Solid Tumor

by Mahlet Moges

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COLLEGEOF HEALTH SCIENCES, SCHOOL Of PHARMACY

DEPARTMENT OF PHARMACOLOGY AND CLINICAL PHARMACY

Comprehensive Analysis of Solid Tumor Profiles, Treatment Modalities, Medication Utilization, and Patient Survival Outcomes in Adults: A 5-Year Survival Analysis Study

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A Thesis Submitted to the Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, College of Health Sciences, Addis Ababa University, in Partial Fulfillment of the Requirements for the Master of Science Degree in Pharmacy Practice.

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Addis Ababa, Ethiopia

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Sep 2023

Addis Ababa, Ethiopia

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Abbreviations

- **ACCR**: Addis Ababa Cancer Control Registrar
- **AJCC**: American Joint Committee on Cancer
- **AC**: Anthracycline + Cyclophosphamide
- **BC**: Breast Cancer
- **CRC**: Colorectal Cancer
- **CAF**: Cyclophosphamide, Adriamycin, and 5-Fluorouracil
- **DUE**: Drug Use Evaluation
- **ESMO**: European Society for Medical Oncology
- **EMA**: European Medicine Agency
- **EMR**: Electronic Medical Record
- **FEC**: 5-Fluorouracil, Epirubicin, Cyclophosphamide
- **FIGO**: Federation of International of Gynecologists and Obstetricians
- **FOLFOX**: Folinic Acid + Fluorouracil + Oxaloplatin
- **HCC**: Hepatocellular Cancer
- **HBV & HCV**: Hepatitis B and C Virus
- **IHME**: Institute of heath metrics and evaluation
- **ICP**: Intracranial Pressure
- **HN**: Head and Neck
- **MCBS**: Medicare Current Beneficiary Survey
- **NCCP**: National Cancer Control Plan
- **NCCN**: National Comprehensive Cancer Network
- **PSA**: Prostate Specific Antigen
- **SNNP**: South Nation Nationalities People Region
- **SSA**: Sub-Saharan Africa
- **TASH**-Tikur Anbessa Specialized Hospital

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Abstract

Background

Cancer, a non-communicable disease, has surged globally in last two decades due to various factors, including racial, biological,socioeconomic status and socio-cultural influences. Solid tumor accounts the highest number of cancer cases across worldwide. Africa faces the greatest challenges, marked by the worst outcomes and the shortest survival rate. This adversity exacerbated by lack of awareness, limited preventive strategies, and the prevalence of unhealthy lifestyles across the continent. Additionally, there is a notable dearth of comprehensive studies conducted in Ethiopia that delve into the disease spectrum, treatment modalities, drug utilization patterns, and patient survival trends over a five-year timeframe.

Objective: This study seeks to elucidate the spectrum of cancer, treatment modalities, patterns of drug utilization, and the myriad factors that influence patient survival within the TASH Solid Tumor Oncology Center.

Methods: Employing a convenient sampling technique, a retrospective observational follow-up study was carried out at TASH oncology facility from July to February 2022. Adult patient data spanning from September 2016 to October 2017 was meticulously extracted from medical records and phone addresses. An organized checklist, pre-tested in English and complete with contact information, was crafted for this purpose. Data analysis was performed using SPSS, with the Cox regression model being employed to identify variables impacting survival. Median and overall survivals were assessed through Kaplan-Meier analysis, and statistical significance was declared at a p-value ≤ 0.05.

Results: The median age of the participant were 47 with majority of them from rural areas. Cervical cancer accounts the highest incidence with 24.5% of the case, while colorectal cancer were the commonest one among males. At the 5-year mark, the overall survival rate of 10 months (8.956-11.044) with 73.8% of the study population having passed away. Notably, overall survival was

significantly influenced by factors such as marital status, exposure status, treatment methods, cancer stage, recurrence, complications, and the administration of specific drugs such as paclitaxel, doxorubicin, and hormonal agents. Patients with advanced cancer stage (Adjusted Hazard Ratio [AHR] 2.02, 95% Confidence Interval [CI] 1.525-2.676), complications (AHR 1.233, 95% CI 1.525-2.676), and those who did not receive chemotherapy (AHR 1.817, 95% CI 1.382-2.389) exhibited poorer survival outcomes, while patients treated with paclitaxel and hormonal therapy demonstrated improved survival.

Conclusion: Our findings indicate suboptimal overall survival across all cancer types when compared to high-income nations with lower mortality rates. Particularly noteworthy is the persistently high incidence of cervical cancer, coupled with limited access to advanced radiation therapy within our center. We advocate for collaborative efforts aimed at addressing cancer prevention and treatment challenges, with a specific emphasis on immunization and the early detection of infectious malignancies.

Keywords: Treatment modalities, cancer stage, disease spectrum, drug utilization.

1. Introduction

1.1 Back ground

Cancer stands as a formidable global challenge and remains one of the leading causes of death in all nations and accumulating risks associated with diet, lack of exercise, tobacco, alcohol and industrial exposure.(1). Solid tumors characterized by abnormal tissue masses and can be benign or malignant traits with various types of classification such as sarcomas, carcinomas, and lymphomas (2).

The year 2020 witnessed a staggering global cancer landscape, with an estimated 19.3 million new cases and 10.0 million cancer-related deaths. Female breast cancer claimed the top spot, constituting an estimated 2.3 million cases (11.7%), followed closely by lung cancer (11.4%), colorectal cancer (10.0%), prostate cancer (7.3%), and stomach cancer (5.6%). Strikingly, the mortality rates for female breast and cervical cancers were markedly higher in transitioning nations in comparison to their transitioned counterparts(3).

As per a comprehensive survey conducted by the World Health Organization (WHO) in 2012, the grim statistics revealed that 8.2 million lives were claimed by cancer during that year (1). Turning our attention to the American Cancer Society's the most frequently encountered cancers encompass prostate, lung, and bronchus (referred to as lung hereafter), colon, and rectum cancers(4).

In the year 2020, Asia grappled with a significant cancer incidence rate, registering 169.1 cases per 100,000 individuals (5).In the context of India, solid malignancies emerged as the predominant concern, afflicting 53.1% of the participants(6).Meanwhile, across the border in Pakistan, the cancer landscape revealed a distinct pattern. Head and Neck cancer stood as the most prevalent type, affecting 19.9% (7). As of 2018, Sub-Saharan Africa grappled with a formidable challenge as it confronted an estimated 752,000 new cancer cases, constituting 4% of the global total. Breast, cervical, and prostate cancers emerge as the dominant forces, casting a long shadow over public health efforts(8,9).

Turning our focus to the cancer landscape in Ethiopia, data derived from population-based registry records in the year 2015 provide valuable insights. Among men, a total of 21,563 incident cancer cases were documented, with 42,722 cases among women. Colorectal cancer (CRC) emerged as the most frequently encountered malignancy in men. Breast cancer (BC) took center stage as the most prevalent cancer in women (9).In Ethiopia, cancer is estimated to be responsible for approximately 5.8% of the nation's overall mortality(10).

Treatment encompasses diverse modalities, ranging from localized approaches such as surgery and radiation to systemic chemotherapy and biological interventions(7,11).In India cytotoxic agents held a dominant position, accounting for usage in 74.9% of cases(6). Conversely, the use of hormonal or monoclonal agents was relatively infrequent(11).while in Iran radiation therapy plays a pivotal role in the treatment with 46.8% of patients benefiting from its targeted approach to combating cancer. In addition, 0.9% of patients use immunotherapy , and radio-iodine therapy, prescribed to 2.0% of individuals, reflecting the growing interest in innovative treatments(12).

In the context of Ethiopia, the predominant and well-established cancer treatment modalities encompass surgery, chemotherapy, hormonal therapy, and radiation therapy. There are limited availability of these advanced treatments underscores the challenges faced in delivering state-of-the-art cancer care(13).

Cancer survival rate will be influenced with a multitude factors including cancer type, age at diagnosis, disease stage, treatment modalities, insurance coverage, concurrent health conditions, and financial resources(14).Furthermore, co-existing medical conditions, known as comorbidities, have been shown to correlate with poorer survival rates among cancer patients(15). This emphasizing the need for holistic and equitable healthcare solutions.

1.2 Statement of the problem

The issue at hand is the global impact of cancer, which affects every community but exhibits varying prevalence and severity depending on the cancer type(14). Recent GLOBOCAN data highlights, revealing that in 2020 alone, with 19.3 million new cancer cases and nearly 10.0 million cancer-related deaths worldwide (2).This profound global health challenge necessitates comprehensive understanding, research, and intervention to address its diverse manifestations and consequences.

Africa faces a unique set of challenges, particularly regarding the prevalence of oncogenic viruses and, 80% of cancer patients in low-income countries are diagnosed at an incurable stage(16). In addition to the viral factors, financial circumstances, quality of life, access to healthcare, and medical services are the great hard ship of the continent(17). The convergence of these complex factors collectively contributes to the heightened cancer incidence and mortality rates among African patients, underscoring the urgent need for comprehensive strategies to address these multifaceted challenges (18).

Many Sub-Saharan African (SSA) nations are grappling with a shortage of cancer treatment options(19).Access to radiotherapy remains limited, with only 23 out of the 52 African nations having this vital resource(16).

As per the 2013 World Health Organization Model Lists of Essential Medicines, a sobering reality emerged from a study involving 28 low-income countries: only 9 out of 25 essential cancer medicines were included on the list(20).Presently, the Ethiopian Essential Medicines List falls short of incorporating chemotherapy options for cancer treatment. Furthermore, even essential medicines for pain management are often scarce and challenging to obtain in many public hospitals (9).

In Addis Ababa, only 25% of these patients were able to access the planned radiotherapy within 12 months(13).This highlighting scarce of radiotherapy access in the region.

Ethiopia is experiencing continuous population growth, with an estimated 117 million inhabitants(9). Consequently, the incidence of cancer has also been on the rise over the years. In 2018 alone, it was estimated that there were approximately 67,573 new cancer cases and tragically over 46,373 cancer-related deaths within the country. This upward trend in cancer cases underscores the pressing need for enhanced cancer awareness, prevention, and access to effective treatments in Ethiopia (21).At TikurAnbessa Specialized Hospital, a concerning pattern emerges, as approximately 80% of reported cancer cases are diagnosed at advanced stages, significantly correlating with unfavorable outcomes. This alarming statistic is primarily attributed to a lack of awareness regarding the advantages of early detection and timely treatment services(9).

Compounding this issue, Ethiopia faces a shortage of cancer specialists, further straining the healthcare system's capacity to provide adequate care. Additionally, the scarcity of advanced cancer therapies, including targeted therapy and stem cell transplantation, leaves the population vulnerable to prolonged waiting times and disease progression(9). These challenges underscore the urgent need for increased awareness, investment in specialized healthcare expertise, and improved access to advanced cancer treatments within the country.

1.3 Significance of the study

This study aims to analyze patient demographic information, socio-economic status, and cancer type by stage, and assess the impact of complication, medication use, and comorbidities on patient outcomes. Additionally, it will examine treatment approaches and chemotherapy patterns with the goal of addressing the significant shortage of cancer therapy and oncology service.

It also serves to reduce the modifiable risk factor that can predispose patients to cancer. This involves empowering health professionals to offer a comprehensive range of cancer prevention, screening, diagnostic, treatments and care options to cancer patients in Ethiopia.

By describing treatment modalities and chemotherapy patterns, we aim to improve service efficiency by documenting the frequency of prescribed regimens. This data will assist in forecasting caner medication needs during procurement and guide institutions in managing their inventory while making efficient use of health care system.

The data obtained from the study will serve as an invaluable tool for future research, enabling the analysis of cancer trends and treatment regimens with in the center. Additionally, this study will shed light the extent of mortality and survival among study patients with predisposing factors. Such insights will be highly informative for the sector, allowing for comprehensive evaluation of the disease's prevalence and severity.

2. Literature review

Cancer is becoming a huge global burden, which particularly impair developing countries like Ethiopia. To address these wide problems the research accomplished the listed objectives and use article written in English from PubMed, Google scholar by using search words tumor/cancer/malignancy, chemotherapy/cancer therapy/treatment modalities, pattern of drug use/drug utilization, patient survival status/outcome and so on.

2.1 Type of cancer and its incidence

70% of cancer fatalities globally are caused by the most prevalent cancers. In terms of overall cases, female breast cancer accounts for 11.7%, followed by lung cancer (11.4%), colorectal cancer (10%), prostate cancer (7.3%), and stomach cancer (5.6%). The liver, rectum cervical, esophageal, and thyroid glands enlisted procedurally(3).

The most prevalent malignancies in developing nations include lung cancer, breast cancer, stomach cancer, colorectal cancer, and liver cancer. In many developing nations, particularly in Sub-Saharan Africa, the prevalence of all HIV-related cancers caused by viruses, such as cervical and colorectal cancer (HPV), Kaposi sarcoma (HHV8), non-lymphoma Hodgkin's (EBV), squamous cell carcinoma conjunctiva (HPV), and hepatocellular carcinoma (HBV), has increased. (20).

In India, the most eminence carcinomas are mouth/oropharynx, esophagus, stomach, and lungs/bronchus/trachea in males while carcinoma of cervix, breast, mouth/oropharynx, and esophagus in females(6).Pakistan conducted a similar study, Head and Neck (HN) cancer is the most frequently recognized cancer worldwide, accounting for 8-10% of all cancers in Southeast Asia. Oral cancers are the most common type of squamous cell cancer in the head and neck(7).Breast cancer, encompasses 27.7% of all cancer cases in Africa, is followed by cervical cancer (19.6%), prostate cancer (18.1%), liver cancer (9.7%), and colorectal cancer (6.9%) (22).

