Cost of Tuberculosis care and treatment and associated factors in West Guji Zone, Oromia Regional state, South Ethiopia

By: Ashenafi Addisu Dhekama (BSc)

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Ashenafi Addisu Dhekama (BSc)

Advisors:

1. Berhane Megerssa (MSc, Ass't Professor)
2. Gelila Abraham (MSc)

Abstract

Background: Tuberculosis (TB) is a leading cause of morbidity and mortality and the major public health concerns of several countries including Ethiopia. It mainly affects people who are active economically productive age group who are between (15-45 years), thus leading to grave socioeconomic consequences. TB patients often incur costs related to illness and health care expenses that can be barrier to access and adherence of care and treatment.

Objectives: To assess cost of tuberculosis care and treatment and associated factors in West Guji zone, Oromia regional state, Southern Ethiopia, 2018.

Methods: Health facility based cross-sectional cost-of-illness analysis was conducted between August13 to Sep 2 /2018 among 299 randomly selected adult TB patients who were on directly observed treatment in 16 public health facilities in West Guji zone, South Ethiopia. Data were collected using interviewer-administered questionnaire adapted from the Tool to Estimate Patients' side Costs. Mean and median costs, reduction of productivity, and household expenditure of TB patients were calculated and ways of coping costs captured. Odds ratio and p values were used to measure association between variables.

Result:-*Of the total 299 TB patients enrolled, 66.2 % were smear-positive PTB, 14 % smear-negative PTB and 19.7% Extra-PTB TB cases. Direct mean and median costs of TB illness were 105.98$ (SD = 64.76$) and 105.2$(Ranges 0.18-321.79$), respectively. Indirect mean and median costs were 153.22$(SD =180.48$) and 91.22$ (Ranges 10.37-1055.22$), respectively. Mean and median total cost of TB illness to patient were 259.20$ (SD = 186.85$) and 211.17$ (Ranges 37.71-1185.6$) respectively. Of the total cost, the indirect and direct costs respectively constituted 59.12% and 40.88%. The total cost had significant association with patient's residence, ways of transportation, DOTs distance and place where diagnosis made (P <0.05).*

Conclusion and Recommendation: *Even though free drugs of TB treatment, Tb patients incurred terrible costs goes beyond them and their family. So, it desires introducing new innovative integrated patient-centered care with comprehensive health insurance coverage, financial incentives and nutrition support to TB patients.*

Keywords: *TB,* Direct cost, indirect cost, total *Patient side costs, West Guji zone, South Ethiopia*

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Abbreviations

AFB: Acid-Fast Bacilli

AIDS: Acquired Immune Deficiency Syndrome

CDC: Centers for Disease Control and prevention

DOT: Directly Observed Therapy

DS-TB: Drug Susceptible Tuberculosis

DST: Drug Susceptibility Testing

ETB: Ethiopian Birr

EHNR: Ethiopian Health and Nutrition Research Institute

EPTB: Extra-pulmonary Tuberculosis

FLD: First Line Anti-TB Drugs

FMOH: Federal Minister of Health

FY: Fiscal Year

HIV: Human Immune Deficiency Virus

IP: Infection Prevention

MDR-TB: Multi Drug Resistance Tuberculosis

NTP: National Tuberculosis Control Programme

PFSA: Pharmaceutical Factory Supply Agency

PPE: Personal Protective Equipment

PMDT: Programmatic Management of Drug Resistant Tuberculosis

RR-TB: Rifampicin-Resistant Tuberculosis

SLD: Second line anti-TB drugs

SSA: Sub Saharan Africa

TB: Tuberculosis

TFC: Treatment Follow Up Center

TIC: Treatment Initiating Center

US$: United States Dollar

WHO: World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1 BACK GROUND OF THE STUDY

TB is a highly contagious disease that caused by the bacillus Mycobacterium tuberculosis. It is the ninth leading cause of death worldwide and the leading cause from a single infectious agent, ranking above HIV/AIDS. An estimated 10.4 million people fell ill with TB in 2016: 90% were adults, 65% were male, 10% were people living with HIV (74% in Africa) and 56% were in five countries: India, Indonesia, China, the Philippines and Pakistan(1,2).

TB remains a high-priority communicable disease that is the second leading cause of death among infectious diseases worldwide, with more than one-fourth of all preventable adult deaths in developing countries due to TB. The disease disproportionately affects people in resource-poor settings, particularly those in Asia and Africa(3).

Ethiopia is among the 22 High TB Burden Countries and among the 27 high Multi Drug Resistance Tuberculosis (MDR) burden countries in the world. Compounded with HIV/AIDS, TB has become an alarming threat to the country. Mindful of the burden of TB, Leprosy and TB/HIV Co-infection in the country, the prevention and control of TBL and TB/HIV remains the priority health programs in all phases of HSDP. Moreover, to guide the successful implementation of the interventions, a five years TBL and TB/HIV Strategic `plan is developed (2010/11 – 2014/15) with focus to the community TB care program as part of DOTS expansion which is integrated in the Health Extension program packages(4).

Social protection against the cost of illness is a central policy objective of Universal Health Coverage and correspondingly the post-2015 Global strategy for TB. Social protection strategies include access to health care, financial protection against the cost of seeking care and poverty improvement strategies. The post-2015 strategy aims for ‘no affected families facing catastrophic

costs due to TB' by 2025. Reducing the impact of the cost of illness is of particular concern in TB control, due to the synergy between poverty and TB disease. Poverty has been linked to a greater risk of infection, poorer patient outcomes as well as affecting health seeking behavior. In addition, TB disease also worsens poverty by reducing patients' physical strength and ability to work, ultimately leading to loss of income. The economic impact on the household is then further exacerbated by the costs incurred while seeking health care(4,5).

Most countries aim to provide TB diagnosis and treatment free of charge within public health services. Access to free TB care has expanded substantially over the past two decades through national efforts and global financial support(2). However, many TB patients and families are still facing very high direct and indirect costs due to TB illness and care-seeking, hampering access and putting people at risk of financial ruin or further impoverishment(3,6).

1.2 STATEMENT OF THE PROBLEM

The National health account five (NHA-5) report, overall spending on TB almost increased from a total of US$47.8 million in 2007/08 to US$51.2 million in 2010/11that accounted for 3% of overall national health expenditure. The major source of TB funding (51%) was the rest of the world, followed by (36%) households, Government and all other sources accounted for 12% and 1%, respectively. About 61%of TB funds were used for TB outpatient care, followed by TB prevention and public health programs, which accounted for 20%, inpatient care for 8%, general health administration for 7%, and health-related services (capital formation and education, training, and research) for 4%. Clearly, accessing TB care and continuing treatment comes with a high risk of financial ruin or further impoverishment for many people. In most settings, income loss is a dominating reason for the high costs(7).

TB is an obstacle to socio-economic development in Ethiopia; 75% of people affected by TB are within the economically productive age group of 15-54 years. Reducing the impact of the cost of illness is of particular concern in TB control, due to the synergy between poverty and TB disease. Poverty has been linked to a greater risk of infection, poorer patient outcomes as well as

affecting health seeking behavior. In addition, TB disease also worsens poverty by reducing patients' physical strength and ability to work, ultimately leading to loss of income(8,9). The economic impact on the household is then further exacerbated by the costs incurred while seeking health care(2,10,11).

Tuberculosis disease had a considerable impact on patients' households in terms of income, health, education and nutrition, particularly if the patient was a wage earner. Longitudinal household surveys suggest a heterogeneous economic impact of health costs on households, with some households demonstrating resilience to high out of pocket cost while others are forced into poverty by relatively small expenditures. In South Africa (SA), the economic burden of ill health on households was severe, given that 30% of the global incident cases of TB-HIV co-infection(6,11–14)

Despite the free TB diagnosis and treatment, TB patients and families incur high direct and indirect costs due to TB illness(6,15,16). According to study conducted in Addis Ababa Ethiopia Out-of-Pocket (OOP) payments due to transportation, accommodation and food to get treatment at health facility aggravate economic crisis of TB patients: impacting their adherence to treatment and forcing them to stop working, sell their properties, borrow money and reduce their overall income(2,14,17).

To overcome this problem FMOH is focusing on community Health workers to early assessing and linking TB suspect patients to primary Health Care (PHC) for diagnosing purpose and reduces TB related death with 42% and morbidity 15% as MDG and achieved with "STOP TB" strategy from 222 to192/100,000 morbidity and 66 to 33 TB related mortality. It also engaged and started to put its effort sustainable development goal "End TB" strategies to reduce TB related morbidity by 90% death by 80% related to 2015 GC and reduce prevalence to 1/100,000 population by 2030 GC. This is to ensure that no family is burdened with catastrophic costs due to TB(4,14,17,18).

