

JIMMA UNIVERSITY INSTITUTE OF HEALTH DEPARTMENT OF HEALTH
ECONOMICS, MANAGEMENT AND POLICY

COST OF ASTHMA ON PATIENTS AND THEIR FAMILIES ATTENDING
PUBLIC HOSPITALS IN ARSI ZONE, OROMIA REGIONAL STATE,
ETHIOPIA 2018.

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Abstract

Background: - Asthma is one of the leading chronic diseases in the world, imposes large economic burdens on national health care, these ranges from individual to national economy, prevalence continues to increase, and it is estimated that by 2020 asthma will likely affect as many as 400 million people and accounts for 346,000 deaths and 22 million disability-adjusted life years lost each year worldwide. In Nigeria mean annual direct cost of asthma follow-up care was US\$368 (± 228) per patient per year.

Objective: To Assess the cost of Asthma on patients and their families in Arsi Zone Public Hospitals, Oromia region, Ethiopia 2018

Methods: An institution based cross sectional study was conducted. A total of 237 participants were selected by consecutive sampling, which enrolled in survey. A semi-structured questionnaire was used to collect the data. Bottom-up approaches and human capital approach was used to estimate direct costs and indirect costs, respectively, along with patient perspective and prevalence based approach. Data was entered into Epi data3.1 and exported to SPSS version20 for further analysis. Descriptive statistics such as mean, standard deviation, and median were calculated to describe some parts of the results. Multiple liner regression analysis was employed to analyze the separate effects of the various predictor variables on the cost of treatment.

Result: The mean outpatient cost per patient per visit for asthma was Birr 517.91(\$18.73) .Mean direct outpatient cost was 504.9birr (\$18.26) takes largest share when compared with the indirect cost 140.22birr (\$5.07).Mean inpatient cost for hospitalized patients was birr 736.67(\$26.64).The mean direct inpatient cost was 635.04birr (\$23) (72.7%direct medical cost and 27.3%direct nonmedical cost).The mean emergency treatment cost was birr 355.43(\$12.85)

Conclusion: This study indicates that the cost of asthma is substantial for both patients and their families. Average direct outpatient cost per visit takes the largest share compared with the indirect counterpart, even more than triple. Average cost of hospitalization for asthma patient per visit is higher than outpatient per visit average cost. Asthma treatment cost is dependent on patient age, family monthly income, and distance from hospital. (**Keywords:** *cost of illness, Asthma, cost, Arsi zone, Ethiopia*)

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List of abbreviations

BSC Bachelor of Science

COI Cost of Illness

CSA central statistical agency

DALY Disability Adjusted Life Year

ETB Ethiopian Birr

EU European Union

GDP Gross Domestic Product

HIV Human immunodeficiency virus

NGO Non-Governmental Organization

S.D Standard Deviation

SPSS Statistical Package for Social Sciences

TB Tuberculosis

USD United States Dollar

WHO World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Asthma is defined as a chronic disorder of the airways that is characterized by variable and recurring symptoms, airflow obstruction, bronchial hyper responsiveness, and an underlying inflammation.(1).It is one of the leading chronic diseases in the world, with about 300 million people estimated to have the condition.(2)

Asthma prevalence continues to increase, and it is estimated that by 2020 asthma will likely affect as many as 400 million people.(3).It is a major cause of chronic morbidity and mortality worldwide and represents a substantial economic and social burden throughout the world.(4)

Asthma is a major global public health problem; the current estimate of 300 million asthmatics worldwide is expected to increase with 33% by 2025. (5) Asthma results in an estimated 346,000 deaths and 22 million disability-adjusted life years lost each year worldwide.(3) Total annual asthma costs in the USA, estimated that they were growing fast and steadily, from \$USD 12 billion in 1994 to \$USD 56 billion in 2011(6).The annual costs of asthma in Europe are estimated at \$18 billion (5)The asthma costs are estimated that a mean cost per patient per year, in Europe is \$USD 1,900, which seems lower than USA, estimated mean \$USD 3,100.(6)

There are huge costs that result from direct and indirect cost of asthma. Direct cost of asthma ,medical costs associated with services that patients receive, including visits to emergency services; hospital admissions; medications .Indirect cost includes value of lost wage of patients and their family.(7)

A cost-of-illness study (COI) is a descriptive type of analysis which estimates disease-specific costs, and provides information on the maximum potential savings that could be done if a disease were to be eradicated. It is important to know whether a specific disease of interest involves the greater medical and/ or social costs and giving an idea of its cost of illness.(8)

The cost of illness can be divided into direct costs and indirect costs .Direct costs are the value of resources used in the treatment of disease. They include costs for outpatients, emergency centers, inpatients, medications, community services, etc. These estimates are used to address the question of the quantity of resources used to treat a disease. Indirect costs are the value of resources lost as a result of illness. They include productivity loss due to either morbidity or mortality. These estimates are used to address the question of the magnitude of the negative economic consequences of illness to the society(8)

1.2 STATEMENT OF THE PROBLEM

A recent global asthma report indicated a sharp rise in asthma prevalence from 235 million to 334 million, between the years of 2011 and 2014, in 2015 alone, 383,000 people died of asthma. An additional burden of 100 million new cases is estimated by the year 2025.(9). Over 80% of asthma deaths occurs in low and lower-middle income countries.(10). The prevalence of asthma was 9.1% in Ethiopia.(11)

World-wide, the costs associated with asthma are estimated to exceed those of TB and HIV/AIDS combined.(12, 13)

Asthma costs the U.S. economy more than \$80 billion annually in medical expenses, days missed from work and school, and deaths.(14)

In Europe, the cost of asthma care is estimated to be \$18 billion per year, with lost productivity accounting for almost \$10 billion of this cost.(15). Over the period 2011-2025, the cumulative lost output in low- and middle-income countries associated with chronic respiratory diseases including asthma, is projected to be US\$ 1.59 trillion (5)

Despite vast number of studies on the cost of asthma in the developed world they are scarce in the Africa continent. In Ethiopia no such study has been documented to calculate the cost of asthma. In this era of scarce resources and rising cost, it is critical to have an understanding of the economic aspect of asthma.

The costs of Asthma are considered to be high. According to the studies conducted in Nigeria(16). They conduct study in three tertiary hospitals in 110 asthmatic patients. Asthmatic patients spent on average direct cost US\$30.7 ± 19, per months. However they assessed only direct cost of the treatment. Moreover they didn't consider indirect costs, families side cost. In addition the geographical location, they include only tertiary hospitals and outpatients, the population and income level of those specific countries may not be similar with ours. Prevalence and associated factor of uncontrolled asthma was studied but economic aspect was not studied in Ethiopia. More importantly there is paucity of data regarding cost expenditure on Asthma treatment in our country. This study assessed direct cost, indirect cost; companion side cost and identifies predictors for variations in patient related cost of asthma

So; this study assessed the current cost of asthma to patient and their families.

1.3 Significance of the study

Cost-of-illness(COI) analysis often falls within measuring the cost impacts of disease by that estimates total costs incurred because of asthma : Costs of medical care, non-medical resources and loss in productivity to treat asthma have value for public health practitioners who to highlight the cost of a disease, beyond the morbidity and mortality incidence and prevalence statistics. cost of illness information should be useful for government agencies, pharmaceutical industries, medical professionals, and insurance payers.

Cost of illness for asthma studies help, to know the quantity of resources (in monetary terms) used to treat and to estimate the effect of disease on society.

This study was identify the affected groups; the cost spent and lost wage of asthma patients and their family, also support the government in the effort to step down expenses for purchasing medications and by saving lost work days following Asthma attacks as well as subsequent hospital admissions.

Enable the health managers to rely on scientific data for justification of resources allocations to reduce the costs needed for the asthma prevention and treatment activities. Inform policy-makers the extent of cost of asthma beyond health burden. Helps to develop advocacy and implement sound public programs. Utilization of the findings might have an input to bring long term changes in designing appropriate strategy to reduce the cost of asthma.

Benefit the government, NGO and health professionals need to be aware of the current cost of asthma and provides evidence for possible preventive, treatment strategies, and to support individuals, family members and other stakeholders.

Specifically, the assessment provides current information on cost of asthma. Moreover this study may serve as a baseline for future studies in cost of asthma.

2. Literature Review

2.1 Epidemiology of asthma

Asthma is a serious global health problem affecting all age groups, with increasing prevalence in many developing countries Worldwide 250,000 people die of the disease every year, mostly in low and low to middle income countries, In Ethiopia prevalence of asthma was 9.1% in 2011 (11). Studies done in jimma showed prevalence of asthma was 3.6% in 2016 .(17)

2.2 Causes of asthma

The causes of asthma are not presently known and appear to be very complex. Genetics, allergic reactions, hormonal changes, obesity, stress, exercise and environmental conditions can contribute to asthma or trigger asthma attacks. But asthma can also erupt spontaneously in some people. Asthma used to be thought of as an allergic disease, where allergen exposure causes sensitization to allergens and continued exposure leads to the processes in the airway which lead to asthma symptoms. While allergy is a potential underlying factor for up to half of the people with asthma, the remainder has no allergic features. (18)

2.3 Prevention and control of asthma

Ethiopian asthma prevention and control strategy includes: avoiding exposure to environmental tobacco smoke during pregnancy and first year of life, Encourage vaginal delivery and advice breast feeding. Decreasing allergic burden, increasing awareness of early detection among public and health professionals and educating patients and healthcare professionals about appropriate treatment (19)

2.4 Costs of asthma

2.4.1. Approaching to costing

The estimation of the cost of a disease can be divided in three broad approaches:

The first one is **cost-of illness (COI) method**, which estimates the direct costs of illness for a particular population in a specific period, plus the indirect costs of the illness. COI used as starting point for the estimation of the burden of any type of disease(20).

The second **Economic growth model** which assess the impact of chronic diseases on the gross domestic product(GDP) by considering how these disease deplete labor, capital and other factors to production levels in a country(21).

The third **Full-income approach (value of statistical life (VSL))**: reflects a population's willingness to pay to reduce the risk of disability or death associated with disease. By placing an economic value on loss of health itself, estimates the societal value of welfare losses or gains associated with poor health, early death, or increases in life expectancy in monetary terms(21, 22).

The COI studies can be described as prevalence-based or incidence-based approaches based on the way in which the epidemiological data are used. Being most commonly used, the former approach estimates the cost of a condition over a specific period, usually a year, while the latter approach estimates the lifetime costs of a condition from its onset until its disappearance (usually by cure or death), which refers to the new number of cases arising in a predefined time period.(8)

Goal of COI study is to evaluate the cost of disease imposes on society as a whole and classify cost into two categories- direct, indirect. Direct costs being incurred by the health system, society, family, and individual patient, the direct costs consist of health care costs and non-health care costs. In estimating direct costs most COI studies used a “top-down” approach or a “bottom-up” approach.

A top-down approach is useful and easier for estimating fixed costs, such as human resources, over the short term. Estimating costs on the consumption of variable items is much more complex. Micro-costing(bottom-up) involves collecting data on the frequency of consumption of services directly from the patient, family, health professionals, or medical records.(23)

Indirect costs represent lost wage to the individual as a consequence of the asthma. For indirect costs: a “human capital” approach the earnings, present and future, lost to that individual as a result of the illness, in “willing-to-pay” approach, or contingent valuation base, life and lifestyle changes are valued as equal to the amount that the individual is willing to spend to reduce their risk of death or illness, and a friction costs represent the costs associated with the replacement of a sick worker(8, 20).

