Addis Ababa University

College of Health Sciences

School of Public Health

CATASTROPHIC OUT OF POCKET EXPENDITURE FOR CANCER CARE AMONG HOSPITALIZED CANCER PATIENTS IN ADDIS ABABA, ETHIOPIA

By;

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Abbreviations/Acronyms

CBHI	Community based health insurance
CHE	Catastrophic health expenditure
COOPE	Catastrophic out of pocket expenditure
LMIC	Low- and middle-income country
MOH	Ministry of health
OOP	Out of pocket expenditure
UHC	Universal health coverage
WHO	World health organization

Abstract

Background: Out of pocket (OOP) expenditure for cancer care exposes households to unanticipated expenditure. When the available health service is mainly dependent on out of pocket expenditure, then the household will face catastrophic health expenditure. Accordingly, this study aimed to estimate the incidence and intensity of catastrophic out of pocket expenditure for hospitalized cancer patients and to identify coping strategies and associated factors.

Method: Hospital based cross-sectional study was conducted in Addis Ababa city. Two public and three private hospitals were included in the study. Hospitals were selected based on their cancer case annual report and the sample size was proportionally allocated based on their patient load. The study participants were inpatient cancer cases who were on treatment follow up for the last one year preceding the interview date. The data was collected through face-to-face interview using structured questionnaire. All direct medical and non-medical and indirect expenditures were calculated. Indirect expenditure was calculated by using human capital model. The data were interred to Epi data3.1 and exported to STATA 16 for analysis. Multivariable logistic regression was applied to assess the relationship of CHE and the independent variables. For this study, household that spent ≥40% of nonfood expenditure for cancer care considered as catastrophic. Sensitivity analysis at different thresholds (20%, 25%, 30%) was done.

Result; The incidence and intensity (mean positive overshoot) of CHE at 40% threshold of households' non food expenditure (capacity to pay) was 77.7% and 78.3%, respectively. CHE for cancer care was significantly associated with the type of facility, patient residence, cycle of chemotherapy, insurance enrolment and income quintiles. Saving and selling assets were identified as the main coping mechanisms.

Conclusion; The incidence and intensity of catastrophic out of pocket expenditure among cancer inpatients is very high**.** Improve quality and coverage of health insurance and decentralizing cancer care to regions at similar standard with Addis Ababa will save households from incurring CHE**.**

Key words: Catastrophe, out of pocket expenditure, coping mechanisms, cancer

Chapter one: Introduction

1.1. Background

Cancer is one of the non-communicable diseases and second leading cause of death globally, which causing a substantial economic burden on cancer patients and their families[1]. World health organization (WHO) global cancer report indicates that in 2018, 18.1 million people around the world diagnosed for cancer disease, and 9.6 million died by cancer disease [1].

International Agency for Research on Cancer reported that, about 715,000 new cancer cases and 542,000 cancer deaths occurred in 2008 in Africa [2]. In low-middle-income countries, there is a rapid increase in the magnitude and mortality of cancer including Ethiopia because of exposure to risk factor such as smoking tobacco, physical inactivity and change in dietary practice [3].

Even though national population-based data does not exist in Ethiopia except for Addis Ababa, national cancer control plan estimated that the annual incidence of cancer is around 60,960 cases and the annual mortality is over 44,000[4].

Addis Ababa population based cancer registry recorded total 4139 new cancer cases in 2012–2013 and it projected to more than 6700 in 2019-2020[5]. According to the estimation done based on Addis Ababa cancer registry on 2015, 21,563 male and 42,722 female incident cancer cases were diagnosed and the most common cancers were: cancer of Breast , cervix, colorectal, non-Hodgkin lymphoma, leukemia, prostate , thyroid, lung, stomach, and liver[6].

Out of pocket (OOP) health care expenditure expose households to unanticipated health expenditure that absorb a large share of the household budget and it often resulted with catastrophe[7]. Poor people are more exposed for inequitable health service when the heath expenditure is mainly dependent on direct out of pocket [8]. When the households have low income level, not enrolled in any health insurance scheme and dependant on out of pocket expenditure, then the household is at high risk of incurring catastrophic health expenditure[9].

Cancer care is not only expose patients and their family for high payments and income lose[10] but also cancer patients perceived that once they diagnosed for the disease, they have no hope for cure [11] so that they may develop psychiatric disorder, neuropsychiatric disorders) and psychosocial syndromes (demoralization, health anxiety, irritable mood)[12].

According to the study done in Addis Ababa, if one patient wishes to get treatment in public hospitals he/she must wait for 5 to 6 months on average which expose patients for unnecessary palliative care and indirect medical expenditure[11]. Since the cost of cancer is high, patients and their family may use different coping mechanism like borrowing, selling assets, spending savings and aid from friends and relatives[13].

1.2. Statement of the problem

Globally, the number of people incurring catastrophic health expenditure increased between 2000 and 2010, whichever threshold was used. At the 10% threshold, the number of people incurring a catastrophic health expenditure increased from 588.5 million (9.7% of the world's population) in 2000 to 808.4 million (11.7%) in 2010[14].

Due to premature death and disability, economic burden of cancer worldwide was $895 billion in 2008 excluding direct medical cost which would further increase the economic lost [15].

Each year, 7 million people die from cancer in the world of which 5 million are in LMICs. Despite this fact, the attention given is very low due to other pressing public health problems like communicable diseases, maternal death, child malnutrition and many people with cancer dying slowly in their homes attracts less attention[16].

The World Bank report of public health expenditure indicates that in Ethiopia the share of Out-of-pocket payments declined from 53 percent in 1996/97 to 33 per cent in 2013/14 and also the Ethiopian seventh national health account report indicates that out of pocket spending decreased from 33% in 2013/14 to 31% in 2016/17. However WHO global health data base 2018 reported that the share of out-of-pocket expenditure from the general health spending of Ethiopia increased to 35.47%.

When Cancer care is mainly dependent on out of pocket spending, then patient and their family experience high rates of financial hardship, which is increasing over time as cancer care becomes more expensive[17]. Ethiopia's government established two types of risk pooling system to minimize out-of-pocket expenditure. These are social health insurance (SHI) for formal sector and community-based health insurance (CBHI) for informal sector. However only CBHI is launched so that cancer is among the services covered by the insurance scheme, however its coverage remains very low as a result households are forced to pay out of pocket for majority of the services [11].

Most cancer patients are required inpatient care at some point during the course of their disease, either for surgery to excise primary or metastatic disease; chemotherapy for adjuvant or palliative therapy; or for supportive care for complications of the disease [18]. Inpatient cancer care increase treatment expenditure due to indirect costs and it will be aggravated when getting the treatment services from private facility[19].

In Ethiopian health system the incidence of catastrophic health expenditure varies in different location, type of disease and the choice of initial threshold for estimation [20-23]. The study done in Addis Ababa by 2018 revealed that using 10% threshold of annual household income 74.4% of cancer patient and their family incur catastrophic health expenditure. The expenditure includes only direct medical and non-medical expenditure[24].

However, there is lack of evidence on the level of catastrophic out of pocket expenditure for cancer inpatients in Ethiopia by considering both direct and indirect expenditures at different thresholds [25-27]. Therefore, the study will aim to fill the research gap that exists by assessing the incidence and intensity of catastrophic out of pocket expenditure at different thresholds among cancer inpatients and coping strategies in Addis Ababa, Ethiopia.

1.3. Significance of the study

The study is an input for health sector planners (MOH and non-governmental organizations) and Ethiopian health insurance agency to appreciate how much cancer patients are in financial risk so that they may plan interventions like decentralizing cancer care services to minimize indirect cost and launching different risk pooling system like SHI to decrease out of pocket health expenditure in achieving universal health coverage. For cancer treatment hospitals it may push them to improve quality and availability of cancer care services to keep insured patients from OOP payments. Finally, this study will be helpful for policymakers, local planners and researchers in the area.

Chapter two: Literature review

2.1. Definition of basic concepts and terminologies

Global cancer fact define cancer as, a group of diseases characterized by uncontrolled growth and spread of abnormal cells while Woda and E. Kurian define Cancer as a malignant process of autonomous, unregulated cell proliferation with the ability to spread (metastasize) to distant sites which usually named based on the organ from which they arise[28].

Out of pocket health expenditure is a direct payment made by individuals to the health care provider at the time of service use excluding any type of prepayments like insurance premium[29].

World health organization (WHO) define Catastrophic health expenditure (CHE) as a household's total out-of-pocket health payments equal or exceed 40% of household's capacity to pay or non-subsistence spending[30]. Whereas Abul Naga, R.H. and Lamiraud define CHE as health care spending that exceeds some specified threshold from the household total income in a given specified period[31].

Health care costs can be broadly categorized as direct, indirect and intangible. Direct cost can be further divided in to medical cost (consultation, diagnostic, medication, surgery and hospitalization costs) and non-medical cost (transportation, bed rent and food costs). Indirect cost is the value of lost production (income lost) because of reduced working time for patients and their care giver during the illness period or while seeking cancer treatment. Intangible costs(non-monetary costs like pain, stress and stigma) [32, 33].

2.2. Cause and treatment options for cancer

Cancer is caused by the interaction between genetic factors and 3 categories of agents. These are Physical Carcinogens (Ionizing radiation such as radon, ultraviolet arrays from sunlight, uranium, radiation from alpha, gamma, beta, and X-ray-emitting sources) Chemical Carcinogens (asbestos, cadmium, benzene, vinyl chloride, nickel, chemicals of tobacco, arsenic and food aflatoxin) and Biological Carcinogens (Infections from certain bacteria, viruses, or parasites and Pathogens like human papilloma virus (HPV), Epstein-Barr virus, hepatitis B and C viruses[34, 35].

Biological carcinogens are responsible for 15% of cancer in the world whereas genetic defects inherited from parents accounts 5-10% of cancer case. Tobacco consumption is the main cause of cancer death which covers 22% of cancer death in the world and 10% of deaths are due to poor diet, obesity, lack of physical activity and excessive drinking of alcohol [35, 36].

Clinicians use different methods to diagnose cancer. These are laboratory test (blood, urine or other body fluids) Imaging tests (CT scan, MRI, Nuclear scan, Bone scan, Pet scan, ultrasound and X-ray) and biopsy for pathological test. Depending on the diagnosis, proper treatment option will be decided by the doctors. These options are Surgery, Radiation Therapy, Chemotherapy, Immunotherapy, Targeted Therapy, Hormone Therapy, Stem Cell Transplants, Precision Medicine[37].

Clinical examination, radiography and ultrasound are commonly practice method of investigation in most LMIC. For example In a study of 80 women in Uganda, ultrasound was useful in differentiation of cystic from solid masses with 100% sensitivity and specificity[38]. The sensitivity and specificity for detection of breast carcinoma were 57·1% and 62·8%, respectively, and the negative predictive value was 99·5%. Advanced imaging technologies and pathology diagnosis are not commonly practiced in sub-Saharan African countries because they are expensive and complex to use which needs skilled human power and infrastructure[39].