The core statement underlying the study is since the disease is a chronic one, loss of job due long time of care, health impairment increases time taken to seek health care, of absenteeism due to sickness, and productivity loses on a daily basis are usual. Beside this, West Guji is one of high TB disease burdened Zones in Oromia Regional State with high number (72%) of smear positive case reported in 2017 according to zonal health department annual report(19).

The few studies dealt on cost of care seeking and diagnosis(13) or cost of treatment(20) but not both. Furthermore, none of the studies analyzed cost predictors across the TB care and treatment.

Therefore, this study is important to assess the costs of tuberculosis care and treatment and associated factors on TB patients and their families.

1.3 SIGNIFICANCE OF THE STUDY

This research was investigated that, cost of TB from patient perspective and associated factors in order to gain a better understanding the extent of TB infection cost incurred to patients. Identifying and evaluating factors that contribute cost of TB patients hence its public health importance is high for the patient and society at large.

In the situation of diminishing resources and increasing demand, up to date information on costs of care and treatment of TB patients is necessary.

Understanding these dynamics empirically will have significance for future planning and budget decisions that needs clear understanding of the disease burden in order to give priority in the allocation of resources and an input to bring long term changes in designing way of refunding from other sources and designing appropriate strategy to reduce the burden of TB care to patients.

The finding of this study benefits the government and nongovernmental organizations (NGOs), health professionals and persons with tuberculosis and their family to be aware of the current and future economic impact of this disease.

Lastly, this study will provide valuable economic burden information of tuberculosis to the healthcare planners, managers and the societies, and serve as stone corner for further detailed studies (research) in this aspect

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Epidemiology and Prevention of TB

According to WHO 2017 report in 2016, 6.3 million new cases of TB were reported (up from 6.1 million in 2015), equivalent to 61% of the estimated incidence of 10.4 million; the latest treatment outcome data show a global treatment success rate of 83%, similar to recent years. Ten countries accounted for 76% of the total gap between TB incidence and reported cases; the top three were India (25%), Indonesia (16%) and Nigeria (8%). Ten countries accounted for 75% of the incidence-treatment enrolment gap for drug-resistant TB; India and China accounted for 39% of the global gap(2).

The decline since 2010 has exceeded 4% per year in several high TB burden countries, including Ethiopia, Kenya, Lesotho, Namibia, the Russian Federation, the United Republic of Tanzania, Zambia and Zimbabwe(2). Ending the global TB epidemic is feasible with dramatic decline in TB deaths and cases, and elimination of economic and social burden of TB. Failure to do so will carry serious individual and global public health consequences(4).

There are various methods of preventing TB. Among them early case detection and treatment of patients with infectious TB is the most effective(21). WHO developed five areas of actions to actively control Tuberculosis Pandemic catastrophe. These are prevent TB to occur, rapid testing and treating all TB, provide immediate access to effective treatment and proper care, prevent transmission through infection control and increase political commitment. Also it is essential to pay careful attention to adequate ventilation in institutions where TB patients encountered in order to prevent infection of those in contact with them(18).

Broader influences on the TB epidemic include levels of poverty, HIV infection, under nutrition and smoking. Most high TB burden countries have major challenges ahead to reach SDG targets related to these and other determinants(2).

2.2 TB clinical case and treatment outcome definition

Smear-positive pulmonary TB (PTB+):- A patient with at least two sputum specimens which were positive for acid fast bacilli (AFB) by microscopy, or a patient with only one sputum specimen which was positive for AFB by microscopy, and chest radiographic abnormalities consistent with active PTB(11,17,18).

Smear-negative pulmonary TB (PTB-):- a patient with symptoms suggestive of TB, with at least two sputum specimens which were negative for AFB by microscopy, and with chest radiographic abnormalities consistent with active PTB, or a patient with two sets of at least two sputum specimens taken at least two weeks apart, and which were negative for AFB by microscopy, and radiographic abnormalities consistent with PTB and lack of clinical response to one week of broad spectrum antibiotic therapy(11,17,18,22).

Extra pulmonary TB (EPTB):-This included TB of organs other than the lungs, such as lymph nodes, abdomen, genitourinary tract, skin, joints and bones, the meninges and others. Diagnosis of EPTB was based on fine needle aspiration cytology or biochemical analyses of cerebrospinal/pleural/ascetic fluid or histopathological examination or strong clinical evidence consistent with active EPTB, followed by a decision of a clinician to treat with a full course of anti-TB chemotherapy. In all the cases of EPTB, sputum examinations and chest radiographs were used to rule out involvement of the lung parenchyma. This hospital lacks the facilities for culture and drug susceptibility testing(10,11,17,18,22).

Multidrug-resistant tuberculosis (MDR-TB) is a form of tuberculosis resistant to at least isoniazid (INH) and rifampicin, two of the most important commonly used and potent first-line TB drugs(3,17,18,21,22).

2.3 Economic burden of TB

2.3.1 Patient's side cost

The systematic review in low and middle income countries shows that the mean total costs ranged from $55 to $8198, with an unweighted average of $847. On average, 20% (range 0-62%) of the total cost was due to direct medical costs, 20% (0-84%) to direct non-medical costs, and 60% (16-94%) to income loss. Half of the total cost was incurred before TB treatment. On average, the total cost was equivalent to 58% (range 5-306%) of reported annual individual and 39% (4-148%) of reported household income. Cost as percentage of income was particularly high among poor people and those with multidrug-resistant TB(15).TB has great impact on TB patients and their families. It is mainly affected by getting early proper diagnosis and early treatment initiation ,the time spent in health facility, the distance from home to health facility, the mode of travel, the frequency of follow up visits and the waiting time. The study done in Ethiopia revealed that mean and median total costs of TB illness to patient during DOT were $177.3 (SD = 78.7) and $177.1 (R = 461.8), respectively. Among the OOP, 37 % was for food supplements for nutrition support and 33.6 % was for hospital related direct costs(14).

According to study done in Southern Ethiopia, total costs incurred by patients for care seeking, diagnosis, and treatment amount to a median was US$201.48 (136.70–318.94). Pre- and post-diagnosis costs respectively constituted 53.6 and 46.4% of the total cost. Total direct cost constituted 29.4% of the total cost and amounted to a median of US$59.58 (29.43–113.81). Drugs other than anti-TB and diagnostic tests (laboratory or imaging tests) corresponded to 49.7 and 44.6% of the total medical costs, respectively. During the care seeking and treatment visits, patients had totally lost a median (IQR) 51.7 (32.0–80.8) workdays that corresponded to a median (IQR) of US$127.68 (78.43–201.85) income loss (indirect cost). Out of the total forgone income due to the TB illness, the loss due to lost workdays following care- seeking visits amounted to a median (IQR) of US$18.02 (11.35–30.85) that constitutes 28.4% of the total indirect cost(6).

2.3.2 Coping mechanism of Cost

Commonly reported coping mechanisms included taking a loan, selling household items, using savings, and transfers from relatives(23). A study conducted in Tajikistan shows that the most common coping strategies were the use of household income, donations received and selling assets(24).Since TB is chronic disease and require long time care and treatment that needs coping in various ways. TB patient faces coping cost during period of diagnosis, treatment and care and even after discharge from care(6).

Income loss often constitutes the largest financial risk for patients. Apart from ensuring that healthcare services are fairly financed and delivered in a way that minimizes direct and indirect costs, there is a need to ensure that TB patients and affected families receive appropriate income replacement and other social protection interventions(15).

Households without full health insurance coverage face a risk of incurring large medical care expenditures should they fall ill. This uninsured risk reduces welfare. Further, should a household member fall ill, the out-of-pocket purchase of medical care would disrupt the material living standards of the household. If the health care expenses are large relative to the resources available to the household, this disruption to living standards may be considered catastrophic. One conception of fairness in health finance is that house- holds should be protected against such catastrophic medical expenses(25)

Study done in Nigeria shows that Possible coping strategies devised by patients to survive during their illness included borrowing Money to cover the costs (26.3%). Of the 65 respondents who borrowed money, an average of US $206.98 was borrowed per person, and most funds were borrowed from neighbors/friends (54.0%), family (24.6%) and cooperatives (20.0%). In an attempt to cope, many patients have been known to further weaken their coping strategies by selling or leasing off their assets or resorting to borrowing, as well as the receipt of vouchers to cover certain basic costs such as food, transportation and house rental(26).

The study done in Ethiopia revealed that for majority (90 %) of TB patients, OOP payments were covered by their family members and for the rest 10 % by their neighbors and nearby friends. Among TB patients, 18 % borrowed money to cope TB costs, of whom 34 % from neighbors, 26 % from friends, 23 % from relatives, and 17 % from organizations. None of them borrowed with interest. Among them 11% of TB patients sold their properties to cope TB costs, and house utensils was the major properties TB patients were selling for coping costs (14).

