with poverty increase the risk of acquiring TB and developing the active disease. This is also in conformity with the report of Tony et al. (2015), which states that living conditions, unhygienic practices, overcrowding in homes, living in poorly designed, unplanned houses and environment may increase the persistence of TB in a locality. Ahlburg (2000), contradicts this report by saying that although TB is "tagged" as a disease of the poor, it is not absolutely true because a good number of those infected were literate, had good education, and earned good incomes.

High prevalence of TB was also found among those who had more than five persons in their household (55%) than among those who had less than five persons (37.5%). A larger percentage of the patients slept together on same beds (48.5%) and ate together or shared cutleries (54.5%). Rundi, (2010) reported that habits like sleeping together on the same bed and eating together played a major role in the spread of the disease. A larger proportion of TB patients were children (31.5%) and wives (30.5%). Proportions of husbands (18.5%) and relatives (19.5%) affected by the disease were smaller. Studies of TB in developing countries found that females in their reproductive years had a higher rate of progression to disease, a higher case-fatality rate, and higher mortality rates. When a woman suffers from TB, additional losses may result. The household loses the activities that the woman routinely performs in the household: cooking, cleaning, childcare, and managing the activities of the household. She can also easily pass TB to other family members.

Indirect costs of the patients were also analyzed in this study, forty-eight percent lived very far from the health centre, majority (71.5%) was found among those who had no health insurance. In this study, it was observed that a good number (62.5%) of the patients stopped work. According to other literatures, the largest indirect cost was income lost by being too sick to work. Other studies suggested that on average 3 to 4 months of work time were lost, resulting in about 20 to 30% of annual household income lost to TB infection (Umar et al., 2012). This agrees with reports from the following studies WHO (2005), Hansel et al., (2004), Paton and Ng (2006), Sagbakken et al. (2008) and Peter et al. (2009). They reported that TB can contribute to poverty by reducing patient's physical strength and ability to work and that most of the TB patients stopped work as a result of the ailment. It was also observed that a good number of TB patients had substantial out-of-pocket expenditures as 57.5% spent more than ₦500 on transportation, 52% spent above ₦2000 on complementary tests, 75.5% spent above ₦2000 on non-TB drugs and 47.5% spent above ₦1000 on daily feeding. 60% complained of spending so much on treatment despite the free-of-charge strategy. Reports from the following studies also showed high direct costs (Sanou et al., 2004; Chang et al., 2004; Ukwaja et al., 2012). Studies from South Africa also recorded high direct and indirect costs despite the free-of-charge treatment (Foster et al., 2015).

It was observed that patient's monthly income ranges between ₦5,000 and ₦200,000 while total expenditure was between ₦2,450 and ₦10,900 per visit. Total expenditure was increased if the number of visits to the health care centre was increased. For patients at the intensive phase of treatment which was twice a month, total expenditure could be ₦2,450 × 2= ₦4,900. For those who spent as high as ₦10,900 on treatment, total expenditure could be ₦10,900 × 2 = ₦21,800. If ₦4,900 was spent on treatment from a monthly income of ₦5,000, the patient will have little or no money left. According to Ukwaja et al. (2012), mean patient pre-diagnostic costs varied between US$36 and US$196 corresponding to respectively 10.4% and 35% of their annual income. 18 to 61% of patients received financial assistance from outside their household to cope with the cost of TB care (Ukwaja et al., 2012). Laokri et al., 2013 also reported that the poor would be unable to finance TB treatment without certain coping strategies.

Conclusions

It was observed in this study that most of the TB patients had lower levels of education, earned low monthly income, lived in overcrowded conditions, belonged to occupations that predispose them to high risk of TB infection and exhibited habits like sleeping together and eating together. The above characteristics could predispose individuals in the community to TB infection and this could result in TB re-occurring. It was also observed that TB patients made substantial expenses,

this further increase the impacts on the poor and the risks to others in society.

LIMITATIONS

Only descriptive statistics was used, this is because the study addresses problems facing TB patients alone. It describes the socio-economic and demographic characteristics of TB patients.

CONFLICTS OF INTERESTS

The authors have not declared any conflict of interests.

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