Hormonal therapy, chemotherapy, surgery and cryotherapy are most applicable treatment options sub-Saharan Africa([39]) however Radiotherapy is not widely applicable because the technology is available only in 23 African countries and the reason is it is expensive and needs highly skilled human power[40]. Ethiopia is among the 23 countries which has single radiotherapy machine in black lion hospital which is the sole center of cancer treatment in the country[25]. Radiotherapy, surgery, chemotherapy, hormonal therapy and cryotherapy are treatment options in Ethiopia[11].

WHO recommends increasing resources and expanding services for cancer care in order to ensure equitable access to centralized facilities, such as radiotherapy, may require funding for travel and accommodation of patients and their families on site[1] and that should be highly recommended for Ethiopia because a single machine is ready to serve more than 105 million people.

2.3. Strategies for cancer prevention and control in Ethiopia

GLOBOCAN 2012 estimation report indicates that about 40% of cancers are preventable through interventions such as tobacco control, promotion of healthy diets and physical activity, protection against exposure to environmental carcinogens and vaccination against specific infections[2].

The federal democratic republic of Ethiopian ministry of health (FDRE-MOH) and stakeholders developed five years (2015/16 to 2019/20) National Cancer Control Plan to reduce the effect of cancer by control risk factors, detect cases early and offer good care to those with the disease. All aspects of cancer control and management interventions with equitable allocation of appropriate resources were planned. Under tertiary level diagnosis and treatment of cancer, one of the strategies is to improve availability of required medicines and medical equipment to achieve uninterrupted and standard cancer

diagnosis and treatment services by 2020[4]. However the study done on The Situation of Cancer Treatment in Ethiopia on 2019[11] revealed that cancer management is full of challenges. Patient's limited knowledge about the disease and longtime appointment expose them to stress and anxiety. "People go home to die since there is a long waiting list and chronic chemotherapy drugs shortage because of the imbalance between supply and demand. When patients want to buy the drugs from private pharmacies, the cost is totally unaffordable and sometimes the private pharmacies unacceptably increase the cost of the drugs if they know that the drugs are not available at the TASH''. Three trained oncologists assigned at black lion specialized hospital to serve 100million people that makes the service very challenging.

2.4. Empirical evidences

2.4.1. Catastrophic spending for cancer care and coping strategies

In Iran by 2014, 67.9% of the households with cancer patients had catastrophic health expenditures and the majority of households who did not faced with catastrophic expenditure receive insurance compensation. Households those faced catastrophic health expenditures are borrowing money from their acquaintances to cope with the problem [41]. According to the study on disease-specific OOP and catastrophic health expenditure on hospitalization in India on 2018, OOP expenditure on cancer care was the highest among all inpatient diseases with 79% of cancer patients and their family were under catastrophe[42]. In USA by 2012 inpatient care was

the primary cause of high OOP expenditures in patients with cancer, representing 42% of total non-food expenditures for patients without supplemental insurance [43].

In Egypt on 2015, due to OOP health expenditure 6% of households encounter catastrophic health expenditure based on threshold of 40% from non-food expenditure [44] while in Tanzania it is three fold of Egypt, that is 18% of households were experienced catastrophic health expenditure with the same threshold that was done in 2014 [45].

The report of Ethiopian socio-economic survey revealed that the rate of CHE increases from 3.4% in 2011 to 9% in 2015 the poorest quintile. From the whole regions Addis Ababa had the second highest catastrophe rate (10%) in 2015. According to Amarech G, in Ethiopia by 2011 the incidence of catastrophic health expenditure at the initial threshold of 5% and 10% of total household expenditure was 9.66% and 6.64% respectively[20]. The study done on 2018 in north east Ethiopia revealed that 20% of the households of patients with chronic disease faced catastrophic health expenditure based on 15% threshold of non-food expenditure [22] which is very low when compared to Addis Ababa (74.4% at 10% of total income) that was studied specifically for cancer treatment expenditure[25].

2.4.2. Factors associated with catastrophic expenditure of cancer patients

2.4.2.1. Demographic and socio-economic characteristics

Large households are less likely to face catastrophic health expenditure according to a community-based survey conducted in Egypt on 10,550 households. Households with no private health insurance, households whose head is unemployed and Households with young children (less than five years) are more likely to face financial catastrophe than households without young children [44].

Adults, who lacked formal education or worked as manual laborers were more likely to get CHE [41, 45] and patients of older age are more likely to incur CHE[46]. According to the study in north east Ethiopia on 2018, community based health insurance enrollment is highly protective, insured households were 81% times less likely to incur CHE compared with non-insured households[22].

The study conducted in Turkey on 2010 revealed that the risk of getting CHE due to households out of pocket health expenditure was more likely among poorer and rural households. However,

a study done in Ethiopia on 2011 reported that CHE was more prevalent among urban and the poorer households. Whereas in case of Korean cancer patients if the head of the household loss his job then the households are more likely to incur catastrophic health expenditure [17, 20, 47] on the contrary having pre-school school children and insurance status are protective of CHE in Turkey[47]. According the study done in Tanzania by 2014, Household head's occupation and household size of more than five significantly increased the likelihood of experiencing catastrophic health expenditure [45, 47].

2.4.2.2. Morbidity history, disease condition and treatment

Households of cancer patients diseased for more than one year and above[17], patients who took greater than six cycles of chemotherapy [25] were more likely to get catastrophic health expenditure. Those households who have elderly individuals and who visit traditional healers were more likely to incur CHE [45].

Limited number of treatment/diagnostic centers and frequent stock out of prescribed medicine from public health facilities increase cancer care expenditures[24] for example, Buying drugs from private facility for patients treated in public hospital increase the cost of cancer care by 14.3% than public health facility and for patients who are far from the hospital the cost of cancer care increases by 0.07% per kilometer[19]

2.5. Conceptual framework

The conceptual frame work presented below developed from different literatures. The frame work shows that out of pocket expenditure for cancer care exposes patients and their household for financial catastrophe. Factors that are directly associated with catastrophic out of pocket expenditure for cancer care were identified and categorized as patient characteristics (Age, occupation status, educational status, gender), household characteristics (Insurance enrolment, distance from the health facility, household size, household income level, household expenditure level residency) and disease condition (cycles of chemotherapies, length of hospital stay, type of health facility, type of cancer).

Patients of older age, no formal learning, those who lost their job and from large family are more likely to incur CHE. And also households of patients whose residence is far from the hospital, not enrolled in any health insurance, low income, taking more cycles of chemotherapy and hospitalized for long duration are at high risk of getting CHE.

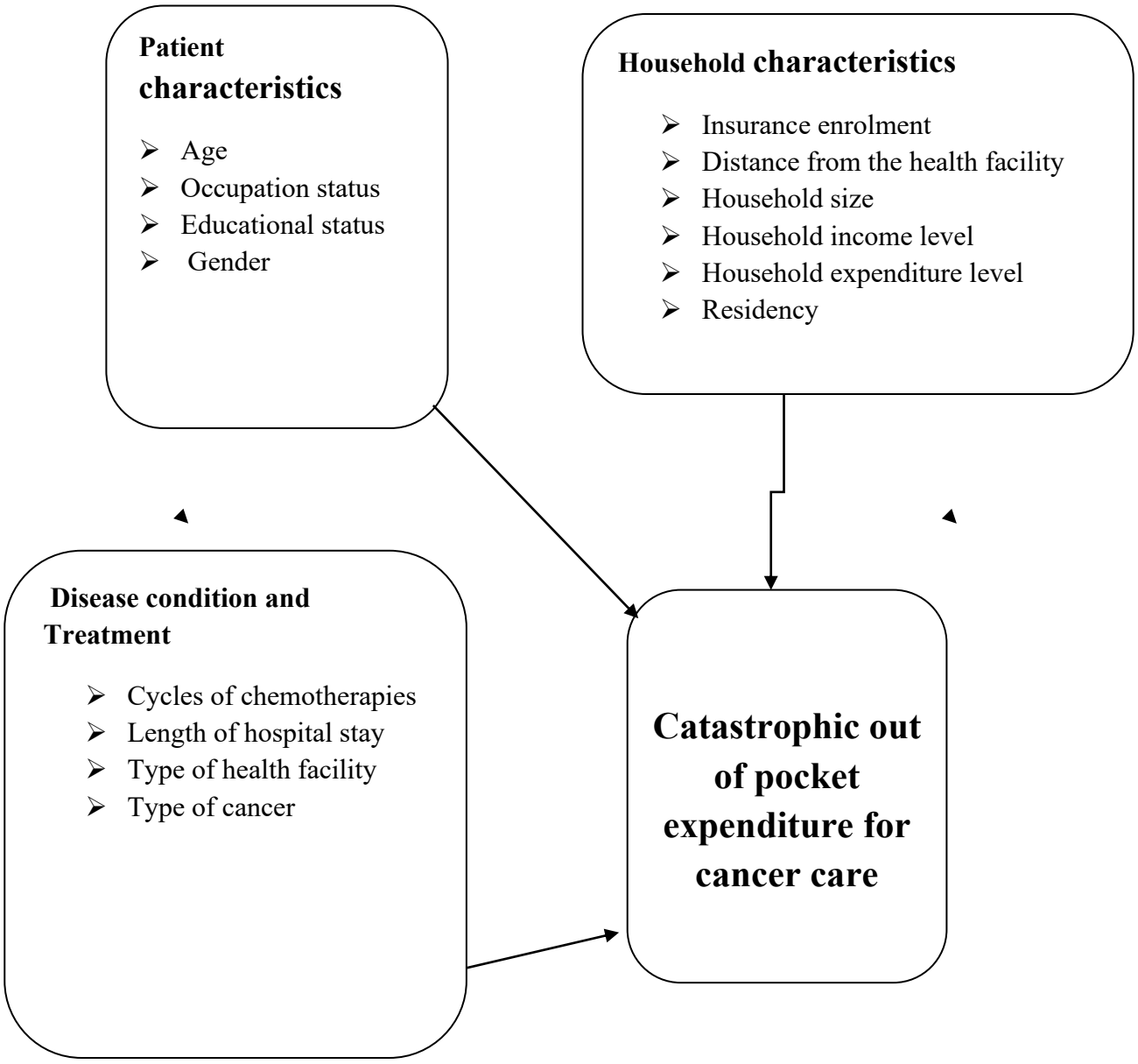

Figure 1, Conceptual framework of the study: out of pocket expenditure for cancer care among cancer inpatients in Addis Ababa, Ethiopia;(adopted from different literatures) [17, 20, 22, 25, 41, 42, 44, 45, 48].

Chapter three: Objective of the study

3.1. General objective;

- To estimate the level of catastrophic out of pocket expenditure and associated factors among cancer inpatients in Addis Ababa.

