AVAILABILITY AND AFFORDABILITY OF ANTICANCER MEDICINES: A CASE STUDY AT OCEAN ROAD CANCER INSTITUTE IN DAR ES SALAAM, TANZANIA

Emmanuel Yohana, BPharm

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AVAILABILITY AND AFFORDABILITY OF ANTICANCER MEDICINES: A CASE STUDY AT OCEAN ROAD CANCER INSTITUTE IN DAR ES SALAAM, TANZANIA

By

Emmanuel Yohana Tessua

A dissertation submitted in partial fulfillment of the Requirements for the Degree of Master of Pharmacy (Hospital and Clinical Pharmacy) of Muhimbili University of Health and Allied Sciences

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July 2010

CERTIFICATION

The undersigned certify they have read and hereby recommend for submission a dissertation entitled "Availability and Affordability of anticancer medicines, A case study at ORCI, Dar es salaam, Tanzania" in partial fulfillment of the requirements for the degree Master of Pharmacy (Hospital and Clinical Pharmacy) of the Muhimbili University of Health and Allied Sciences



Dr. Appolinary A. Kamuhabwa

Supervisor

Date 23.11.2010



Dr. Phares Mujinja

Co-Supervisor

Date 23.11.2010

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I, Emmanuel Yohana, hereby solemnly declare that this is my original work and it has not been presented nor will it be presented to any other University for similar or any other degree award.

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Abbreviations

AAR	Africa Air Rescue
BMI	Basal Metabolic Rate
AIDS	Acquired Immunodeficiency Virus
CHF	Community Health Fund
DNA	Deoxyribonucleic acid
DRF	Drug Revolving Fund
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
HPV	Human Papilloma Virus
KCMC	Kilimanjaro Christian Medical Centre
MEWATA	Medical Women Association of Tanzania
MSD	Medical Stores Department
MPharm	Master of Pharmacy
MUHAS	Muhimbili University of Health and Allied Sciences
NHIF	National Health Insurance Fund
NSSF	National Social Security Fund
ORCI	Ocean Road Cancer Institute
RNA	Ribonucleic Acid
TB	Tuberculosis
TSh	Tanzania shillings
UN	United Nations
USD/$	United States Dollars
WHO	World Health Organization

Summary

Background: In Tanzania and other East African countries little is documented regarding the availability and affordability of anticancer medicines at the patient level. Also it is not known if anticancer medicines prescribed at the Ocean Road Cancer Institute (ORCI) are available for the patients. The number of anticancer medicines prescribed to the cancer patients is also not known. It is also not known if there were other financing mechanisms for anticancer medicines to the patients treated at chemotherapy department.

Objective: To determine and assess the availability of anticancer medicines to patients attending chemotherapy clinic at ORCI in Dar es salaam. Also to find out the prices of anticancer medicines in private pharmacies which are accessible by patients treated at ORCI. Alternative sources of funds to the ORCI in Dar es Salaam were also reflected in the process of the study.

Methodology: A cross-sectional study was carried out to patients attending the ORCI chemotherapy clinic between March and May 2010. A total of 384 cancer patients aged 18 and above and on chemotherapy treatment were included in the study. Some health care providers at the chemotherapy department and dispensing personnel in the private pharmacies were interviewed for availability and accessibility of anticancer medicines.

Results: The mean anticancer medicines prescribed were 2.01 with the mean anticancer cost reported by patients to be TSh 106,300. The availability of medicines at the ORCI for the management of cancer patients was about 50% of all surveyed medicines. In private pharmacies the unit cost for medicines was very high ranging from TSh 2,500 to 744,000 which were equivalent from one day income of the respondents to seven month income. The average amount of money the patients paid to buy anticancer medicines was TSh 151,100 for one course of treatment. More than 90% of the medicines surveyed at both ORCI and private pharmacies accessible by ORCI cancer patients were generics.