The incidence of cancer in Ethiopia was calculated in 2015 using data from population-based registries. A male to female ratio of around 1:2 was observed, with 21,563 cases in males and 42,722 in women. The most frequent cancers in men under the age of 15 were lung cancer, non-Hodgkin lymphoma, prostate cancer, colorectal cancer, and non-Hodgkin lymphoma. Breast cancer (BC), cervical cancer (CC), ovarian cancer (CRC), and leukemia were the most prevalent cancers in females aged 15 and older (5).Another study in Addis Ababa found that a large proportion of patients (38.8%) had advanced stage 4 disease, while just a small fraction of cancer entities (2.0%) had stage 1 cancer.(13).

2.1.1 Female breast cancer

Female breast cancer became leading cause of global cancer incidence in 2020, with 11.7% of all cancer cases and 685,000 deaths (3).In Sub-Saharan Africa, account for 27.7% of all cases and the second principal cause of death after the cancer of the cervix(8).Retrospective study in Nigerian also revealed about the spectrum of the severity and that majority of them came at advanced stage(56%)(22).It accounts for one-third of all cancer diagnoses among women in Ethiopia, one in five of all cancer cases, and 9061 breast cancer fatalities annually(23).

2.1.2 Lung cancer

It was the second most prevalent cancer in terms of diagnoses and the leading cause of death in the US in 2020. About two-thirds of lung cancer deaths worldwide, are attributed to smoking with most frequent kind of cancer among men.(3).In Pakistan, it is the third leading cause of cancer death, it conquer 4.6 % of new cases and 5.9 % of deaths in 2012(7).South Africa has a rate of 27.5% and 9.3%, North Africa 19.3% and 3.5%, East Africa 4.2% and 3.0%, Middle Africa 3.4% and 1.8% and West Africa 2.8% and 1.8% for males and females, respectively declared by Global Cancer Observatory 2020 (25).2.7% of the total number of cancers diagnosed at TASH from 2011 to 2017, 1% in men and 2% in female(24).

2.1.3 Colorectal cancer

Colorectal cancer ranks third among all cancers in the US, but it is also the second leading cause of mortality. In countries in transition, incidence rates are much higher and about greater with a superior mortality rate (3).In Ethiopia, colorectal cancer is second only to bone and soft tissue cancer at 12.2%, while there were 58,000 new cases of the disease per 100,000 persons in Africa in 2019 for both sexes(25)

2.1.4 Prostate cancer

Prostate cancer is rated the second most common cancer and sixth leading cause of cancer deaths among men globally(3).According to the Institute for Health Metrics and Evaluation (IHME), the number of men diagnosed with prostate cancer per day in Sub-Saharan Africa (SSA) grew from 100,200 in 1990 to 219,700 in 2010, while the number of men who passed away went from 5,600 to 12,300 in the same year. According to the GLOBOCAN 2012 data, the mortality rates in Africa were 23.2 and 17.0 per 100,000, respectively(26).It also becamealarming among Ethiopian men and it is the third most common cancer in men (27).

2.1.5 Stomach cancer

Stomach cancer encompasses a major cause of death in the world, with over one million new cases in 2020 and an estimated 769,000 deaths(3).Incidence rates are highest in Eastern and Central Asia and Latin America(5).North and East Africa have the lowest rate, with only 4.7 annual diagnoses per 100,000 males (28).

2.1.6 Liver cancer

In 2020, primary liver cancer is the sixth most common cancer and the third leading cause of cancer death worldwide, followed by hepatocellular carcinoma (HCC) (75-85 % of cases) and intrahepatic cholangitis carcinoma (10-15%), as well as other rare types(3).In Western, Central, Southern, and Eastern Africa, the

age-standardized incidence rates of liver cancer are 8.3, 6.5, 4.9, and 4.8 per 100,000 person-years, respectively(29).A retrospective study on liver patient at Ras Desta Damtew memorial hospital in Addis Ababa with hepatocellular cancer made up 7.5% of the total(30).

2.1.7 Cervical cancer

According to statistics from around the world as stated in recently updated guidelines by the American Cancer Society, cervical cancer is consistently the second most prevalent cancer death among women between the ages of 20 and 39(2).For every 100,000 women, there are 40 to 43 occurrences in Eastern and Southern Africa. As of 2018, this cancer killed more than 75% of affected women each year in East, Central, and West Africa(31).In Ethiopia, 574 (90.5%) of the 65.1 % of patients with cervical cancer who presented in late stages (III&IV) had squamous cell carcinoma. Nearly a third (33.4%) of those with comorbidity—or more than half (54.7%)—were also HIV-positive.(32).

2.2Treatment modalities and drug utilization pattern

Surgery, radiation, chemotherapy, immunotherapy, and hormones are a few of the treatment options for cancer. Chemotherapeutic drugs, which either target specific cell cycle states or all cells rapidly dividing, are used to treat cancer at various stages (6).

Iranian research reveals what the percentage of patients prescribed chemotherapy (n = 4093), surgery (n = 4038), and radiotherapy (n = 3327) as the primary cancer treatment modalities while in Europe 50% of cancer patient has indication for radiotherapy(12)(33).In 2021, the American Cancer Society will provide a list of cancer types and available treatments. European study states women with (stage IV) breast cancer (56%) undergo radiation and/or chemotherapy without surgery, whereas 17% receive surgery alone or in combination with other treatments, and 26% do not receive chemotherapy (14).The majority (80.8%) got at least one therapy modality, according to a retrospective cohort study of AACCR from 20 cooperating facilities in Addis Ababa. 52% of patients

underwent surgery to remove their original tumor, while 54.1% of all patients received chemotherapy as treatment(13).

For advanced squamous cell oral cancer, cisplatin and 5-FU are the most frequently used treatments in Germany,followed by FOLFOX for genito-urinary cancer, barium (5-FU) alone or in combination with radiotherapy, 5-fluorouracil, and folinic acid (irinotecan, oral Capecitabine, and a combination of irinotecan, 5-fluorouracil, and 5-folinic acid) for gastrointestinal cancer, while cisplatinis the most incisively studied drug for respiratory cancer (18).Anthracyclines (AN) are the first line chemotherapeutic treatment according to a retrospective analysis of bone and soft tissue sarcoma patients in China, followed by alkylating agents (17.3%), antimetabolites (11.9%), and vinca-alkaloids & etoposide (8.7%). (20). In the United States, most patients with gastric cancer exert platinum- and/or fluoro-pyrimidine-containing regimens as first line (21).

In Saudi Arabia, FEC + docetaxel (43%) and FEC + docetaxel + trastuzumab (23%) were used to treat 81% of patients with HER-2 positive breast cancer (9).Pemetrexed and carboplatin were frequently recommended in India (52.9%) for lung cancer, followed by doxorubicin and cyclophosphamide (36%) for breast cancer(11). The CMF combination treatment (Cyclophosphamide, Methotrexate, and 5-Fluorouracil) was heavily used for 149 patients in a retrospective analysis in Nigeria; Tamoxifen was also administered for 92 (48.9%) of the patients.(22).

2.3 Clinical outcome of cancer patients

For cancer care, the benefits of managing physical and psychosocial symptoms and limitations are immeasurable. If at all possible, the treatment aims to "cure" the cancer while also extending life expectancy and enhancing quality of life both during and after treatment(14). Europe accounts for 22.8% of total cancer cases and 19.6 % of cancer deaths, despite accounting for 9.7% of the global population(3).

Cancer death in Africa has surpassed those of AIDS, tuberculosis, and malaria due to lack of effort to impose the disease from the continent. Infamous mortality will be anticipated to exceed the global average by 30% in the next 20 years(34). According to one cross-sectional study in Tanzania, 12 (11.8 percent) patients died within 90 days of starting therapy (21).

Breast cancer has a 5-year relative survival rate of90% in women in US (14). In Nigeria, 51 patients (22.6%) died during treatment(22). In a research on breast cancer patients in Ethiopia, Gondor University found that the overall survival rate was 54.24% after two years and 25.8% after five years(35).

In Europe, the 5-year survival rates for stage I and stage II colorectal cancer are 91% and 82%, respectively. Overall 5-year survival rates for rectal cancer are slightly higher (67%) than for colon cancer (64%)(14).The total colorectal cancer patient death rate in Ethiopia was 20.3 per year (95% CI: 17.7-23.3). With a median survival period of 34.8 months (95% confidence interval: 30.4-36.8), overall survival was 18.1%(36).

Only one in five Americans with lung cancer receives a stage I diagnosis, which has a 57% survival rate compared to 15% for advanced stage disease. Compared to NSCLC (23%) SCLC (60%) has a poorer survival rate (37).According to a comparable study conducted in Korea, the average survival time for all lung cancer patients was calculated to be 2.48 years during the follow-up period, and the anticipated life expectancy over a 25-year period was 4.53 years (38).

In the United States, the majority of prostate cancers (90 %) are diagnosed in the local or regional stages, where the 5-year relative survival rate approaches 100% (14).

Ethiopian retrospective study on cervical cancer states those with FIGO stage I, II, or III at baseline had a longer median survival time (28.87 months) than those with stage IV(32).

2.4 Conceptual framework

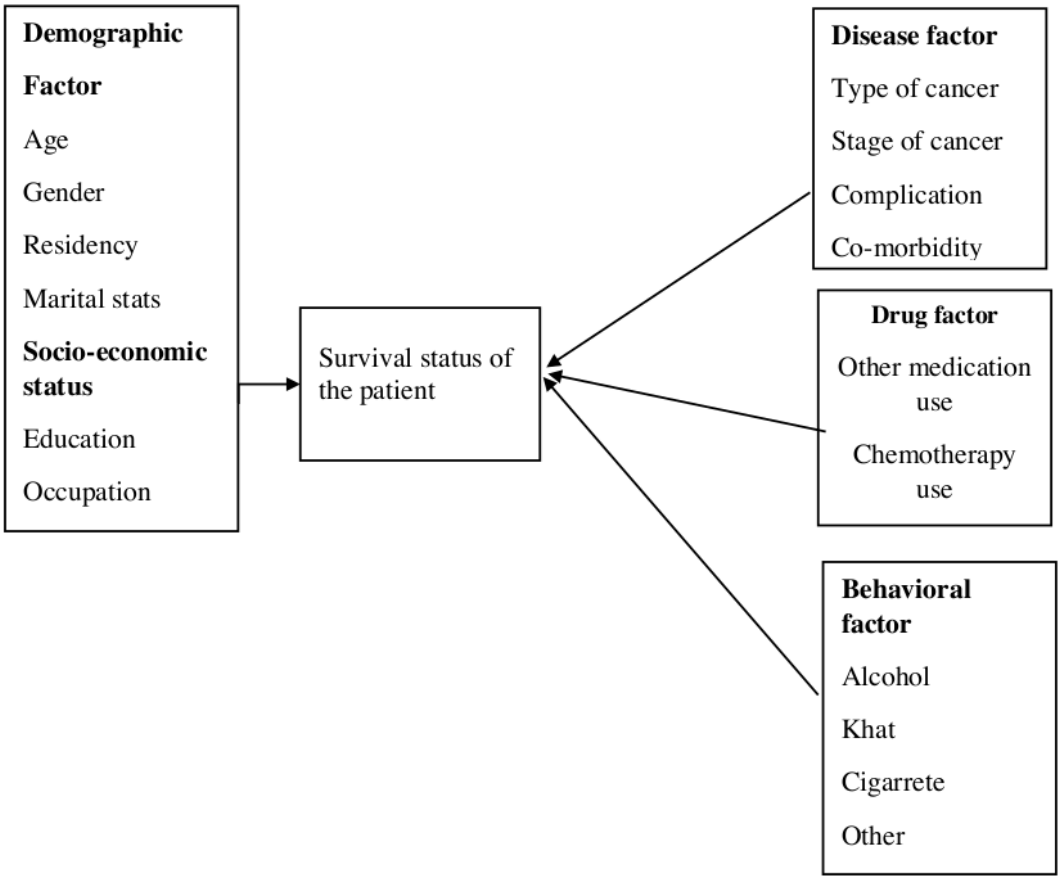


Figure 1: The conceptual framework of the study done at TASH oncology center of solid tumor 2023

3. Objective

3.1 General objective:

- To comprehensively characterize, the spectrum of diseases, treatment modalities, including drug utilization patterns, and patient outcomes within the oncology center at TASH (Tikur Anbessa Specialized Hospital).

3.2 Specific objectives:

- To provide a detailed description of pattern of solid cancer, considering patient staging patterns.
- To assess the various treatment modalities employed, focusing on patterns of chemotherapy utilization.
- To estimate the 5-year survival rates following cancer diagnosis.
- To identify and determine factors associated with survival outcomes.

4 Methodology

4.1 Study area

The study was conducted at TASH, in Addis Ababa, Ethiopia, using medical record reviews of all adult cancer patients. This hospital established in the early 1960s, is the largest and most renowned medical institution in the country(39).The hospital houses some of the country's most senior specialists as well as Addis Ababa University faculty(32).

The center offers a comprehensive range of services, including chemotherapy, radiation therapy, pain management, and various supportive and palliative care options. In Addis Ababa, it holds a pivotal role as the primary hub for cancer registry, early detection, prevention, standardized treatment and palliative care(32).

Chemotherapy, radiation therapy, pain management, and a range of other supportive and palliative services are readily accessible at the center. Tikur Anbessa Hospital in Addis Ababa serves as a pivotal hub for cancer registry, early detection, prevention, the administration of standard treatments, and the provision of comprehensive palliative care within the region(32).

4.2Study design and period

A retrospective observational follow-up study was conducted by reviewing the medical charts of patients diagnosed with solid cancer at TASH. The study covered a period from July to February 2022.

4.3 Population

4.3.1 Source population

All cancer patients who were under care at TASH from September 2016 to January 2017 were included in the study.

4.3.2Study population

The study encompassed all cancer patients who were diagnosed and treated at TASH from January 2016 to December 2017, and who met the inclusion criteria during the data collection period.

4.4.1 Inclusion criteria:

- Adult cancer patients aged 14 years and above, with histological evidence confirming their cancer diagnosis.
- Patients who have provided informed consent to participate in the telephone questionnaire.
- Patients with comprehensive and complete information available in their medical records.