3.2. Specific objectives

- To assess the incidence and intensity of catastrophic out of pocket expenditure for cancer care
- To identify coping mechanisms for cancer care
- To identify factors associated with catastrophic out of pocket expenditures for cancer care

Chapter four: Method and materials

4.1. Study area and study period

The study was conducted in five cancer care hospitals that are found in Addis Ababa from November 2021 to February 2022. Addis Ababa has 13 public hospitals, 32 private hospitals and 93 public health centers. Estimated total population of Addis Ababa city in 2019 was around 6.5milion. About 150-200 new cases of cancer are registered monthly in ten cancer diagnostic and treatment service providing hospitals in Addis Ababa(MOH). Hallelujah, Bete-Zata and Leghar General Hospitals reported the highest number of cancer cases among the private hospitals[25]. From the public hospitals, Tikur Anbessa Specialized hospital (TASH) is the largest and sole center of cancer treatment for the country. And also, the only hospital which has radiotherapy service and cancer registry setting. Addis Ababa Cancer registry reported that more than 7600 new cases visited TASH in 2019(TASH cancer registry office). The study was conducted in two public hospitals (TASH and Paulo's hospital millennium medical college) and three private hospitals (Bethezata, Hallelujah and Legehar).

4.2. Study design

Hospital based cross-sectional study design was applied.

4.3. Population

4.3.1. Source population

The source populations were all cancer patients who were attending cancer care in government and private owned hospitals in Addis Ababa.

4.3.1. Study populations

The study populations were all cancer inpatients that are seeking cancer treatment during data collection period in selected hospitals.

4.4. Inclusion and exclusion criteria.

4.4.1. Inclusion criteria

Hospitalized cancer patients who were taking cancer treatments (chemotherapy, radiotherapy, hormonal, surgery or supportive treatment) for 12 months preceding the data collection period

and who have history of at least seven days admission in the last 3 months preceding the data collection date were involved in the study.

4.4.2. Exclusion criteria

Admitted cancer patient with co-morbidity history and pregnant women were excluded from the study to avoid the outlier of the data that may not reflect specifically cancer care expenditure.

4.5. Sample size determination

The sample size was determined by using a single population proportion formula for a cross-sectional study using the assumptions 95% confidence interval, power 80%, 5% degree of freedom and 74.4% catastrophic out of pocket expenditure of cancer patient [24].

$$n = \frac{(Z\ \alpha/2)^2\ P\ (1-P)}{d^2},$$

Where – n = Sample size

P=74.4%

Z= standard normal distribution curve value for the 95% confidence interval (1.96)

d = the margin of error or accepted error (0.05).

The sample size determined become 293 by adding 10% for non -response rate, the final total sample size become 322 cancer patients. The sample size was proportionally allocated for the hospitals depending on annual patient flow report.

4.6. Sampling Procedure

Hospitals that are giving cancer care and treatment in Addis Ababa were included in the sampling frame. Three public hospitals (Tikur Ambessa specialized hospital, Paulo's hospital millennium medical college and Torhailoch hospital) and three private hospitals (Betezatha, Hallelujah and Legehar) which were reported highest patient flow in 2019/2020 were selected. However, data was not collected from Torhailoch hospital because the hospital was not admitted cancer patients during data collection period due to internal issue of the hospital. All cancer patients who were hospitalized during data collection period and fulfill the inclusion criteria were included. So that, the sample size for each hospital depends on their patient load during data collection period.

4.7. Data collection tool and data collection technique

A structured questionnaire was developed from the WHO SAGE (Study of Global Ageing and Adult Health) survey instrument (*WHO, 2013*) and other relevant literatures [49]. The data was collected by face to face interview using structured questionnaire. In addition, medical charts were reviewed for each respondent to collect clinical data to estimate patient out of pocket expenditure for cancer care.

The data was collected by three BSC degree health professionals and supervised by one Masters of public health professional.

The data collection tool consists six parts: These are Socio-economic and demographic characteristics (age, gender, occupation, marital status, education level, household size, residence, household income, household consumption expenditure and insurance enrolment), Medical data (type of cancer, time of first diagnosis, treatment initiated and type of treatment taken), Direct non-medical expenditures (expenditure for food, transportation, hospital bed cost and traditional healer), Direct medical expenditure (expenditure of consultation, medicine, bed, investigation and procedures), Indirect medical expenditure (house hold income lost due to the illness from the patient and care giver) and Patient chart review checklist to collect patient clinical data, investigation done and treatment taken which helped us to estimating patient treatment/diagnostic expenditure.

4.8. Measurement methods

Still now there is no unique definition to estimate the incidence of catastrophic Health expenditure. Some studies define CHE as OOP payments which exceeds 10% of total household annual income [50]. And also other researchers describe CHE as out of pocket health care payments that comprise ≥40% of nonfood household expenditures [51]. Most applicable thresholds vary between 5% and 25% of total household expenditure or between 20% and 40% of capacity to pay or non-food expenditure [23, 52]. So for this research the share of household's out-of-pocket cancer care expenditure ≥40% of household's capacity to pay was taken as catastrophic health expenditure and sensitivity analysis was done using different threshold (20%, 25% , 30%) [30].

Catastrophic health expenditure is a dummy variable with value 1 taken as catastrophic and value 0 taken as not.

$\boldsymbol{catah = 1,\ if \frac{oop}{ctph} \geq 0.4}$ When, $catah$= catastrophic household

$\boldsymbol{catah = 0,\ if \frac{oop}{ctph} < 0.4}$ ctph= capacity to pay of the household

. oop= out of pocket expenditure of the household

WHO defined household's capacity to pay *(ctph*) as the non-subsistence effective income of the household. However, households may report food expenditure so that the non-food expenditure is used as non-subsistence spending[30].

Household non-food expenditure was used as a proxy measure for the household's capacity to pay, because this more precisely reflects purchasing power in comparison with stated income[47].

$\boldsymbol{ctph = exph - foodh}$ When, $ctph$= household's capacity to pay

$exph$ = total possible expenditure of household

$foodh$ = total food expenditure of household[30]

Then the incidence (head count) of catastrophic health expenditure will be;

$$\boldsymbol{H = \frac{1}{N}\sum_{i=1}^{N} Ei}$$ When, N= Sample size

E= the value of catah(1 or 0)

However, incidence (headcount) of catastrophic health expenditure could not measure intensity of catastrophic expenditure. Hence, catastrophic overshoot (**O**) (amount by which the household expenditure exceeds the threshold) and mean positive overshoot (MPO) (the mean level by which catastrophic health expenditure exceeded threshold used) captures the intensity[9].

$$\boldsymbol{Oi = \ Ei(\left(\frac{T}{X}\right) - Z)}$$ **T=** Out of pocket expenditure

X= Household capacity to pay

Z= Specified threshold

Then the overshoot is the average

$$\boldsymbol{O = \frac{1}{N}\sum_{i=1}^{N} Oi}$$

Then intensity of catastrophic expenditure is measured by the payment in excess of the threshold, averaged over all households exceeding that threshold. This measure, referred to as the mean positive overshoot (MPO).

$$\boldsymbol{MPO} = \frac{\mathbf{O}}{\mathbf{H}}$$

Cancer expenditure was estimated as all cancer care expenditure of the household for the last 12 months prior to the interview time from the patient perspective. Direct non-medical expenditures, household consumption expenditures and indirect medical expenditures were estimated by asking the participant. We tried possible probing approaches to avoid recall biases. Direct medical expenditure was estimated by reviewing medical charts of the participant and asking receipts from the participant.

For the patients with known monthly income, we calculated the income lost by multiplying their daily wage by days absent from work without payment. For care givers and for patients with unknown monthly income other than student and non-work age we calculated by multiplying total days spent for cancer care per year by wage scale of 137birr per day (4127birr per month) according to the report of Central statistics agency of Ethiopia, statistical report on the 2021 labour force and migration survey[64].

The level of CHE was calculated by considering the total indirect and direct medical and nonmedical cost for 1 year. The monthly household expenditure and income was transformed to annual basis.

Households may use different strategies to cop the financial burden of out-of-pocket cancer care expenditure. We assessed the types of coping strategies by asking the study participants and the strategies were any household member income savings, equb/edir, any financial support from relatives and religious organization, by selling assets like jewelry, land, house, livestock, and other household property and borrowing from usury or financial institutions. Then we classified these coping mechanisms in to two groups as covered by themselves (borrowing, selling asset and income saving including equb and edir) and financial support by others (from relatives, religious organization and others). We deducted financial support from the total expenditure in estimating the level of catastrophic health expenditure.

4.9. Study Variables

4.9.1. Dependent Variable

- Catastrophic out of pocket health expenditure; It is equal to 1 if the household spent ≥40% of annual non-food expenditure and equal to 0 if the household spent <40% of annual non-food expenditure for cancer treatment.

4.9.2. Independent variables

Patient characteristics: Age of the patient, gender(male and female), marital status (married, unmarried, divorced and widowed) occupational status(farmer, housewife, government employee, private organization employee, private business, daily laborer, retired and unemployed) and educational status(unable to read and write, read and write, elementary school, secondary school, preparatory school, level 1-4 and higher education).

Household characteristics: Insurance enrolment (community based health insurance, organizational/employer insurance, medical aid and no insurance), distance from the health facility, household size, household income level (lowest, second, third, fourth, highest), household expenditure level(lowest, second, third, fourth, highest) and place of permanent residency(Addis Ababa and out of Addis Ababa)

Disease condition: Cycles of chemotherapies (1-3 cycles, 4-5cycles 5-8 cycles and >8cycles), length of hospital stay(7-21 gays, 22-41days and ≥42 days), type of health facility (public and private) and type of cancer(breast, cervical, colorectal, prostatic, lung, blood, gastro-esophageal, oro-pharyngeal and others).

4.11. Data Quality Control

The data quality was maintained by; conducting pre-test on five percent of the sample size and some corrections was done according to the pre-test result. Both the data collectors and the supervisors were given a two days training about the study aim, the data collection procedure and research ethics. The data collection tool was translated into Amharic and translated back to the original language English to keep its consistency. The data collection procedure was closely supervised.

4.12. Data Processing and Analysis

The collected data was entered to EPI data version 3.1 then exported to STATA version 16.0 for further analysis. Descriptive statistics such as simple frequencies, crosstabs, mean, median, standard deviation (SD) and Inter-Quartile Range (IQR) were used to compute socio demographic, clinical and economic characteristics of the study participants and it was presented by using text, tables, pie charts, and graphs. Multivariable logistic regression model was applied to assess the relationship of CHE and explanatory variables using confidence interval (CI) 95% of crud odds ratio (COR) and adjusted odds ratio (AOR).

4.13. Ethical considerations

Ethical approval obtained from Addis Ababa University School of public health Institutional Research Ethics Review Board (IRB), Paulo's Hospital millennium medical college Institutional Research Ethics Review Board (IRB), Addis Ababa health bureau public health research directorate Research Ethics Review Board (IRB) and letter and verbal permission from each study hospitals. Written informed consent was provided after a brief explanation of the study purpose for each study participant and their consent was assured before proceeding to the interview. For the study the participant whose age was below 18 years old, Guardian (relative) signed on behalf of the patient. The Study participant's information confidentiality was kept by giving special codes for questionnaires. In order to protect the study participants and data collectors from the pandemic covid-19; personal protective equipment (face mask and alcohol-based sanitizer for data collectors and face mask for respondents) were provided.