2.4 **Factors** affecting patient side cost of TB

A study conducted in Tajikistan shows that receiving complimentary treatment led to 2.12 times higher expenditure during treatment. Patients hospitalized for 1 week had a 50% higher expenditure than patients who were not hospitalized. Patients hospitalized for 2 months had 5.6% higher expenditure than patients who were hospitalized for 1 week only. The main factors leading to higher expenditure related to TB were receiving complimentary treatment, longer hospital stay and longer treatment delay(24). In South Africa, expanded access to care could decrease household tuberculosis-related catastrophic costs by 5–20%, but gains would be seen largely after 5–10 years(27).

The study done in Addis Ababa Ethiopia analyzed factors associated with high total cost due to TB in were family income, place of residence, primary income earner, cost payer and additional food cost. TB patients who had lower income were less likely to pay high cost for their TB illness when compared to TB patients with high income, reflecting that TB patients with low income required a more financial incentives and health insurance coverage to survive up with TB illness(14). The study conducted in Southern Ethiopia reflect that the mean total cost incurred by patients who are rural residents is about 24% higher than that by urban residents, adjusted exp. coefficient (AeC) (95% CI) 1.24 (1.13, 1.4)(6).

2.5 Conceptual Frame Work

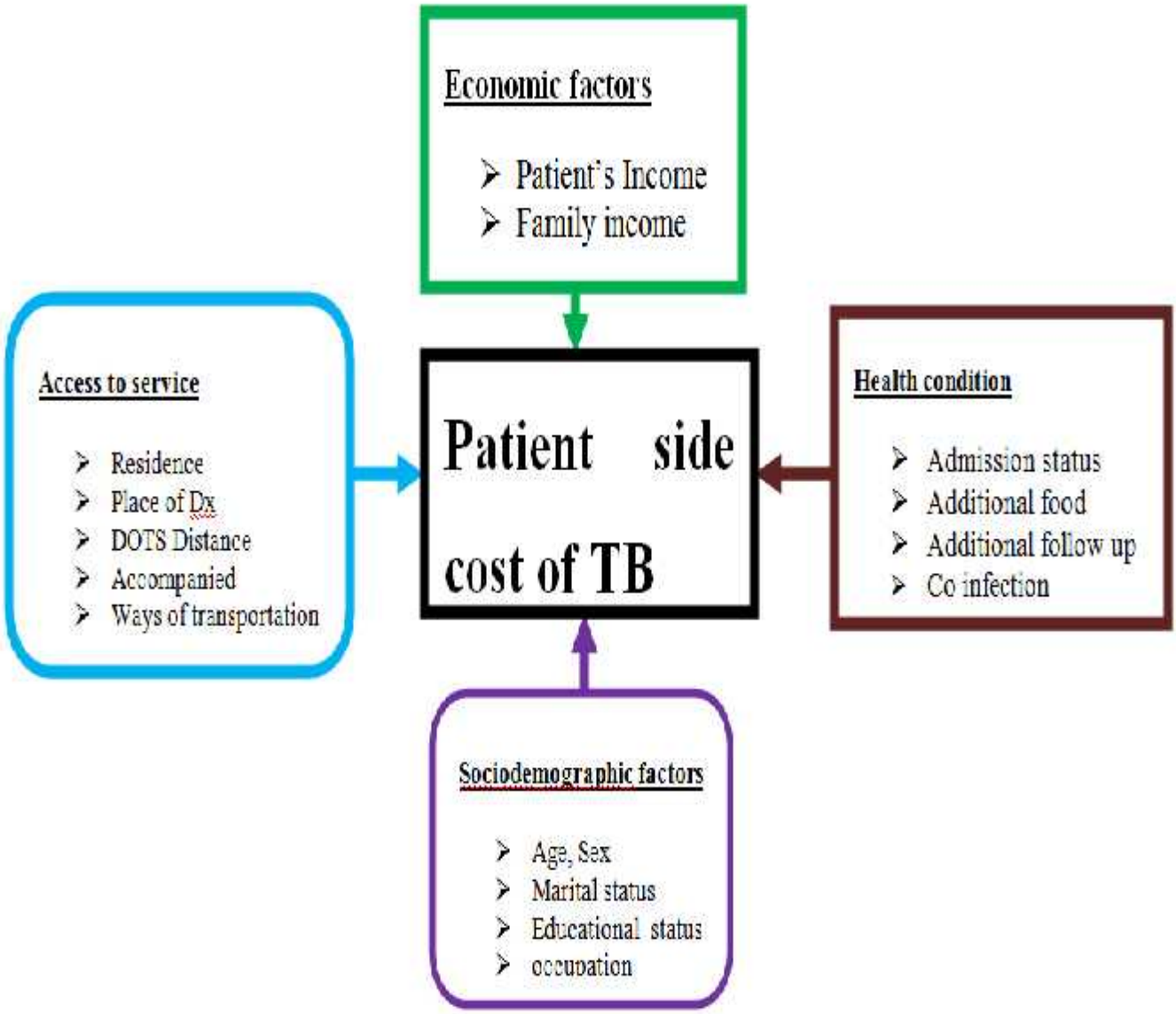

Figure 1 Conceptual framework of cost of TB in West Guji zone (developed after reviewing literatures)

CHAPTER THREE

3. OBJECTIVE OF THE STUDY

3.1 GENERAL OBJECTIVE

- To assess cost of Tuberculosis care and treatment and associated factors in West Guji zone, Oromia Regional state**,** Southern Ethiopia, 2018.

3.2 SPECIFIC OBJECTIVES

- To estimate direct cost of tuberculosis care and treatment incurred by the patients in West Guji zone, Oromia Regional state**,** Southern Ethiopia, August, 2018.
- To estimate indirect cost of tuberculosis care and treatment incurred by the patients in West Guji zone, Oromia Regional state**,** Southern Ethiopia, August, 2018.
- To identify the coping strategies of TB patients in West Guji zone, Oromia Regional state**,** Southern Ethiopia, August, 2018
- To identify factors associated with cost of TB patients' in West Guji zone, Oromia Regional state**,** Southern Ethiopia, August, 2018.

CHAPTER FOUR

4. METHODS

4.1. Study area and period

The study was conducted in West Guji zone which is one of the Oromia regional state zones with capital city of Bule Hora located at 467 Kilo meter away from Addis Ababa from August13 to Sep 9 /2018. The Zone lies at latitude and longitude of 5°35'N 38°15'E and altitude of 1716 meters above sea level. The zone is divided into 10 small administrative structure called woredas with an estimated 2017/18 population of **1,273,888** living in 8 woredas and 2 towns administration(28). It has 2 hospitals, 39 health centers and 196 health posts providing health services to the community. It is one of high TB disease burdened Zones in Oromia with high number of smear positive case report 72%. Case notification is far beyond case detection with low diagnosis center (only Heath facilities 17/41 which is less than 50 %;). One MDR TB treatment initiating center (TIC) and 8 treatments follow up centers (TFC) with mentor transportation, with poor infection prevention control, providing TB service with no separate room like at emergency room at 7 HCs and One TIC and four TFC for MDR TB treatment.

4.2. Study design

Facility based cross sectional study design was employed using bottom–up and human capital approaches to estimate direct and indirect costs of TB patients in West Guji zone.

4.3. Population

4.3.1 Source population

All TB patients in West Guji zone Oromia region south Ethiopia.

4.3.2 Study population

All economically active age group TB patients in the list of the TB register for the period from March1 to June 30, 2018 in the West Guji zone.

4.3.3 Inclusion and exclusion criteria

4.3.3.1 Inclusion Criteria

TB patients with confirmed active pulmonary or extra-pulmonary TB who has been on treatment for 6–10 weeks and aged greater than or equal to 15years old were included.

4.4 Sample size and Sampling procedures

4.4.1 Sample size

Sample size is detemined using single population mean formula for cross sectional study design (the standard deviation/SD is used from the study done on TB care strategies and their economic consequences for patients in Addis Ababa; SD was birr 1644.665 and a mean of birr 3705.198, 95% CI and margin of error 5) (14,29). As follow:

$$n = \frac{Z_{\alpha/2}{}^2 . s^2}{d^2}$$

$$n = \frac{(1.96)^2 x\ (1644.66\ )^2}{(185.\ 2599)^2} = 302$$

Where:

n = the sample size estimate

s = the sample standard deviation (Birr 1644.665 obtained from the study)

Z_{alpha} = the confidence level is 95%, 1.96

d = margin of error (5% of the mean of study birr 3705.198 is 185.259)

A correction factor was used to determine the final size of the sample. Since our source population (numbers of TB patient in West Guji zone is equal to 477) which is (<10,000) then the population correction formula was used as follow:

nf = n/(1+n/N) = (302/(1+302/477)) =185

By adding 1.5 design effect 185*1.5=277 and 10% non-response rates 277*1.1 = 305

4.4.2 Sampling technique /Sampling procedures

For this study, a list consisting of the 41 health facilities currently providing tuberculosis care and Treatment was received from the West Guji Zonal Health department and n = 16 of them were randomly selected using lottery method(30–32). For each selected health facility study participants were allocated proportionally based on their patients flow of six months before study period. Concerning health facilities 15 health centers and Bule Hora general hospital those were providing tuberculosis care and Treatment services were included. In order to make sure sufficient sample size recruited for each randomly selected health facilities proportional allocation formula was used.

$$ni = n \cdot \frac{Ni}{N}$$

Where **ni** is required sample size in each strata, **n** is for total sample size, **Ni** stand for number of patient in each selected health facilities and N total number of TB patient on their patients flow of six months before study period in all selected health facilities. The study participants are TB patients on follow up come to each Health facility every k^{th}(for this study selecting first four and jumping every fifth TB patient) during data collection.