4.4.2 Exclusion criteria:

- Patients diagnosed with hematological malignancies.

4.5 Sample size determination and sampling procedure

The study's overall sample size comprised all cancer patients who were diagnosed and treated at TASH oncology center between January 2016 to December 2017. Medical records were conveniently sampled, and data collection continued until a significant volume of data had been obtained. Out of the initial enrollment of more than 1546 patients, a total of 1127 patients were included in the study.

4.6 Study variable

4.6.1 Dependent variables:

- Five-year survival after diagnosis
- Spectrum of cancer
- Pattern of treatment modality with chemotherapy use

4.6.2 Independent variables:

Demographic Factors:

- Age
- Gender
- Ethnicity

- Marital status

Socio-economic status:

- Occupation
- Educational Status

Disease Factors:

- Types of Cancer
- Stage of Cancer
- Co-morbidity
- Complications

Medication Use Factors:

- Any medication use
- Chemotherapy use
- Behavioral Factors:
- Substance Use

4.7 Data collection tools and procedure

Data were collected from patients' charts using an English-language structured checklist. Trained health professionals conducted the data collection under the close supervision of the principal investigator. The checklist underwent an evaluation for clarity and length, and after training, the principal investigator ensured its completeness and made any necessary corrections.

The checklist included the following sections:

1. Demographic Information:

- Age
- Gender
- Race

2. Socioeconomic Status (Occupation &Educational Status)
3. Disease Factors:

- Types of Cancer with Stages for Each Type
- Complications (e.g., Infection, Pneumonia, ICP, Pneumothorax, etc.)
- Co-morbidities (e.g., Hypertension, Diabetes, HIV, Cardiac Illness, etc.)

4. Chemotherapy Drug Patterns Prescribed per Individual Patient and Medication Use (Including Herbal Medication and Drugs for Co morbidities or Infections)

5. Behavioral Factors (Such as Chat, Cigarette, Alcohol, etc.)

Patient survival status was obtained from the medical files or consent obtained during telephone interviews.

4.8Data management and quality Assurance

The questionnaire used in this study was adapted with modifications from previously published research. Rigorous quality control measures were implemented throughout the data collection process, including daily checks on the questionnaire. Pretesting was conducted with a subset of 5% of the total sample size to verify the consistency of the collected data with the actual records from the study period. Subsequently, the collected information was meticulously, coded, cleaned, and thoroughly explored by the primary investigator prior to analysis

Pretesting was calculated from estimated number of the study population, n = 1000 5% of the total sample size=5/100x1000=50 patients who were pretested and excluded from the study.

4.9 Data processing and analysis

The data was first coded and then entered into the SPSS (Statistical Package for the Social Sciences) version 26 software for analysis. The entered data was thoroughly edited and cleaned to ensure accuracy and completeness. The study population was described in relation to relevant variables through the calculation of frequencies, proportions, and descriptive statistics, which were visually presented in tables and graphs. To assess overall survival rates and determine the median survival time, Kaplan-Meier analyses with a life table approach were used.

The log-rank test was employed to assess differences in survival across various variables. Prior to running the Cox regression model, we checked the assumption of proportional hazards. This assessment was conducted using the Schoenfeld residual test, with variables having a p-value greater than 0.05 considered meeting the assumption. The multivariable Cox regression model analysis

included variables with a significance level of less than 0.2 in the bivariable Cox regression model. Variables in the multivariable Cox model with a p-value less than 0.05 were deemed to have a substantial impact on patients' survival, with a 95% confidence interval taken into account.

4. 10 Operational definition

Event: In this research, an "event" refers to the death of cancer patients, which was the primary outcome of interest.

Comorbidity: "Comorbidity" is defined as the presence of any medical conditions other than cancer that were documented as "yes" in the checklist during the patient's diagnosis**.**

Substance use: "Substance use" encompasses patients who reported using one, two, or all three of the following substances: cigarettes, chat, and alcohol.

Palliative care: "Palliative care" refers to the approach of alleviating the symptoms of cancer when there is no chance of cure.

Survival status: "Survival status" is defined as the outcome of patients, categorized as either "censored" (patients who are still alive at the end of the study) or "death" (patients who have passed away), based on clinical data**.**

Time to death: "Time to death" is calculated as the period between the dates of a clear cancer diagnosis and the date of the patient's death, measured in months.

Stage at diagnosis: The "stage at diagnosis" is determined based on the TNM staging system for most solid cancers, which describes the size of the tumor, its spread to nearby tissue (N), and the extent of distant spread to other parts of the body (M).

Follow-up time: "Follow-up time" is defined as the duration from the start of the study period to an event (such as death), the end of the study, or the point at which a patient was lost to contact or withdrew from the study**.**

4.11Ethical consideration

The study received approval from the Ethical Review Committee of Addis Ababa University School of Pharmacy. We also obtained a permission letter from the hospital administration referencing it as (ERB/SOP/453/152022/institute of AAU, CHS School of Clinical Pharmacy and Pharmacology). To protect the confidentiality and anonymity of study participants, no names or personal identifiers were disclosed.

4.12 Dissemination of the result

The data collected in this study have been submitted to the Department of Pharmacology and Clinical Pharmacy at the College of Health Sciences, Addis Ababa University, as part of the requirements for obtaining a Master of Science degree in Pharmacy Practice. The findings have been presented at the departmental level for review and discussion. Additionally, efforts are being made to submit the results for possible publication in scientific journals, contributing to the body of knowledge in the field of oncology.

5. Result

5.1 Socio-demographic characteristics of study participants

Between January 1st, 2016, and December 30th, 2017, we embarked on a journey of understanding cancer with 1567 courageous patients at Addis Ababa University's Tikur Anbessa Specialized Hospital (TASH). Within this group, 1127 individuals stepped forward, offering their detailed medical accounts (Figure 2). Among these individuals, 743 (65.9%) were women. The age spectrum was diverse, with 257 (22.8%) falling within the 40-49 age group, closely followed by 252 (22.4%) in the 50-59 age bracket. Faith united many, with 752 (66.7%) following the Orthodox religion, and 362 (32.1%) hailing from the Oromia regional state. Patients from Addis Ababa accounted for 319 (28.3%) of the group. The majority were married (706 or 62.6%), while 534 (47.4%) were illiterate. The occupational tapestry was colorful, comprising 477 (42.3%) unemployed individuals, 428 (38.0%) private workers, and 19.47% government employees. Around 334 (29.6%) had experienced occupational hazards. Among them, 204 (18.1%) were farmers, 77 (6.8%) had used hormonal medication, and 33 (2.3%) were factory workers (as depicted in Figure 3). When it came to funding treatment, the government stepped in for 658 (58.4%) patients, while the remaining 41.6% managed the expenses themselves. A chapter within this narrative was dedicated to substance use, with 185 (16.4%) individuals having a history of substance use. Among them, 73 (6.5%) were alcohol users, and 71 (6.3%) were enthusiasts of khat(Table 1) and (Figure 4).

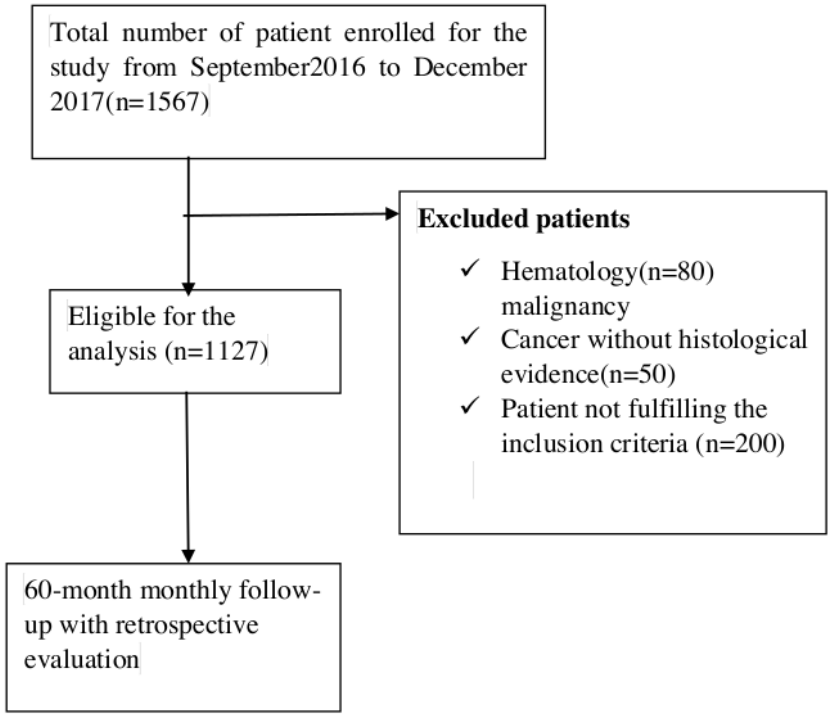


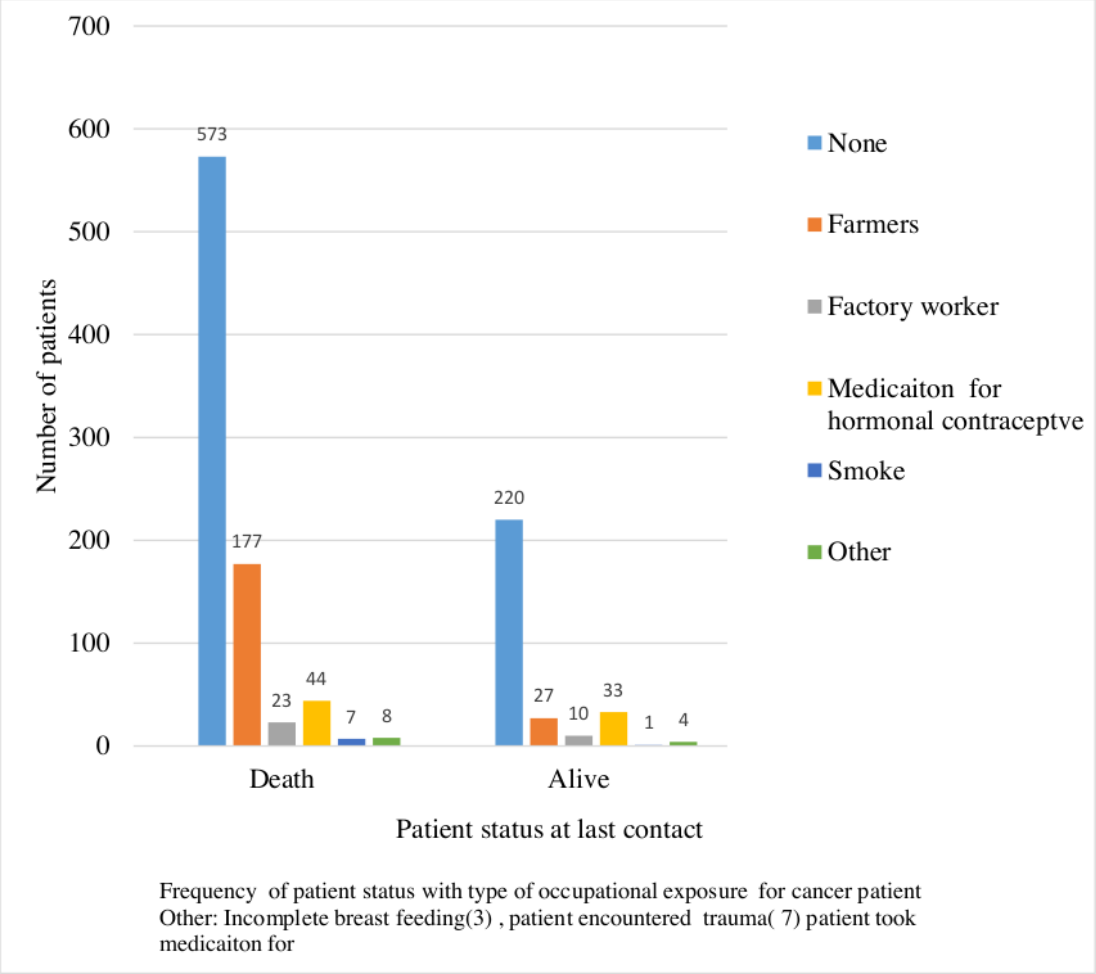
Figure 2: Figure of flow chart for data extraction criteria in TASH Referral Hospital at Oncology center of solid tumor Addis Ababa 2023.