Conclusion Availability of anticancer medicines at ORCI in Dar es Salaam is not adequate. As a result, patients are required to buy anticancer medicines from private pharmacies in Dar es Salaam. In these private pharmacies anticancer medicines are too costly and most patients are not covered by health insurance to purchase their medicines.

CHAPTER ONE

1. Introduction

1.1 Introduction

Tanzania has been recording all cases of cancer since 1966 with the establishment of Tanzania Cancer Registry (Alexander, 1983) but it does not have population -based cancer registry compared to the cancer registries in developed countries (Stenbeck et al, 1995). The number of cancer patients in the country is increasing every year as shown by the data from ORCI. The number attended at the Ocean Road Cancer Institute (ORCI) which is the only public hospital specializing in cancer is going up every year and it is now more than 4000 new patients. According to ORCI and WHO report five leading causes of cancer deaths in males are prostate, mouth and oropharynx, esophagus, leukemia and lymphomas. In female the most cause of cancer deaths are cervix uteri, breast, mouth and oropharynx, leukemia and colon and rectum cancer (WHO, 2005, Kahesa et al, 2008). These cancer are mostly diagnosed at advanced or metastatic stage when chemotherapy treatment is the essential option (Higginson, 2006).

In many countries the allocated funds for purchasing medicines for the management of all diseases to the hospitals is usually not enough and is normally supplemented by other sources of funds such as DRF (drug revolving funds) (Carasso et al, 2009). Chemotherapy drugs in middle- income countries are becoming far too expensive and being promoted inappropriately (WHO, 2007). The government of Tanzania has committed itself in the provision of free cancer services for the cancer patients but the sustainability of the supply of the anticancer medicines is questionable.

The commitment and ability of the government to provide anticancer services may be affected by limited resources and existence of other disease conditions such as HIV, TB and malaria. According to the WHO, comprehensive cancer control is based on prevention, cancer screening or early diagnosis, anticancer treatment, and palliative care. African countries including Tanzania have low financial and human resources (Sitas et al, 2008) for cancer management.

Consequently, access to anticancer drugs has been a challenge to most cancer patients. Most people who attend cancer treatment in hospitals are coming from all

over the country as there are few hospitals specialized in treatment of cancer. As a result, patients have to incur many expenses like transport to get treatment (Guidry, 1997). Most of these patients are very poor and can not afford the expenses associated with the treatment. When patients are not getting the medicines from the public hospitals they have to get them from private pharmaceutical outlet or remain untreated because of lack of ability to pay for the medicines (Bouchardy et al, 2007). The cost of the treatment for the course of few days is many hundred dollars. For many patients this is a considerable financial burden as the medications are expensive and they have to make extraordinary sacrifice in order to pay for their health care. Many different determinants such as socioeconomic, cultural, geographic accessibility to medical centres with oncologic services and availability of traditional healers affect patients in their decisions to obtain early medical help as well as to refrain from the proposed therapeutic methods (surgery, radiotherapy, and chemotherapy (Vorobiof et al, 2001).

1.2 Risk factors for cancer

Cancer is the generic term for a group of diseases that can affect any part of the body. Malignant tumours of the brain, lung, breast, prostate, skin, and colon are among the diseases known as cancer. Other examples of cancers include leukaemia, sarcomas, Hodgkin disease and non-Hodgkin lymphoma. Certain common morphological features differentiate all forms of cancer from other types of disease, including other noncommunicable diseases and diseases caused by toxic agents (WHO, 2002). With the increse in the knowledge of cancer mechanisms especially after the completion of human genome project many drugs will be expected in the market. Many of the cancers have no known etiology but they are related to some risk factors.