2.4.2. Types of costs

Generally the cost of asthma comprises of direct costs and indirect costs. Direct medical costs of asthma are costs borne by the patients and their family in diagnosis and treatment such as drugs, investigation, consultation fees, and hospital inpatient. Direct non-medical cost; includes transportation costs, food and accommodation.

The indirect costs assess wage losses by patients in outpatient department consultation, travel to and from hospitals, waiting for admission, and institutionalized treatment; by relatives accompanying patients during pre-admission consultation, travel to and from hospitals accompanying patients. (24).

2.4.3. Empirical research on asthma

Direct costs of empirical research on asthma

Study done in Australia estimates that the direct economic cost is \$1.2billion which is for drugs and hospitalization. Expenditure on prescription pharmaceuticals is \$263 per person with asthma and \$102for inpatient in 2015.(1)

Study in South Korea show that the total economic costs of asthma is \$535.5 million in 2008.The medical care costs (516.7 million USD), the non-medical care costs (18.8 million USD).(25)

The study done Asia-Pacific region indicates that mean \pm SE total direct annual cost per patient was US\$320 \pm 15, ranging fromUS\$1010 \pm 100 in Hong Kong to US\$108 \pm 13 in Malaysia. On average, the urgent care costs were higher than maintenance costs, as well as for half of the participating areas: Singapore, Hong Kong, Malaysia and China. Overall, urgent care costs represented 62% of total costs, with values ranging from 89% of costs in Hong Kong to 18% in the Philippines. Per-patient drug costs represented only, 30% of total per-patient direct costs (US\$95versusUS\$225 for drug versus nondrug costs). As a proportion of total direct costs, drug costs were lowest in Hong Kong (9%) and highest in the Philippines (75%).(26)

Study done in Brazil indicates that total annual mean cost was \$1,291.20/patient, direct cost accounted for 82.3% of the estimated total cost. The cost of medications for asthma accounted for 62.2% of the direct costs of asthma.(27)

Other studies done in Brazil show that total annual mean cost was U\$1,291.20/patient (SD = 1,298.57). The cost related to isolated asthma was U\$1,155.43/patient-year (SD = 1,305.58). The direct cost accounted for 82.3% of the estimated total cost, the cost of medications for asthma accounted for 62.2% of the direct costs of asthma.(28)

In England a descriptive study estimates annual mean treatment costs among severe refractory asthma patients were \$ 2912 (SD \$ 2212) to\$ 4217 (SD\$ 2449), the data analyzed are patient-specific healthcare data drawn from the British Thoracic Society National Registry for dedicated UK Difficult Asthma Services in 2012.(29)

Study done in Greece explains that the annual cost of managing exacerbations was estimated at \$392.1, while maintenance costs were estimated at \$1,579.6 per year. Total costs of managing asthma per patient per year were estimated at \$3276.6, 64.4% of which represented direct medical costs. Of the direct costs, pharmaceutical treatment was the key driver, accounting for 63.9 and 41.2% of direct and total costs, respectively .Direct non-medical costs (patient travel and waiting time) were estimated at \$152.3.(30)

A cost of illness study done in Turkey informs that Direct cost was\$214.9(95% CI: 183.9; 245.8) per attack. The cost of severe attack\$308.2 (95% CI: 258.2; 358.2)] was significantly higher than moderate \$172.6 (95% CI: 155.1; 190.2) and mild \$128.6(95% CI: 102.6; 154.7) attacks. It was also significantly higher for inpatient follow-up\$257.7 (95% CI: 220.4; 295) vs. outpatient follow-up \$54.5(95% CI: 47 ;).Treatment cost (55.6%) was the most predominant direct costs item followed by health care resources utilization (24.7%), diagnostic tests (19.2%) and consultation (0.5%) costs (31)

Study done a cross three European countries show that the direct cost of managing asthma and COPD in 2015 was estimated at \$813 million, \$560 million, and\$774million for Spain, Sweden and the UK, respectively, costs of asthma and COPD per patient were lowest in the UK, while the highest per-patient costs were incurred in Spain in 2016.(32)

A study done in united state Washington State indicates that in 2010, hospitals charged about \$73 million for asthma related hospitalizations.\$4.8million were charged to the patients themselves. Insurance providers, government sponsored programs, and charities were charged

\$68.5 million. \$43.1 million were charged to Medicaid and Medicare. Work-related asthma is the most commonly diagnosed

Occupational lung disease in the US, in 2010, there were 42 (accepted, state fund) work-related asthma claims in Washington State, with total costs of about \$300,000 per patient, per year.(33)

Another study united state of America estimates the per-person total direct incremental expenditure \$1,999.17 associated with asthma. The estimate breaks down to \$15.33 billion in inpatient expenditures, \$13.62 billion in prescription medication expenditures, \$7.32 billion in office-based visit expenditures, \$1.34 billion in outpatient expenditures, \$4.54 billion in home health expenditures, \$1.14 billion in emergency room visit expenditures, and \$0.29 billion other medical expenditures.(34)

Study done in Nigeria shows that mean monthly direct cost of asthma care was US\$30.7 ± 19, mainly from drugs \$26.7, transportation \$2.4, and laboratory test \$1.4. Mean annual direct cost of asthma follow-up care was calculated as US\$368 (±228) per patient for 1 year. Medication costs (US\$320) accounted for the majority (87%) of the mean annual cost of asthma follow-up care.(16)

Indirect costs of empirical research on asthma

Study done in Australia estimates that the indirect \$1.1 billion. In 2015, the estimated productivity cost of asthma is around \$1.1 billion, by workers is around \$198.9 million (\$84 per person with asthma), by employers is around \$526.7 million (\$221 per person with asthma) and by the government is around \$404.6 million (\$170 per person with asthma).(1)

Study in South Korea show that the largest amount of the cost 103.1 million USD, was the morbidity costs, the mortality costs were 74.6 million USD, and the costs related to the caregivers time 117.1 million USD.(25)

The study done Asia-Pacific region indicates that mean ±SE total per-patient societal costs were US\$435 ±17, ranging from a low of US\$184 ±16 in Vietnam to a high of US\$1,189 ±105 in Hong Kong. This represents 16% of per capita GDP when all countries are pooled. The per capita GDP societal costs of asthma were particularly high in China (39%), Vietnam (46%), and the Philippines (28%) (26)

Study done in Brazil indicates that indirect costs are \$455.7 million and \$418.7 million per person. (27)

Other studies done in Brazil show that total annual mean cost was U\$1,291.20/patient (SD = 1,298.57). The cost related to isolated asthma was U\$1,155.43/patient-year (SD = 1,305.58). The indirect cost accounted for 17.7% of the estimated total cost and estimated annual cost related to absenteeism was U\$24,702.01. (28)

Study done a cross three European countries show that indirect cost burden of managing asthma and COPD in 2015 was estimated were \$1.4 billion, \$1.7 billion and \$3.3 billion in Spain, Sweden and the UK, respectively, patients in Spain losing more productive days on average compared with patients in Sweden, total annual indirect costs in Spain were approximately half of those for Sweden (\$0.60 billion compared with \$1.18 billion, respectively). (32)

Study done in Greece explains that indirect costs of managing asthma per patient per year were estimated at \$946.93 accounted for 28.9% of total costs. (30)

A study done in united state Washington State indicates that in 2010, 22 percent of Washington adults with asthma missed work, or could not do normal activities, for a total of 4.3 million person-days of lost productivity. Similarly, 25 percent of Washington 10th grade youth with asthma missed at least one day of school in 2010, 5 percent missed 5 or more days. (33)

Another study united state of America estimates the annual mean incremental indirect cost associated with asthma was \$628.84 per person. The total indirect cost of illness associated with asthma in the United States in 2007 was \$13.7 billion.(34)

Majority of studies done in cost of asthma they estimates direct and indirect cost of patients only they cannot consider companion side cost and variation in cost of asthma .More importantly unit of analysis of most studies are per patient per months and per patient per year. Patients have monthly regular follow up.

Studies done in Nigeria in 110 outpatients assessed only direct cost of the treatment. Moreover they didn't consider indirect costs, family side cost, they include only tertiary hospitals.

Generally, most existing literatures on asthma show that it imposes huge economic impacts on patients and their families and this study provides current cost of asthma.

In Ethiopia, except very few prevalence based studies it is not easy to get evidence about cost of asthma. And no studies have been conducted on cost of asthma. Therefore, this study estimates the direct cost, indirect cost of asthma on patient and Identify predictors for variations in patient related cost of asthma and estimate direct non-medical cost and indirect cost on companion. Provide current information on cost of asthma. This study is intended to fill the information gap and may help researcher, planners, policy makers, program mangers and the community at large.