Table1: Socio-demographic characteristics of study participants in TASH oncology center Addis Ababa, 2023

Variables	Categories	Alive Number (%)	Death Number (%)	Total Number (%)
Age in years	<30	60(20.3)	111(13.3)	171(15.2)
	30-39	50(16.9)	126(15.1)	176(15.6)
	40-49	66(22.4)	191(23)	257(22.8)
	50-59	66(22.4)	186(22.4)	252(22.4)
	60-69	43(14.6)	151(18.1)	194(17.2)
	≥70	10(3.4)	67(8.1)	77(6.8)
Gender	Female	215(72.9)	528(63.5)	743(65.9)
	Male	80(27.1)	304(36.5)	384(34.1)
Religion	Orthodox	207(70.2)	545(65.5)	752(66.7)
	Muslim	53(18)	191(23)	244(21.7)
	Protestant	30(10.2)	88(10.5)	118(10.4)
	Other*	5(1.7)	8(1)	13(1.2)
Region	Addis Ababa	94(31.9)	225(27)	319(28.3)
	Oromia	88(29.8)	274(32.9)	362(32.1)
	Amhara	52(17.6)	168(20.2)	220(19.5)
	SNNPR	37(12.5)	108(13)	145(12.9)
	Other**	24(8.2)	57(6.9)	81(7.2)
Marital status	Married	192(65.1)	514(61.8)	706(62.6)
	Single	93(11.2)	35(11.9)	128(11.4)
	Divorced	56(6.7)	30(10.2)	86(7.6)
	widowed	169(20.3)	38(12.9)	207(18.4)
Educational status	Illiterate	422(50.7)	112(38)	534(47.4)
	primary	178(21.4)	61(20.7)	239(21.2)
	secondary	143(17.2)	69(23.4)	212(18.8)
	Tertiary	89(10.7)	53(18)	142(12.6)
Occupational status	Government worker	83(28.1)	139(16.7)	222(19.7)
	Unemployed	127(43.1)	350(42.1)	477 (42.3)

	Private worker	85(28.8)	343(41.2)	428(38.0)
Occupational exposure	Yes	75(25.4)	259(31.1)	334(29.6)
	No	220(74.6)	573(68.9)	793(70.4)
Hospital cost	Out of pocket	118(40)	351(42.2)	469(41.6)
	Government	177(60)	481(57.8)	658(58.4)
Substance Use	Yes	38(12.9)	147(17.7)	185(16.4)
	No	257(87.1)	685(82.3)	942(83.6)

Abbreviation: SNNPR= Southern Nation, Nationalities, and peoples Region, Other*: Only Jesus (3), Catholic (4), Jehovah (1) and Adventist (5),
Other**DireDawa(11),Tigray(32),Somalia(10),Gumuz(5),Gambella(4), Harari(12) and Afar(7)



Frequency of patient status with type of occupational exposure for cancer patient
Other: Incomplete breast feeding(3) , patient encountered trauma(7) patient took medicaiton for

Figure 3: Frequency of patient status with type of occupational exposure for cancer patient in TASH oncology of solid tumor 2023

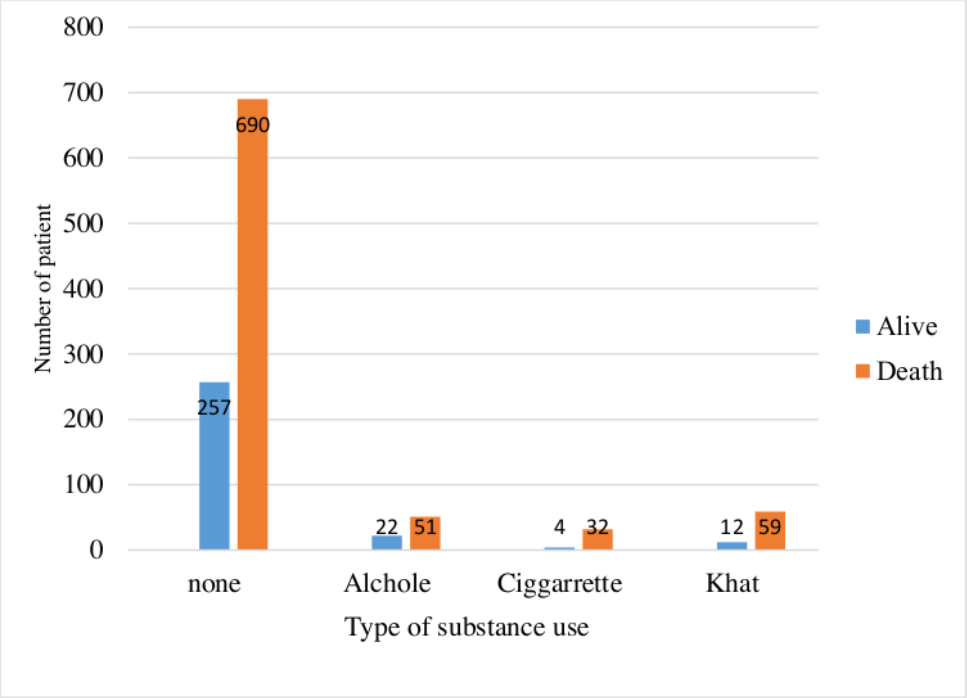


Figure 4: Frequency of patient status with the type of substance use in TASH oncology center of solid tumor 2023

5.2: Burden of cancer in TASH oncologic center with solid tumor

5.2.1 Spectrum of cancer with their frequency

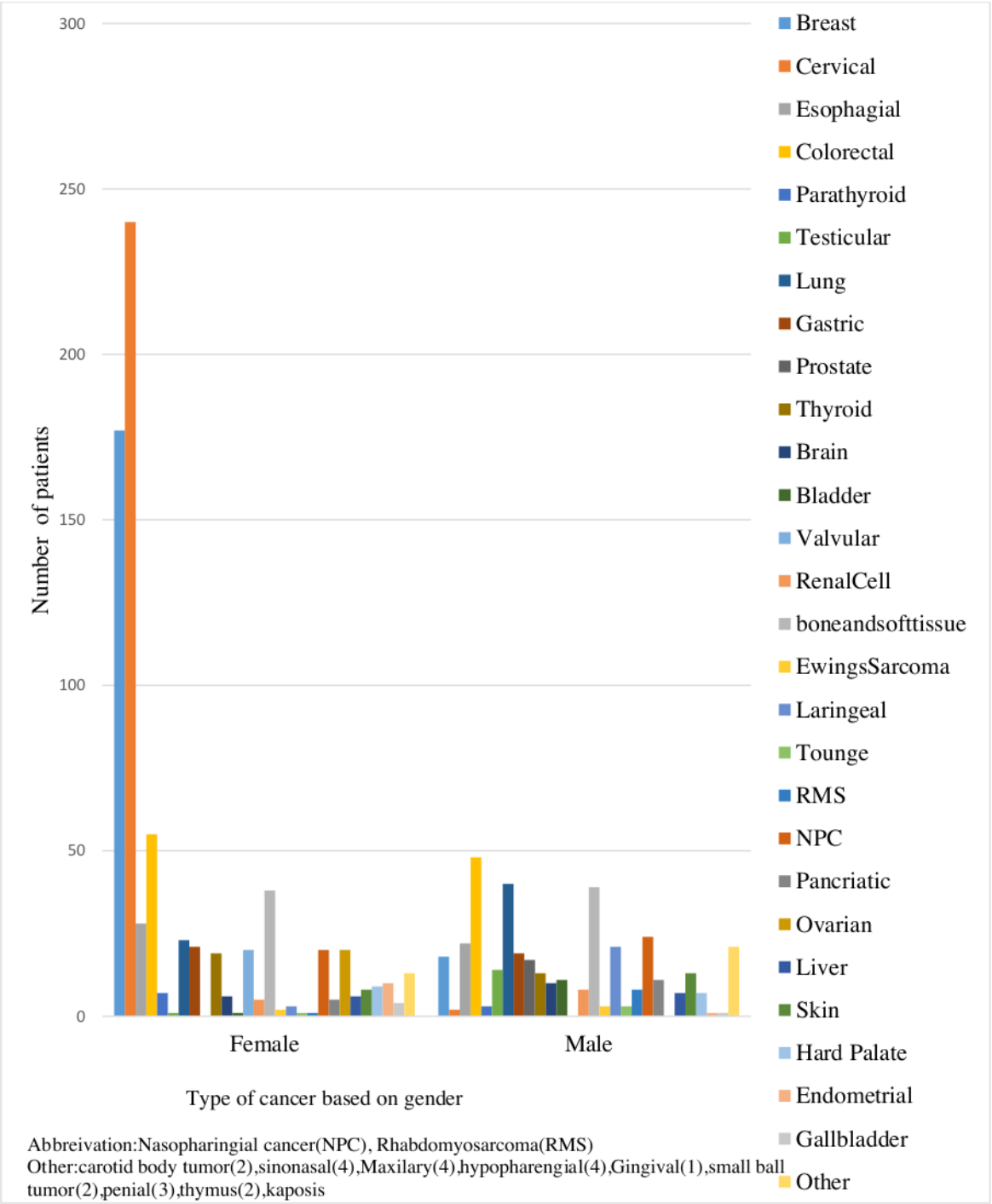
During the period from September 2016 to January 2017, cervical cancer emerged as the most prevalent cancer among the study population, with 242 cases (21.5%), followed closely by breast cancer at 195 cases (17.3%), while colon and rectum cancer accounted for 9.1% of cases, bone and soft tissue cancer constituted 6.8%, and lung cancer stood at 5.6%. In male patients, colorectal cancer led with 48 cases (12.5%), followed by lung cancer with 40 cases (10.4%), and bone and soft tissue cancer with 39 cases (10.2%) (Among females, cervical cancer remained predominant, accounting for 32.3% of cases, followed by breast cancer at 23.8%, and colorectal cancer at 7.4%.(Table 2)(Figure 5). The median age for all cancer types combined was 47 years, falling within the 40-49 age range (Table 1)(Figure 6).

Table 2: Spectrum of cancer and their frequency atTASH oncology center from September 2016 to February 2021 in Addis Ababa, Ethiopia 2023.

Variables	Alive Number (%)	Death Number (%)	Total Number (%)
Cervical	62(21)	180(21.6)	242(21.5)
Breast	83(28.1)	112(13.5)	195(17.3)
Colorectal	28(9.5)	75(9)	103(9.1)
Bone and soft	19(6.4)	58(7)	77(6.8)
Lung	6(2)	57(6.9)	63(5.6)
Esophageal	0(0)	50(6)	50(4.4)
NPC	8(2.7)	36(4.3)	44(3.9)
Gastric	7(2.4)	33(4)	40(3.5)
Thyroid	13(4.4)	19(2.3)	32(2.8)
laryngeal	5(1.7)	19(2.3)	24(2.1)
Skin	7(2.4)	14(1.7)	21(1.9)
Valvular	7(2.4)	13(1.6)	20(1.8)
Ovarian	4(1.4)	16(1.9)	20(1.8)
Prostate	5(1.7)	12(1.4)	17(1.5)
Brain	4(1.4)	12(1.4)	16(1.4)
Hard palate	3(1)	13(1.6)	16(1.4)
Pancreatic	2(0.7)	14(1.7)	16(1.4)
Testicular	10(3.9)	5(0.6)	15(1.3)
Renal cell	2(0.7)	11(1.3)	13(1.2)
Liver	0(0)	13(1.6)	13(1.2)
Bladder	2(0.7)	10(1.2)	12(1.1)
Endometrial	4(1.4)	7(0.8)	11(1.0)
Parathyroid	3(1)	7(0.8)	10(0.9)
RMS	2(0.7)	7(0.8)	9(0.8)
Gall bladder	1(0.3)	4(0.5)	5(0.4)
Ewing sarcoma	1(0.3)	4(0.5)	5(0.4)
Tongue	0(0)	4(0.5)	4(0.4)
Other	7(2.4)	27(3.2)	34(3)
Total	292(100)		

Abbreviation: NPC- Nasopharyngeal Cancer, RMS-Rhabdomyosarcoma

Other:Carotidbodytumor(3),Sinonasal(4)Maxillary(4)Hypopharengial(4)Gingival(1)Smallballtumor(2),Gastro-juoginaltumor(1),penialcancer(3),Sublingualcancer(1),Trachacial(1),Thymus(2),Conjectivital(1),kapossi sarcoma(3)



Abbreivation:Nasopharingial cancer(NPC), Rhabdomyosarcoma(RMS)
Other:carotid body tumor(2),sinonasal(4),Maxilary(4),hypopharengial(4),Gingival(1),small ball tumor(2),penial(3),thymus(2),kaposis

Figure 5: Frequency of type of cancer with gender categories in TASH oncology center of solid tumor 2023

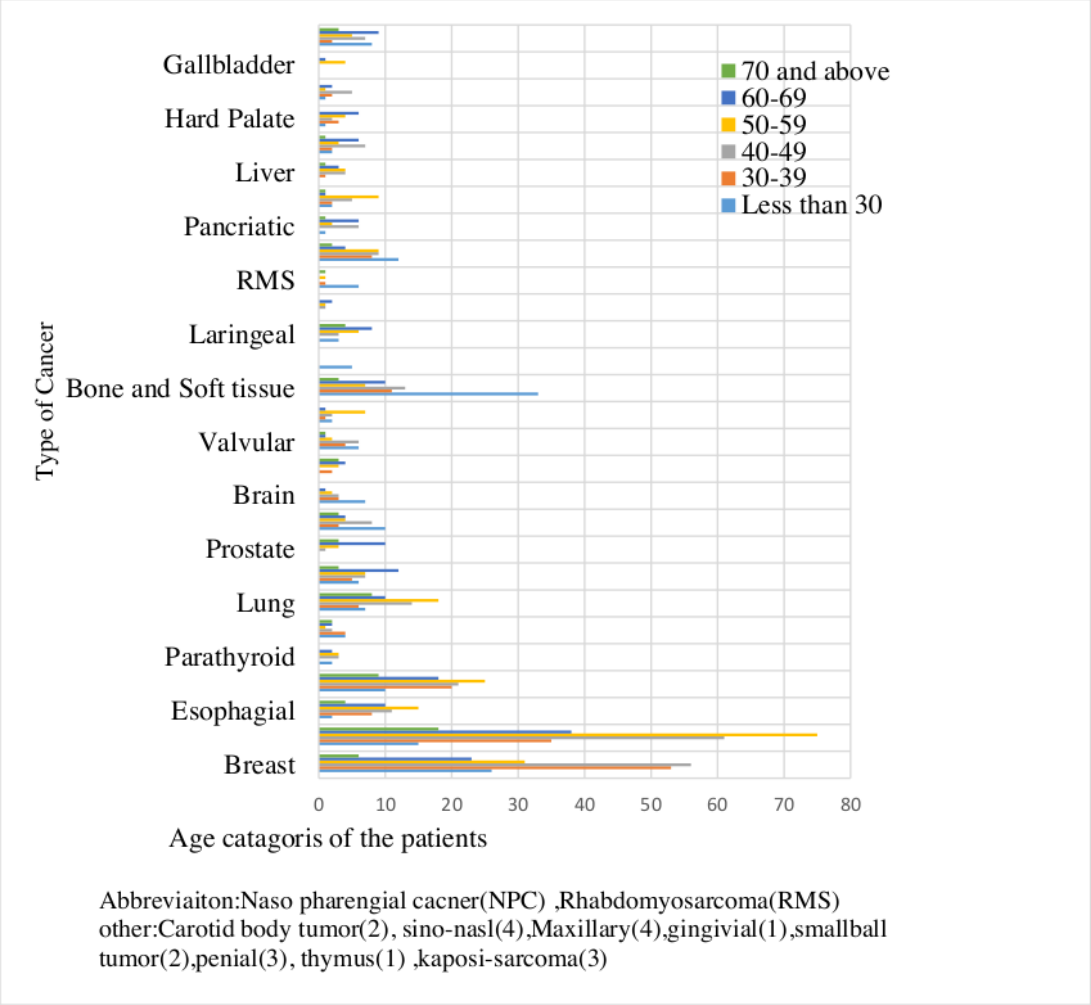


Figure 6: Frequency of type of cancer with patients' age categories in TASH oncology center of solid tumor 2023.