Chapter five: Result

5.1. Socio-demographic and economic characteristics

A total 320 cancer patients were approached and of whom 305 (95.3%) responded for the interview. Majority of the respondents (66.2%) were females, the distribution of their marital status was 61.2 married, 20.98 unmarried, 6.89 divorced and 10.49 widowed. Regarding to age, 91.82% of the participants were between the age of 19 to 65 and the mean of their age was 44.1 with standard deviation of (±SD) 15.5. More than half (55.7) of the study participants came

from large family size (4-6) and more than half them (57.7%) were from out of Addis Ababa with average distance 181.9km with standard deviation of (±SD) 223.80 from the hospital.

Table 1: *Socio-demographic and economic characteristics of the study participants*

Characteristics		Frequency	Percent %
Facility type	Public	263	86.32
	Private	42	13.77
Gender	Male	103	33.77
	Female	202	66.23
Age group	1-18	12	3.93
	19-65	269	88.20
	≥66	24	7.87
Religion	Orthodox	183	60.0
	Islam	61	20.0
	Protestant	55	18.03
	Others	6	1.97
Marital status	Married	188	61.64
	Unmarried	63	20.66
	Divorced	22	7.21
	Widowed	32	10.49
Education level	Unable to read and write	41	13.44
	Able to read and write	36	11.80

	Elementary school (1-8)	55	18.03
	Secondary school (9-10)	35	11.48
	Preparatory school (11-12)	38	12.46
	Level 1-4	21	6.89
	Higher education (diploma and above)	79	25.90
Occupation	Farmer	36	11.8
	Housewife	52	17.05
	Government employee	40	13.11
	Non-governmental/private organization employee	33	10.82
	Private business	61	20.00
	Day laborer	18	5.90
	Retired	24	7.87
	Unemployed	41	13.44
Household Income quintile	Lowest	65	21.31
	Second	62	20.33
	Third	58	19.02
	Fourth	59	19.34
	Highest	61	20.00
Household expenditure	Lowest	61	20
	Second	61	20

quintile	Third	61	20
	Fourth	61	20
	Highest	61	20
Residence	Addis Ababa	129	42.3
	Out of Addis Ababa	176	57.7
Distance from hospital (in km)	≤50	145	47.54
	51-300	91	29.84
	301-500	36	11.8
	501-700	24	7.87
	>700	9	2.95

5.2. Clinical information

Most of the study participants were from public hospitals (86.23%) and the rest 13.77% from private hospitals. Breast cancer was the leading type of cancer which accounts 29.51% and followed by cervical cancer (21%). More than half of the study participants were on 4-6 cycle of chemotherapy and all patients received supportive treatment so far and during the interview time most (91.15%) of the participants were on chemotherapy.

The mean and median of total hospital admission days per year to get cancer care was 32 (SD; 40.99) and 22(IQR; 22) respectively. Patients reported days absent or minimized working days without payment and the total days their attendant absent from work to give care was mean 59.85(SD; 75.76) and mean 36.1(SD; 39.74) respectively.

Table 2*: Clinical information of patients attending cancer treatment services in Addis Ababa, Ethiopia 2021.*

Clinical variables		Frequency	Percent %
Type of cancer	Breast cancer	89	29.18
	Cervical cancer	64	20.98
	Colorectal cancer	47	15.41
	Blood cancer	23	7.54
	Gastro-esophageal	19	6.23
	Prostate	15	4.92
	Lung	14	459
	Oro-nasopharyngeal	13	4.26
	Others	21	6.89
Current type of Treatment	Chemotherapy	278	91.15
	Radiotherapy	3	.98
	Surgical therapy	8	2.62
	Hormonal therapy	15	4.92
	Supportive treatment	1	0.33
Type of treatment taken so far	Chemotherapy	298	97.7
	Radiotherapy	29	9.51
	Surgical therapy	135	44.26
	Hormonal therapy	13	4.26
	Sportive treatment	305	100

Cycle of chemotherapy	1-4	148	48.52
	5-8	125	40.98
	≥9	32	10.49

- Type treatment taken so far; frequency and percentages couldn't be added because multiple response was possible
- Other types of cancer include; lymphoma, skin cancer, bone cancer, liver cancer, pancreatic cancer, thyroid cancer and testicular cancer.

5.3. Overall cancer care expenditure

The cancer care overall expenditure per patient for the last one year was estimated to be mean 60724.33birr/$1432.2 (SD; 32038.33birr) and median 54860birr/$1294 (IQR; 36480). We used U.S dollar exchange rate of 42.4 which was the rate of the middle year of the study period. The mean expenditure of the patients who came from out of Addis Ababa, live far from treatment hospital (>700km), getting treatment in private hospital, not enrolling in any type of health insurance and receiving more cycle of chemotherapy were higher as compared to their counter parts. The mean annual expenditure of Blood cancer (leukemia) 75335.812 (S.D; 28166.244) was high as compared to other cancer types.

Table 3. *Mean expenditure per year for each cancer patient by different subgroups*

Sub group variables	**Mean of expenditure per patient birr (SD)**	**Median of expenditure per patient birr (IQR)**
Facility type		
Public	56197.8 (25458.4)	52054 (28770)
Private	89069 (50146.2)	89897.5 (47085)
Gender		
Male	67238.9 (37286.7)	59920 (37370.33)

Female	57402.6(28532.3)	51882 (34230)
Marital status		
Married	61630.7 (34360.1)	54895.84 (38242.5)
Unmarried	62031.8 (29256.5)	58875 (33680.33)
Divorced	63371.9(26347.1)	58321.66 (31630)
Widowed	51005.3 (25515.6)	45335(29455)
Education level		
Unable to read and write	59193.7 (21195.2)	56225 (19325)
Able to read and write	56875.2 (33226.6)	48247.5 (32558)
Elementary school (1-8)	54667.9 (21651.3)	51135 (28514.34)
Secondary school (9-10)	65896.1 (33132.7)	62713.33 (45471)
Preparatory school (11-12)	63132.1 (33208.98)	55775 (33140)
Level 1-4	64655.016 (31066.4)	63053.33 (33525)
Diploma & above)	62994.924 (40533.588)	55405 (52286)
Treatment cycle		
1-4	52871.6 (27477.9)	48999.5 (30904.8)
5-8	69018.98 (35349.5)	62715(38810)
≥9	64214.85 (30032.5)	59039.2(36165.2)
Type of cancer		
Breast cancer	54419.38 (29390.91)	49720 (34106.67)

Cervical cancer	56063.4 (28291.381)	48999.5 (34582.17)
Colorectal cancer	65686.1(36179.643)	56866 (32175)
Prostate cancer	69739.9 (52057.605)	56225 (37835)
Lung cancer	64679.8 (30166.496)	64217.5(42377)
Leukemia	75335.8 (28166.244)	69976.67(30624.67)
Gastro-esophageal cancer	62247.9(9731.427)	58870 (23090)
Oro-pharyngeal cancer	65741.6 (35050.564)	50180(49910)
Other	60980.9(34356.25)	54931.67 (49014.67)
By residence		
Addis Ababa	54956.1(33668.8)	48116.7(36263.3)
Out of Addis Ababa	64874.5 (30198.7)	56891.7(35077.8)
Health insurance enrolment		
CBHI	53620.7 (22521.4)	50470(27660.3)
Organizational/employer insurance	39099.5(32012.9)	32540(53445)
Medical aid/NGO insurance	58335 (31102.9)	54420 (30020)
No insurance	80288.2 (38539.3)	70855 (42810)
Distance from hospital		
≤50	54967.1 32600.524	49100 (34735)
51-300	64547.1 (32457.893)	59799 (36416)
301-500	63800.6(27337.759)	54820.5(25554.16)

501-700	66681.5(26575.99)	58741.66 (28174.66)
>700	86637.5(32422.585)	86004.67 (52945)

*****SD stands for Standard deviation

5.4. Direct and indirect medical expenditure

Medicine expenditure was the highest expenditure from the direct medical expenditures with mean 21718.09birr (S.D; 14115.19) which was followed by imaging investigation expenditure (7953.9birr, SD; 4568.3). Consultation expenditure was the lowest from the direct medical expenditure (734.6, SD; 1723.8)

See table 4 for detail.

Table 4. Average annual direct medical and non-medical expenditures of cancer inpatients

Variables	**Mean (SD)**	**Median (IQR)**
Consultation	734.6(1723.8)	100(400)
Laboratory	5684.8 (5620.5)	4480 (4600)
Imaging	7953.9 (4568.3)	7760 (5700)
Medicine	21718.09 (14115.2)	18700(15460)
Transportation	3937.6 (3756.2)	2800 (5400)
Food	3149.2 (5005.8)	1800 (3600)
Bed rent	1200.8 (1818.0)	0 (3600)
Traditional treatment	1224.8(3191.6)	0 (0)

Indirect medical expenditure (household's income lose due the illness) accounted 19.63% of the total medical expenditure. The estimated mean and median of indirect medical expenditure per patient was 11922.36birr (SD; 11091.05) and 8619.33birr (IQR; 15040) respectively.

Table 5. Indirect medical expenditures of inpatients attending cancer treatment in Addis Ababa, Ethiopia

Variable	**Mean (SD)**	**Median (IQR)**
Annual patient time spent in days	60(75.76)	35(90)
Annual caregiver time spent in days	36(39.74)	30(20)
Annual indirect medical expenditure per patient in birr	11922(11091.05)	8619.33 (15040)

Medical expenditure accounted the large share of both direct medical expenditure (80%) and total medical expenditure (62.7%). The mean and median medical expenditure per patient was 38073.85birr (SD; 24380.15) and 32100birr (IQR; 25560) respectively. The non-medical expenditure accounted 20% of the direct medical expenditure and 17.67% of both direct and indirect expenditure with estimated mean of 9503.36birr (SD; 8729.59) and median 8450birr (IQR; 12000) per patient.