Conceptual framework of Cost of Asthma

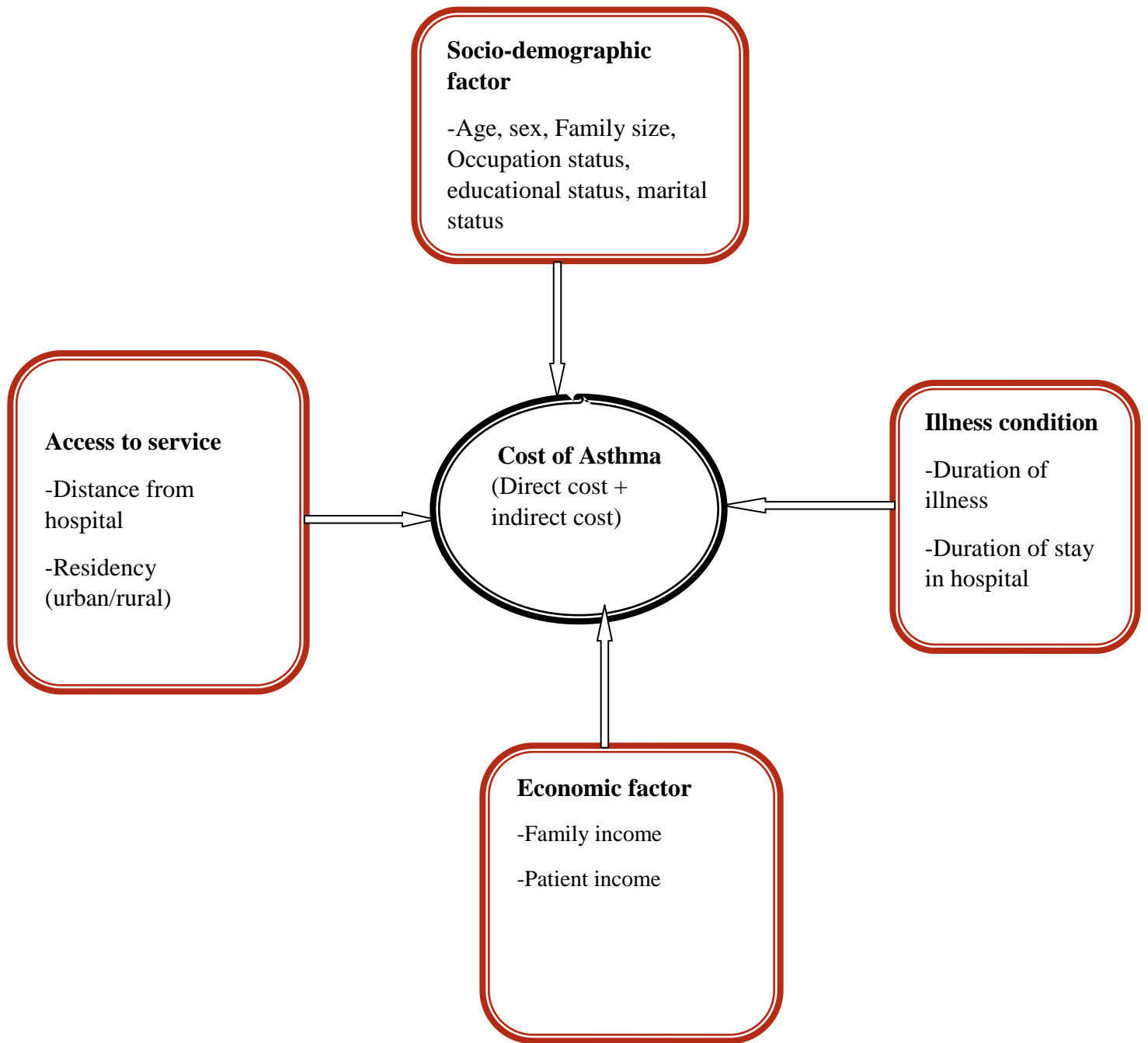


Figure 1: Conceptual framework cost of asthma adapted from different literature

CHAPTER THREE

3. Objective of the study

3.1 General objective

- To assess Cost of Asthma on Patients and Their family attending Public Hospitals in Arsi zone, Oromia Regional State, Ethiopia, 2018

3.2 Specific Objective

- To estimate the Direct Cost of asthma on Patients and Their families attending Hospitals in Arsi zone
- To estimate the Indirect Cost of asthma on Patients and Their Families attending Hospitals in Arsi zone
- To identify predictors for variations in patient related cost of asthma.

CHAPTER FOUR

4. Methods and Materials

4.1 Study area and Period

The study was conducted in Arsi zone of Oromia regional state, Ethiopia among Asthma patients attending public hospitals. Arsi zone is one of the 22 zonal administrations of Oromia region and Center of the zone is Asella which is found 125KM away from Addis Ababa, capital city of Ethiopia. Based on the 2007 census conducted by the CSA, Projected total populations for 2010 was 3,637,657, from this 1,837,016 are men and 1,800,640 are women; There are 7 functional public hospitals in Arsi zone.

The study was conducted in Asella Hospital, Arsi dida Hospital, Bekoji Hospital, and Kersa Hospital. The study was conducted from September 6 - October 07, 2018.

4.2 Study Design

This study was quantitative study using a facility based cross-sectional design; to estimate patient side costs of asthma;

4.3 Source and study population

4.3.1 Source population

In this study the source populations were all asthma patients attending treatment at Arsi zone Public Hospitals were the source population.

4.3.2 Study population

Selected asthma patients attending treatment at Arsi zone Public Hospitals during the study period were the study population.

4.3.3 Study unit

Person with diagnosis of asthma (Every chosen asthma patients from study population)

4.3.3 Inclusion criteria

All Asthma patients ≥ 18 years of age attending treatment during study period was included.

4.3.4 Exclusion criteria

Those patients who are critically sick, unable to communicate or difficult to get information from relatives was excluded.

4.4 Sampling Size and Sampling procedure

4.4.1 Sample size determination

Sample size was calculated using single population mean formula. Due to lack of similar study in Ethiopia, mean and S.D was taken from study done in Nigeria(16) because of similarities of variables under study, mean was \$ 49.7 and standard deviation of \$19, 95% CI and margin of error 5%.

$$n = \frac{Z\alpha^2 s^2}{d^2}$$

Where:

sample size calculation as follow n = the sample

S = the sample standard deviation

Zα = the confidence level is 95%,

$$n = \frac{(1.96)^2 (19)^2}{(2.485)^2}$$

d = margin of error (5% of the mean \$49.7 is 2.485)

$$(2.485)^2$$

$$= 225$$

By adding 10% non-response rate final sample size was 248.

4.2.2 Sampling technique

From seven public hospitals in Arsi zone four hospitals are selected by simple random sampling lottery method and Consecutive sampling technique was used to select the study subjects.

Physician diagnosed asthma patients were selected from 4 hospitals. In order to make sure sufficient sample size recruited for each hospital proportional allocation formula was be used

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

Where n_i is required sample size in each Hospital, n is for total sample size, N_i stand for number of asthma patient in each hospitals and N total number of asthma patients who was treated in hospitals. The number of study units for each unit was proportionally allocated (based on the number of patients last year first quarter because asthma was one of seasonal diseases)

4.2.3 Sampling procedure (Number allocated based on last year first Quarter)

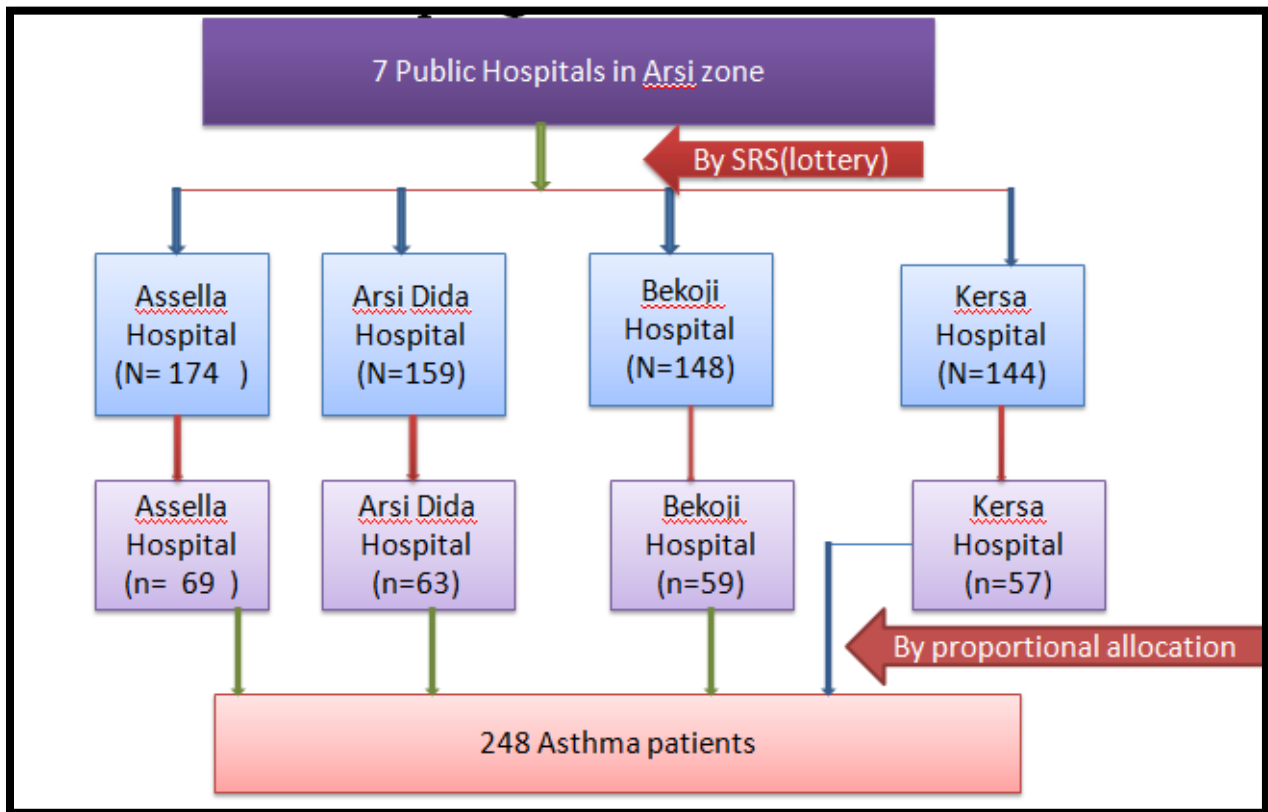


Figure 2: Sketch map of sampling procedure

4.5 Data collection Tools and Procedure

4.5.1 Data collection instrument

Questionnaire adapted from study done on the costs of cervical cancer on patients and their family in Tikur Anbessa Hospital (Desalegne A. 2011) (adapted and modified from different literature reviews to answer the objective of this study).

Data was collected with face to face interview using semi-structured questioner

4.5.2 Personnel (Data collectors)

Two supervisors and four data collectors were recruited and trained. The supervisors are selected with at least first degree in Health and having experience in the area. Data collectors were nurses who have previous data collection experience was selected and one days training was provided by principal investigator for data collectors and supervisors on objective of the study, contents of questionnaires and how to maintain confidentiality and privacy of the study participant.

4.5.3 Data measurement

Semi-structured Questioner was used.

Cost of illness (COI) method, estimates the direct costs, indirect costs of asthma on patients and their family in a specific period. It is Prevalence based cost study, measure the cost of asthma within one year.

Patient perspective was used, all costs of patient and their families incurs due to asthma was included.

A micro-costing (bottom up) approach was used to calculate the direct cost of asthma spent by patients and their family and end up with the total sum.

Human capital approach was used to calculate indirect costs which measures values of total wage losses due to asthma.

Cost of Asthma on patients and their family.		
Cost type	Cost component	Cost Estimation Approach
Direct	Medical cost	<p>Medicine: calculated by summing the cost incurred on drugs by patients.</p> <p>Consultation: calculated by summing the cost incurred on consultation and registration by patients.</p> <p>Diagnostics: calculated by summing the cost incurred on laboratory tests, X-ray and Ultrasound by patients.</p> <p>Total medical cost: estimated by summing the cost incurred by patients on medical, consultation, diagnostic test, and medication due to their asthma disease.</p>
	Non-medical cost	<p>Travel: calculated by summing the travel costs incurred by the patients when travelling to and from the hospital.</p> <p>Lodging: calculated by summing the costs incurred by patients on food and accommodation.</p> <p>Total non-medical cost: estimated by summing the cost incurred by patients on travel and lodging due to their asthma disease.</p>
Indirect		This was calculated by summing the loss of income of person who is ill and caregivers.

4.6 Variables of the study

4.6.1 Dependent Variables

Cost of Asthma (Direct cost +indirect cost)

4.6.2 Independent Variables

- Socio demographic variables: Age, sex, occupation status ,educational status and, marital status
- Economic factor: Family income, Patient income
- Access to service :Distance from hospital, Residency
- Illness condition :Duration of illness, Duration of stay in hospital

4.7 Operational Definitions

Cost: spent money to get asthma treatment including direct and indirect cost.

Cost-of-illness study (COI): analysis that computes the total costs incurred by patients and their family as a consequence of asthma, typically including both the direct and the indirect costs such as medical costs and lost productivity associated with asthma.

Direct costs: Amount of Ethiopian birr paid for drug, investigation, consultation, transportation, accommodation and food during the study period. It includes medical and non-medical costs used by patients and care giver.

Direct Medical costs: includes diagnostic tests, drugs, consultation fees, laboratory tests costs, and inpatient, outpatient medication costs.