5.2.2 Clinical characteristics of cancer

It is worth noting that nearly half of the observed patients had a pathological report indicating that their cancers had metastasized. Among the total patient population of 1127 individuals, 554 (49.2%) were diagnosed at stage IV, while 213 (18.9%), 150 (13.8%), and 68 (6.0%) were diagnosed at stages III, II, and I, respectively. Additionally, 136 (12.1%) of the study population experienced cancer recurrence after completing treatment. The incidence of comorbidity among cancer patients was found to be 236 (20.9%). Among patients with comorbid conditions, HIV was the most prevalent at 65 (5.8%), followed by hypertension at 54 (4.8%). Furthermore, 325 (28.8%) patients had a history of medication use. Among those on medication, 114 (10.1%) had a history of herbal medication use, 77 (6.8%) were HIV patients receiving HAART, and 29 (2.6%) were taking anti-hypertensive medications. Complications were observed in 273 (24.5%) of the total patient population, affecting the quality of life and survival status. Pleural effusion was the most common complication, affecting 46 (4.1%) patients, followed by paralysis, which affected 38 (3.4%) patients (Table 3).

Table3: Clinical characteristics of solid tumor adult patients who had visited oncology center of TASH from September 2016 to January 2017 in Addis Ababa, 2023

Variables	Categories	Alive Number (%)	Death Number (%)	Total Number (%)
Stage of cancer	Stage I	61(20.7)	7(0.8)	68(6.0)
	Stage II	97(32.9)	53(6.4)	150(13.3)
	Stage III	67(22.7)	146(17.5)	213(18.9)
	Stage IV	21(7.1)	533(64.1)	554(49.2)
	Unknown	49(16.6)	93(11.2)	142(12.6)
Comorbidity	Yes	63(21.4)	173(20.8)	236(20.9)
	No	233(78.6)	659(79.2)	891(79.1)
Type of comorbidity	Hypertension	11(3.7)	43(5.2)	54(4.8)
	Diabetic mellitus	11(3.7)	28(3.4)	24(3.5)
	Human immune deficiency virus	20(6.8)	45(5.4)	65(5.8)
	Tuberculosis	7(2.4)	26(3.1)	33(2.9)
	Other*	9(3.)	19(2.3)	28(2.5)
Medication use	Yes	74(25.1)	251(30.2)	325(28.8)
	No	221(74.9)	581(68.4)	802(71.2)
Type of medication	HAART	24(8.1)	53(6.4)	77(6.8)
	Anti TB	6(2)	23(2.8)	29(2.6)
	Antihypertensive	11(3.7)	37(4.4)	48(4.2)
	Anti -diabetic	3(1)	19(2.3)	22(2)
	Herbal medication	19(6.4)	94(11.3)	113(10.0)
	Other**	4(1.4)	15(1.8)	19(1.7)
Complication	Yes	36(12.2)	240(28.8)	276(24.5)
	No	259(87.8)	592(71.2)	851(75.9)
Type of complication	Pneumonia	24(2.9)	3(1)	27(2.4)
	Respiratory obstruction	0(0)	26(3.1)	26(2.3)
	Pleural effusion	4(1.4)	42(5)	46(4.1)
	Paralysis	6(2)	32(3.8)	38(3.4)
	Hypovolemic s hock	0(0)	27(3.2)	27(2.4)
	Sepsis	0(0)	2(0.2)	2(0.2)
	Renal complication	5(1.7)	23(2.8)	28(2.5)
	Thrombosis	5(1.7)	25(3)	30(2.7)
	Infection (Neutropenia)	10(3.4)	17(2)	27(2.4)
	Other***	3(1)	22(2.6)	25(2.8)
Recurrence	Yes	24(8.1)	112(13.5)	136(12.1)
	No	271((91.9)	720(86.5)	991(87.9)

Abbreviation-Intracranial Pressure(),Pulmonary Hypertension(PHTN), -Hepatitis positive (HepB+ve),Humammunodeficiency Virus(HIV),Diabetic Mellitus(DM),Hypertension(HTN),HighlyActiveAnti-RetroviralTherapy(HAART), **Other*= Co- morbidity:** Urinary tract infection (5) Epilepsy (6), HepB+ve(4), HIV and DM (3),HIV and HTN(3)**, Other**Medication:** Anti-Epilepsy (6), Asthmatic patients on Nebulizers and steroid (5) HAART and Anti-Diabetic (3) HAART and Anti-Hypertensive (3)**,**
Other*Complication:**Jaundice(7),Ascites(5),Osteoporosis(1)Hepatotoxicity(1)ICP(3) PHTN(1)Seizure(3)

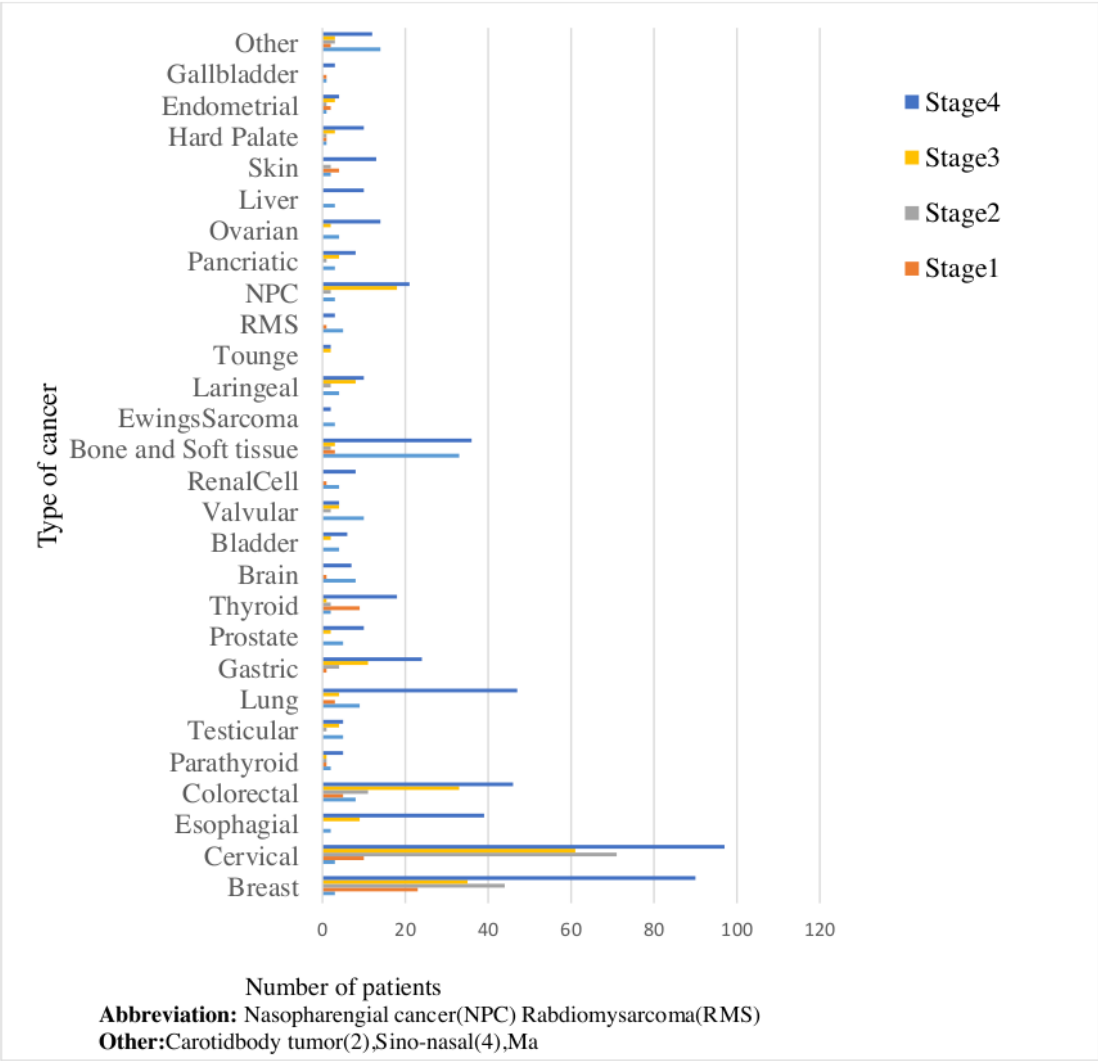


Figure 7: Distribution of cancer types by cancer stage at TASH oncology center in 2023 for solid tumor patients

5.3 Pattern of drug utilization and treatment modalities

When analyzing the treatment patterns and drug utilization among participants, it was observed that the majority of patients, 225 (20%), underwent both surgery and chemotherapy. Conversely, 214 (19.0%) did not receive any specific cancer treatment and were solely on palliative care. Notably, among patients with bone and soft tissue cancer, 19 (24.7%) underwent surgery, while 111 (45.9%) of cervical cancer patients received radiation therapy (see Figure 8 and Table 4). Regarding chemotherapy, the most commonly prescribed regimens included cisplatin+5FU (100, 8.1%) and cisplatin+paclitaxel (100, 8.1%). Cisplatin+5FU was frequently used for patients with NPC (18, 40.9%), while cisplatin+paclitaxel was preferred for lung cancer patients (19, 30.2%). FOLFOX (58, 5.1%) was the predominant regimen for colorectal cancer patients and occasionally for those with gastric cancer. Additionally, 56 (5%) patients with breast cancer were prescribed AC+paclitaxel+tamoxifen as their treatment regimen. Out of the 1127 cancer patients, cisplatin (236, 20.9%) and doxorubicin (200, 17.7%) were the most commonly prescribed medications at the hospital (see Figure 9 and Table 4).

Table4: Treatment modalities, regimens and pattern ofchemotherapy in-patient who had visited oncology center of TASH from September 2016 to January 2017 in Addis Ababa, 2023

Variables	Categories	Censored Number (%)	Death Number (%)	Total Number (%)
Modalities of treatment	Surgery	59(20)	78(9.4)	137(12.2)
	Radiation	39(13.2)	105(12.6)	144(12.8)
	Surgery + radiation	21(7.1)	37(4.4)	58(5.1)
	Surgery+ chemotherapy	96(32.5)	129(15.5)	225(20)
	Surgery+ chemotherapy +radiation	45(15.3)	60(7.2)	105(9.3)
	Radiation +chemotherapy	20(6.8)	82(9.9)	102(9.1)
	Chemotherapy only	11(3.7)	131(15.7)	142(12.6)
	Palliative therapy	4(1.4)	210(25.2)	214(19)
Regimen	Doxorubicin+cyclophosphamide +paclitaxel+ tamoxifen +anastrazole	5(1.7)	11(1.3)	16(1.4)
	Doxorubicin+cyclophosphamide +paclitaxel+ tamoxifen	33(11.2)	23(2.8)	56(5)
	Doxorubicin+cyclophosphamide +Paclitaxel +anastrazole	14(4.7)	5(0.6)	19(1.7)
	Doxorubicin+cyclophosphamide +paclitaxel	5(1.7)	9(1.1)	14(1.2)
	Doxorubicin+cyclophosphamide +tamoxifen	6(2)	12(1.4)	18(1.6)
	FOLFOX	17(5.8)	41(4.9)	58(5.1)
	FOLFRI	0(0)	10(1.2)	10(0.9)
	Capox	7(2.4)	6(0.7)	13(1.2)
	Cisplatin+ paclitaxel	15(5.1)	85(10.2)	100(8.1)
	Cisplatin+5-FU	16(5.4)	84(10.1)	100(8.1)
	Vincristine+doxorubicin +cyclophosphamide	6(2)	17(2)	23(2)
	Doxorubicin+ dacarabazine	8(1)	6(2)	14(1.2)
	BEP	7(2.4)	1(0.1)	8(0.7)
	Cisplatin +gemcitabine	0	11(1.3)	11(1)
	Doxorubicin+cyclophosphamide	5(1.7)	6(0.7)	11(1)

	+anastrazole			
	Doxorubicin +cyclophosphamide	4(1.4)	12(1.4)	16(1.4)
	Cisplatin +doxorubicin	4(1.4)	21(2.5)	25(2.2)
	Other	21(7.1)	46(5.5)	67(5.9)
Pattern of chemotherapy	Cisplatin	41(23.4)	195(13.9)	236(20.9)
	Paclitaxel	64(21.7)	122(14.7)	186(16.5)
	Doxorubicin	83(28.1)	117(14.1)	200(17.7)
	Cyclophosphamide	75(25.4)	91(10.9)	166(14.7)
	Vincristine	7(2.4)	21(2.5)	28(2.5)
	5-FU	28(9.5)	115(13.8)	143(12.7)
	Oxaloplatin	31(10.5)	108(13)	139(12.3)
	Hormonal therapy	68(23.1)	56(6.7)	124(11)
	Capcitabine	13(14.4)	25(3)	38(3.4)
	Dacarabazine	6(2)	10(1.2)	16(1.4)
	Bleomycin	8(2.7)	1(0.1)	9(0.8)
	Etoposide	10(1.2)	13(1.6)	23(2)
	Carboplatin	8(2.7)	29(3.5)	37(3.3)
	Gemcitabine	1(0.3)	18(2.2)	19(1.7)
	Ironitican	1(0.3)	9(1.1)	10(0.9)
	Ifosphamide	1(0.3)	6(0.7)	7(0.6)
	Vinorelibine	1(0.1)	1(0.3)	2(0.2)