Schematic presentation of sampling procedure

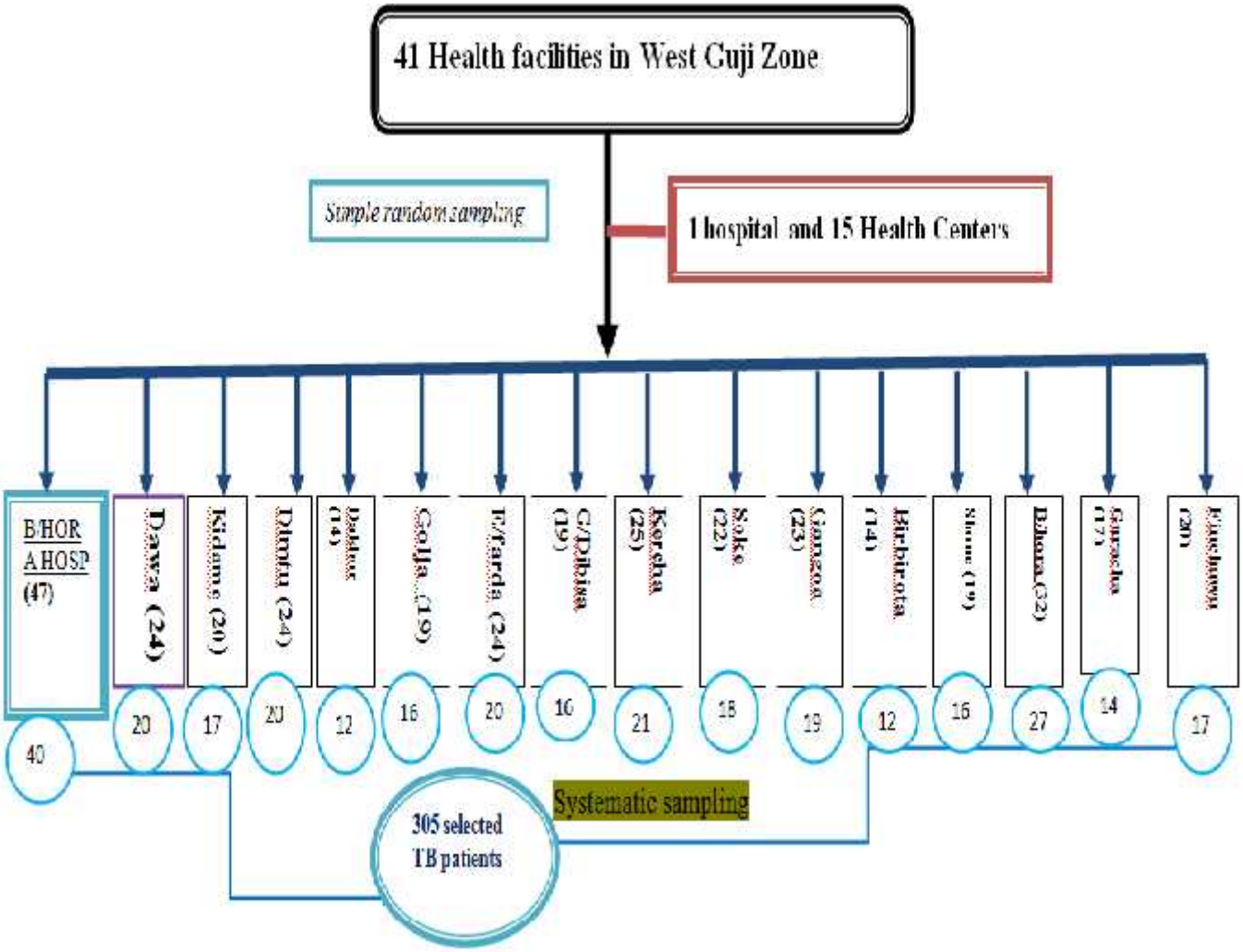

Figure 2 schematic representation of sampling procedure of cases (number of TB patients) on treatment and selected proportional

4.5 Data collection procedures (Instrument, personnel, data collection technique)

4.5.1 Data collection process and analysis

The questionnaire was customized from a standardized tool to estimate TB patients' costs developed by the World Health Organization (WHO), KNCV Tuberculosis Foundation, and the Japan Anti-Tuberculosis Association(33,34). This tool was used to aid estimate the total costs of TB patients, guardian costs, reduction of productivity, and coping costs by adapting it to the local setting. Checklist was used to collect clinical data from patients' record, registers of the facilities. Data were exported to SPSS 20 version software for analysis. Descriptive statistics such as mean, standard deviation (SD), median, range (R), and percentages were computed to explain the variables. $P<0.25$ analysis to identify candidate predictor and multiple logistic regression model was generated by using backward method. Finally 95 % CI to assess strength of association and $P < 0.05$ were considered as cut-off point for statistical significance. The various costs collected in ETB was converted into $ at the official exchange rate of the National Bank of Ethiopia for August, 2018 of 1$ to 27.471ETB. Purchasing power parity was used for discussion purpose(35).

4.5.2 Personnel

Eight data collectors and two supervisors were recruited. Both supervisors with BSc degree and data collectors with Diploma Nurses those experienced in data collection were assigned. Two days training was provided on objective of study, contents of questioner, clarity of questioner and ethical issues during interview.

4.5.3 Data collection method/technique

Data were conducted by face to face interview interviewer-administered questionnaire comprising open- and close-ended questions by trained data collectors. Before the actual data collection process began, the questionnaire was tested on 5% (15) of sample size to see the

validity of the tools in Soda health center. Some correction and changes like: ambiguous questions, logic and skip pattern were revised before actual data collections.

4.6 Study variables

4.6.1 Dependent variable

- Cost of TB

4.6.2 Independent variables

- Socio-demographic characteristics(Age, Sex, Marital status, Religion, Educational status, Income, Ethnicity, Family size, Occupation)
- Admission status
- Additional follow up
- Additional food
- Distance
- Co morbidity
- Coping strategies
- Place of diagnosis
- Residence

4.7 Operational definitions

- ***Direct costs*** **-** Cost includes the cost of Medical treatment, transport and food expenses required to reach health care facilities so as to receive treatment that was measured from the house hold's perspective that means what individual or households pays that were measured by combining all the average out-of-pocket medical and non-medical costs for TB patients, as well as costs for accompanying person/s.

- **Average diagnosis waiting time**: The time spent by patient in health institution (i.e. from registration to obtain service identification card to patient was diagnosis as TB measured by the time spent patient through patient interview.
- ***Indirect costs*** - productivity losses due to TB related morbidity, mortality and disability, borne by the individual. OR inability to carryout normal daily activities (paid and or unpaid work), and their valuation.
- **Normal daily activities:** is formal and non-formal work carried out by individuals. To calculate the productivity losses, the inability of TB patient was divided into absenteeism and presenteeism. To calculate the respondent's days lost due to illness, respondents were asked whether they completely unable to work in the last 2 months (60 days) or not.
- **Patient side direct costs** -In this study direct costs was identified in terms of medical costs such as consultation, treatment, drugs, medical supply; non-medical costs of receiving health care for both patient and accompanying person travel, lodging and food devote for receiving health care waiting, consultation and treatment measured by money spent patient through interview and record review.
- **Patient delay**: the time between the onsets of the first disease symptoms until first visit to health facility will be measured by the number of days spent patient through patient interview.
- ***Out-of-pocket Expenditures****:* The portion of medical expenses a patient is responsible for paying.
- **High Payee**: TB patients those pay equal or greater than patient side total median cost
- **Low Payee**: TB patients those pay less than patient side total median cost
- **Total cost**: refer to the sum of the patient side direct cost, patient side indirect cost (the value of foregone earnings from domestic and economic activities during illness).
- ***TB patient***: a patient who has been diagnosed as suffering from tuberculosis either DSTB or DR TB by a clinician and has been prescribed and following TB treatment.
- **Coping cost**: Costs incurred by patients who attempted to cope with the costs of TB care by: borrowing money or selling their assets.