Direct Non-medical costs: includes transport, food, and accommodation costs.

Indirect costs: Wage losses in productivity in Ethiopia birr that borne by patients and their families with contact of asthma.

Prevalence-based approach: quantifies costs by measuring all costs due to asthma usually a single year, regardless of the time of disease onset.

Micro-costing (bottom up costing): cost valuation method used to measure all direct cost used by patient and their family and end up with the total sum.

Human capital approach: Values of total wage losses due to asthma on patients and their family.

Waiting time: time from hospital arrival to seen by physician

4.8 Data processing and Analysis

The collected data was cleaned, coded, and entered to Epi Data 3.1 version data checked for accuracy, consistencies and values. Any errors identified were corrected. Then, data was exported to statistical package for social scientists version 20(SPSS-20) for descriptive analysis. The result was presented in descriptive statistics like frequencies, percentages mean, median and S.D was calculated. Multiple linear regression analysis was employed to analyze the relationship between the cost (dependent variable) and potential predictor variables (independent variables). In the regression model, independent variables with a probability value of P statistics < 0.25 on the analysis have been entered whereas only Statistically significant ($P < 0.05$) variables were included to the final model.

(According to National bank of Ethiopia average exchange rate of September 2018 1USD=27.65 Ethiopian Birr)

4.9 Data quality

Questionnaires translated to local language Afan Oromo then back translated to English to maintain consistence. Questioners were pretested in Gobesa hospital using 5% of sample size; result was not included in the study. One days training was provided by principal investigator for data collectors and supervisors on objective of the study, contents of questionnaires and how to maintain confidentiality and privacy of the study participant. Collected data was checked by investigator on daily basis for completeness, accuracy, clarity, and any misunderstanding. Data was entered to software carefully, miss entered data was checked cleared and corrected, strict supervision was undertaken by the researcher and supervisors throughout the data collection period.

4.10 Ethical Consideration

Ethical clearance and approval of study was obtained from Ethical Review board of Jimma University Institute of Health. Formal letter of permission was taken from Oromia Health Bureau and Each Hospital. Informed consent was obtained from each study participants. Respondents were assured about confidentiality of responses that would be maintained during and after data collection.

4.11 Dissemination and utilization of the result

The findings from this study will be presented and disseminated to Arsi zone Health office, Each Study Hospitals and Jimma University Institute of Public Health and other organizations who are interested in these issues. Publication and Presentation of findings at local and international forums will be considered.

5. Results

5.1 Demographic and Socio Economic Characteristics

Out of total 248 samples 237 (95.6%) individuals (127 males and 110 females) were interviewed. from patients presenting to Asella Hospital (69), Arsi dida hospital (63), Bekoji hospital(57)and Kersa hospital(48)

The age of individual included in this study ranges from 18 to 75 with average age of 43. Majority of patients 185(78.05%) were in age group of 18 to 54. The proportion of respondents within the age group 18-24 years old was 8 (3.4%). Only 17 (7.2%) of the respondents were above 64 years of age. In the case of marital status 188(79.3%) were currently married, which is followed by single 23(9.7%) and widowed 15(6.3%). The rest of respondents, 11(4.7%) are either separated or divorced. Large number of respondents are 84(35.4%) were with primary education, followed by 65(27.4%) no formal education.

In terms of occupational status, most of respondents, 67(28.3%) were farmers, followed by 55(22.3%) were housewives. Those who claimed that have their own business account for 53 (22.4%) of the total respondents, whereas those employed and unemployed were 36(15.2%) and 24(10.1%), respectively. With regard to their residency 131(55.3%) were urban and 106(44.7%) were rural.

Most of the respondents 130 (54.9%) indicated that they are Orthodox Christians. 79 (33.3%) of the respondents are Muslims and 26 (11%) are Protestants. The rest of the respondents indicated that they are Catholic 2(.8%) and twenty one (8.9%) was former smokers and 8(3.4%) were current smoker. (Table 1). Out of 237 asthma patients, 56(21.9%) cost of treatment was covered by CBHI

Table 1: Socio-demographic characteristics of the study subjects, Arsi zone, Oromia region, Ethiopia 2018

Variable	Frequency	Percent
Sex		
Male	127	53.6
Female	110	46.4
Age		
18-24	8	3.4
25-34	46	19.4
35-44	77	32.5
45-54	54	22.8
55-64	35	14.8
Above 64	17	7.2
Marital status		
Single	23	9.7
Married	188	79.3
Widowed	15	6.3
Divorced/ Separated	11	4.7
Educational status		
No formal education	65	27.4
Primary school	84	35.4
High school	51	21.5
College and above	37	15.6

Variable	Frequency	Percent
Occupational status		
Farmer	67	28.3
House wife	55	23.2
Employed	36	15.2
Daily Laborer	15	6.3
Student	4	1.7
Unemployed	5	2.1
Private	53	22.4
Others	2	.8
Religion		
Orthodox	130	54.9
Muslim	79	33.3
Protestant	26	11.0
Ethnicity		
Oromo	157	66.2
Amhara	63	26.6
Tigre	3	1.3
Gurage	10	4.2
Others*	4	1.7

(Income category and Educational status category taken from research done in jimma on uncontrolled asthma and associated factors (17) ,and age category taken from research done Hadiya zone on Assessment of Asthma Treatment Outcomes(35)) and (* Sidama)

In regards to household income, 133(56.1 %) of the population earned greater than 2,500 ETB (90.4USD) per months, the mean value of household income per month was 2876.1 ETB (104USD) with standard deviation of 2431.8ETB (88USD)

The maximum reported household income per month was 10,000ETB (361.66USD) while the minimum was 200 ETB (7.23USD).

Out of a total of 237 respondents, 135 (57%) were able to report an estimate of their monthly income, the remaining 102(43%) unable to estimate. Majority of respondent 53(22.4%) earned a monthly income less than ETB 1200 (USD less than 43.4). Around 34(14.3%) of the respondents earned between ETB 1201-2499 and 48(20.3%) earned ETB 2500 and above. The mean value of study participant income was 1527.7ETB (55.25USD) with standard deviation of 3190.6ETB (115.37USD). (Table 2)

Table 2: Percent distribution of monthly income of family and the study participant in Arsi zone, Oromia region, Ethiopia 2018

Variable	Frequency	Percent
Family monthly income(n=181)		
<=1200	16	6.8
1201-2499	32	13.5
2500 and above	133	56.1
Participant monthly income(n=135)		
<=1200	53	22.4
1201-2499	34	14.3
250 and above	48	20.3

5.2 Outpatient costs of Asthma patients at Hospitals

The mean follow up duration year of study participant was 3.14 with standard deviation of 3.2years. An average time to be seen by a doctor was 38minutes.

5.2.1 Patient side costs

Among 194 outpatient treated asthma patients 148(76.3%) of them pay directly for their treatments. The treatment cost for the rest 45(23.2%) covered by community based health insurance and one (0.5%) patient was covered by other payers.

Outpatient direct cost incurred per-visit per patient were; mean cost of consultation with physician, investigation and treatments came to Ethiopian birr 13.27(USD 0.48), 237.89(USD 8.6) and 252.04 (USD 9.11), respectively. From total direct cost components drugs represents the largest share (38%) followed by investigation fee (35.9%).

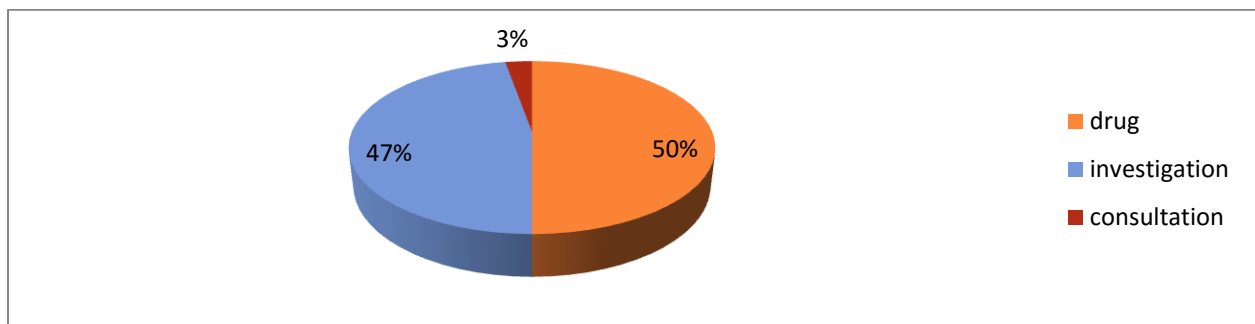


Figure 3: Direct medical cost components of outpatient in Arsi zone, Oromia region, Ethiopia

Direct cost for nonmedical reasons takes the lower share of the total cost; only 19.3%. The mean cost for single trip transportation was ETB 28.22(USD 1.02).

Expenditures for other different items related with illness (Costs for other expenses), food, drink and non-prescribed remedies were ETB 92.79(USD 3.36), which is 14.8% of the total direct cost. (Table 3)

Table 3: patient side outpatient direct cost of study subject, Arsi zone, Oromia region, Ethiopia 2018

Direct costs in ETB	Mean	Median	S.D	Sum
Direct medical cost (n=148)	503.20(\$18.2)	463.50(\$16.76)	128.23(\$4.63)	74475.00(\$2693.5)
Costs of drugs	252.05(50%)	230.00	125.04	37303.00(38%)
Investigation fee	237.90(47.2%)	240.00	28.00	35208.00(35.9%)
Consultation fee	13.27(2.6%)	10.00	4.63	1964.00(2%)
Direct nonmedical cost	121.01(\$4.37)	99.00(\$3.58)	148.42(\$5.36)	23477.00(\$849.07)
Transportation fee	28.22(23.3%)	25.00	20.70	5475.00(5.6%)
Costs for other expenses	92.80(76.7%)	60.00	142.83	18002.00(18.4%)
Total direct cost	504.90(\$18.26)	498.50(\$18)	278.20(\$10)	97952.00(\$3542.56)

5.2.2 Indirect costs

On average, each of the asthma cases had the illness for about 3.1 years, but great variation was seen among the cases regarding the number of ill days with minimum of 6 days and maximum of 20 years. The average working days lost was 9.38 days. During this time the patient lost ETB 2524 (USD 91.3) with mean and S.D of ETB 140.23(\$5.07) and 131.38(\$4.75), respectively. Time elapsed on travel to reach hospital vary from minimum of 5 minute to maximum of 120 minutes for single trip, with mean of 30.8 minutes. The average waiting time at reception was 38 minutes with minimum and maximum of 10 and 120 minutes respectively. (Table 4)

Table 4 : patient side outpatient Indirect cost in Arsi zone, Oromia region, Ethiopia 2018

patient side indirect cost	Mean	Median	S.D	Sum
Lost time of patient				
Duration of complaint in days	1147.06	730.00	1170.15	222530.00
Days remained out of work	9.38	7.00	6.50	1821.00
Time for transportation (minute)	30.85	20.00	25.23	5985.00
Waiting time at reception(minute)	38.09	30.00	22.41	7390.00
Lost productivity (patients)				
Amount of wages lost in ETB(n=18)	140.23(\$5.07)	98.00(\$3.54)	131.38(\$4.75)	2524.00(\$91.28)