Abbreviation:5-Florouracil(5-FU),5-florouraicil,leucovorin,oxaloplatin(FOLFOX),-5-florouraicil,leucovorin,irinotiecan(FOLFRI),Capcitabine,Oxaloplatin(Capox),Bleomycin,,Etoposide,Cisplatin(BEP),5-Florouracil,Doxorubicin,Cyclophosphamide(FAC)Isophosphamide +Etoposide(IE),**Other** Cisplatin only(15)Tamoxifen only(10)Anastrazole only(9),FAC(6), Cisplatin + paclitaxel+doxorubicin(3),Cisplatin+etposide+paclitaxel(4),UnknownChemotherapy(10), Etoposide+cisplatin(5)Doxietaxelonly(2),IE(3)Cyclophosphamide+epirbucin(2) andVinorelibine(2)

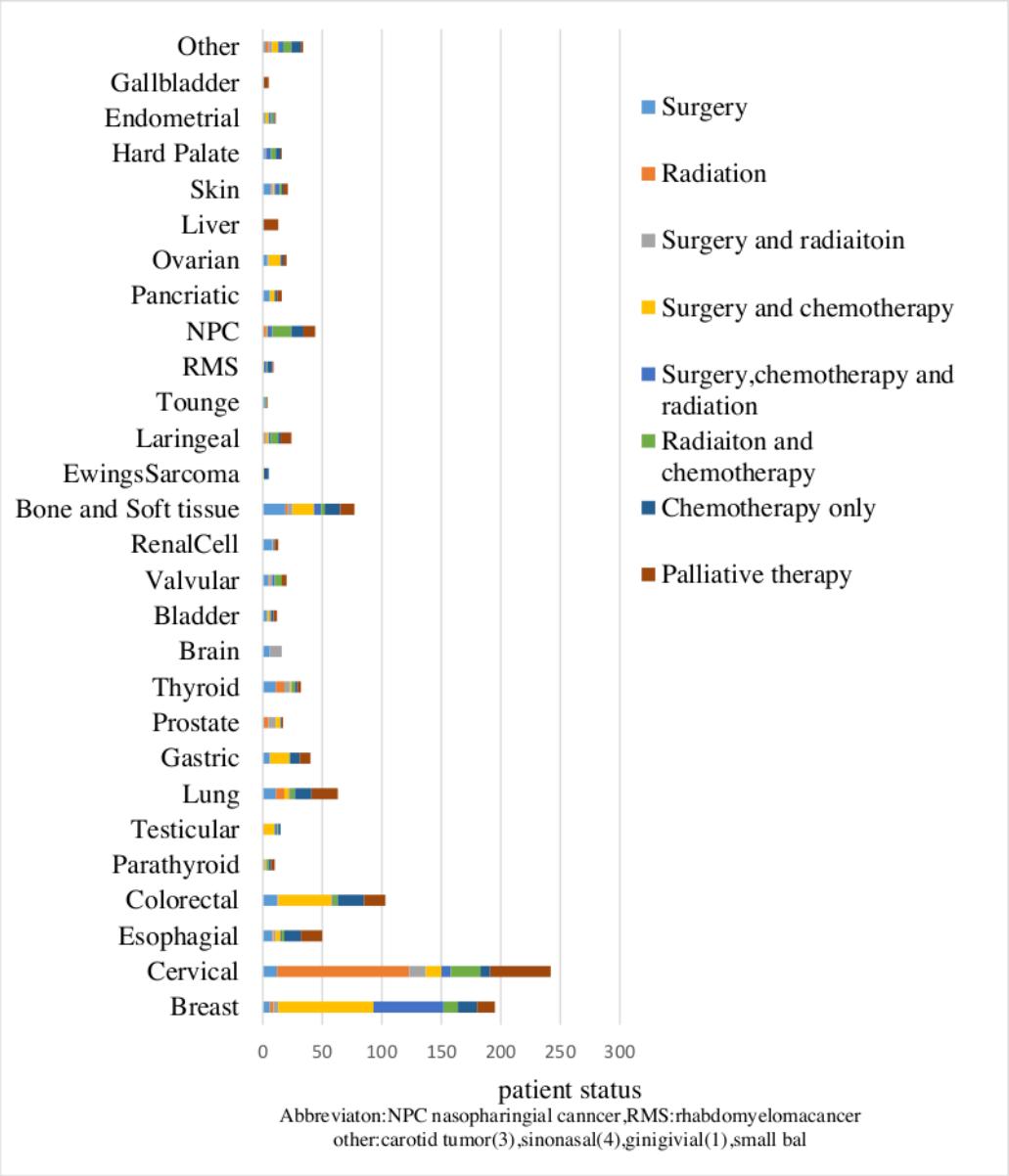


Figure 8: Frequency of type of cancer with categories of treatment modalities in TASH oncology center of solid tumor 2023.

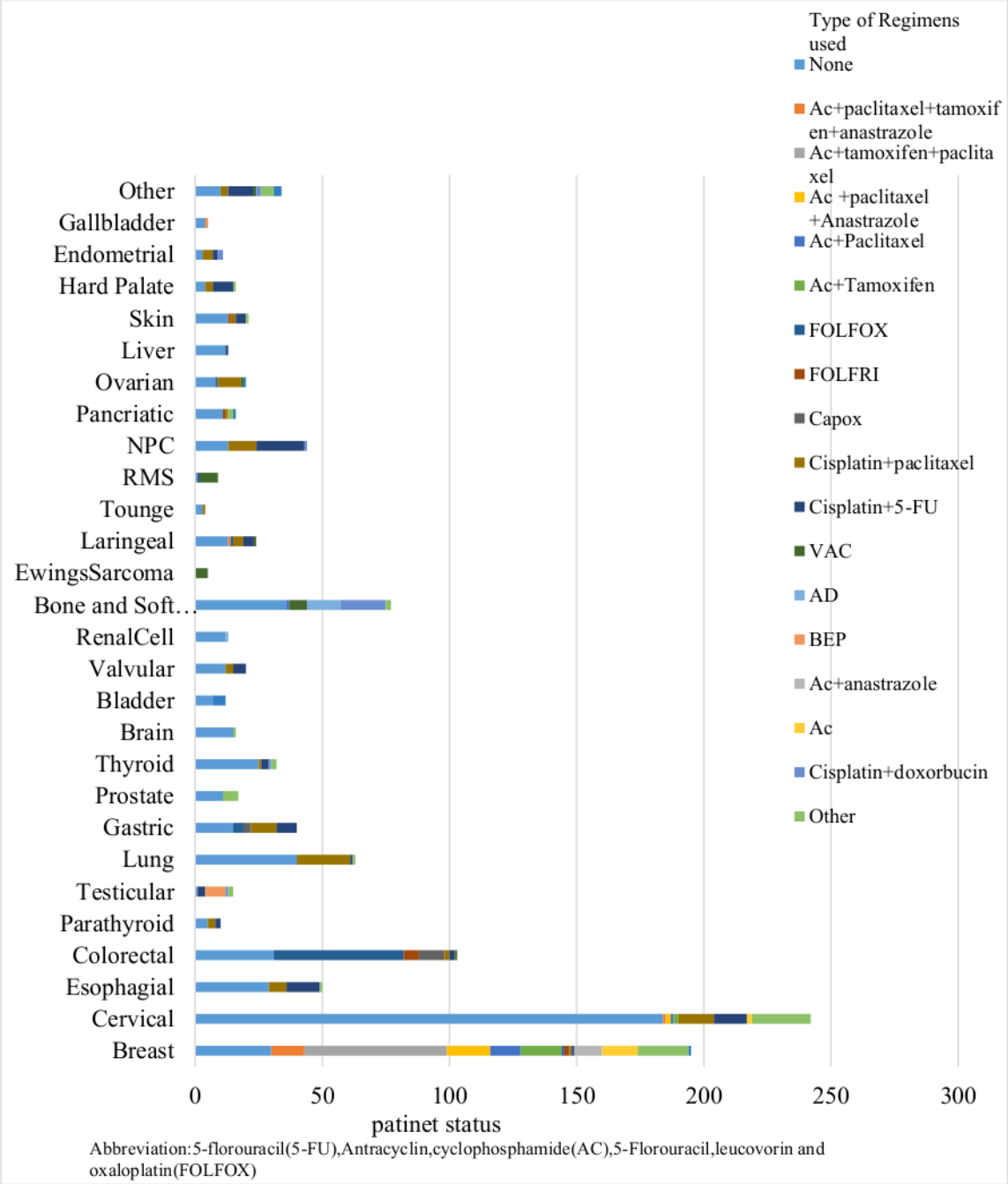


Figure 9: Frequency of type of cancer with the regimen used in TASH oncology patient of solid tumor 2023.

5.4 Factor influencing the overall 5-year survival rate

Table 5 provides the results of statistical analysis, including the Crude Hazard Ratio (CHR), Adjusted Hazard Ratio (AHR), and p-values for various variables in relation to the survival status (Alive vs. Died).

The multivariable regression analysis unveiled several noteworthy associations with regards to the risk of mortality and patient survival. Notably, single patients faced a 1.4 times higher risk of death when compared to their married counterparts (AHR= 1.410, 95% CI= 1.105-1.799, p-value= 0.006). Likewise, patients with a history of occupational exposure exhibited a 1.1 times higher risk of mortality in contrast to patients without such exposure. Furthermore, patients diagnosed with advanced cancer stages (specifically stage 3 and 4) confronted a twofold higher risk of death in comparison to patients in earlier stages (stages 1 and 2) (AHR= 2.020, 95% CI= 1.525-2.676, p-value= 0.000). Interestingly, patients who had experienced a recurrence in their medical history demonstrated a 20.9% higher likelihood of survival in comparison to patients without a history of recurrence (AHR= 0.791, 95% CI= 0.636-0.983, p-value= 0.034). Furthermore, patients with additional medical complications experienced a 1.23 times higher risk of mortality compared to patients without such complications (AHR= 1.233, CI= 1.047-1.451, P-value= 0.012). Regarding treatment approaches, patients who underwent combined therapies, such as surgery combined with chemotherapy (AHR= 0.674, CI= 0.476-0.954, P-value= 0.026) or radiation combined with chemotherapy (AHR= 0.677, CI= 0.460-0.996, P-value= 0.047), exhibited more favorable survival outcomes. Conversely, patients who did not receive chemotherapy, particularly those receiving palliative care, faced an elevated risk of mortality compared to patients exclusively treated with surgery (AHR= 1.817, CI= 1.382-2.389, P-value= 0.000).

Moreover, concerning specific chemotherapeutic agents, patients treated with paclitaxel exhibited a significant improvement in survival rates (AHR= 0.743, CI= 0.586-0.942, P-value= 0.014), experiencing a 41.2% increase in survival. Similarly, patients who underwent hormonal therapy also demonstrated

substantial enhancements in survival (AHR= 0.592, CI= 0.402-0.874, P-value= 0.008), with a notable 40.8% increase in survival rates. Conversely, patients treated with doxorubicin faced a higher risk of mortality (AHR= 1.569, CI= 1.033-2.384, P-value= 0.03), resulting in a decreased survival rate of 31.2%.

Table5: cox regression with uni-varable and multi-variable result of cancer patients in TASH 2023. (n=1127)

Variable		Alive	Died	CHR	AHR	p-value
Gender						
	Female	215	528	1.00		
	Male	80	304	1.135(0.985-1.307)	0.942 (0.792-1.121)	0.502
Marital status						
	Married	192	514	1.00		
	Single	**35**	**93**	**1.190 (0.953-1.485)**	**1.410 (1.105-1.799)**	**0.006***
	Divorced	30	56	0.843 (0.639-1.112)	0.903 (0.680-1.200)	0.483
	Widowed	38	169	0.874 (0.734-1.041)	0.948 (0.787-1.142)	0.573
Exposure						
	No	220	573	1.00		
	Yes	**75**	**259**	**1.101 (0.951-1.276)**	**2.353 (1.568-3.530)**	**0.000***
Hospital cost						
	Government	177	481	1.00		
	Self	118	351	1.166 (1.016-1.339)	1.049 (0.906-1.216)	0.521
Substance use						
	No	257	687	1.00		
	Yes	38	145	1.201 (1.003-1.437)	1.146 (0.932-1.408)	0.196
Stage of cancer						
	Stage 1 and 2	158	60	1.00		
	Stage 3 and 4	88	679	1.983 (1.516-2.592)	2.020 (1.525-2.676)	0.000*
	Unknown	49	93	1.543 (1.113-2.141)	1.306 (0.923-1.847)	0.132
Recurrence						
	No	271	720	1.00		
	Yes	24	112	0.688 (0.564-0.841)	0.791 (0.636-0.983)	0.034*
Complication						
	No	259	592	1.00		
	Yes	36	240	1.120 (0.964-1.301)	1.233 (1.047-1.451)	0.012*
Modality of treatment						
Surgery		59	78	1.00		
Radiation		39	105	0.858 (0.639-1.151)	0.948 (0.697-1.290)	0.736
Surgery + radiation		21	39	0.713 (0.485-1.048)	0.739 (0.498-1.095)	0.132
Surgery +chemotherapy		96	128	0.576 (0.434-0.764)	0.674 (0.476-0.954)	0.026*
Surgery+radiation+ chemotherapy		45	60	0.567 (0.404-0.794)	0.713 (0.475-1.072)	0.104
Radiation+chemoth erapy		20	82	0.630 (0.462-0.859)	0.677 (0.460-0.996)	0.047*
Chemotherapy		11	130	0.962 (0.726-1.275)	1.050 (0.741-1.488)	0.785
Nochemotherapy, (pallative)		4	210	1.758 (1.353-2.284)	1.817 (1.382-2.389)	0.000*
	No	254	637	1.00		
	Yes	41	195	0.780 (0.664-0.916)	0.955 (0.749-1.218)	0.711
Paclitaxel						
	No	231	710	1.00		
	Yes	64	122	0.588 (0.484-0.714)	0.743 (0.586-0.942)	0.014*
Doxorubicin						
	No	212	715	1.00		
	Yes	83	117	0.688 (0.566-0.838)	1.569 (1.033-2.384)	0.035*
Cyclophosphamide						
	No	220	741	1.00		