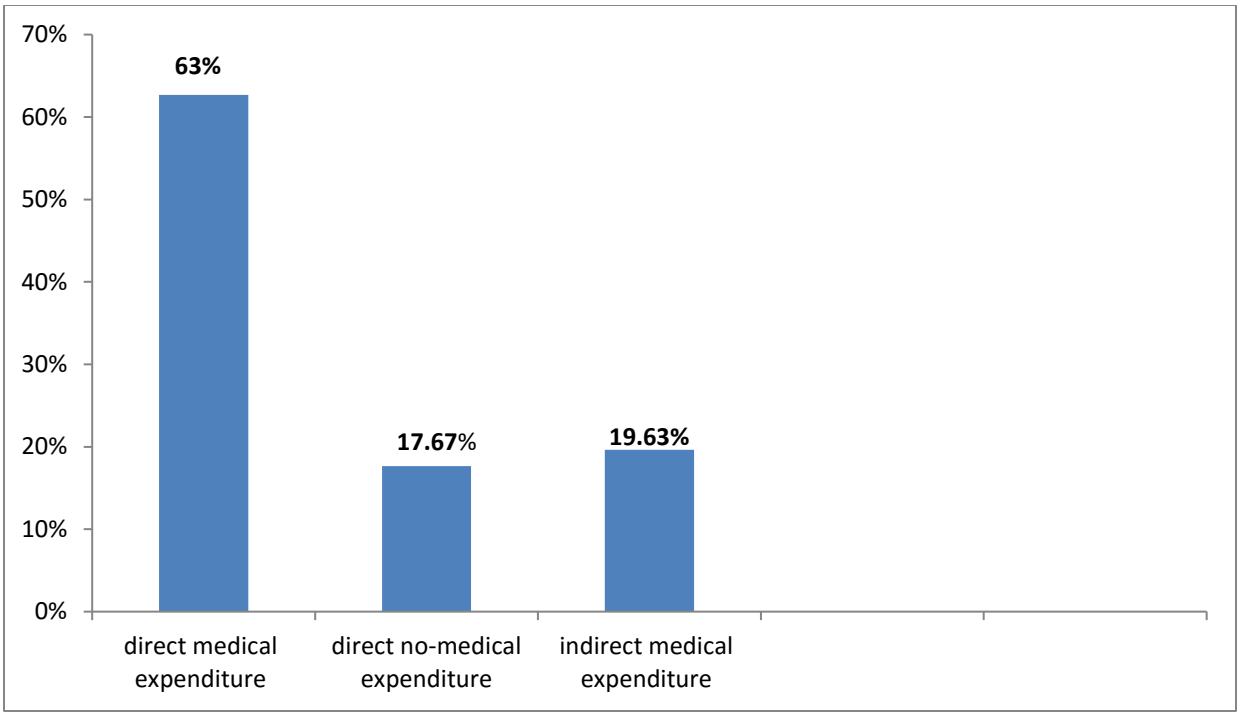

Figure 2. Percentage of direct medical, direct non-medical and indirect medical cancer care expenditure per patient among inpatients in Addis Ababa, Ethiopia.

5.5. Incidence and Intensity of catastrophic out of pocket expenditure

The average headcount family equivalent annual income and expenditure was found to be 35177.53birr (median; 28800) and 16025.8birr (median; 12979.33), respectively. Whereas the mean annual household income and expenditure was found to be 136875.4birr (median;120000) and 60724.33birr (median; 54860), respectively. The estimated average annual capacity to pay of the household was 100951birr (median; 82800birr).

Using both direct and indirect medical expenditure the catastrophic incidence (percentage of households experiencing catastrophic OOP health expenditure) at threshold of 40% of household's capacity to pay found to be 77.70%. While using only direct medical expenditure the incidence of CHE at threshold of 40% was found to be 65.57%.

The incidence (headcount) of CHE varies at different thresholds. At threshold of 20%, 25% and 30% the head count of CHE was 94%, 90.5% and 88.2% respectively. Households with lowest income quintile and highest expenditure quintile were faced with higher catastrophic cancer care expenditure.

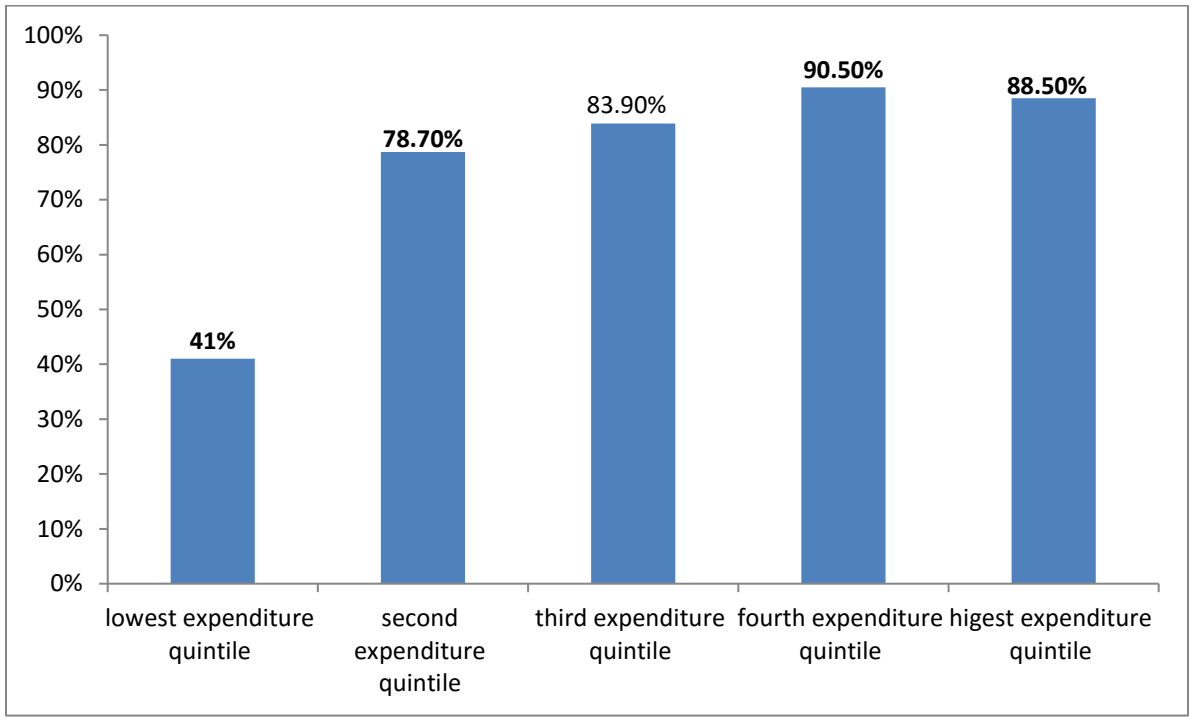

Figure 3. *Incidence of CHE across expenditure quintile strata at 40% threshold among cancer inpatients*

The intensity of CHE (amount by which the household expenditure exceeds the threshold) revealed an inverse relation with different thresholds. At 40% threshold the mean positive overshoot (MPO) was 47.1% while at 20% threshold the MPO was 55.7%.

Table 6. The intensity of CHE at different threshold among cancer inpatients in Addis Ababa, Ethiopia

CHE as share of capacity to pay	**Threshold level**			
	20%	25%	30%	40%
Head count	94	90.5	88.2	77.7
Overshoot	51.8	47.9	44.0	36.2
Mean positive overshoot	55.1	52.9	49.9	46.6

The incidence of CHE for the lowest and highest income quintile at 20% threshold was 98.3% and 85.5% respectively. At 40% threshold the incidence of CHE for the lowest and highest income quintile was 91.4% and 62.9% respectively.

The intensity of CHE for the lowest income quintile was very high at all thresholds. As the income quintile of the households increase, the intensity of CHE decreases and the reverse is also true. The mean positive overshoot for lowest income quintile at 40% threshold was 78.3%. This means on average, out of pocket expenditure for households of lowest income quintile is 78.3% higher than 40% of the household's capacity to pay.

Table 7. Sensitivity analysis for the incidence and intensity of CHE at different thresholds across income quintile strata and gender

Sub Group variable		**CHE as share of capacity to pay**	**Threshold level**			
			20%	**25%**	**30%**	**40%**
Income quintile	**Lowest**	Headcount	98.3	96.8	96.5	91.4
		Overshoot	89.8	85.3	80.7	71.6
		Mean positive overshoot	91.4	88.1	83.6	78.3
	Second	Headcount	96.8	95.2	95.0	87.1
		Overshoot	69.3	64.9	60.6	51.9
		Mean positive overshoot	71.6	68.2	63.7	59.6
	Third	Headcount	95.1	93.1	93.4	80.3
		Overshoot	43.8	39.8	35.8	27.7
		Mean positive overshoot	46.1	42.7	38.3	34.5
	Fourth	Headcount	95.2	88.7	83.9	67.7
		Overshoot	29.1	25.8	22.5	15.8
		Mean positive overshoot	30.1	29.1	26.8	23.3

	Highest	Headcount	85.5	79	72.6	62.9
		Overshoot	24.2	21.3	18.8	13.6
		Mean positive overshoot	28.3	26.9	25.8	21.6
Gender	**Male**	Headcount	95.1	92.2	91.3	83.5
		Overshoot	60.5	56.33	52.2	43.8
		Mean positive overshoot	63.6	61.2	57.2	52.5
	Female	Headcount	93.1	88.1	85.1	74.8
		Overshoot	47.9	44.2	40.5	33.0
		Mean positive overshoot	51.5	50.2	47.6	44.1

5.7. Factors associated with catastrophic health expenditure

Multivariable logistic regression was executed to test the association of factors with the outcome variable. The regression revealed that residence of out of Addis Ababa (AOR; 4.8, 95% CI; 1.72, 13.36), taking more than 5 cycles of chemotherapy (AOR; 10.2, 95% CI; 3.48, 30), having lowest income quintile (AOR; 45.28, 95% CI;7.4, 277.2**)**, not enrolled in any type of health insurance (AOR; 14.8, 95% CI; 3.9, 56.21) and hospital admission for more than 41 days (AOR; 4.36, 95% CI; 1.09, 17.46**)** are statistically associated with CHE for cancer care. See table 8 for more detail.

Table 8. *Factors associated with CHE among inpatients attending cancer treatment services in Addis Ababa, Ethiopia*.

Independent variables		Incidence of CHE N (%)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	p-value AOR
Type of facility	Public	215(90.7)	1**	1**	**--**
	Private	22 (52.38)	0.31(0.16, 0.62)	0.42(0.11, 1.63)	0.21
Age	≥18	10(83.3)	1**	1**	---
	19-65	210(78.1)	1.19(0.37, 3.83)	6.65(0.61,72.8)	0.12
	≥66	17(70.8)	0.99(0.23, 4.31)	1.85(0.12 ,28.24)	0.65
Sex	Male	86 (66.15)	1**	1**	--
	Female	151(74.7)	0.71(0.4, 1.28)	1.28(0.28, 5.76)	0.74
Residence	Out of Addis A.	153(86.9)	**5.56(3.04, 10.15)**	**4.8(1.72, 13.36) ***	**0.00***
	Addis Ababa	84 (65.12)	1 **	1**	--
Household size		---	1.06(0.92, 1.22)	0.98(0.76, 1.26)	0.85
Cycle of chemo-therapy	1-4	106(72.1)	1**	1**	--
	5-8	106(81.5)	2.77(1.5, 5.08)	**10.2(3.48, 30)**	**0.00***
	≥9	25(89.3)	4.5(1.3, 15.51)	**36.1(4.59, 283)**	**0.01***
Insurance enrolment	CBHI	140(85.4)	1**	1**	--
	Organization/employer insurance	3(23.1)	**0.27(0.11, 0.66)**	**0.2 (0.04, 0.95) ***	**0.04**
	Medical aid/NGO insurance	8(88.9)	0.8(0.29, 2.2)	2.7(0.62. 11.6)	0.18
	No insurance	86(76.2)	**3.25(1.45, 7.26)**	**14.8(3.9, 56.21) ***	**0.00***
Length of hospital stay in days	1-21	107(73.8)	1**	1**	--
	22-41	96(76.7)	2.37(1.28, 4.41)	1.9(0.73, 4.94)	0.19
	≥42	19(90.5)	**9.03(2.42, 15.01)**	**4.36(1.09, 17.46)**	**0.04***