5.2.3Companion side cost

Out of a total of 194 outpatient patients who visited one of hospital, 137(70.6%) of them had a family or friend who accompanied them. 112(81.7%) of the companion had lost their income because cared for them. Mean direct nonmedical cost incurred by companions was ETB 223.56(USD 8.08) with S.D of 70.3 (USD 2.54). Cost for transportation was ETB 3695(USD 133.6) with average of 27(USD 0.98) birr. Expenditure for other expenses (food, drink and bedroom) was ETB 26933, with mean and S.D of 196.6 and 61.9, respectively. On average each companion spent 31minutes on transport for single trip. Work days lost by the companion was 658 days with mean of 4.8days,lost wages of companions during lost work days was ETB 13007(USD 470.4) with mean and S.D of 104(USD 3.76) and 31.8birr(USD 1.15), respectively.(Table 5)

Table 5: Companion side direct non medical and indirect costs of outpatient in Arsi zone, Oromia region, Ethiopia 2018 (n=137)

Direct nonmedical costs (ETB)	Mean	Median	S.D	Sum
Transportation Fee	27.00	25.00	20.87	3695.00
Cost for Other expenses	196.60	198.00	62.00	26933.00
Total direct nonmedical costs	223.56	213.00	70.30	30628.00
Indirect costs				
Time for transportation (in minutes)	31.45	20.00	24.87	4308.00
Days lost from work to accompany	4.80	5.00	2.19	658.00
Amount of wages lost in ETB(n=112)	104.05	100.00	31.85	13007.00

5.3 Means of transportation to reach Hospitals

The means of transportation to come to hospitals by vast majority of the respondent, 219 (92.4%), was car. Only 15(6.3%) of them used animal transport.(figure 3)

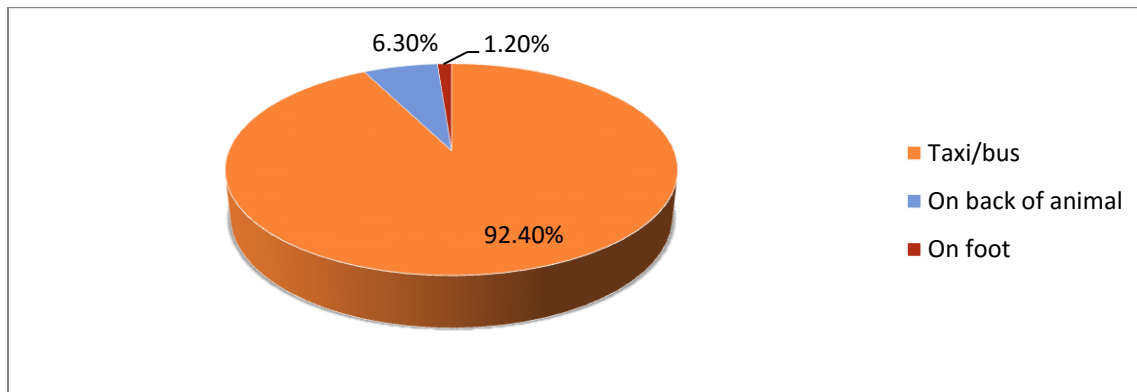


Figure 4: Means of transportation used by the patient to come hospitals, in Arsi zone, Oromia region, Ethiopia

5.4 Inpatient cost

From the total of interviewed 237 patients, 43(18.1%) of them had admitted and treated as an inpatient in Asella, Arsi dida, Bekoji and Kersa hospitals for at least one days.

5.4.1 Patient side cost

5.4.2 Patient direct cost

Among 43 hospitalized patients 37(86%) of them pay directly for their treatments. The treatment cost for the rest 6(14%) covered by community based health insurance.

Mean direct medical cost for hospitalized study subjects per admission was ETB 536.4(USD 19.4) with of S.D103.4 (USD 3.7) .Cost for drug was the largest of all other cost with mean and S.D of ETB 279(USD10), 89.55(USD 3.23),respectively, followed by investigation fee (mean=241.9, median=248), consultation fee (mean=15.4, median=20).

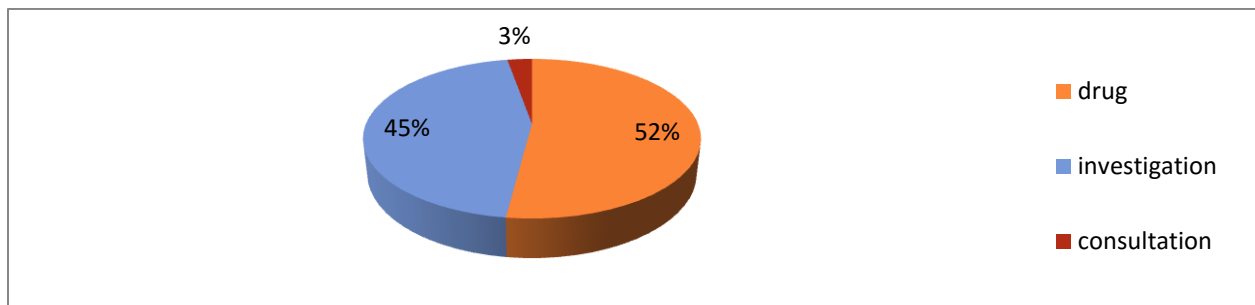


Figure 5: Direct medical cost components of inpatient in Arsi zone, Oromia region, Ethiopia

Sum of direct nonmedical cost per admission was ETB 7460.00 with mean of ETB173.4 (USD 6.27) The mean cost for transportation was ETB 33(USD1.2), expenditures for other different items related with illness (food, drink) and non-prescribed remedies were ETB 6035. (Table 6)

Table 6: patient side Inpatient direct costs of Asthma for hospitalized study subject, Arsi zone, Oromia region, Ethiopia 2018

Direct costs in ETB	Mean	Median	S.D	Sum
Direct medical cost (n=37)	536.40(\$19.4)	523.00(\$18.9)	103.41(\$3.74)	19847.00(\$717.8)
Costs of drugs	279.10(52%)	250.00	89.55	10326.00(37.8%)
Investigation fee	241.90(45.1%)	248.00	36.15	8951.00(32.8%)
Consultation fee	15.40(2.8%)	20.00	5.05	570.00(2.08%)
Direct nonmedical cost	173.50(\$6.2)	180.00(\$6.5)	119.20(\$4.3)	7460.00(\$269.8)
Transportation fee	33.14(19.1%)	30.00	13.71	1425.00(5.2%)
Costs for other expenses	140.35(80.1%)	150.00	114.26	6035.00(22.1%)
Total direct cost	635.04(\$22.97)	656.00(\$23.72)	257.80\$9.32)	27307.00(\$987.6)

5.4.3 Indirect costs

Patient side indirect cost

On average, each of the asthma cases had hospitalization for about 3.34 days with S.D of 1.32 days; the total working days lost were 231 days with average of 5.3 days. During this time the patient lost total ETB 4370 (USD 158) with mean and S.D of ETB 101.62(\$3.67) and 42.58(\$1.53), respectively. Time elapsed on travel to reach hospital vary from minimum of 5 minute to maximum of 120 minutes for single tripe, with mean of 30.8 minutes. The average waiting time at reception was 20.7minutes with minimum and maximum of 5 and 107 minutes, respectively. (Table 7)

Table 7: patient side Inpatient Indirect costs of Asthma for hospitalized study subject, Arsi zone, Oromia region, Ethiopia 2018

Lost time of patient	Mean	Median	S.D	Sum
Duration of stay in days	3.35	3.00	1.32	144.00
Days remained out of work	5.37	5.00	2.02	231.00
Waiting time at reception(minutes)	20.75	15.00	21.42	892.00
Lost productivity (patients)				
Amount of wages lost in ETB	101.63(\$3.67)	98.00(\$3.54)	42.58(\$1.53)	4370.00(\$158)

5.3.4 Companion side cost

Out of a total of 43 in patients hospitalized who stayed in one the of hospitals, all of them had a family or friend who accompanied them.

Cost for transportation was ETB 1205(USD 43.6) with mean and S.D of ETB 28(USD 1.01) and 15(USD0.54), respectively. Expenditure for other expenses (food, drink and bedroom) was ETB 8482(USD 306.7), with mean and S.D of 197.2(USD7.1) and 50.5(USD 1.8), respectively.

The mean direct nonmedical cost of companion was ETB 225.2(USD8.1) with S.D of 56.6birr (USD 2.04) and total forgone earning born by the Companion was ETB 4594(USD 166.1) (mean=106.8(USD 3.86), S.D=38.4(USD 1.39)) due to 171 working days lost with average of 4 days. (Table 8)

Table 8: Companion side direct non medical and indirect costs of inpatient Arsi zone, Oromia region, Ethiopia 2018(n=43)

Direct nonmedical costs (ETB)	Mean	Median	S.D	Sum
Transportation Fee	28.02	30.00	15.04	1205.00
Cost for Other expenses(food, drink and bedroom)	197.26	198.00	50.50	8482.00
Total direct nonmedical costs	225.30(\$8.14)	218.00(\$7.88)	56.67(\$2.04)	9687.00(\$350.34)
Indirect costs				
Time for transportation (minutes)	29.00	20.00	22.24	1245.00
Days lost from work to accompany	4.00	3.00	1.67	171.00
Amount of wages lost in ETB	106.80(\$27.86)	100.00(\$3.61)	38.50(\$1.39)	4594.00(\$166.14)

5. 5 Emergency Treatment cost

Among 237 study participants 96(40.5%) have visited emergency department of health facilities with acute attack of asthma within past six months. Emergency total treatment cost of ETB 34,122(USD1234.06) with per patient per-visit mean and S.D of 355 and 451.6, respectively. During their emergency treatment on average they lost 1.88days with S.D of 0.96days.(Table 9)

Table 9: Emergency Treatment cost of Asthma patient in Arsi zone, Oromia region, Ethiopia 2018

Emergency treatment cost	Mean	Median	S.D	Sum
Emergency treatment cost	355.44(\$12.85)	250.00(\$9.04)	451.60(\$16.33)	34122.00(\$1234.06)
Days lost from work	1.90	2.00	.96	181.00

5.6 Total Outpatient and inpatient patient side treatment cost of Asthma

Table 10: Total Outpatient and inpatient patient side treatment cost of Asthma, Arsi zone, Oromia region, Ethiopia 2018

Total patient side cost						
	Outpatient cost			Inpatient cost		
	Direct	Indirect	Total	Direct	Indirect	Total
Mean	504.9	140.20	517.90	635.05	101.60	736.65
Median	498.5	98.00	519.50	656.00	98.00	761.00
S.D	278.2	131.35	283.30	257.8	42.60	264.05
Sum	97952.00	2524.00	100476.00	27307.00	4370.00	31677.00

5.6 Predictors for variation in patient related cost

Multiple linear regressions

To determine which socio-demographic characteristics influenced cost, a multiple linear Regression model was fitted to the cost data for total cost of asthma patient.

Bivariate analysis identified nine candidate variables associated with cost of asthma at Hospital. The nine variables at probability level of $P < 0.25$ were age, urban, emergency visit, male, Distance, family size, family monthly income, participant income and Duration of illness Of patient.