Most cancers in third world countries are due to multiple infections. Infections account for about 15% of the cancer worldwide (Martin et al, 2008). This proportion is greater in the developing world where an estimated 22% of cancers are caused by infectious (Pisani et al 1990). *Helicobacter pylori* is associated with stomach cancer (Correa, 1996). Of recent is the HIV infection which has increased the cases of Kaposi sarcoma. Hepatocellular carcinoma occur in patients with hepatitis B and C

virus infection. Schistosoma japonicum infection predisposes to the development of squamous carcinoma of the bladder. But there is an effort by the scientific community and pharmaceutical industries to develop vaccines to prevent these types of cancer. Currently there has been introduction of HPV vaccine which provides protection against HPV-16 and HPV-18, which cause approximately 70% of cervical cancers (Rossum et al, 2008).

Many studies have shown the relationship between cancer and tobacco smoking. According to WHO tobacco is responsible for 80–90% of all lung cancer deaths, and probably some of the deaths from cancer of the oral cavity, larynx, oesophagus and stomach (WHO, 2002). In a study done in Hong Kong smoking and cooking emisions for years were responsible for increased incidence of lung cancer among women (Wang 2009).

The use of dietary fat has also been shown to increase the incidences of many types of cancer.For example the study done in Britain the intake of total fat and fat subtypes was three times associated to the development of prostate cancer (Lophatananon, 2010). Changing the eating life style by eating low fat, high fibre contents, reducing red met intake and high fruit content will be necessary for cancer prevention as reported by Gooderham et al (1997).

The nuclear disaster s of Hiroshima and Nagasaki in Japan and Chernobyl led to an increased incidence of leukaemia after 5–10 years in the exposed population. Increased incidences of thyroid and breast cancer have also been reported. Radiotherapy used, for example, in ankylosing spondylitis and Hodgkin's lymphoma, has led to increased incidences of cancer (IARC, 2000).

Consumption of large amount of beverages containing alcohol has been associated with development of lung cancer (Fan et al, 2009) and other cancers such as esophagus.

Women with a body mass index (BMI) in the obese range had a threefold increased risk of breast cancer in a case-control study suggesting that obesity in postmenopausal women could increase risk of breast cancer (Montazeri et al, 2008) high BMI is associated with an increased incidence ofmany types of cancer.

1.3 Pharmacology of some anticancer medicines

Cancer chemotherapy started in 1945 when research on nitrogen mustard uncovered their potential use in cancer (Connors, 1996). Most of these drugs affect normal cells as well as cancer cells by altering cellular activity during one or more phases of the cell cycle. Although both types of cells die as a result of irreparable damage caused by chemotherapy, normal cells have a greater ability to repair minor damage and to continue living than do cancer cells. The increased vulnerability of malignant cells is exploited to achieve the therapeutic effects seen with administration of antineoplastic drugs.

The choice of a chemotherapeutic regimen depends on differences in time to progression, response rate, toxicity profile, cost and symptom relief. Several other strategies, such as three-drug combinations, sequential use of a third drug, weekly administration, etc., have been evaluated to improve the chemotherapeutic effect (Inoue, 2001). Sometimes the use of different methodology in the management of cancer has been advocated. For example using the combination of chemotherapy and radiotherapy or the combination of chemotherapy, radiotherapy and surgery (Wong et al, 2010) Also combination therapy in chemotherapy is highly practiced in the management of patients. The reasons for chemotherapy combination are:

- The use of several drugs in combination may reduce the likelihood of resistance.
- The use of combinations of drugs with different toxicities may allow more treatment to be given than could be achieved by increasing one drug to a maximum dose.
- It is possible that the drugs may interact with each other so that the effect of two drugs can be greater than the sum of their individual effects (Malhotra V et al 2003)

An example can be shown by the study conducted by Kotwall (1999) in which it was shown that most women with breast cancer treated systemically with combination chemotherapy mortality are substantially reduced.

Patients with cancer need to get enough prescribed courses of anticancer drugs. A certain drug dosage will kill a constant percentage of cells rather than a constant

number of cells. Repeated doses of chemotherapy are thus needed to reduce the total number of cells. The number of cells left after chemotherapy depends on the results of the previous dose, the time between doses and the doubling time of the tumour (Robinson, 1993)

Some of the chemotherapeutic agents used in cancer are on the following groups.