Traditional healer visit	Yes	50 (80.65)	1.25(0.62, 2.51)	2.25(0.78, 6.47)	0.13
	No	187 (76.9)	1**	1**	
Occupational status	Farmer	35 (97.22)	3.4(0.87, 14.0)	0.38(0.03, 4,19)	0.43
	House wife/husbad	45 (86.54)	1.6(0.55, 4.6)	0.96(0.14, 6.74)	0.97
	Governmental employee	24 (60)	0.40(0.15, 1.1)	0.27(0.04, 2.12)	0.21
	Nongovernmental/ private employee	23 (69.7)	0.77(0.27, 2.25)	0.46(0.6 , 3.55)	0.45
	Private business	46 (75.41)	1.2(0.45, 3.14)	0.76(0.13, 4.56)	0.77
	Daily laborer	16 (88.89)	21.45(0.43, 6.16)	0.59(0.06, 6.21)	0.66
	Retired	17 (7.83)	0.58(0.19, 1.79)	0.25(0.03, 2.24)	0.86
	Unemployed	31 (75.6)	1**	1**	--
Educational status	Unable to read & write	39(95.1)	4.8(1.7, 13.67)	0.48(0.06, 3.66)	0.48
	Able to read & write	28(77.8)	2.36(0.95, 5.86)	0.24(0.05, 1.35)	0.11
	Elementary school	47(85.5)	3.99(1.66, 9.60)	2.63(0.56, 12.29)	0.22
	Secondary school	30(85.7)	5.1(1.61, 15.78)	0.94(0.13, .53)	0.94
	Preparatory school	30(78.9)	2.36(0.95, 5.86)	1.14(0.25, 5.18)	0.86
	Level 1-4	15(71.4)	2.1(0.69, 6.3)	7.21(1.26, 41.36)	0.03
	Diploma & above	48(60.8)	1**	1**	--
Household income quintile	Lowest	53 (91.4)	**6.25(2.18, 17.9)**	**45.28(7.4, 277.2)**	**0.00***
	Second	45 (72.6)	**4.0.8(1.6, 9.83)**	**8.6(1.84, 40.1)**	**0.01***
	Third	49 (80.3)	**2.4(1.07, 5.44)**	**3.88(1.03, 14.65)**	**0.04***
	Fourth	42 (67.7)	1.24(0.59, 2.6)	0.89(0.25, 3.18)	0.08
	Highest	39 (62.9)	1**	1**	--
Type of cancer	Breast cancer	68(76.4)	1.38(0.68, 2.83)	**3.77(1.04, 13.59)**	**0.04***
	Cervical cancer	42(65.6)	1**	1**	---

Colorectal cancer	36(76.6)	1.68(0.70, 4.04)	1.64(0.3, 9.1)	0.57
Prostatic cancer	13(86.7)	2.95(0.61, 14.34)	38.1(1.35, 1071.6)	0.03
Lung cancer	13(92.9)	2.73(0.56, 13.34)	16.7(1.15, 241)	0.04
Blood cancer	19(82.6)	4.77(1.02, 22.35)	8.6(0.6, 117.2)	0.11
Gastro-esophageal cancer	18(94.7)	8.18(1.02, 65.61)	39.3(1.6, 992.3)	0.03
Oro-pharyngeal cancer	12(92.3)	1.52(0.38, 6.11)	3.4(0.28, 40.6)	0.34
Others	16(76.2)	1.14(0.38, 3.36)	0.65(0.12, 3.9)	0.64

. *: significant association, **: reference group

5.8. Coping strategies for financial problem

Households may use different mechanisms to cope with financial problem. Most of the study participants reported that they implemented more than one coping strategy to alleviate their financial burden. Almost all (98.36%) of the study participant reported that they used their family members as their coping strategy to overcome their financial burden. On the other hand 38.69% of the patients soled their long term assets including their jewelry, 31.8% of the respondent asked financial support from friend or relatives and 2.95% of the respondents borrowed to overcome their financial burden. Apart from these 6.56% of the respondents used money saved in equb/edir.

Table 9 Coping strategies used by patients' household to overcome financial burden

Coping strategies	**Frequency**	**Percent%**
Saving or any household member income	300	98.36
Selling assets	118	38.69
Financial support from friend, relative	97	31.8

or religious organization		
By equb/edir	20	6.56
Borrowing from usury or financial institution	9	2.95

* Both the frequencies and percents couldn't be added because more than one response was possible

Chapter 6: Discussion

The incidence of out of pocket expenditure for cancer care based on 40% threshold of households' capacity to pay was 77.7% which was very high when compared to the Korean cancer patients (39.8%)[17] and Malaysian colorectal cancer patients (48.7%)[53] and lower than Indian cancer patients(79%)[42]. Similar study done in Addis Ababa revealed that the level CHE for cancer care was 74.4% based on 10% threshold from total household income[24]. However, the difference may arise due to the indirect medical expenditure was included in this study but not for the previous study. On other hand excluding the indirect medical expenditure the incidence of CHE for cancer care in this study was 65.57% which is lower than the previous study. The reason for this may be there is an increase in health insurance enrollment.

When we compare the incidence CHE for cancer care with other diseases, it was almost three-fold of CHE for cardiovascular disease in Addis Ababa (27%) and households of persons with depression and disability in rural Ethiopia (24%) [21, 54]. This indicates that cancer expenditure is very high and uncountable number of patients is dying at home without getting cancer care or they destruct other needs to invest on cancer care.

When the cycle of chemotherapy increased, the chance of the households being catastrophic is increased. The result was supported by the study done in Addis Ababa and north west Ethiopia[19, 46].

Patients who came from out of Addis Ababa are at high risk of getting CHE (AOR; 4.8: 95%C.I.; 1.72, 13.36). This was similar with the study on cardiovascular disease patients in Addis Ababa[21]. This may happen due to increased direct non-medical expenditures like transport food and bed rent during hospital visit.

Health insurance enrolment was statistically significant with CHE for cancer care. Patients who were enrolled in organizational/employer insurance were protected from CHE (AOR; 0.2: 95%C.I.; 0.04, 0.95) whereas patients who were not enrolled in any type of health insurance scheme were 14.8 times at risk of incurring CHE (AOR; 14.8: 95%C.I.; 3.9, 56.2). A community survey done in Egypt reported that households with no private health insurance are at high risk of CHE[55] and also the study done north east Ethiopia revealed that insured households were 81% times less likely to incur catastrophic health expenditure compared with non-insured[22]. However, patients who are enrolled in CBHI are not significantly protected from incurring CHE. The reason may be the CBHI scheme is not reimburse for the payments done outside of public hospitals even though patients pay for many treatment services in private facilities due to limited treatment services in public hospitals[56].

In the study it was found that as the number of hospital admission day increases, the risk of incurring CHE increased. The incidence of CHE for those households of patients admitted for more than 42 days was 4.36 times than households of patients admitted for less than 21 days. Many studies support the result [48, 57, 58]

Households' income quintile was directly associated with CHE. When we go down to the lowest income quintile the risk of incurring CHE was increased. As compared to those in the richest income quintile the incidence of CHE for those in the lowest income quintile is 45.3 times (95%C.I.; 7.4, 277.2). Many studies support this result. For rural Chinese cancer patients the chance of getting CHE for those household of lowest income quintile was 36 times[59]. The study done in Malaysia on colorectal cancer revealed that households in the higher income quintile are at lower risk of incurring CHE[60]. The study done on cardiovascular disease in Addis Ababa reported that households in the lowest income quintile are more likely to get in to CHE than highest income quintile[21].

In this study length of hospital admission days was directly associated with CHE (AOR; 4.36, 95% CI; 1.09, 17.46). The result supported by the study done in American oncology inpatients which reported that as the length of hospital stay increase, the cost of cancer care highly increased [18].

Patients and their households may use more than one coping strategy for their financial constraint. In this study saving was the main coping mechanism followed by selling assets and asking financial support from relatives and friends which was similar with other studies [19, 21,

46, 61]. However some studies reported that borrowing and selling asset was the main coping mechanism[62, 63]. The difference could be the country's economic status and availability of borrowing setup from financial institutions.

Chapter 7: Conclusion and recommendation

This research intended to assess the incidence and intensity of catastrophic out of pocket expenditure for cancer care, identify associated factors and coping strategies. The incidence and intensity (mean positive overshoot) of CHE at 40% threshold of households' capacity to pay was 77.7% and 78.3%, respectively. At similar threshold the incidence of CHE by considering only direct medical expenditure was 65.6%. Patients who came from out of Addis Ababa, increased cycle of chemotherapy, increased hospital admission days and those who were not enrolled in any type of health insurance were significantly associated with CHE. Saving or any household member income, selling assets and asking financial support from relatives were the main coping mechanisms of financial burden. Hence to achieve universal health coverage and to approve financial risk protection for cancer patients, the government and responsible body (Ethiopian health insurance agency, ministry of health and non-governmental organizations) should focus on expanding the coverage and quality of health insurance and decentralize the cancer care given in Addis Ababa to the regions with similar standard.

Limitations of the study

Due to the nature of data collection technique, recall bias could be a problem to Obtain reliable data on the household annual income and expenditure.

Secondly, since the study was only hospital based patients who were treated for some period of time and those who may resign the treatment due to financial constraint were not included. More over the study should be seen as critical input since this is the first to study both the incidence and intensity of CHE among cancer inpatients. And also we are confident of our findings which may evidenced by the patterns of associations across outcomes.