The final model includes three variables, all of which were significantly associated with patient side total cost of asthma ($p < 0.05$):

Age of study participant, family monthly income and distance from hospitals were significantly associated with total cost of asthma.

Being the age of participant increases by one year total cost of patient increase by 2.83 birr by holding other variable constant, When there is a one unit increases in family monthly income the total patient cost increases by 0.14 birr by holding other variable constant.

Change in distance one km the total patient cost increases by 2.05birr by holding other variable constant.

The adjusted R^2 value for this model was 60 % ($F(190, 3) = 5.08, P = 0.002$). This indicates that the variability in the cost was 60% explained by the predictor variables in the model but the left variability due to the other factors.

Multiple linear regression model equation

$$y' = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 \dots + \beta_pX_p + \text{ where}$$

y =cost of asthma

β_0 =intercept (constant)

β = regression coefficients (slope)

X_1 = distance from Hospital

X_2 =family monthly income

X_3 =age of participant

The estimated Multiple Linear Regression Equation is:

$$\text{Cost of asthma} = 555.596 + 2.05(\text{distance}) + 0.14(\text{family income}) + 2.831(\text{age})$$

Table 11: Multiple Linear regression model for total patient treatment cost of Asthma, Arsi zone, Oromia region, Ethiopia 2018

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	555.596	47.627		11.666	.000	461.651	649.541
Distance in km	2.051	.735	.208	2.792	.006	.602	3.500
Family monthly income	.014	.005	.181	2.549	.012	.003	.024
Age of participant	2.831	1.085	.191	2.609	.010	4.971	.691

6. Discussion

This study was held in order to assess the cost of asthma and to identify factors associated, and has produced some important key findings related to the cost of asthma that may contribute to better healthcare planning. It indicates how much society is spending. This can be used as an input for further economic evaluation of asthma.

There have been scarce studies examining the cost of asthma in Africa. Comparison of our findings with other countries would be of limited value because of the difference in the method used, the pattern of health services utilization and the health care system.

The result of the present study reveals that the mean age of the respondents was 43 year, the age the majority of were within the age range between 28 and 47 years. Majority of them is farmers and followed by housewives and most of the respondents were having no formal education. Attention should be given to asthma control particularly in patients at productive age because of its social and economic consequences on the patient as well as the whole community. These characteristics of the study participants were consistence with studies conducted in Nigeria. (16).

With regard to their residency majority 131(55.3%) were urban ,this similar to research done in Sub-Saharan Africa (11)The average number of asthma-related outpatient visits was 3.9 per year.

The Mean direct outpatient cost per visit was 504.9birr (18.26USD) takes the largest share compared with the indirect counterpart ETB 140.22(5.07USD); even more than triple. These is lower than studies done in Turkey in 2010 \$244.44 (36) and Nigeria(30.7USD) (16). From total direct cost components costs of drugs represents the largest share (40.4%), these findings are lower than study done in Brazil(62.2%) and Greece(63.9%) (28, 30) this may be due to difference in health systems .

Average cost of medication for outpatient asthma patient per visit was USD 9.11 ,these are lower than study done in Turkey 2010 (USD 37.63) (36) this may be due to difference in health systems .

Total mean inpatient cost for hospitalized patients per admission was 736.67(26.64USD) .The average direct inpatient cost per admission was birr 635.04(23USD). These was lower than study done in Turkey (USD 293) (36) this may be due to difference in health systems .

Total emergency cost born by Asthma patient was ETB 34122.00 (1234.06USD) .The average emergency cost per patient per visit was birr 355.43 (12.85USD) which is lower than studies done in Malaysia(US\$ 46.64 ± 28.30) (37)

Mean direct cost per visit was higher among inpatient when compared to outpatient, this was similar with study done in (Turkey 2011).this slightly similarity could be due to unity of analysis.

Accordingly, all direct cost items were significantly higher among inpatient population when compared to outpatient follow-up in asthma in this study.

Total companion side direct non medical cost of outpatient was ETB 30628(\$1107.70) with average of birr 223.5(\$8.08) and total companion side direct non medical cost of inpatient was ETB 9687(\$350.34) with average of birr 225(\$8.13).This studies result shows that total direct non-medical cost higher for outpatient companion this may be due to more number of outpatient visit.

A multiple linear regression model analysis identified a number of variables featured in questionnaire as being associated with cost of asthma. Three of them associated with total patient cost were age of study participant; family monthly income and distance from hospitals were associated with the higher patient side cost.

Also, we show that costs of asthma treatment did not differ significantly across sex, occupation status, and educational status.

7. Conclusion

This study was planned to answer the two main research questions: How much financial burden do have asthma on patients, and their families, care-givers and on the society at large? The second question was: what are the predictors that explain the variation of patient side cost in different group? Despite its limitation, this cost of illness study is the first attempt to estimate the direct and indirect costs of patients and their families associated with the asthma.

Average direct outpatient cost per visit takes the largest share compared with the indirect counterpart, even more than triple. Average cost of hospitalization for asthma patient per admission was higher than outpatient per visit average cost of treatment.

Average indirect outpatient cost of treatment of asthma patient was higher than, inpatient indirect cost of treatment of asthma patient per admission.

Treatment cost of asthma dependent on patient age, family monthly income, and distance from hospital. This study indicates that the cost of asthma on patients and their families was substantial.

8. Limitation of the Study

- This study was limited to patient side and their families' cost only due to time constraints.
- Cross sectional study design limitation and cost data were obtained from the patients; this is subject to a potential recall bias.
- Indirect cost (productivity loss) calculation did not expressed in price rather than days lost.
- Moreover, since the study is health facility based its findings cannot be generalized to the general population

9. Recommendation

- Health policy should emphasis on improving asthma control could benefit not only patients but also the economies of our countries, reductions in the cost of asthma care, increases in productivity, and patient wellbeing could be achieved
- Patients have to be encouraged to enroll into health insurance schemes in order to decrease direct medical costs.
- Advice patients to utilize nearby health center in order to decrease direct non medical cost
- Further studies with different methodology should be done on cost of asthma from both provider and patient perspective. Also studies should be done including intangible cost.

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ANNEXES

Questionnaires

Good Day! My name is _____and I am a student at Jimma University Institutes of Public Health, currently conducting a research to assess the Cost of Asthma on patients and their families in_____ Hospital. Thus, I am requesting your cooperation to fill out the survey question which will take about 20-30 minutes to complete. Participation in this survey will be voluntary, and if don't want to participate or if there is any question you don't want 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. A finding it may help to design appropriate strategies and improves health of asthma patients and their family. I hope you will participate in the survey as your participation is important.

Thank you very much for your cooperation!!

Do you have any questions?

The Respondent agreed to be interviewed ----- continue with interview.

If the respondent does not agree to be interviewed -----end with thanks.

107	What is your ethnicity?	1.Oromo 2.Amhara 3.Tigray 4.Gurage 5.Others (Specify)_____	
108	Where is your permanent residence area?	1. Rural _____ 2.Urban _____	
109	Number of Family members	_____	
110	How many are working at moment?	1. _____ 99.Refused to tell	
111	What is your family monthly income?	1. _____ Birr 98.I don't know 99.Refused	
112	What is your monthly income?	1. _____ Birr 98.I don't know 99.Refused	
113	Cigarette Smoking	1.Never smoked 2.Former smoker 3.Current smoker	

Section Two. Outpatient costs of Asthma at Hospital

S. No	Questions	Possible answer	Skip
-------	-----------	-----------------	------

201	How long have you been an outpatient for asthma treatment?	1. _____ days 98.I don't know 99.Refused to tell	
202	During , an outpatient on average, how Long do you wait at reception to see a doctor?	1. _____ hours 98.I don't know 99.Refused to tell	
203	Are you new visit or repeat or do you have appointment?	1.first visit 2.repeat 3. I have appointment	
204	How many outpatient visits have you had in that time?	1. _____ days 98.I don't know 99.Refused to tell	
205	How many days have you remained from work being an outpatient?	1. _____ days 98.I don't know 99.Refused to tell	
206	During you remained from work do you lost your wages?	1.yes 2.no	If no, skip to Q208
207	Amount of wages lost from work?	1. _____Birr 98.I don't know 99.Refused	
208	Did you have to pay anything for your treatment, drugs or tests?	1.yes 2.No	If no, skip to Q214

209	How much have you spent on Prescribed drugs while you were an outpatient?	1. _____Birr 98.I don't know 99.Refused	
210	How much have you spent for laboratories while you were an outpatient?	1. _____Birr 98.I don't know 99.Refused	
211	How much have you spent for X-ray while you were an outpatient?	1. _____Birr 98.I don't know 99.Refused	
212	How much have you spent for Ultrasound while you were an outpatient?	1. _____Birr 98.I don't know 99.Refused	
213	How much have you spent on registration cards?(consultation)	1. _____Birr 98.I don't know 99.Refused to tell	
214	How much have you spent on any other non-prescribed remedies?	1. _____Birr 98.I don't know 99.Refused to tell	
215	While you were an outpatient do you pay for food?	1.yes 2.no	If no, skip to Q217
216	How much have you or any visitors spent on your food?	1. _____Birr 98.I don't know	

		99.Refused to tell	
217	Distance from your home to hospitals	1. _____k.m	
218	What is the means of transportation to get to Hospital?	1.On foot 2.Taxi/bus 3.On back of animals 4.Other(specify)_____	
219	How long does it take you to get the health service site?	1. _____hours/minutes 98.I don't know 99.Refused to tell	
220	Total cost of transportations fee for one trip?	1. _____Birr 98.I don't know 99.Refused to tell	
221	Has anyone from your family or friends looked after you during your treatment?	1.yes 2.No	If no, skip to Q. 231
222	If yes to Q.221, number of days lost from work to accompany you?	1. _____days 98.I don't know 99.Refused to tell	
223	If yes to Q. 221, what is their monthly income?	1. _____birr 98.I don't know 99.Refused to tell	

224	If yes to Q.221, Do any of the care-givers lose any income because they cared for you?	1.yes 2.No	If no, skip to Q226
225	If yes to Q. 224, amount of wages lost per days lost from work?	1._____birr 98.I don't know 99.Refused to tell	
226	What is the means of transportation for caregivers to get to the health facility?	1.On foot 2.Taxi/bus 3.On back of animal 4.Other(specify)_____	
227	How long does it take them to get the health service site?	1._____hours/minutes 98.I don't know 99.Refused to tell	
228	How much did he/she spend for transportation fee?	1._____birr 98.I don't know 99.Refused to tell	
229	How much did he/she spend for food and drink on the way to here with you?	1._____birr 98.I don't know 99.Refused to tell	
230	How much did he/she spend for bed-room on the way to here with you?	1._____birr 98.I don't know 99.Refused to tell	

231	What is your financial source for asthma treatment?	1. Government free 2. Insurance 3. Self 4. Family/relatives 5. Sale of asset 6. borrowing 7. From our saving 8. Other(Specify)_____	
232	If yes to Q.224, amount of cost for other expenditures?	1. _____ birr 98. I don't know 99. Refused to tell	

Section Three: Household economic status and spending

301	What is the main source of energy in the house?	1. Fire wood 2. Charcoal 3. Animal dung 4. Kerosen 5. Electricity 6. Solar 7. Other(specify)_____	
302	What is your household expenditure in the last month for items listed in average (in Birr)?	1. Food items _____ birr 2. House rent _____ birr 3. Transport _____ birr 4. Health _____ birr 5. Water _____ birr 6. electricity _____ birr 7. Other household _____ birr	