4.8 Costing methods

Costing was done from patient perspective. Valuations of direct and indirect costs were estimated for TB care and treatment period. Bottom-up approach was employed in order to estimate direct cost of TB. Each Facility TB registration was reviewed for information about consumption of drugs and follow up cost of patients. To estimate indirect costs human capital approach was used to value productivity time losses, time foregone in seeking care and productive time lost was converted into cost based on the daily gross salary for paid work. Time foregone in seeking care and income lost was converted into indirect cost based on the daily wage rate and then multiplied by the number of working days lost. The daily wage rate for monthly paid patients was estimated by dividing their net monthly salary by 30 days. Daily wage rate for daily paid patients was calculated based on the patients reported daily earnings. For non-paid work (like housewives' household chores), the wage rate of someone in paid work that closely matched the unpaid worker was used as a proxy.

To overcome the limitation that arises from over estimation of productivity loss (if average income considered), we took local labour wage rate. Thus, we used the human capital method of estimation (valuation) to estimate the value of lost workdays at the community level. All costs were reported in ETB(1US$=27.4711August 2018)(36).

Table 1 Cost categories and data Source in West Guji Zone, Oromia Regional State South Ethiopia, August, 2018.

S.n	Cost item	Data source	Method of data collection	Data type
1	Direct non-medical costs	Patient/care giver	Patient interview	Transport, lodging, food
2	Direct medical cost	Patient/health facility/ care giver	Patient/ care giver interview or record review	Cost of drugs, Admin cost, if any investigations
3	Indirect cost	Patient/ care giver	Patient/ care giver interview	Income loss by patients and their families/relatives

4.9 Data process and analysis

Face to face exit interview was conducted by using interviewer administered questionnaires. Descriptive statistics such as mean, standard deviation (SD), median, range (R), and percentages were computed to explain the variables. P values and Odds ratio were used as the measure of association between variables. For regression analysis, the total median cost was used as a cutoff point to dichotomize the total cost into low and high payee. Back ward stepwise-method regression model was used. Dependent and independent variable were analyzed by multiple logistic regression models using Statistical Package for Social Science (SPSS) version 23. Before analysis, the data had been examined for the fulfillment statistical assumptions. Multiple logistic regressions using back ward selection procedure, was employed to identify the predictors of cost variability. In regression model, independent variables like socio demographic, economic and associated factors were entered after they analyzed by one to one regression analysis. Then those variables which their p. value < 0.25 were entered to multiplied linear regression model where as only statistically significant (P<0.05) variables were included in the final model.

4.10 Data quality management

The questionnaire that was adapted from WHO tools to estimates cost of TB and translated to local language Afan Oromo which is the working language of the region and Zone. And finally it was translated back to English by independent translator to check consistency. Prior to data collection, pretest was conducted to ensure clarity of questions among 5% (15) TB patients in **Soda** health center. The results of the pretests were discussed, and some correction and changes like: ambiguous questions, logic and skip pattern were revised before actual data collections as much as possible. The data collectors and supervisors were trained and well oriented on tools before the pre-test and actual data collection started. Furthermore, on daily basis the quality, completeness, clarity and any misunderstandings on the questionnaires were checked after each data collection process by supervisors and the researcher. The data were cleaned to check for

completeness and missing values, coded and entered into Epideta version 3.1, and exported to SPSS version 23 for analysis.

4.11 Ethical consideration

Ethical clearance was initially obtained from Jimma University Health Ethical Review board. Formal letter of permission was taken from West Guji Zonal health department and was given to the Health facilities to obtain consent and required information from all study participants. Each TB patient (the study unit) was informed about the study to obtain their verbal consent before starting the interview. Any interviewee could have the right to withdraw from the process at any time. All the information was recorded and used anonymously and confidentially throughout the study.

4.12 Dissemination plan

The findings of the study will be disseminated through presentation to JU. Discussion will be held with concerned bodies (departments, Zonal and Woreda health offices). Written documents will be submitted to JU, health institutions and finally efforts will be made for publication.

CHAPTER FIVE

5. Results

5.1 Socio- demographic characteristic of study participants

Of the total 305 TB patients accessed 299(98%) were responded to the questionnaire. Fifty-three percent were female, 75.3 % were live in rural area, and 39.5 % were farmer. The minimum household monthly income was in the range $7.28–54.6 for 25 % of TB patients, while the maximum was in the range $91–455 for 25 % of TB patients. Based on their history of diagnosis, 198 (66.2%) were smear-positive PTB and 42 (14 %) were smear-negative PTB. Regarding their TB treatment outcome 86 % were newly diagnosed and 1% relapses. All of the cases were offered HIV screening test during treatment initiation that of 28 (9.4%) tested positive.

Concerning their socio-demographic features the mean age was 35.73± (SD =13.25) years and 88.9% were within the economically active age group of 15-54 years (Table1).

Table 2 Socio-demographic characteristics of study participants, in West Guji zone, August 2018.

Variables	Frequency	Percent
Sex		
Male	139	46.5
Female	160	53.5
Ethnicity		
Oromo	136	45.5
Amhara	39	13
Gedeo	91	30.4
Guraghe	15	5
other*	18	6

Variables	Frequency	Percent
Occupation		
Farmer	118	39.5
Gov'l employed	48	16.1
Retired	9	3
Student	41	13.7
House wife	58	19.4
Merchant	25	8.4
Age		
15-24	59	19.7
25-34	100	33.4
35-44	55	18.4
45-54	51	17.1
55-64	34	11.4
Residence		
Urban	74	24.7
Rural	225	75.3
Religion		
Muslim	52	17.4
Protestant	171	57.2
Orthodox	33	11
Catholic	14	4.7
Wakefata	19	6.4
Abakalu	10	3.3
Marital status		
Single	55	18.4
Married	199	66.6
Widowed	6	2
Divorced	39	13.1

Variables	Frequency	Percent
Educational status		
Cannot read & write	56	18.7
Able to read & write	99	33.1
Elementary	26	8.7
Secondary	44	14.7
college/university & above	74	24.7
Family income		
<=54.6$	98	32.8
54.67-72.8$	79	26.4
72.81-91$	78	26.1
>91$	44	14.7

*= Silte, Burji, Amarokele,

TB patients first visited a healthcare facility after a mean of 53.84 ± 34.08 (median: 45 days, range: 10-156 days) days from onset of illness (patient delay). Thus, 23.1% and 50.2% of the cases first visited private clinics and public health centers, respectively. The rest of the cases first visited hospitals (26.7%). TB diagnosis of 89(29.8%) cases was made at a hospital, and for 133(44.5%), the diagnosis was made at health center. The longest delay reported was five month and six days. Thirty one (10.4 %) of patients were diagnosed within the acceptable 2weeks on set of sign and symptoms of the TB whereas the rest beyond 2 weeks.

In this study 39(13%) of respondents with co infection: 28(71.8%) HIV, 5(12.8%) Diabetic and 6(15.4%) were with hypertension. Concerning means of transportation to the facility during diagnosis more than two fifth (43.8%) were travel by car, 73 (24.4%) were by motor bike, 56 (18.7%) were on foot followed by animal back as means of transportation. As most (68.2%) of respondents used other than foot and animal back as means of transportation could produce significant cost to patients and their families(figure 3).

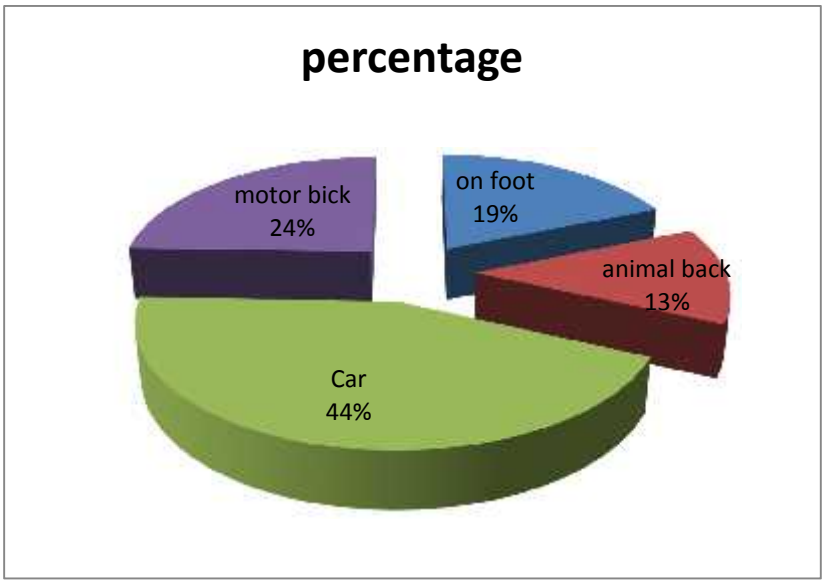

Figure 3 percentage distributions of patients` means of transportation to TB diagnosis center West Guji Zone, August 2018.