Alkylating agents. Nitrogen mustard (mustine) is a reactive chemical which is capable of combining with large molecules such as DNA. Nitrogen mustard and other similar drugs are bifunctional, which means that they can react with DNA at more than one site. In this way they are capable of joining the two strands of DNA together and cross-link it. DNA which is cross-linked is prevented from replicating because the two strains cannot be separated. Alkylating agents also prevent replication by inhibiting RNA, DNA and protein synthesis in rapidly dividing tissues. Nitrogen mustard is one of a family of drugs known as alkylating agents, all of which act by this means. Other drugs in the family are melphalan, chlorambucil, cyclophosphamide, ifosfamde, treosulphan and busulphan. Nitrosoureas such as carmustine and lomustine probably act by a similar mechanism. The heavy metal compounds cisplatin and carboplatin are also thought to have properties that cause inter- and intra-strand alkylation. As a class, alkylating agents are considered cycle nonspecific. They exert their lethal effects throughout the cell cycle, but tend to be more effective against rapidly dividing cells. The alkylating agents have been proven to be cytotoxically active against lymphomas, Hodgkin's disease, breast cancer and multiple myeloma (Robinson,1993).

Antimetabolites. These interfere with the bodies metabolites. For example methotrexate interferes with cell division in a different way-stopping the cell from making the extra DNA necessary for replication. DNA is formed from four bases,thymine, cytosine, adenine and guanine. Folic acid is needed by the cell to make adenine, guanine and thymine. Methotrexate acts by preventing the cell from converting folic acid from an inactive form to its active form. All drugs which interfere with the manufacture of DNA are called antimetabolites. Apart from methotrexate, most of them are molecules which mimic the natural bases and in that way interfere with their function. Examples of other antimetabolites are 5-

fluorouracil (5-FU), 6-mercaptopurine, hydroxyurea, 6-thioguanine and cytosine arabinoside. Most antimetabolic cytotoxic activity occurs during the S phase of the cell cycle and these drugs are, therefore, most effective when used against rapidly dividing cell populations (Katzung, 2006).

Antibiotics. The anti-tumour antibiotics are agents that are isolated from natural substances such as plants and micro-organisms. As a class they are cell cycle nonspecific and appear to have several different mechanisms by which they produce their cytotoxic effects. Bleomycin, mithramycin and mitomycin C are examples of antibiotic anti-cancer agents (Robinson, 1993).

Intercalating agents. Examples of intercalating agents (of which the antitumour antibiotics are a subgroup) are doxorubicin (adriamycin), epirubicin, daunorubicin, actinomycin D and mitozantrone. The two strands of DNA form a double helix. The strands are held together because the bases on opposite sides join to each other in pairs. Adenine pairs with thymine and guanine with cytosine. Intercalating agents are drugs which can bind in between the base pairs and thus interfere with the function of DNA.

Vinca alkaloids (spindle poisons). After the DNA has replicated, but before the cells can divide the two identical copies of the DNA must be removed physically to the opposite ends of the cell. This is accomplished by spindles-minute protein fibres(microtubules] which are formed in the cell and subsequently pull the chromosomes apart. Vincristine, vinblastine and vindesine prevent cellular proliferation by interfering with the function of the microtubules.
Plant alkaloids work by crystallizing the microtubular mitotic spindle proteins during metaphase, which arrests mitosis causing cell death. The action of plant alkaloids is considered cell cycle phase-specific, occurring during the M phase (Katzung, 2006).