	Yes	75	91	0.606 (0.487-0.754)	0.689 (0.420-1.131)	0.141
Fluorouracil						
	No	267	717	1.00		
	Yes	28	115	0..801 (0.658-0.976)	0.745 (0.493-1.127)	0.164
Oxaloplatin						
	No	264	724	1.00		
	Yes	31	108	0.865 (0.706-1.059)	1.420 (0.930-2.168)	0.104
Hormonal therapy						
	No	227	776	1.00		
	Yes	68	56	0.444 (0.338-0.585)	0.592 (0.402-0.874)	0.008*
Capcitabine						
	No	282	807	1.00		
	Yes	13	25	0.694 (0.465-1.034)	0.802 (0.519-1.239)	0.320

5.5 Overall survival of cancer patients during follow-up time

In this study, 1,127 patients diagnosed with various types of cancer were monitored over a period of 60 months (5 years). Among these study participants, 832 individuals (73.8%) unfortunately succumbed to the disease, while 295 individuals (26.2%) managed to survive during the follow-up period. It is worth noting that among the patients whose outcomes were not observed until the end of the study (censored patients), 240 individuals (21.3%) were classified as "cured" based on accurate telephone addresses and histo-pathological reports, while the remaining 55 individuals (4.9%) were under palliative care and survived despite being at an advanced stage of the disease. The survival analysis revealed that patients at the outset of the follow-up period had a higher probability of overall survival (OS), which gradually decreased in subsequent follow-up months. The Log rank test indicated a statistically significant difference in survival experiences among different predictive factors. The overall survival time for each category of variables was estimated to be approximately 10 months (with a 95% confidence interval ranging from 8.956 to 11.044), as summarized in Table 6.

Table6: Median and overall survival of cancer patient at TASH oncology center 2023(n=1127)

Variables	Median survival time, in month (95% CL)	Overall 5-year Survival in month	Log rank test	p-value
Marital status		10(8.956-11.044)	7.646	0.054
Married	10(8.741-11.259)			
Single	8(5.648-10.352)			
Divorced	12(5.529-18.47)			
Widow	11(7.687-14.313)			
Exposure		10(8.956-11.044)	1.786	0.181
No	11(9.6-12.335)			
Yes	8(6.427-9.573)			
stage of cancer		10(8.956-11.044)	31.95	0.000**
Stage1 and stage2	26(4.246-17.679)			
Stage 3 and 4	8(6.882-15.2)			
Recurrence		10(8.956-11.044)	14.586	0.000**
No	9(7.848-10.152)			
Yes	18(14.96-21.04)			
complication		10(8.956-11.044)	2.343	0.0126**
No	10(8.8-11.17)			
Yes	9(6.9-11.04)			
Treatment Modality				
Treatment Modalities		10(8.956-11.044)	157.489	0.000
Surgery	7(5.151-8.849)			
Radiation	10(6.917-13.083)			
Surgery and Radiation	17(3.812-30.188)			
Surgery and Chemotherapy	16(13.31-19.68)			
Surgery+ chemotherapy +radiation	21(18.499-23.501)			
Radiation +Chemotherapy	18(15.282-20.718)			
Chemotherapy only	9(7.399-10.601)			
Without Chemotherapy	3(2.475-3.525)			
Paclitaxel		10(8.956-11.044)	31.59	0.000

Non user	8(6.876-9.14)			
User	20(16.273-23.74)			
Doxorubicin		10(8.956-11.044)	17.232	0.000
Non-user	9(7.868-10.132)			
User	16(11.033-0.967)			
Hormonal therapy		10(8.956-11.044)	38.155	0.000
Non-user	9(7.922-10.070)			
User	34(15.871-36.129)			

A Kaplan-Meier survival analysis was performed, demonstrating statistically significant differences in survival among various variables, which encompassed the stage of cancer disease, the type of treatment modality, as well as patients who were administered paclitaxel or hormonal therapy (Figure 10).

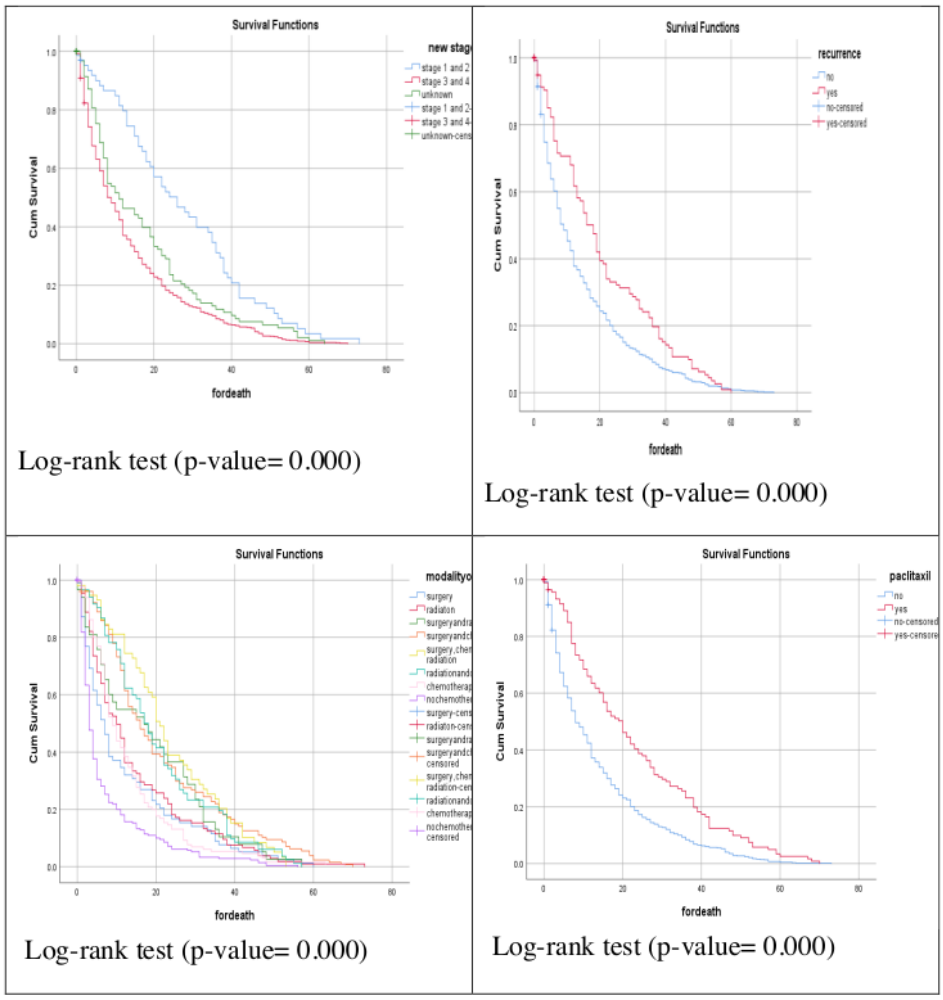


Figure 10: Kaplan-Meier survival analysis curve in variables showed significant association in terms of survival of TASH solid tumor patients 2023.

6. Discussion

The primary aim of this study was to assess the spectrum of solid cancers and mortality, considering factors associated with survival. Our investigation also shed light on patterns of drug utilization, including the most commonly prescribed regimens and types of treatment modalities employed at Tikur Anbessa Specialized Referral Hospital's solid tumor oncology Center. To provide context and benchmarks for our findings, we referenced global cancer statistics for 2020 (GLOBOCAN estimates) and consulted the results from the Addis Ababa Cancer Registrar (AACCR)(3,21).

Our study findings align with those of prior research conducted in various regions, including Korea, India, and the Addis Ababa Cancer Registrar. Specifically, our investigation revealed that both female and younger patients face a heightened incidence of cancer and mortality(5,6,21).This consistency in results across different geographic locations underscores the importance of these demographic factors in cancer epidemiology and highlights the need for targeted interventions and healthcare strategies for these vulnerable populations(5).

Conversely, research conducted in Europe has shown a different trend, where cancer predominantly affects older adults and has a higher prevalence among men. This variation can be attributed to the increased incidence of lung cancer among males and the prominence of prostate and bladder cancers in the older population(40).

In our study, majorities of the participants were married (62.6%), hailed from rural areas, and had limited formal education, with 47.4% being illiterate. These findings closely mirror those of previous studies conducted in Tanzania and Tikur Anbessa Specialized Referral Hospital (TASH) during different periods, from 1998 to 2010 and 2015 to 2018 (35,40,17).This consistency in demographic characteristics across various studies emphasizes the persistence of these patterns in cancer patient populations over time and underscores the importance of

addressing the unique needs of these groups in cancer care and prevention strategies.

The search revealed that 58.8% of hospital costs were covered by the government, which is slightly lower compared to the 68.7% reported in the Addis Ababa Cancer Registrar (AACCR) dataset(13). This difference can be attributed to factors such as the accessibility of radiation therapy, which often involves additional costs that patients may need to bear(16).These findings highlight the challenges and disparities in healthcare financing and access to specialized cancer treatments, underscoring the need for policies and interventions to improve affordability and availability of cancer care services(19).

Between 1998 and 2015, the trends in cancer incidence at Tikur Anbessa Specialized Referral Hospital (TASH) closely mirrored the findings of this study(17,36). Cervical cancer remained the most prevalent cancer resemble with this study accounting for 21.5% of the cases, followed closely by breast cancer at 19.2%. This finding contradicts with studies conducted in Egypt and Western countries, where the prevalence of infectious malignancies is relatively low. This contrast can be attributed to the more advanced economic status and widespread implementation of preventive strategies in Western nations, which have effectively reduced the incidence of infectious-related cancers(42). In contrast, regions with limited resources, such as the study area, may still face a higher burden of infectious malignancies due to various socio-economic and healthcare disparities(16).Cervical (21.5%), breast (19.2%), and colorectal (9.1%) cancers emerged as the top three cancer types in this study, while liver, pancreatic, and lung cancers accounted for the highest number of cancer-related deaths. These findings are consistent with previous studies conducted in Ethiopia before 2016 (17,37) and are also in line with global estimates(3).There are prominent findings emphasize the substantial impact of lifestyle choices, geographical location, and genetic mutations on the variations observed in cancer incidence and mortality rates(5). .For example, according to 2020 cancer estimates, breast cancer

emerges as the most common cancer type among women in Europe, Africa, and African-Americans, despite variations in mortality rates attributed to well-established screening programs(34,4,36). Conversely, in Asia, lung cancer takes precedence, with head and neck cancers being particularly prominent in countries like India and Pakistan(5,11,7).The high prevalence of tobacco use in Asia is a significant contributing factor to this pattern(5)and Additionally, the elevated incidence of HPV16 and EBV in India and Pakistan further underscores the prevalence of head and neck cancers in these regions(7).

According to the findings of this study, colorectal cancer (12.5%) stands out as the most prevalent cancer among males, followed closely by lung cancer. In contrast, prostate cancer ranks among the top three cancers in Western Europe (22.2%) (40), among Black Americans (4) and within African populations(42). However, in Asian regions, prostate cancer incidence is notably lower, with cancers of the digestive tract, such as liver and stomach cancers, taking precedence. These significant variations between continents can be attributed to disparities in cancer screening programs and region-specific risk factors. For instance, prostate cancer screening practices are more intensive in Western countries compared to Asia(5).

The results suggest that the demand for various cancer treatment modalities during the hospital stay in this study was as follows: surgery (46.6%), chemotherapy (51%), radiotherapy (36.3%), hormonal therapy (11%) and no treatment (19.0%). A similar study conducted in Iran reported percentages of 57.6%, 56.8%, 46.8%, and 12% for surgery, chemotherapy, radiotherapy, and hormonal treatment, respectively(12).Additionally, the AACRR revealed that 19.2% of patients did not receive any treatment (13).In this study, there was a predominance of treatment plans consisting of combined treatment modalities (43.5%) over monotherapy (38.6%), which is comparable to the findings of the study conducted in Iran (55.2% versus 44.8%) (12).However, there is still insufficient use of radiation therapy in the hospital when compared with studies conducted in Europe and Iran(12,37).The demand for radiation therapy does not

match the need, especially considering that certain tumor types require high levels of radiation therapy, unlike in developed countries. For example, in Norway, 42.5% of patients receive radiation therapy, and in Belgium, 37% receive it, but both countries still fall short of the 2010 target of 53% (37,16)(16)(16)(16)(16)(16)(16). This variation might be attributed to factors such as a lack of qualified personnel, limited facilities, and cost-effectiveness issues within the healthcare sector(19).