5.3 Direct costs incurred by TB patients

5.3 .1 Direct costs incurred by TB patients before disease identification

TB Patients incurred variable cost prior to actual diagnosis. These include expenditures on medical costs (consultation fee, investigations, and drugs) and non-medical cost (food, lodging and transport) for patients. The mean expenditure for those who visited health facility before diagnosis of TB were (n=161) was 22.9± 21.97$ with a wide range of costs from 0.18 to 85.5$ per visit. Sixty nine(43%) of them incurred costs of at private clinic. The estimated median in pre diagnosis cost was 16.3$ (Table 3).

Table 3. Mean expenditure for TB treatment before the identification of the disease, in West Guji Zone, August, 2018**.**

(US$1 = ETB 27.4711, August, 2018 exchange rate)

Cost Category	Mean	Median	SD	Minimum	maximum
Consultation fee	2.58	0.36	5.85	0.18	54.61
Investigation (laboratory, X-ray, etc.)	16.43	7.28	15.06	1.82	43.68
Food	6.33	4.37	6.60	0.36	3.64
Transport	4.95	4.37	4.09	0.15	18.93

TB patients expended an average of 16.01$ on all visits associated with direct medical cost. Non-medical direct costs (Travel costs, food and accommodation) accounted for about 72.5% of the costs incurred prior to TB diagnosis to TB patients whereas direct medical costs included charges for rest.

5.3 .2 Direct Costs Incurred by TB patients after disease identification

These include actual Out-of-Pocket (OOP) payments on medical costs of additional follow up and non-medical cost (food, house rent and transport) for patients in follow DOT to get treatment at health facility after diagnosed to adhere ant TB treatment. The median direct total patient side cost of TB before and after TB identification for study participants was 85.47$. In this study the mean patient side direct cost before and after TB diagnosis which includes costs for follow up cost, transportation, food and house rent was 129.36$(Table4).

Table 4 Summary of direct cost TB care and treatment among patients, in West Zone, August, 2018.

Cost category	N	Mean	Median	SD	Minimum	maximum
Anti TB drugs follow up	299	45.23	23.95	45.34	0.00	190.02
Admission related	44	27.43	18.57	18.95	4.37	94.65
Additional food	187	19.42	18.20	9.14	9.10	50.96
House rent	90	11.89	13.10	4.34	4.37	20.39
additional follow up	118	4.91	4.37	3.23	0.73	14.56
Transport	***206***	8.59	7.28	7.00	0.15	26.21

5.4 Indirect costs incurred by TB patients and their families

5.4.1 Indirect costs incurred by TB patients before TB identification

TB patients were lost wages because of absenteeism from work, either in order to seek care or due to serious illness. More than four fifth (88.9 %) respondents were reported absenteeism from usual activity before TB identification. On average respondents were absented from work 15.34±9.108 days (range: 3 to 45 days). More non-formal educated respondents (94.3%) than formal educated respondents (74.1%) were absented from work before TB identification. The income lost by study participants was 15.69± 13.11$ (range: 0.44 -72.80$) (Table 5)

Table 5 Delay days, Workdays lost and income lost by the participants before the identification of the disease, in West Guji Zone, August 2018.

Classification	**N**	Mean	Median	SD	Minimum	Maximum
Delay days	299	53.84	45.02	34.081	10	156

Workdays lost	299	15.34	14.25	9.108	3	45
Income lost	299	15.69	16.02	13.11	0.44	72.80

5.4.2 Indirect costs incurred by TB patients after TB identification

Of respondents, 288 (96.3%) were reported that they have been absent from usual work after identification of tuberculosis. On average patient lost their work for was 31.95±16.34 days. The wage lost by study participants after identification was 93.87±107.14 $ (Table 6).

Table 6 mean **outpatient days**, workdays lost and income lost by the participants after the identification of the disease, in West Guji Zone, August 2018**.**

Classification	N	**Mean**	**SD**	**Minimum**	**Maximum**
Outpatient waiting and travel days	299	32.55	32.498	5	216
Workdays lost	288	31.95	16.338	5	70
Income lost	299	93.87	107.14	4.19	685.16

5.4.3 Costs Incurred by families/companion cost after the identification of the disease

These include actual expenditures on non-medical costs (food, lodging and transport) for families/friends by accompany before and after identification of the disease. One hundred forty four (48.2%) of study participants were accompanied by other person when went to the health facility. Average direct non medical cost for care giver was $18.96 (SD = $14.56). The Indirect cost after the identification of the disease includes income lost by the patient and wage lost by their families/friends. Indirectly mean work days lost 8.28(SD = 14.56) days by 144 caregivers

were used during TB patients treatment Patients' families/friends lost income in order to care for the patients. The average income lost of TB patients'' family/friends was 43.66± 75.57$.

Table 7 mean workdays lost and expenditures by Patients` families/friends after the identification of the disease, in West Guji Zone, August 2018.

(US$1 = ETB 27.4711, August, 2018 exchange rate)

Classification	N	**Mean**	**SD**	**Minimum**	**Maximum**
Workdays lost	144	8.28	5.904	3	45
Income lost	144	43.66	75.57	0.00	491.83
Transport	86	11.19	4.54	0.15	18.20
Food	118	4.91	3.23	0.73	14.56
Others	25	2.86	6.79	0	36.24

Others= any things given TB patients in cash or kind by families or relatives

In this study majority (62%) of indirect cost was incurred by the patients themselves while the rest account by their families/ friends.

Table 8 Summary of indirect cost of TB care and treatment among patients and their families, in West Guji Zone, August, 2018

Cost category	**N**	Mean	SD	Minimum	Maximum
Pre diagnosis income lost by patient	299	15.69	13.11	0.44	72.80
Post diagnosis income lost by	299	93.87	107.14	4.19	685.16

patient					
Accompany income lost	144	43.66	75.57	0.00	491.83

Generally, in this study the Patients side total mean costs per patient was 259.20$ (SD = 186.85).

Table 9 summary of total patient side cost of TB care and treatment among patients and their families, in West Guji Zone, August 2018

Cost category	N	Mean	median	SD	Minimum	Maximum
total direct cost	299	105.98	105.20	64.76	0.18	321.79
total indirect cost	299	153.22	91.22	180.48	10.37	1055.22
patient side total cost	299	259.20	211.17	186.85	37.71	1185.61

5.5 Impact of illness on tuberculosis patients and their coping costs

5.5.1 Predictors of patient side tuberculosis cost

Regarding the socio-demographic characteristics of patients; marital status, educational status, house rent, accompany with, admission status and family income of the respondents were significantly associated with patient side cost in bivariate analysis but were not significantly associated in multiple logistic regression analysis.

From multiple logistic regression analysis, the place of residence was very strongly associated with high patient side cost (AOR and 95% CI =0.452 (0.213-0.958).That means patients who live urban were 54.8% less likely to pay high cost for their TB illness when compared to TB patients who live rural

Regarding place diagnosis was made, it was strongly associated with patient side high cost (AOR and 95% CI=2.87(1.59-5.154). This odd ratio depicts that those patients that was diagnosed in

private health facility were 2.87 times more likely to pay high cost than those patients diagnosed in public health facilities.

The study result showed that, the ways of transportation of patients to get DOTs service was also strongly associated with patient side high cost of TB (AOR and 95% CI=0.308 (0.103-0.919). That means patients who travel by car were70% less likely to pay high cost for their TB illness when compared to TB patients who travel on foot.

The additional food intake was very strongly associated with patient high cost to TB patients in West Guji (AOR and 95% CI=0.538(0.304-0.952) and this indicates that patients who were no additional food intake were 46% less likely to pay high patient side cost of TB illness than patients with additional food intake.

The DOTs distance from home was also strongly associated with high cost of TB illness (AOR 5.47(2.094-14.313). This implies that the patients who travel more than 20km to take DOTs service were 5.47 times more likely to pay patient side cost than those patients traveled less than 20km.

Table 10 Predictors of patient side cost of tuberculosis in West Guji zone.

Category	Variables	Patients' total Cost in US$		AOR	(95 % Confidence interval)		P value
		<211.17	>=211.17		Lower boundary	Upper boundary	
Residence	**Urban**	**26**	**48**	**0.452**	**0.213**	**0.958**	**0.038**
	Rural	124	101	1			
Where Diagnosed							
	Health center	92	58	1			
	Hospital	35	45	1.43	0.833	2.457	
	Private clinic	**23**	**46**	**2.87**	**1.59**	**5.154**	**0.025**
Ways of transportation	On foot	19	37	1			
	Animal back	22	17	0.413	0.180	0.946	
	Car	**65**	**66**	**0.308**	**0.103**	**0.919**	**0.035**
	Motor Bick	44	29	3.571	0.263	11.24	
Additional food	Yes	88	99	1			
	No	**62**	**50**	**0.538**	**0.304**	**0.952**	**0.033**
DOTs distance	<10km	69	55	1			
	11-20km	70	38	1.68	1.41	1.92	
	>20km	**11**	**56**	**5.47**	**2.094**	**14.313**	**0.001**

1=reference

5.5.2 Coping costs

Tuberculosis produces disastrous cost to patients. So, patients adopt different coping strategies. Among the total 299 TB patients, 16.1% (n=48) borrowed money to cope TB costs, of whom 50.3 % from neighbors, 42.4 % from family/friends, 5.7% from cooperatives, and 1.5 % from churches/mosques. More than half (55.5%) of TB patients sold their property to cope TB costs, and livestock and cash crop were the major properties TB patients were selling for coping costs. Only 9 (3%) of TB patients had medical insurance scheme.