More than 100 cytotoxic drugs are currently available. WHO has established a list comprising 17 drugs that, on the basis of their cost-effectiveness and life-saving

potential, are needed to treat the 10 most common cancers or category 1 or 2 cancers (Sikora et al., 1999)

Table 1. Essential drugs for oncology

Drug	Top 10 cancers tumours	Category 1 or 2
Bleomycin	+	+
Chlorambucil	+	+
Cisplatin	+	+
Doxorubicin	+	+
Etoposide	+	+
5-Fluorouracil	+	+
Methotrexate	+	+
Prednisolone	+	+
Procarbazine	+	
Tamoxifen	+	+
Vinblastine	+	+

Vincristine	+	+
Daunorubicin	+	
6-Mercaptopurine	+	
Dactinomycin	+	
Cytarabine	+	

Category 1 Drugs are needed to treat curable pediatric tumors
Category 2 Drugs are needed to treat the 10 most common tumors in the world

1.4 Ocean Road Cancer Institute

The Ocean Road Hospital is the only hospital specialised in the treatment of cancer in Tanzania. The ORCI is the oldest health institution in Tanzania having been founded in 1895 by the German colonial government. At its inception it catered for German community only.

In 1920, the British took over the running of the hospital from Germany after the 1st world war and changed it to 'The European Hospital'. The British colonial government followed the footsteps of their predecessors and adopted a policy that centralised its medical services and facilities for the European communities.

After independence in 1961, all the barriers from the colonial past were removed and the European hospital was re-named the Ocean Road Hospital to cater for all races. In the 1960s and 1970s the Ocean Road Hospital operated as maternity wing of the Muhimbili Medical Centre. In 1980 a decision was made by the Ministry of Health to make Ocean Road Hospital the hub for cancer services, whereby the Radiotherapy Unit of the Faculty of Medicine, University of Dar es Salaam was shifted from Muhimbili Medical Centre to the Ocean Road Hospital to give room for expansion.

During the period between 1980 to mid 1996, deliberate efforts were made to upgrade the Radiotherapy Unit to a comprehensive Cancer Institute. In June 1996, by an Act of Parliament, Ocean Road Hospital was made an indepedent autonomous institute directly under the Ministry of Health and its name changed to Ocean Road Cancer Institute.

The top 10 causes of attendance for adults at ORCI in the year 2000 were cervical cancer (34.3%; 586 cancers), Kaposi's sarcoma (12.6%), head and neck cancers (7.4%), oesophageal cancer (6.7%), breast cancer (6.6%), skin cancer (1.8%), bladder cancer (1.6%), cancer of the conjunctiva (1.6%), leukaemia (1.3%), and lymphomas (1.1%). Kaposi's sarcoma was the most common cancer seen among males and was the third most common cancer seen among females at ORCI (ORCI data).

No local information is available concerning the stage of cancer patients at diagnosis but ORCI attends to only 10% of the WHO estimate of new cancer patients per year in Tanzania. For the past few decades the number of cancer patients treated at Ocean Road Cancer Institute has been raising steadily. For example in 1975 there were 48 new patients, in 1989 there were 1639 and in 2004 there were 2866 patients. World Health Organisation (WHO, 2002) estimated that 21,000 new cases occur each year in Tanzania.

However, clinical observations of cancer patients at Muhimbili National Hospital and ORCI (both in the Dar es Salaam Region) indicate that more than two thirds of the cancers presents initially in advanced stages where cure is not expected and palliative care is indicated.

1.5 Definition of the problem

Availability and affordability of anticancer medicines to poor cancer patients in a poor country like Tanzania is not known. It is also not known if all the anticancer medications prescribed to the patients attending at the ORCI are available at the Institute pharmacy. It is also not well-established if there is other means of financing the medicines for cancer patients when the medicines are out-of-stock in the hospital

pharmacies. In addition, the magnitude of treatment interruption because of short supply of the medications at the hospital is also not known.

1.6 Rationale of the study

The focus of this study was to assess the availability and affordability to anticancer medicines by patients suffering from cancer. This covered the number of anticancer chemotherapeutic agents present in the hospital which patients can access, the number of patients getting the medicines from the hospital and ability to buy from other pharmacies. The findings of the study may encourage the increase of the budget for purchasing of anticancer medications which could result into better patient management. The study results will also reveal if there is a need for other form of financing in the area of anticancer medicines in Tanzania.