In terms of drug utilization and treatment regimens, the study reveals that cisplatin + 5-FU (8.1%) and cisplatin + paclitaxel (8.1%) were the most commonly prescribed medications for patients with NPC and lung cancer, respectively. Additionally, cisplatin (20.9%) and doxorubicin (17.7%) were the most frequently prescribed chemotherapy drugs in the study, which is comparable to a study conducted in India where cisplatin (24.4%) followed by carboplatin (20.6%) were commonly used(6). These findings highlight the variation in access to the top 20 medicines across different economic settings, which should be taken into consideration(43). Interestingly, studies in Germany and Pakistan showed that cisplatin and 5-FU were the most commonly used regimens for gastric cancer and head and neck cancer, respectively(28,7). However, for lung cancer, Pemetrexed + Carboplatin was more commonly used in India. These differences in treatment regimens might be attributed to variations in access to cancer medicines and oncology services across different regions and healthcare systems (12,43)

Regarding the trends in chemotherapy utilization for breast cancer at TASH, it's noteworthy that prior to 2012, there was a high utilization rate of FAC chemotherapy (around 66.9%) associated with poor survival outcomes, and patients demonstrated non-adherence to treatment(44). However, in this study, the prescription patterns for breast cancer treatment changed. Doxorubicin/Cyclophosphamide for four cycles followed by 12 weekly paclitaxel was the most commonly prescribed regimen, accounting for 5.1% of patients. Additionally, there was a significant increase in the use of hormonal

treatment compared to previous studies. In contrast, in Nigeria, 66.2% of breast cancer patients received CMF chemotherapy, while in India, AC chemotherapy was prescribed for 36% of patients, and in Pakistan, FAC chemotherapy was frequently prescribed(22,11,7).These variations in chemotherapy regimens could be attributed to differences in cancer care practices and access to chemotherapy across these regions and healthcare systems(45,43).

There has been an overall decrease in cancer mortality worldwide, especially in Europe and certain Asian countries. This decline can be attributed to the widespread adoption and adherence to cancer screening programs, which have led to earlier cancer diagnoses(37,5).However, this study reports that 73.8% of the study population succumbed to various types of cancer, resulting in an overall survival rate of 26.2% (approximately 10 months). This survival rate is comparable to global cancer statistics (3).But higher than those observed in Asian populations (53.3%) and other African regions(5).Notably, testicular cancer (66.7%), breast cancer (42.6%), and thyroid cancer (40.6%) had the highest survival rates in this study. In contrast, the American Cancer Society's 2022 statistics report the highest survival rates for prostate cancer (98%), skin cancer (93%), and breast cancer (90%)(3).Survival rates for individuals with cancer in Africa are significantly lower than those achieved in high-income countries. This disparity can be attributed to several factors, including the inadequate control of infectious malignancies, poor preventive strategies, and the high cost of cancer therapy(19).

Several studies have examined factors associated with survival in specific types of cancer, but this study provides a comprehensive overview of cancer survival. The results indicate that only 26.6% of the population survived for at least 5 years after diagnosis. This survival rate is considerably lower than the global cancer statistics reported for the period 2011-2017, which ranged from 68% to 86% for adolescents and 52% to 72% for black American women and white women(4).This significant disparity can be attributed to various factors, including gaps in healthcare infrastructure, low socio-economic status, and

inadequate palliative care, all of which contribute to higher mortality rates in Africa(42).

The study reveals that being unmarried is significantly associated with worse survival, with unmarried individuals having a 1.4 (AHR: 1.410 (1.105-1.799) times higher risk of death compared to married individuals. This finding aligns with previous research conducted in Slovenia (HR 1.32, CI 1.24-1.4) and Boston, which showed that married patients were less likely to present with metastatic disease (HR 0.83, CI 0.82-0.84)(45).This agreement underscores the potential benefits of improved psychological support from spouses, which can contribute to a better cancer prognosis(46).

The stage at presentation was found to be a significant factor affecting the survival rate among cancer patients. In this study, 68.1% of patients presented at Stage III/IV, and they faced a higher risk of death (HR 2.02, CI 1.525-2.676) compared to those diagnosed at clinical stages 1 and 2. This finding is consistent with the 2022 cancer statistics in black women, which also revealed an association between late-stage diagnosis and poor survival(4). Similarly, a study conducted in England in 2015 showed that patients diagnosed before reaching stage 4 had substantially increased one-year survival rates(47).

Patients in this study who had a history of occupational exposure were found to have a significantly higher risk of death, with a 2.4 times greater likelihood compared to those without exposure. This substantial increase in risk is a noteworthy finding. It is consistent with other studies that have also observed elevated risks associated with exposure to agricultural chemicals and pesticides in patients with prostate cancer(48). A Recent at 2020 study in the USA, which reported an association between cancer risk and endotoxin exposure(44).These findings underscore the importance of recognizing and addressing occupational and environmental factors in cancer outcomes.

In this study, cancer patients who did not receive chemotherapy and were solely managed with palliative care faced almost two times higher risk of mortality compared to those who underwent surgery. This finding aligns with a similar

study conducted in Egypt in 2015, which revealed that patients without palliative care involvement had a 6.26 times higher risk of death. It underscores the importance of early palliative care involvement for cancer patients, as it can lead to better end-of-life care outcomes compared to aggressive treatment with chemotherapy due to the adverse outcome of chemotherapy agent than enhances the severity(49).

In this study, patients with a history of recurrence demonstrated a 20.9% higher likelihood of survival compared to those without a history of recurrence (AHR= 0.791, CI= 0.636-0.983, P-value= 0.034). It's important to note that there are limited comparative data available to assess post-recurrence survival. The survival outcomes after recurrence can vary significantly and are highly dependent on factors such as the extent of tumor resection, histologic differentiation, the presence of symptoms, and the type of post-recurrence therapy received(50).The finding that patients with a history of recurrence in the study exhibited a higher likelihood of survival compared to those without a history of recurrence may seem counterintuitive at first glance. However, there could be several factors contributing to this observation: Patients who experienced a recurrence may have been under closer medical surveillance, leading to the earlier detection of recurrent tumors. Early detection allows for prompt intervention and treatment, which can improve survival outcomes. It is possible that the recurrent tumors in some patients were more responsive to treatment than the initial tumors. This could be due to changes in the tumor biology or the availability of more effective treatment options. The observed difference in survival between the two groups might be also within the range of statistical variability and not necessarily indicative of a causal relationship. It is important to note that cancer and its treatment outcomes are complex and multifactorial. While this study suggests a survival advantage for patients with recurrence, further research and analysis are needed to understand the underlying reasons fully.

Complications affecting survival in this study, with a 1.2 times higher risk of death, align with findings from studies conducted in Toronto and the USA(46,47).These studies have also shown that complications, particularly those related to sepsis and organ infections, can significantly reduce overall patient survival. This consistency in results across different studies underscores the importance of recognizing and addressing complications promptly in cancer care. Timely intervention and appropriate management of complications can be crucial in improving patient outcomes and increasing the chances of survival.

In terms of chemotherapy use, hormonal treatment for breast cancer and the use of paclitaxel in this study were associated with better survival outcomes. However, using doxorubicin increased the risk of death by 1.6 times compared to non-users. The study conducted in Europe in 2012 demonstrated that the use of paclitaxel in combination with gemcitabine improved survival outcomes for pancreatic cancer patients. However, there have been controversial reports, particularly from Germany in 2020, suggesting that paclitaxel's use might be limited to small cell lung cancer (SCLC) patients who have a good performance status(48,49).These conflicting findings underline, the complexity of cancer treatment and, the need for further research to better understand the effectiveness and appropriateness of specific treatments for different types and stages of cancer. Decisions regarding the use of paclitaxel and other therapies should be made on a case-by-case basis, taking into consideration the patient's individual characteristics, cancer type, and overall health status.

Likewise, concerning doxorubicin, a study conducted in the USA highlighted the risk associated with dose-response, potentially leading to heart failure (HF) within the first week of anthracycline treatment or even decades later(54).It's essential to carefully monitor and manage the cardiac health of patients receiving doxorubicin to mitigate these risks. Furthermore, studies conducted in Germany in 2015 and th USA in 2017 reported that patients who underwent hormonal therapy had a significantly better overall survival prognosis than non-users (HR 0.71; 95% CI 0.57–0.89),demonstrating the beneficial impact of endocrine

therapy on patient outcomes(50,51).This emphasizes the importance of personalized treatment strategies in cancer care to optimize survival and quality of life for each patient.

Additionally, the overall 5-year survival rates differ to some extent across these marital status groups, with married individuals displaying the highest survival rate(45).The log-rank test, however, suggests a borderline significant difference in survival among marital status groups, with a p-value of 0.054. This borderline significance implies that marital status may play a role in cancer survival but requires further investigation to determine its precise impact. Cancer stage, a well-established prognostic factor, demonstrates a substantial impact on survival in this analysis(47). Patients diagnosed with stage 1 and stage 2-cancer exhibit a significantly longer median survival time of 26 months compared to those with stage 3 and stage 4 cancers, which have a much shorter median survival time of 8 months. Both recurrence and complication statuses are associated with significant differences in median survival times(45,51). Patients without recurrence have a median survival time of 9 months, while those with a history of recurrence experience a significantly longer median survival time of 18 months. Similarly, patients without complications exhibit a median survival time of 10 months, whereas those with complications have a slightly shorter median survival time of 9 months. The log-rank tests for both recurrence and complication statuses yield highly significant p-values (0.000 and 0.0126, respectively), indicating that both factors exert a substantial influence on survival outcomes. The choice of treatment modality is associated with significant differences in median survival times. Various treatment modalities demonstrate varying median survival times, highlighting the importance of treatment selection in cancer care(12).

7. Conclusion

Notably, a higher prevalence of cervical and breast cancer was observed among females, underscoring gender-specific disparities in cancer burden. This pattern was particularly pronounced in cases of infection-related malignancies, which were more prevalent in individuals with poor socio-economic status. Furthermore, the increased incidence of HIV-related cancers, such as cervical and vulvar cancer was closely associated with the high rate of HIV/AIDS.

A deeply concerning revelation emerged from our analysis, as the overall cancer-related mortality rate reached 73.8%. This alarming figure can be attributed, at least in part, to deficiencies in palliative care services, necessitating urgent attention and improvement.

Access to novel systemic cancer therapies, including targeted, biological, and immunotherapies, remains severely limited due to the escalating costs of these treatments. The stark disparity in their availability significantly affects treatment outcomes, highlighting the pressing need for interventions addressing cost and accessibility barriers. Furthermore, the availability of radiotherapy services stands at a mere 36%, a level that falls far short of meeting the demand, particularly in cases where tumors are diagnosed at advanced stages. This analysis also reinforces the multifaceted nature of cancer survival, influenced by factors ranging from marital status and cancer stage to recurrence, complications, and treatment modalities. Further research and in-depth investigations are warranted to unravel the precise impact of these factors on cancer outcomes,

ultimately improving our ability to provide effective and personalized cancer care.

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8. Recommendation

- Combined efforts of national cancer control group who works in Ethiopia and Africa needed in both prevention and treatment of cancers in developing countries. This can be highly used to the most amenable cancer types such as testicular cancer, oral cancer, and cervical cancer.
- Establishing Screening programs and pathologic expertise for rapid and accurate diagnosing and staging.
- Further searches can use this finding as premises to see trends of cancer incidence and mortality of the recent year.
- Innovators' and drug expertise in the future can dig out the survival benefit of each regimen and chemotherapy in particular type of cancer mitigating the oncology service.
- Improved access to palliative care, is also essential to improve survival and limit suffering from the disease in the center
- Equipping the radiotherapy service through spending great capital cost and alarming all nations and global community to call integrated, comparative and resilience measures in order to compact the higher mortality.
- Prophylactic immunization against cancer causing HPV and HBV should be mobilized to minimize the economic burden of infectious related malignancy

9. Strength and limitation of the study

Pediatric population and cancer patients with hematology did not included in the study due time constraint, may consume large amount human resource and money. The strength of this search is, rigorous and consistent data were collected from each individual's siblings and from the persons who are alive through telephone addresses.

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Annex I English version Questionnaires
Quesionnarrie ID---------- MRN----------

Table 7:Questionnaires lists for answer for TASH oncology center of solid tumor 2023

Section1.Demographic and socio-economic data of the Patient with individual level of factor

S.N	Question item	Possible answers
1	Age (year)	1.Less than 30 2.30-39 3.40-49 4.50-59 5.60-69 6.greater than 70
2	Gender	1. Female------ 2. male----------
3	Marital Status	1. Married 2. single 3. divorced 4. widow
4	Region	1. Addis Ababa 2. Dire Dawa 3. Oromia 4. Amhara 5.other
6	Occupation	1 Employed

		2 Unemployed 3 Self-employed
7	History of occupational exposure	1.yes 2.No If yes----------
8	Educational status	1.primary 2.secondary 3.Tertiary
9	Hospital cost coverage	1.Government(insurance) 2.self
10	History of substance use	1 yes 2 No If the answer is yes 1.alchole 2.cigaratte 3.chat 4.other----------
11	History of medication use	1.yes 2.No If the answer is yes write down the medication ----------
13	Any comorbid disease	1. Yes 2 No If the answer is yes--- 1 Hypertension 2 Diabetic 3 HIV 4 Tuberculosis 5other----------

Section 2 Type and Stage of cancer with associated disease factor

14	Type of cancer	write the name of the solid tumor----------

15	Stage of the cancer	1.Stage I 2.Stage I 3.Stage III 4.Stage IV(metastasize) 5.unknown
16	Any complication during diagnosis	1.yes 2.no If yes write ----------

Section 3 Prevalence and pattern of drug use

17	Modality of cancer treatment that the patient was taking during follow up.	1.Surgery 2.Surgery and radiation 3.Surgery and chemotherapy ---------- 4.surgery, chemotherapy and radiation ---------- 5.Chemotherapy only ----------

Section 4 Patient survival status at last presentation

18	Patient status at last contact	1.Death Time death from time of diagnosis ----------(month) Time of diagnosis----------(month) 2.Alive If the patient is alive what is the intent of therapy 1 Cured 2 Palliative care

Annex II-Assurance of Investigator

The undersigned postgraduate pharmacy practice student consents to accept responsibility for the scientific, moral, and technical conduct of the research project as well as for the delivery of necessary progress reports in accordance with the terms and requirements of the Addis Ababa University's research and publications office.

NameoftheInvestigator:

Mahlet Moges (post graduate pharmacy practice student)

Signature_____Date_____/_____/_____

AdvisorName:

Dr Legese Chelkeba (PhD, Associate Professor)

Signature_____ Date_____/_____/_____

Solid Tumor

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