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Annex 1. Amharic questionnaire

በአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል

ሰላም ጤና ይስጥልኝ፡ ስሜ _____ይባላል:: የመጣሁት ከአዲስ አበባ ዩኒቨርሲቲ የህብረተሰብ ጤና ትምህርት ክፍል ነዉ::. እዚ የተገኘሁት **ድንገተኛ/ከአቅም በላይ የህክምና ወጪ ሰላንሰር ተኝቶ ታካሚወች በአዲስ አበባ** በሚል ርእስ ሰሚሰ ዉ ጥናት መረጃ ለመሰብሰብ ነዉ::የጥናቱ ባለቤት አቶ **ገረም ይሁን** በአዲስ

አበባ ዩኒቨርሲቲ ህብረተሰብ ጤና ት/ት ክፍል የጤና ምጣኔ ሀብት የሁለተኛ ዲግሪ ተማሪ ነኝ::ጥናቱ ሆስፒታልን መሰረት ያደረገ መስቀለኛ ጥናት ሲሆነ የሚሰራውም በአዲስ አበባ ሚገኙ የካንሰር ህክምና በሚሰጡ የተመረጡ የግልና የመንግስ ሆስፒችላይ ነዉ::የጥናቱ አላማ ድንገተኛ/ከስቀም በላይ የህክምና ወጪ በተኛች ታካሚ ካንሰር ታመሚዎች ላይ የሚያመጣዉን ጫናና አጋላጭምክንያቶችን ለመለየት ነዉ::ስለሆነም ጥናቱ ላገሬቱ ህግ አዉጪዎችና ፖሊሲ አርቃቂዎች እንዲሁም ለሚመለከታቸዉ አካላት የካንሰር ታማሚወችን የኢኮኖሚ አደጋ ተጋለጪነትን የመቀነስተግ ባሩትን ለማጠናከር ግብአት ይሆናል::በዚ ጥናት መሳተፍ ምንም አይነት ቀጥታ ጥቅም የለዉም ነገር ግን የጥናቱ ዉጤት የጤና ስርአቱ ላይ ጫና መፍጠር ለሚችሉ ፖሊሲ አዉጭዎች የጤና ሥራቱን ለማሻሻል ግባት ይሆናል::ጥያቄ ናመልሱ ከ20-30 ደቂቃ ሲፈጅ ይችላል::የጥና ቱስካል የሆኑት በሰድል ሲሆነ በዚ ጥናት ስለተሳተፉ ምንም አይነት ጉዳት አይደርስቦትም::በጥናቱ ላይ ሲሳተፉ ሙሉበሙሉ በፈቃደኝነት ላይ የተመሰረተ ነዉ::በፈለጉት ሰአት ጥናቱን የማቋረጥ መብቶ የተጠበቀ ነዉ::ለጥያቄወች የሚሰጡት ምላሽ በጣም ሚስጥረ የተጥበቀ መሆኑንና በጥንቃቄ እንደሚያዝ ላረጋግጥሎት እፈልጋለዉ::የሚሰጡን መረጃ ከላይ ለተጠቀሰዉ ጥናት ብቻ ይዉላል::ስለሆነም የጥናቱ አካል ለመሆን ፍቃደኝነትን ማረጋገጥ እፈልጋለዉ::

የጥናቱ አካል ለመሆን ተስማምተዋል?

1. አዎ 2. አይ፣ጥያቄዉንያቋርጡ

የጥናቱ አካል ስለሆኑ በጣም አመሰግናለዉ

ማነኛውም አይነት ጉዳይ ካሎት ከዚ በታች ያሉትን አድራሻወች ይጠቀሙ፤

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- ✓ ዶ/ርአናጋዉደርስህ(Advisor), Tel; 0944121769, E-mail: anagawd@yahoo.com
- ✓ አትታምሩይመቀ, (Advisor), Tel 0911661041, E-mail; tamirud@gmail.com

Name of the health facility: _____ Type of health Facility: 1. Public 2. Private Interviewer's name: _____ Interviewer's signature: _____	Date of the interview: ___/___/___ Interview time began: _____ Interview time end_____

I. Socio-Economic and demographic characteristics

ተ.ቁ	ጥያቄ	መልስ
101	እድሜህ/ሽ ስንት ነዉ?	1. _____አመት 88. አላዉቅም
102	ፆታ?	1. ወንድ 2. ሴት
102	ሀይማኖትህ/ሽ ምንድን ነዉ?	1. ኦርቶዶክስ 2. እስላም 3. ፕሮቴስታንት 4. ካቶሊክ99. ሌላ/ይገለፁ_____
103	የጋብቻ ሁኔታ?	1. ያገባ/ች, 2. ያላገባ/ች 3. የተፋታ/ች 4. የሞተችበት/ባትት, 5. የተለያየ/ች, → ወደ Q ≠106ይሰፋ
104	የቤቱ አባወራ ነህ/ነሽ?	1. አዎ, ወደ Q ≠106 ይሰፋ 2. አይ
105	ከቤቱ አባወራ ጋር ያለህ/ሽ ዝምድና ምንድን ነዉ?	1. ሚስት 2. ባል 3. ልጅ 4. አባት/እናት 5. ወንድም/እህት

		99. ሌላ ዝገልጽ_____
106	የቤተሰብህ/ሽ ብዛት ስንተን/ስንችን ጨምሮ ምን ያህል ነዉ?	1. _____ 2. ብቻየን ነዉ እምኖረዉ 99. ሌላ
107	የትምህርት ደረጃህ/ሽ ምንድ ነዉ?	1.ምንም ስልተማርኩም/ማንበብና መጻፍ ስልችልም 2. ማንበብና መጻፍ እችላለዉ/መጸበኛ ያልሆነ ት/ት 3. የመጀመሪያ ደረጃ ት/ት (1-8) 4. ሁስተኛ ደረጃ ት/ት (9-10) 5. የመሰናዶ ት/ት (11-12) 6. ደረጃ1-4 7. ክፍተኛ ደረጃ ት/ት(ዲፕሎማና በላይ)
108	ስራህ/ሽ ምንድ ነዉ?	1. ገበሬ 2. የቤት እመቤት, 3. የመንግስት ስራተኛ 4. መንግስታዊ ያልሆነ/የግል ድርጅት ስራተኛ 5. የግል ስራ 6. ጥቃቅን ነጋዴ 7. የቀን/የጉልበት ሰራተኛ 8. ሙሪተኛ 9. ስራዩ ስኝም 99. ሌላ/ዝገልጽ
109	ቋሚ መኖሪያህ የትነዉ?	1. ስዲስ ስባባ 2. ከስዲስ ስባባ ዉጪ
110	ቋሚ መኖሪያህ ከዚ ሆስፒታል ምን ያህል ኪሎ ሜት ርይርቃል?	1. _____ኪ/ሜ 88. ስላዉቅም
111	የቤተሰቡ ስባወራ ወራዊ ገቢ በስማካኝ ስንት ይሆናል?	1. _____ብር 88. ስላዉቅም
112	በቤተሰቡ ዉስጥ ከስባወራዉ ዉጪ መጸበኛ ወራዊ ገቢ ያለዉ ሰዉ ስለ?	1. ስዎ 2. ስይ , **ወደ Q ≠114** ይሰፉ
113	ካለ ወራዊ ገቢዉ ስንት ነዉ?	1. _____ብር 88. ስላወቅም
114	ቀጥሎ ስተዘረዘሩት ፍጆታዎች ቤተሰብህ/ሽ በወር ምን ያህል ያወጣል?	1. ስምግብና መጠጥ ብር_____ 2. ስትራንስፖርት ብር_____ 3. ስቤት ኪራይ ብር _____ 4. የቤት ፍጆታ (መብራት፣ዉሀ፣ስልክ ወዘተ) ብር_____ 5. ስትምህርት ቤት ክፍያ ብር_____ 6. ስቤተሰብ ህክምና ብር_____ 7. ስቤተሰብ ስልባሳት ግዥ ብር_____ 99. ሌላ/ይጠቀስ ብር_____
115	በዚህ ህክምና ተቋም ስሚያገኙት ስገልግሎት የሚጠየቁትን ክፈያ በከፈል ወይም ሙሉ በሙሉ የሚሸፍንልዎት ድርጅት ስለ? ስምሳሌ የጤና መድህን ድርጅት፣የህክምና እርዳታ ድርጅት ወይም	1. ስዎ 2. ስይ, **ወደQ#201** ይሰፉ

	የመስፈያ ቤት?	
116	መልስህ/ሽ ስም ከሆነ የትኛዉ ስደነት ድርጅት?	1. ማህበረሰብ ስቀፍ ጤና መድህን 2. የግል ጤና መድህን 3. የመስፈያ ቤት ህክምና ስገልግሎት 4. የህክምና እርዳታ ድረጅት/NGO 99. ሌላ/ደጠቀስ
II.	**የህክምና መረጃ**	
201	ስመጀመሪያ ግዜ የካንሰር ምርመራ ያደረከዉ/ሽዉ መቸ ነዉ?	1. በዚህ ስመት 2. ከስንድ ስመት በፊት 3. ከሁስት ስመት በፊት 4. ከሶስት ስመት በፊት 88. ስላስታዉስም
202	የካንሰር ምርመራዉን ያደረከዉ/ሽው ያደጋገጥከዉ የት ነዉ?	1. ስዲስ ስበባ የመንግስት ሆስፒታል 2. ስዲስ ስበባ የግል ሆስፒታል 3. ከስዲስ ስበባ ዉጪ የመንግስት ሆስፒታል 4. ከስዲስ ስበባ ዉጪ የግል ሆስፒታል 5. ካገር ዉጪ የግልሆስፒታል 99. ሌላ
203	ባስፋት 12 ወራት የካንሰር ህክምና ሰጪ ክፍል ያሳቸዉን ጤና ተቋማት ስካንሰር ህክምና ጉዳይ በስመቃሳይ ስንት ጊዜ ሄዱ/ነበኙ?	1. _____ግዜ 88. ስላስታዉስም
204	እስካሁን የትኛዉን ስደነት ህክምና ስግኝተዋል? /ከስንድ በላይ መልስ ይቻላል/	1 የመደሀኒት ህክምና/ኬሞቴራፒ 2 የጨረር ህክምና 3 ቀዶ ጥገና ህክምና 4 የሆርሞን ህክምና 5 የድጋፍ ህክምና **6** ሌላ/ይገለጽ_____
III.	**ቀጥተኛ የካንሰር ህክምና ተዛማጅ ወጭ(Direct non-medical expenditure**	
301	ከካንሰር ህክምና ጋር በተያያዘ ባስፋት 12 ወራት ዉስጥ ቀጥሎ ስተዘረዘሩት ስገልግሎቶች ምን የህል ስወጣህ/ሽ?	1. ስትራንስፖርት ብር_____ 2. ስምግብና መጠጥ ብር_____ 3. ስስቢጋ ኪራይ/ወደ ህክምና ሲሄዱ/ ብር_____ 4. ሌላ/ደጠቀስ_____ ብር_____
IV.	**ቀጥተኛ የካንሰር ህክምና ወጭ**	
401	ባስፋት 12 ወራት ዉስጥ ባህላዊ/ዘይማኖታዊ ህክምና ቦታ ሄደዘል/ሄደሻል?	1. ስም 2. ስይ, **ወደ Q ≠403ይስፋ**
402	ባስፋት 12 ወራት ዉስጥ ስባህላዊ/ዘይማኖታዊ ህክምና ምን ያህል ስወጣህ/ሽ?	1. _____ETB/12 months 88. ስላስታዉስም
403	ባስፋት 12 ወራት ዉስጥ ከግል ፋርማሲ መድሃኒት ስመግዛት ምን ያህል ገንዘብ ስወጣህ/ሽ? **ለመንግስት ሆስፒታል ታካሚ የሚጠየቅ**	_____ETB/12 months
V.	**ቀጥተኛ ያልሆነ የካንሰር ህክምና ወጪ**	
501	ባስፋት 12 ወራት ዉስጥ ስምን ያህል ቀን ስቢጋ ይዘዉ ታከሙ?	1. _____ቀን 99. ስላስታዉስም