Section Four. Inpatient costs of asthma (only for ever hospitalized)

S.No	Question	Possible answer	Skip
401	How many days did you stay in hospital?	1. _____ days 98.I don't know 99.Refused to tell	
402	During , an outpatient on average, how long do you wait at reception to see a doctor?	1. _____ hours 98.I don't know 99.Refused to tell	
403	Did you have to buy anything special for your stay in hospital?	1.Yes 2.No	if no ,skip to Q 405
404	If yes, How much have you spent?	1. _____ birr 98. I don't know 99.Refused to tell	
405	How many days have remained from work being an inpatient?	1. _____ days 98. I don't know 99.Refused to tell	
406	Did you lose any income as a result of being in hospital?	1.Yes 2.No	if no, skip to Q 408
407	If yes, How much have you spent per days lost from work?	1. _____ birr 98. I don't know 99.Refused to tell	

408	Did you have to pay anything for your treatment, prescribed drugs or tests since Being in this hospital?	1.Yes 2.No	if no, skip to Q 414
409	If yes, How much have you spent on prescribed drugs?	1. _____ birr 98. I don't know 99. Refused to tell	
410	If yes, How much have you spent for laboratories investigations?	1. _____ birr 98. I don't know 99. Refused to tell	
411	If yes, How much have you spent for X-ray investigations?	1. _____ birr 98. I don't know 99. Refused to tell	
412	If yes, How much have you spent for Ultrasound investigations?	1. _____ birr 98. I don't know 99. Refused to tell	
413	If yes, How much have you spent on registration cards?	1. _____ birr 98. I don't know 99. Refused to tell	
414	How much on any other un-prescribed remedies?	1. _____ birr 98. I don't know 99. Refused to tell	

415	While you were an outpatient do you pay for food?	1.yes 2.no	If no skip to Q417
416	How much have you or any visitors spent on your food while in hospital?	1. _____ birr 98. I don't know 99.Refused to tell	
417	Distance from your home to hospitals	1. _____ k.m	
418	What is the means of transportation to get to Hospital?	1.On foot 2.Taxi/bus 3.On back of animals 4.Other(specify) _____	
419	Amount cost for one trip transportation?	1. _____ birr 98. I don't know 99.Refused to tell	
420	Has anyone from your family or friends looked after you during your stay in the hospital?	1.Yes 2.No	If no, skip to Q 430
421	If yes, number of days lost from work to accompany you?	1. _____ days 98. I don't know 99.Refused to tell	
422	If yes, what is their monthly income?	1. _____ birr 98. I don't know 99.Refused to tell	
423	Do any of the care-givers lose any income because they cared for you?	1.Yes 2.No	If no, skip to Q 425

424	If yes, amount of wages lost per days lost from work?	1. _____birr 98. I don't know 99.Refused to tell	
425	If yes, what is the means of transportation for caregivers?	1.On foot 2.Taxi/bus 3.On back of animal 4.Other(specify)_____	
426	If yes, how long does it take them to get the health services site?	1. _____hours or _____minutes 98. I don't know 99.Refused to tell	
427	If yes, amount of cost for one trip transportation?	1. _____birr 98. I don't know 99.Refused to tell	
428	How much did he/she spend for food and drink on the way to here with you?	1. _____birr 98. I don't know 99.Refused to tell	
429	How much did he/she spend for bed room on the way to here with you?	1. _____birr 98. I don't know 99.Refused to tell	
430	What is your financial source for Asthma treatment?	1.Government free 2.Insurance 3.Self 4.Family/relatives 5.Sale of asset 6.borrowing 7.From our saving	

		8.Other(Specify)_____	
431	If yes, amount of cost for other expenditures?	1. _____birr 98. I don't know 99.Refused to tell	

Section Five Emergency visit

501	Did you have an emergency visit in the 6 month/ not regular visits?	1. Yes 2. No	
502	If yes in Q 501, how many times do you visit, how many days do you had during it?	1. _____ times 2. _____Days	
503	During your emergency case from where do get services?	1. Government Hospitals 2. Health centers 3. Private health facilities 4. Others _____	
504	In last 6 months, how much was your total emergency medication/treatment costs?	_____birr	
505	During your emergency visits was a Caregiver with you?	1. Yes 2. No	
506	If yes in Q 505 for how many days the stay, Consider Only main caregiver	_____ Days	
507	In last 6 months emergency visits, How much you and your caregiver cost in other expenditure like cafeteria and not considered above?	1. _____ birr in 1 st visit 2. _____ birr in 2 nd visits 3. _____ birr in total	

Questioner Afan Oromo version Gaafannoo ragaan ittin sassaabamu

Seensa

Fayyaan/nagaan isinif yaa ta'u, akkam oltan /tte, Ani _____ jeedhama.

Kanan baradhu Yunivarsiiti jimmatti koollejji saayinsii fayyaa sagantaa diigri lammaffa gosa barnoota Dinagdee Fayyaa yoo ta'u, Qo'annoon kun "dhukkubni Asmii dhukkubsataa fi maatii isaa irratti dhibbaan baasii dingadee" kan jedhu dha.

Qo'annoon kun dhukkubni Asmii dhukkubsataa fi maatii isaa irratti dhibbaan baasii dingadee irratti qabu tilmaamuf faayida gudda qaba. Isin qo'annoo kanarratti kan filatamtan haal-dure tokko malee yoo ta'u, feedhii keessan qofa irratti kan hundee dha. Qo'anno kana irratti mirgi hirmaachu dhabu keessani kan eeggame dha. Garu hirmaachun keessan qo'annoo kanaaf bu'a gudda waan buusuf Sababa dhukkubaatin baasi diinagdee bahuf qabatamaan tilmaamu waan nudandeessisu fi rakkoo kanaaf furmaata kaa'uf waan gargaaruf akka hirmaattan isin jajjabeessina. Turmaata gabaaba waliin qabnuuf gaafiwwan muraasa isinif dhiyeessina. Gaafin isinif dhiyaatu odeeffannoo wali-galaa, haala fayyummaa keessani , baasii sababa dhukkubaatin isin irra gahe fi dhimmoota kanaan wal-qabatan ta'a. Gaafannoon kana keessatti waantoonni namummaa keessan ibsu hin barreefamu. Gaafannoon kun harka namaa biraa haala hin gallen kan eggammu dha. Kanaafu ragaan kennitan icitin isa kan eeggeme dha. Bu'an/argannoon qoo'annoo kana akka barbaachisumma isaatti yoo dhiyaatu icciti dhunfa keessani kan ibsu hin dhiyaatu. Qoo'annoo kana irratti hirmaachuf feedhi yoo qabaattan ta'e gaafiwwan waliigalaf daqiqaa 20-25 fudhachu danda'a. Gaafii qabdu?

Qo'annoo kana irratti himaachu fi fedhi keessan nuf ibsu/kennu/dandeessu?

Eeyyan_____ (Gaafi fi deebii keenya jalqabu dandeenya)

Hindanda'u _____ (gaaficha addan kuta).

Maqaa raga guree _____ Mallattoo _____ Guyyaa _____

Maqaa too'ata _____ Mallattoo _____ Guyyaa _____

Kutaa tokko: Haala waliigala raga hawaasumma fi diinagdee

Lakk.	Gaffilee	Deebiwaan filanno	Irra darbii
101	Saala	1.dhiira 2.dhaala	
102	Umriin keessan meeqa?	1. _____ 98.hin beeku 99.odeefanon hin jiruu	
103	Yeroo ammaa kanaa haalii gaa'eelaa keessani akkami?	1.kaa gaa'eelaa hin qabnee 2.kaa gaa'eelaa qabuu 3.. Du'an kan adda bahan 4.gaa'eelaa kan qabuu garuu kaan waliin hin jirane 5.seeran gaa'elii isaan kaan diigamee	
104	Sadaarkan baruumsaa keessanii meeqa?	1.kaan barumsaa idlee hin baraatiin 2.Barumsaa marsaa duraa 3. Barumsaa sadaarkaa lammafaa 4.Koljii fi isaa olii	
105	Hojiin guddan keessan ji'oota kudhaa lamaan darbaanii keessatii maali innii?	1.qoteebulaa 2.hadhaa manaa 3.Kan qacaramee 4.dafiqaan buula 5. barataa 6. hojii dhaaba 7.hojaata dhaabataa dhuunfaa 8.dhuukubaa irra kan kae kan dalaguu hin dandenyee 9. Kaan biiroo_____	
106	Ammantaan keessan maali?	1.Ortoodoksii 2.Proteestantii 3.Musilimmaa 4 .Katoolikii	

		5.Kaan biiroo_____	
107	Saabiinni keessan maalidha?	1.Oroomo 3. Tigiree 5. kaan biiroo_____	2.Amaraa 4.Guraagee
108	Dhaabataan eesa jiraatu?	1.Baadiyya	2.Magaala
109	Maatiin keessan meeqa?	1._____ 99. odeefanoon hin jiruu	
110	Maatii keessan keessa namaa meeqatuu dalaagaa qabaa?	1._____ 99. odeefanoon hin jiru	
111	Gaaliin waaliigalaa maatii keessani ji'atti meeqa?	1.____qarshii 98. hin beeku	99. odeefanoon hin jiru
112	Gaaliin dhuunfaa keessan ji'atti meeqa?	1.____qarshii 98. hin beeku	99. odeefanoon hin jiru
113	Tamboo xuuxanii beektuu?	1.Xuuxee hin beekuu 2.Duuran nan xuuxa 3.Ammaa nan xuuxa	

Kuuta lammaaffa: Dhuukubsaata dhuukuba Asiiimii Eerrigaa taatanii booda baasiin deedebeii hospitaalatii bayee(opd)

201	Deedebeitanii walanaamuun haangam turtaan?	1.____guyyaa 98. hin beeku	99. odeefanoon hin jiru
202	Hospitaala keesatti yaalii/ogeessa argachuuf sa'aatii meeqa eegde?	1.____sa'aatii 98. hin beeku	99. odeefanoon hin jiru
203	Reefu yaalaaf dhuftanimoo deddeebi'aa turtani? Beellama qabdumoo xumurtanii jirtu?	1.Reefu yaalaaf dhufee 2.deddeebi'aa turee 3Beellama qaba	

204	Yeroo meeqaafii hospitaalatti deedebitaanii walanaamtaani?	1.____ 98. hin beeku 99. odeefanoon hin jiru	
205	Guyyaa meeqaafii walansaafii hojiirra haftaanii?	1.____guyyaa 98. hin beeku 99. odeefanoon hin jiru	
206	Yeroo hojii irraa haftan miindaan keessan sinirraa cita ture? (yoo miindeffamaa tahan)	1. Eeyaan 2.miti	
207	Guyyaa haftaan kaana keessatii qarshii meeqa dhaabidaani? (miindaa, daldala, qonnaa, etc)	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
208	Yeroo deedebitaanii yaalamitaan yaalafi ni qarsii bafiitaan?	1.Eeyaan 2.Hin baasuu	Lammaa yoo tae garaa 209tii darbii
209	Qorchaa ogeessa fayyaatiin isiin ajaajameefi qarshii meeqa bafiitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
210	Yeroo deedebitaan labiiratoorifi qarshii meeqa bafiitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
211	Yeroo deedebitaan rajiifi qarshii meeqa bafiitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
212	Yeroo deedebitaan alitiraasawondifi meeqa bafiitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
213	Kardiifi qarshiii meeqa baftaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
214	Qorichaa ogeessa keessaniin ajaajameen alaati dhukkubaan waal qabatee qarshii meeqa baaftan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
215	Yeroo hospitaalatti deddeebitan nyaata bittanii nyaatu turee?	1. Eeyaan 2.miti	