Among TB patients who were employees and/or students (n=87), 53 (62%) ever stopped working and/or going to school due to TB illness at least for four days, of whom 27 % gave up for more than 10–25 days and 8.5 % totally stopped working. One hundred thirty eight (46.2 %) of guardians were accompanying TB patients to go to health facilities by quitting their income earning jobs.

CHAPTER SIX

6 Discussion

6.1 Characteristics of study participants

The Ethiopian FMoH has given due attention and priority to the treatment, prevention and control of TB with technical and financial support from partners in the field. Because of the development and implementation of countrywide strategies which fully aligned with the globally recommended Stop TB strategy, Ethiopia augmented ability to achieve all TB related millennium development goals; reduced the incidence by 44 %, prevalence by 50.5 % and deaths related to TB by 64 % from 1990 baseline(37,38).

However the economic consequences of a range of TB strategies for patients had been a doubtful issue. The cost-of-illness analysis we conducted illustrate that TB patients living in West Guji are facing multiple challenges due to the high cost of the DOT strategy, the mean total direct cost per treatment by TB patient was $105.98(SD=$64.76) and the largest share of direct medical cost on direct non medical cost (89.5%vs 10.5%). That was lower than study conducted in Addis Ababa the direct (OOP) mean costs of TB were $128.0(SD=61.2)(14) and higher than the study done in Southern Ethiopia in which mean direct cost of TB was $84.82(6). The differences might arise from different study settings, place of residence (76% from rural), and the type of TB cases included in the studies.

The mean total indirect cost per treatment was $153.22(SD=$180.48) for TB patients. Income loss constituted 59.1 % of the total cost of TB illness to patients, which was almost equal to the 60 % reported for low and middle-income(15) and higher than 30% of Addis Ababa(14). The difference could arise from the difference of study participants' average monthly income between study participants of this study and middle and low income countries where the review assessed.

Mean total cost of TB include direct and indirect cost of the patients and companion during TB treatment was $259.20 (SD=$186.85) i.e. even quite higher than the 44.18$ estimated for PTB patients in Southern region(16) and the 184.59$ estimated for the DOT strategy in Addis Ababa(14) in Ethiopia, despite the fact that it was by far lower than the $1148.6 estimated for low-income countries(15). The differences might occur from different study settings, time of determination as cost is time-sensitive, and the type of TB cases included in the studies.

This study shows that the economic consequence of TB illness to patients was beyond OOP payments. Income loss constituted 59.1 % of the total cost of TB illness to patients, which was almost equal to the 60 % reported for low and middle-income(15) and higher than 30% of Addis Ababa(14). The difference could arise from the difference of study participants' average monthly income between study participants of this study and middle and low income countries where the review assessed. Besides, 36.1% of this study participant was students, House wife and pensioners' without income earning jobs. Furthermore, the implication was reflected to the guardian of TB patients, with a significant number of guardians quitted their income earning jobs to accompany TB patients and give care. There was also a subsequent reduction of productivity and increment of household expenditure due to TB illness to patients. These call for an urgent need of financial incentives for TB patients in West Guji zone to enforce adherence to treatment. Financial incentives proved to be effective in proving treatment completion and reducing default rates among TB patients(16).

The current study shows that TB patients who live urban were 54.8% less likely to pay high cost for their TB illness when compared to TB patients who live rural (AOR of 95% CI=0.452 (0.213-0.958). Similar finding indicated in previous study(13). This might be due to rural TB patients attending health facilities late that complication of diseases occurred, due to low access of health facility which let patient's loss of productivities to them and their families.

The current study reveals that only 9(3%) of TB patients had medical insurance scheme to which were protect them from financial risks. This is almost lower with study done in central and

southern Ethiopia (14,39–41). This might be due to infantile stage implementation of insurance in the study area, reflecting that TB patients required a more financial incentives and health insurance coverage to survive up with TB illness.

In this study more than half of TB patients sold their properties to cope TB costs. This value quite more double higher than study in Ethiopia, Addis Ababa 18%(14), and Nigeria 26.3% (26) sold their property to cope TB illness. The difference might be due to high informal workers in current study area than those areas and difference of study participants' average monthly income among studies participants.

6.2 Determinants of Patient perspectives Costs

Despite other studies(14,16,26), in this study, age, gender, marital status, and educational status were not associated with total costs of TB illness to patients. The factors associated with high total cost due to TB in were ways of transportation, additional food intake, DOTs distance and place of diagnose made this might be difference of study site and participants.

The current study shows that TB patients who live urban were 54.8%less likely to pay high cost for their TB illness when compared to TB patients who live rural (AOR of 95% CI=0.452 (0.213-0.958), reflecting TB patients who came from rural were more likely to spend high OOP payments compared to urban residents. Similar finding indicated in previous study(9,13,42,43). This might be due to rural TB patients attending health facilities late that complication of diseases occurred, due to low access of health facility which let patient's loss of productivities to them and their families.

6.2.1 Strength of the study

The present study takes account on patient side cost and considered economic losses due to illness. Selection of the study subjects was also made randomly instead of convenient selection. It also used multiple logistic regression analysis was used to control confounders.

6.2.2 Limitation of the study

The study did not take into account social cost, intangible costs of pain, grief, suffering and loss of leisure due to difficult to set market value for such costs that have great role both on health and economy of individuals.

CHAPTER SEVEN

7 Conclusion and Recommendations

7.1 Conclusion

This study establishes and quantifies the extra costs borne by TB patients in accessing TB diagnosis and treatment in West Guji zone. Costs borne by patients are due to travel, places of diagnosis made, DOTs distance and food costs, constituted high proportion and exert strong drive to high cost. TB patients had limited financial protection which results in adverse consequences such as borrowing money, selling good, income loss, productivity drop and household expenditure escalation. The economic consequences were beyond TB patients and their family; it reached to neighbors, relatives, and the community as well.

7.2 Recommendations

Based on result obtained in this study the following recommendations formulated to specific bodies to enhance its application and avoid role misunderstanding.

Federal Ministry of Health/Regional Health Bureau

- Vigor multi sector approach to early diagnosis and prevent TB **burdens** with poverty reduction sectors such as Educational sector.
- Raising strategies that reduce direct cost throughout country /region such as insurances**,** home-based TB care programs to reduce direct costs due to attending health facility
- Introduce innovative integrated patient-centered care with comprehensive health insurance coverage, financial incentives and nutrition support to TB patients and their family to reduce direct costs and retain them in care.
- Develop mechanism for strong public and private coordination to reduce client transfer before TB diagnosis as well strength private health institutions as diagnostic centers through communicating diagnosis cost of TB**.**

West Guji Zone Health Department / Each Woreda Health Office/Health institutions

- Re-evaluate and enhance DOTS decentralizations to health post level nearest to community.
- Ever-increasing number of diagnostic centers to early identity cases though recruiting human power such as laboratories in health centers**.**
- Health promotion activities at different level should focus on early treatment seeking behaviors, means of preventions, symptoms and means of transmission of TB.
- Activate resource and stakeholders to community based tuberculosis diagnosis of slide fixing by health extension particular to pastoralists community to prevent delay to diagnosis and to alleviate costs incurred by tuberculosis clients and their family.
- There is also need to further strengthen the capacity of health facilities to offer TB services through improved health service provisions at facility level to reduce patient diagnosis after visiting facilities.

Community

- Work together with nearby health facility in order to minimize client transit.
- Progress early treatment seeking behaviors and reduce unreasonable by self-referrals to next health facility.

Researchers

- And also qualitative study designs will be recommended to assess health facility factor (delay) permit clients' late diagnosis of TB.

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Annexes I QUESTIONNAIRES:- Questionnaire for a research on Economic costs of Tuberculosis in West Guji zone, South Ethiopia, August, 2018

INTRODUCTION AND CONSENT

Hello. My name is_____ and I am data collector of a study on " **Economic Cost of TB care and treatment in West Guji zone, Oromia Regional State, South Ethiopia by Ashenafi Addisu MSc students in Jimma University**.`` Thus, I am requesting your cooperation to fill out the survey question which will take about less than 25 minutes to complete. Participation in this survey will be voluntary, and if you don't want to participate or if there is any question you are not interested you can skip to next, or if you choose not to participate you could withdraw at any time. I assure all information that you provide will remain strictly private, and confidentiality of responses would be maintained during and after data collection. Only numbers will be assigned to each copy and no name will be required on the questionnaire, so no one can link your identity with the registration numbers. Its finding may help to design appropriate strategies and improves health of TB patients and their family. I hope you will participate in the survey as your participation is important.