502	ባለፉት 12 ወራት ዉስጥ በካንሰር ህመም ምክንያት ያለ ክፍያ ወደም የሰገቢ ስራ ማቆም ወደም ከስራ መቅረት ወደም መስራት ስለመቻል ሕጋዋህ/ሽ ነበር?	1. አዎ, 2. አዶ, **ወደ Q ≠404ደለፉ**
503	ለምን ያህል ቀን ያለ ክፍያ ወደም የለ ገቢ ከስራ ቀረህ/ሽ?	1. _____ቀን 99. አላስታዉስም
504	አስታማሚ አለህ/ሽ?	1. አዎ 2. አዶ, **ወደ Q ≠601 ደለፉ**
505	ካለህ/ሽ አንተን/አንችን ለማስታመም ለምን ያህል ቀን ያለምንም ክፍያ/ገቢ ካንተ/ቺ ጋር ቆየ?	1. _____ቀን 99. አላስታዉስም
VI.	**የታማሚዉ ቤተሰብ ከፍተኛ የህክምና ወጪ ለመቋቋም የሚጠቀሟቸዉ መንገዶች**	
601	አንተ/ች ወደም ቤተሰብህ **ከፍተኛ** የካነሰር ህክምና ወጪዉን ለመቋቋም ምን አይነት ዘዴ ትጠቀማላቹ? /ከአንድ በላይ መልስ ይቻላል/ (እያንዳንዱንወጪበብርይገለጽ)	1. በማነኛዉም የቤተሰብ አባልገቢ _____ 2. በቁጠባ _____ 3. ከዘመድ ወደም ከጓደኛ በመጠየቅ_____ 4. ሀይማኖታዊ ድጋፍ_____ 5. ከNGOs_____ 6. ከስራዉ አበዳሪ_____ 7. ከጤና መድህን ተመላሽ ገንዘብ_____ 8. ንብረት በመሸጥ(መሬት፣እቃ፣እንስሳትጌጣጌጥ) _____ 9. እቁብ/አድር _____ 10. ሌላ/ይገለጽ _____

ለግዜዎትና ለስዙኝ መልስ በጣም አመሰግናለዉ!
Interview time taken: _____ Interview time ended: _____

VII. Clinical information, investigation and treatment expenditure check list (to be filled by respective patient chart review)

Patient MRN No_____Date; _____/_____/_____Review started time _____

701	Type of cancer diagnosed	1. Breast cancer 2. Cervical cancer 3. Colorectal cancer 4. Prostate cancer 5. Lung cancer 6. Leukemia 7. Gastro-esophageal 8. Other _____
702	Stage of the disease	_____stage
703	When did the treatment initiated	_____months before
704	Type of treatment given currently Multiple answer possible	1. Chemotherapy 2. Radiotherapy 3. Surgery 4. Supportive treatment 5. Hormonal

		99. Other _____
705	Current treatment cycles	1. _____cycle 2. On other treatment option
706	During these months of visit, how much ETB did the patient spent for the following services? (Please put your answer in ETB)	**Total_____** 1. Consultation cost_____ 2. laboratory investigation Cost_____ 3. Imaging investigation cost_____ 4. Medicines cost_____ 5. Hospital bed cost_____ 99. Other related cost_____
707	If he patient has been treated in public hospital, how much birr did he/she spend for the following services to be done outside the hospital/ in private facility?	**Total_____** 1. Laboratory investigation cost_____ 2. Imaging investigation cost_____ 3. Other /specify_____

Review time taken: _____ **Review time ended: _____**

Annex 2, English questionnaire

Addis Ababa University College of Health Science School Public health

Department of health Economics

Hello, Dear participant! My name is _____. I am representing, Addis Ababa University, School of Public health. I am here to collect data for a research entitled "**Out of pocket expenditure for cancer care among hospitalized cancer patients in Addis Ababa, Ethiopia, 2021**". The research investigator is Girum Yihun**,** a Masters student in Addis Ababa University, School of public health. It is a hospital based cross sectional study to be conducted at public and private hospitals providing cancer treatment services. The purpose of this study is to determine the level of catastrophic out of pocket health expenditure and identify associated factors among patients attending cancer treatment services in Addis Ababa, Ethiopia. Hence, conducting this study will be used as a basic input to policy makers and other responsible bodies of the country which could help for strengthening the risk pooling and payment mechanisms and other prevention strategies development which will prevent a catastrophic level of financial expense and improve the health status of cancer patients. Becoming part of study will not have any payment you gain but the study finding will give an insight for policy makers that might

have an influence on the current health care practice. It might take you 20-30 minutes to finish the interview. You are being part of the study by chance and you will not get any harm because of participating in the study. Your participation in this study is completely voluntary. You have the right to withdraw from the study in any time. We reassure all your responses will remain strictly confidential and will be handled in secured manner. The information you provide will be used only for the purpose of the study stated above. Therefore, I would like to confirm your consent to be part of the study.

Do you agree to be part of the study? **Agree** ☐ **Disagree** ☐

Thank you very much to be part of the study.

If you have any concerns you can contact the following bodies;

- ✓ Mr Girum Yihun (investigator**)**, Tel: 0910474367, E-mail; girumhu@gmail.com,
- ✓ Dr Anagaw Derseh, (Advisor), Tel; 0944121769, E-mail: anagaw.derseh@aau.edu.et,
- ✓ Mr Tamiru Demeke, (Advisor), Tel 0911661041, E-mail; tamirud@gmail.com

Name of the health facility: _____ Type of health Facility: 1. Public 2. Private Interviewer's name: _____ Interviewer's signature: _____		Date of the interview: ____/___/___ Interview time began: _____ Interview time end_____
I. Socio-Economic and demographic characteristics		
S.no	**Questions**	**Respondent response**
101	What is your age	1._____years 88.I don't know
102	Sex?	1.Male 2. Female
102	What is your religion?	1.Orthodox 2. Muslim 3. Protestant 4. Catholic 99. Others (specify) _____
103	What is your marital status?	1.Married , 2.Single 3.Divorced, skip to Q ≠105 4. Widowed , 5.Separated,
104	Are you the head of the household?	1.Yes, skip to Q ≠106 2.No
105	What is your relation with the head of the household?	1.Wife 2.Husband

		3.Child 4.Father/mother 5.Brother/sister 99.Other
106	What is the family size of your household including yourself?	1._____ 2.I am living alone 99.Other
107	What is your level of education?	1. Unable to read and write 2. Only read and write 3. Elementary school (1-8) 4. Secondary school (9-10) 5. preparatory school (11-12) 6. Level 1-4 7. Higher education (diploma and above)
108	What is your employment status?	1.Farmer 2.House wife, 3.Government employee 4.NGO/private employee 5. Self employed 6.Petty trader 7.Daily laborer 8.Retired 9.Unemployed , 99. Other
109	Where is your permanent residence?	3. Addis Ababa 4. Out of Addis Ababa
110	How many kilometers is your permanent residence far from this hospital?	2. _____kilometers 88. I don't know
111	How much is the average monthly income of the household head?	2. _____birr 88. I don't know
112	Is there anyone other than the household head who have regular monthly income in the family?	3. Yes 4. No , **skip to Q ≠114**
113	How much is the average monthly income of the other person in the household?	2. _____birr 88. I don't know
114	If you are unemployed what is the source of your income	Specify _____
115	How much money you expend per month for your family consumption?	1.Food and beverage birr_____ 2.Transport birr_____

		3.House rent birr _____ 4.School birr_____ 5.Medical other than basic consumption birr_____ 99. other birr_____
116	Have you enrolled in any type of pre-payment scheme (e.g. health insurance, employer or organizational insurance system, medical support or similar program) to get full or partial payment for cancer care?	1.Yes 2.No, **skip to Q#201**
117	If yes, which type of insurance have you enrolled?	1.Community based health insurance 2.Private health insurance 3.Organizational/employer insurance 4.Medical aid/NGO insurance 99. Other health insurance
	II. Medical information	
201	When did you diagnosed for cancer for the first time?	1.This year 2.A year ago 3.Two years ago 4.Three years ago 88. I don't remember
202	Where did you do cancer diagnosis?	1.Public hospital in A.A 2.Private hospital in A.A 3.Public hospital out of A.A 6.Private hospital out of A.A. 7.Private hospital abroad 99. other
203	Over the last 12 months (total visit), how many times did you visit oncology service unit providing health facilities for cancer care?	2. _____times 88. I don't remember
204	Which treatment did you receive so far? (multiple answers possible)	1.Chemotherapy 2.Radiotherapy 3.Surgery 4.Hormonal 5.Supportive treatment 99. Others (specify)_____

	III. Direct non-medical expenditure	
301	In the last 12 months how much did your household spend for the following services to get cancer care	1. Transportation _____ 2. Food and beverage_____ 3. Bed rent/during hospital visit_____ 4. Other/ specify _____
	IV. Direct medical costs	
401	Did you go to traditional/religious healing or treatment areas?	3. Yes 4. No **, skip to Q ≠403**
402	During the last 12 months, how much did you spend for traditional healing/treatment practice?	2. _____ETB/12 months 99. I don't know
403	In the last 12 months how much money you expended related to your treatment?	1. _____birr 88. I don't remember
404	During the last 12 months, how much did you spend to buy drugs from private pharmacy? **To be asked in public hospitals**	_____ETB/12 months
	V. Indirect medical costs	
501	In the last 12 months, for how many days you treated as inpatient/hospitalized?	2. _____days 99. I don't know/I don't remember
502	Have you reduced or absent from work or unable to work due to the illness?	2. Yes, 2. No **, skip to Q ≠504**
503	If yes, how many days you lost from work without payment or income in the last 12 months?	2. _____days 100. I don't know/remember
504	Do you have attendant/care giver?	3. Yes 4. No, **skip to Q ≠501**
505	If yes, how many days your attendant lost from work without payment/income to give care for you?	2. _____days 99. don't know/remember

	VI. Patients' Household financial coping strategies	
601	What type of method do you or your family used to cope with the cost of cancer treatment? Multiple answers possible, (Please put the amount used to cover in ETB)	1. Income of any household member/s _____ 2. From savings _____ 3. Ask relatives or friends 4. Religious support 5. NGOs _____ 6. Borrow from usury_____ 7. Payment or reimbursement from a health insurance plan (including private health schemes)? _____ 8. Sold assets (land, property, livestock, jewellery) _____ 9. Eqqub/Iddir _____ 10 .Others, (specify) _____

Thank you very much for your time and answers!

Interview time taken: _____ Interview time ended: _____

VII. Clinical information, investigation and treatment expenditure check list (to be filled by respective patient chart review)

Patient MRN No_____

Date; _____/_____/_____

Review started time _____

701	Type of cancer diagnosed	9. Breast cancer 10. Cervical cancer 11. Colorectal cancer 12. Prostate cancer 13. Other _____
702	Stage of the disease	_____stage
703	When did the treatment initiated	_____months before
704	Type of treatment given so far Multiple answer possible	6. Chemotherapy 7. Radiotherapy 8. Surgery 9. Supportive treatment 10. Hormonal 100. Other _____

705	Current treatment cycles	3. _____cycle 4. On other treatment option
706	Over the last 12 months (total visit), how many times did the patient visit oncology service unit for cancer care?	_____times
707	During these months of visit, how much ETB did the patient spent for the following services? (Please put your answer in ETB)	**Total_____** 1. Consultation cost_____ 2. laboratory investigation Cost_____ 3. Imaging investigation cost_____ 4. Medicines cost_____ 5. Hospital bed cost_____ 100. Other related cost_____

Review time taken: _____ Review time ended: _____