216	Yoo, eeyyee jettan Nyaataf isiinif ta'ee namaa isiin waliin jiruu wajjin qarshii meeqa baaftaani?	1. ____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
217	Manni keessan hospitaala itti yaalamtan irraa hagam fagaata?	_____ km	
218	Garaa hosipitaala maliin imaalitaan(deemitaani)?	1.lukkaan 2.konkoolataa 3.beeyiladaan 4.kaan biiroo__	
219	Imaali garaa hosipitaala yeroo hangaami isiiniti fudhatee?	1. ____ daqiiqa/saatii 98. hin beeku 99. odeefanoon hin jiru	
220	Geejibba imaalatiif marsaa tokotti qarshii meeqa baaftaanii?	1. ____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
221	Yeroo walaanamtaan mattii ykn hirriyaan isiin walansisee jiraa?	1.eyyen 2.hin jiruu	2 yoo ta'ee garaa 301tii darbii
222	isiin walansisuuf guyyaa meeqa hojii idilee irra hafee/te	1. ____ guyyaa 98. hin beeku 99. odeefanoon hin jiru	
223	Namnii isiin walaansisuu sunii ji'aan hangamii galiin argaata?	1. ____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
224	Namnii isiin walansisuu suunii yeroo isiin walansisuu galiin inni dhabee jira?	1.Eeyaan 2.hin jiruu	
225	Walaansisaan guyyota walaansisuuf hafee keessati galiin inni dhabee qarshiidhan meeqa taaa?	1. ____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
226	Namnii isiin walaansisuu iddoo sanii geejiba maalin imaala ture?	1.lukkaan 2.konkoolataa 3.beeyiladaan	

		4.kaan biiroo__	
227	Namnii isiin walaansisuu idoo sani gayuufi yeroo hangamii itti fudhatee?	1.____daqiqqa/saatii 98. hin beeku 99. odeefanoon hin jiru	
228	Walaansisaan suunii geejibaaf qarshii hangaamii baasee?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
229	Walaansisaan suun yeroo isiin hojiin dhufuu sanii nyaataf, fi dhugaatif qarshii hangaamii kanfaalani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
230	Walaansisaan suun yeroo isiin hojiin dhufuu sanii sireefi qarshii hangaamii kanfaalani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
231	Yaali dhukuuba asmiitiif maddii galii keessanii essayii?(deebiin tokkoo ol ni dandamaa)	1.yaala bilissa(motuumman) 2.inshuransii 3.galii dhuunfatin 4.mattii/hirriyootaan 5.qabeenyaa gurguruunii 6. liqii 7.Qusanoo dhuunfaako irraa 8.kaan biro_____	
232	Basiwaan hin erramiin yoo jirataan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	

Kutaa sadaffa ;Basiifi galii mana keessa

301	Maddii aniisaa mattii keetii irraa caalanii maali?	1.mukaa 2.cilee 3.koobota 4.nafixaa(kurazii) 5.ibsaa 6.kaan biro	
302	Ji'aa dabree basin giddugaleessa mattii keessanii dhimootaa eraaman hangaami?	1.nyaataf____qarshii 2.kiraa manaatif____qarshii 3.geejibaaf_____qarshii	

		4.fayyaaf_____ qarshii 5.bishaanif_____ qarshii 6.ibsaaf_____ qarshii 7.kardii mobaayiliif_____ qarshii 8.baasii birootif_____ qarshii	
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Kutaa afraaffa:Dhibee Asmiitin ergaa ciifitaanii walaanamuu egaalitaanii booda basin bayee(ciisanii kaan walanaamaniif qofa)

401	Hosipitaala keessa guyyaa meeqaf turaatani?	1.____guyyaa 98. hin beeku 99. odeefanoon hin jiru	
402	Hospitaala keesatti yaalii/ogeessa argachuuf sa'aatii meeqa eegde?	1.____ sa'aatii 98. hin beeku 99. odeefanoon hin jiru	
403	Turtii hosipitaalatin meeshan adda bitaan jira(fashaa,gowani,shabaxiifi kkf)?	1.eyaan 2.hin jiru	2 yoo tae garaa lakk 404tii dabrii
404	Meshaan bitaan qarshii meeqa isiiniti fixee?	1.____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
405	Ciifitaanii walaanamaa ergaa tataaniraa guyyoota meeqa dalagaa idilee irra haftaan?	1.____guyyaa 98. hin beeku 99. odeefanoon hin jiru	
406	Ciifitaanii walaanamaa yeroo tataanitii galiin dhaabidaan jiraa?	1.eyyen 2.hin jiru	2 yoo tae garaa lakk 407tii dabrii
407	Ciifitaanii walaanamaa ergaa tataaniraa guyyaatii galiin giddu galeessi dhabidanii qarshiidhaan hngaami?	1.____ qarshii 98. hin beeku 99. odeefanoon hin jiru	
408	Ciifitaanii walaanama erga tataanii yaaliif basinin yaalif godhamuu(dawaafi,qorannofikkf) hin kanfalitaan turee?	1.eyyen 2.hin kanfaluu	2 yoo tae garaa lakk 411tii dabrii
409	Ciifitaanii walaanamaa yeroo tataanitii	1.____ qarshii	

	walaana keetiin dawaa isiinif ajaajamee bituuf qarshii hangaamii baftaan?	98. hin beeku 99. odeefanoon hin jiru	
410	Ciiftaanii walaanamaa yeroo tataniira kutaa qorannoo labiratoorifi qarshii hangaamii baftaani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
411	Ciiftaanii walaanamaa yeroo tataniira kutaa qorannoo rajiifi qarshii hangaamii baftaani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
412	Ciiftaanii walaanamaa yeroo tataniira kutaa qorannoo alitiraasawondifi qarshii hangaamii baftaani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
413	Ciiftaanii walaanamaa yeroo tataniiti kardiif qarshii hangamii bafitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
414	Ciiftaanii walaana yeroo tataniratti walaana keetiin dawaa ajaajameen alaa dibee ketiin kaan walqabataa,huccufi nyaata adda addaatif kkf qarshii hangaamii bafitaani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
415	Yeroo hospitaalatti Ciiftaanii nyaata bittanii nyaatu turee?	1. Eeyaan 2.miti	
416	Ciiftaanii walaanamaa yeroo tataniiti nyaataaf isiin ykn gargaara keessanif qarshii hangaamii baftaani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
417	Manni keessan hospitaala itti yaalamtan irraa hagam fagaata	_____km	
418	Garaa hosipitaala maliin imaalitaan?	1.lukkaan 2.konkoolataa 3.beeyiladaan 4.kaan biiroo__	
419	Geejibaaf qarshii marsaa tokkotti hangaamii kaffalitaan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
420	Miseensaa maatii ,firaa ,hirriyaa ykn kaan	1.eyyen	2 yoo tae

	biroo kaan isiin walaanisisuu ninjiraa?	2.hin jiru	garaa lakk 501tii darbii
421	Isiin walaanisisuufi guyyaa hangaamiif hojii idilee irra hafaani?	1.____guyyootaa 98. hin beeku 99. odeefanoon hin jiru	
422	Walaanisiisan keessan galiin jiaa isaa hangaami?	1.____guyyootaa 98. hin beeku 99. odeefanoon hin jiru	
423	Walaanisiisan keessan yeroo isiin walaanisiisuu galiin innii dhabuu jiraa?	1.eyyen 2.hin jiru	
424	Walaanisiisan walaanisiisuufi guyyaa hafee keessa tti giddugalaan galiin dhaaban qarshiin meeqa?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
425	Namnii isiin walaansisuu iddoo sanii geejiba maalin imaala ture?	1.lukkaan 2.konkoolataa 3.beeyiladaan 4.kaan biiroo	
426	Namnii isiin walaansisuu idoo sani gayuuf yeroo hangamii itti fudhatee?	1.____daqiqqa/saatii 98. hin beeku 99. odeefanoon hin jiru	
427	Walaansisaan sun geejibaaf qarshii hangaamii kanfaalani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
428	Walaansisaan suuni yeroo isiin hojiin dhufuu sanii nyaata fi dhugaatif qarshii hangaamii kafaalani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
429	Walaansisaan suuni yeroo isiin hojiin dhufuu sanii sireefi qarshii hangaamii kanfaalani?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	
430	Yaali dhukuuba asmiitiif maddii galii keessanii essayii?(deebiin tokkoo ol ni dandamaa)	1.yaala bilissa(motuumman) 2.inshuransii 3.galii dhuunfatin iraa 4.mattii/hirriyootaan 5.qabeenyaa gurguursisuun 6. liqii 7.Qusanoo dhuunfaako irraa	

		8.kaan biro_____	
431	Basiwaan hin erramiin yoo jirataan?	1.____qarshii 98. hin beeku 99. odeefanoon hin jiru	

Kutaa shaanaffaa: basii dhukkubaa tasaaf

501	Ji'aa jahaan dabraani keessati dhukkuba asimii waliin waliqabatee dhubiin tasaa isiin muddatee turee?	1.eyye 2.hin jiruu	
502	Gaffii asii olitifii deebiin keessan eyye yoo taae jiaa 6ti guyyaa hangamii,waligalaan guyyaa meeqa isiniiti fudhaate?	1.____yeroo 2.____guyyaa	
503	Yeroo dhukkubii tasaa tajaajila yaala essa arigatuu?	1.hospitalaa motummaa 2.buufataa fayyaa 3. dhaabataa fayyaa dhunfaa 4. kaan biro	
504	Ji'aa dabiraan 6 keessatii yaalii dhuukubaa tasaatif basii hangaam turee?	_____qarshii	
505	Ji'aa 6 dabiraanyeroo dhuukubaa tasaa namnii isiin gargaaruu , walaanisisuu qabduu turee?	1.eyye 2.hin jiruu	2 yoo taae irraa dabrii
506	Deebbiin eyye yoo taae garigaaraa meeqa qabduu;hanigaam turtaani;giddugalaan mindaa/galii hanigaami base?	1.____gargaarasaa kenna/walaanisiisa 2.____guyyaa	
507	Ji'aa 6n dabraani keessatii sabaabii dhuukubaa tasaatin ofiif walaanisisaan wantoota addaa adda kaan akka nyaata,shayii, bunnaa fi kaanen biroof baasii hangaamii bafitaani?(wantoota olitii eramaaniif)	1.____qarshii marsaa duraa 2.____qarshii marsaa lammaaffa 3.____qarshii waliigalaa	

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.

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Signature: _____

Name of the institution of health faculty of Public health

Date of submission: _____

This thesis has been submitted for examination with my approval as University advisor

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Date. _____ Signature _____

Successfully defended final thesis