Thank you very much for your cooperation!!

May I begin the interview now? yes ☐ No ☐ if no, don't continue to fill questions

If yes sign/finger thumb sign _____

Interviewers Name_____ Supervisors Name_____

Date of interview_____

Further information and general question on the study, contact

Principal investigator Ashenafi Addisu Dhekama

Contact address: Tel:+251913886724 E-mail:ashenafiwotiye@gmail.com

Section I Socio-demographic characteristics

S.N	Questions	Possible answers and coding	Skip
101	Sex	1. Male 2. Female	
102	Age	1. _____years	
103	Ethnicity	1.Oromo 2.Amhara 3. Gedeo 4. Gurage 5. Other_____	
104	Residence	1. Urban 2. Rural	
105	Religion	1. Muslim 2. Protestant 3. Orthodox 4. Catholic 5. other _____	
106	Marital status	1. Single (never been married) 2.Married 3. Separated 4. Widowed 5. Divorced 6. Other (specify)_____	
107	Educational status	1. Cannot read and write 2. Able to read and write only 3.Elementary school 4. Secondary school 5.College, university and above 6. Other (specify)_____	
108	Your main occupation (Past twelve months)?	1. Farmer 2.Employed 3.Retired 4.student 5. House wife 6.Trade/ Private business 7.Unemployed 8.Others	
109	Number of people living in your family	1._____	
110	History/ Type of tuberculosis	1. Smear positive PTB 2. Smear negative PTB 3. Extra-pulmonary TB 4. MDR/RR-TB	
111	Where was the patient taking TB treatment?	1. Public health facility 2 NGO health facility 3. Private health facility	
112	How many are employed/ working at the moment?	1._____	
113	What is their regular total monthly income?	1._____	
114	What are sources of your income?	1. My employment 2. My spouse's employment 3. My son/Daughter's employment 5. My Business 6. My Farming 7. Others (specify)_____	
115	How much income do you get from your Q114 Choices? (convert yearly income to monthly later on)	Year Income(Birr)_____ When Converted to Month_____	
116	What is your monthly income?	1._____Birr or _____in Kind	

Section 2: Costs of Tuberculosis before diagnosis

S.N	Questions	Possible answers and coding	Skip
201	How long did you have your complaints before becoming a patient at this health facility?	1._____ days	
202	How many days had you remained from work?	1._____ days	
203	Amount of wages lost for days lost from work	1._____	
204	Did you visit any other providers before diagnosis of TB?	1.yes 2.No	If no, Skip to Q 214
205	If yes to Q 204, number of health services/providers visited before diagnosis?	1._____	
206	Which health services did you visit?	1.Government 2.NGO 3.Private 4.Traditional Healer 5.other (specify)	
207	Total cost of consultation fees	1._____Birr	
208	Total cost of Investigations (Laboratory, X-ray, etc.)	1._____Birr	
209	Total cost of drugs purchased	1._____Birr	
210	What is the means of transportation to get to the health facilities?	1. On foot 2.On animal Back 3.Taxi/bus 4.Other(specify)_____	
211	How long does it take you to get the health services site?	1._____hours _____minutes _____KM	
218	If yes to Q 214, amount of wages lost per days lost from work?	1._____ Birr	
219	What is the means of transportation for caregivers to get to the health facility?	1. On foot 2.On animal Back3.Taxi/bus4.Other(specify)_____	
220	How long does it take them to get the health services site?	1._____hours /____minutes_____KM	
221	If yes to Q 214, amount of cost for transportation?	1._____ Birr	
222	If yes to Q 214, amount of cost for other expenditures?	1._____ Birr	

Section 3: Costs of Tuberculosis after Diagnosis as an Outpatient

S.N	Questions	Possible answers and coding	Skip
301	How long have you been an outpatient for TB treatment?	1._____ days	
302	How many outpatient visits have you had in that time?	1._____	
303	How many days have you remained from work being an outpatient?	1._____ days	
304	Amount of wages lost for days lost from work	1._____Birr	
305	Did you have to pay anything for your treatment, prescribed drugs or tests since you have been an outpatient?	1.Yes 2.No	If no, skip to Q 315
306	If yes to Q305, How much have you spent on prescribed drugs while you were an outpatient?	1._____Birr	
307	If yes to Q305, How much have you spent on investigations while you were an outpatient?	1._____Birr	
308	If yes tor Q305, How much have you spent on other items, (Doctors payments, registration cards, clothing etc.)?	1._____Birr	
309	If yes to Q305, How much have you spend on traditional medicines?	1._____Birr	
310	If yes to Q305, How much have you spent on any other non-prescribed remedies?	1._____Birr	
311	If yes to Q305, How much have you or any visitors spent on your food?	1._____Birr	
312	What is the means of transportation to get to the health facility?	1.On foot 2.On animal Back 3.Taxi/bus 4 other(specify)_____	
313	How long does it take you to get the health services site?	1.___hrs/__ min ___KM	
314	Total cost of Transportations	1._____Birr	
315	Has anyone from your family or friends looked after you during your treatment?	1.Yes 2.No	If no, skip to Q401
316	If yes to Q 315, number of days lost from work to accompany You?	1._____ days	
317	If yes to Q 315, what is their monthly income?	1._____ Birr	
318	If yes to Q 315, Do any of the care-givers lose any income because they cared for you?	1.Yes 2.No	If no, skip to Q 401
319	If yes to Q318, amount of wages lost per days absent from work?	1._____ Birr	
320	What is the means of transportation for caregivers to get to the health facility?	1.On foot 2.On animal Back 3.Taxi/bus 4.Other(specify)_____	
321	How long does it take them to get the health services site?	1.__hrs or __minutes –KM	
322	If yes to Q 318, amount of cost for transportation?	1._____ Birr	
323	If yes to Q 318, amount of cost for other expenditures?	1._____ Birr	

Section 4: COPING STRATEGIES

S.N	Questions	Possible answers and coding	Skip
401	How did you or your family manage costs for treatment and days lost due to illness?	1. By using cash (income +saving)	Go to 402
		2. Sale of assets	Go to 403
		3. Loans	Go to 404
		4. Borrowing	Go to 406
		5. Gifts	Go to 408
		6. Insurance	Go to 410
		7. Others (specify, with value)	
402	If using income or savings, please tell me how much money you spent for your treatment?	In Birr_____	
403	If sale of assets, how much money was received?	*In Birr*_____	
404	If taking loan, what is the source of the loan	1. Relatives 2. Friends/ neighbor 3.Local saving group 4. Government banks or cooperatives, 5. Private banks 6.Other source_____	
405	If taking loan, how much money was received?	In Birr_____	
406	If borrowed, please tell me the source	1. Relatives 2. Friends/ neighbor 3. Local saving group 4. Government banks or cooperatives 5. Private banks 6. other source	
407	If taking borrowed, how much money was received?	In birr_____	
408	If you received gifts, tell me the source	1. Relatives 2 Friends/neighbor 3.Other (specify)___	
409	If you received gifts, how much money was received?	In Birr_____	
410	If you used insurance, how much money was received?	In Birr_____	

Section 5. Household Economic Status and Spending

S. N	Questions	Possible answers and coding
501	Does your family/household own? Check all that applies.	1. Piped water 2.Electricity 3.Radio 4.TV 5.Own car 6.Own Bicycle 7.Own home 8. Other(specify) _____
502	What is the main source of energy in the house?	1. Fire wood 2.Charcoal 3.Animal dung 4.Kezrosene 5.Electricity 6. Other(specify)_____
503	What is your household budget for?	1. Food items_____2.Electricity_____3.water_____ 4.Education_____ 5. Clothing_____ 6.Transport_____7. Telephone_____ 8.House Rent_____ 9.Kerosene_____10.Milling_____11.``Eder``_____12.``Equb``_____13 .Savings_____ 14.Utensils_____15.Health_____16.Tax_____ 17.Others_____

PART 6:COST TO FILLED FROM SECONDARY RECORD REVIEW

S.No	Direct Cost	# Visit		Unit cost	Total cost	
		TB	MDR TB		**TB**	MDR TB
601	Direct medical cost					
602	HIV test					
603	CBC					
604	Sputum-test					
605	X-ray					
606	Ultrasound					
607	ESR					
608	Blood chemistry					
609	A) TB drugs (strength, dosage, form)					

DECLARATION

- I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.
- Name: _____ Signature: _____ Date _____
- Name of the institution: Jimma university institute of health
- Date of submission: _____
- This thesis has been submitted for fulfillment of requirements for the Master of Science in Health Economics with my approval as University advisor and examiner
- **Name and Signature of the internal examiner**

  Name _____ Signature_____ Date _____

- **Name and Signature of the advisors**

1. _____ Signature_____ Date _____
2. _____ Signature_____ Date _____