1.7 Objectives of the study

The main objective of this study is to assess the availability and affordability of the anticancer medicines to cancer patients in Tanzania.

The specific objectives are

- To assess the availability of anticancer medicines for managing the top five cancers in Tanzania at Ocean Road Cancer Institute and other retail pharmacies in Dar es salaam.
- To determine the prices of commonly prescribed anticancer medicines in retail private pharmacies
- To assess the number of prescribed anticancer medicines dispensed to the patient at ORCI.
- To assess the financial ability of the cancer patients to purchase anticancer medicines from private pharmacies.
- To determine alternative channel and sources of funds to ORCI to purchase anticancer medicines for the treatment of top five cancers.

CHAPTER TWO

2. LITERATURE REVIEW

In 2002 there were 5.1 million new cases of cancer in developed countries and 5.8 million new cases in developing countries. However, by 2020 it is predicted that the majority of the 15–20 million new cases of cancer will occur in developing countries (Kanavos , 2006; Mellstedt, 2006). A third of these cancers are preventable and another third are treatable if detected early. According to WHO cancer is currently the cause of 12% of all deaths worldwide and in Tanzania in 2009 the age-standardized mortality rate by cause from all types of cancer was 150/100,000 population.

The costs associated with current and emerging therapies, as well as supportive care, are significant and pose a tremendous financial burden to both patients and managed care (Cook, 2008) and has been the reason for chronically ill patients to take less medications than prescribed (Heisler and Piette, 2004). Access to medical services is an important component of a health policy in developing countries as it is considered a basic human right by activist working in the health sector (Pecoul and Chirac, 1999). Patients with low social economic status are highly affected by the poor availability of medicines and other techniques such as surgery and radiation as they are less likely to receive these services (Cheung et al, 2010) hence their availability and accessibility to cancer patients have to be guaranteed.

Cancer is often not a stated priority for health care expenditures in countries with limited resources. Because infectious diseases typically dominate the health care agendas of such countries cancer control efforts generally fall behind other priorities of the national health authorities (Anderson et al, 2006).

Effective cancer treatment strategies need to focus on providing basic care, making efforts to diagnose cancers earlier, making treatments more accessible and affordable. (Ndom, 2008). According to the study done in Canada financial impediments disproportionately affect rural residents' decisions about cancer care and highlight the need that centralised specialist care such as cancer treatment is accessible (Mathews, 2009). Patients and oncologist have a challenge regarding the

efficacy of the treatment as well as the financial consideration of the costly anticancer medicines.

The Ocean Road Cancer Institute in Dar es Salaam is treating 4000 cancer patients every year most of them attending at the hospital in advanced stage of the disease (Kazaura et al 2007). Breast and cervical cancer is the leading cause of death in women in Tanzania according to WHO (2008). In males prostate and oesophageal cancer are common. Many of the cancers especially cervical cancer have association with HIV virus and the increase in HIV prevalence have increased this type of cancer (Kahesa et al 2008). In response to this screening for breast and cervix cancer has been carried out by Medical Women Association of Tanzania (MEWATA) in recent years. Public education and the promotion of healthy lifestyles such as quitting cigarette smoking have been actively campaign for health promotion.

The incidence of cancer in the third world countries is 60% of the world's new cancer but only 5% of the resources for cancer are directed to third world (Tanneberger, 1995). This burden of cancer in developing countries like Tanzania is growing resulting in high morbidity, mortality and economic cost in the next 20 years (Ngoma, 2006). According to WHO the age-standardized mortality rate by cancer is 151/100,000 in Tanzania. Also according to WHO cancer killed approximately 21,000 in Tanzania, 14,000 of those killed were under the age of 70 (Parkin, 2001). The number of deaths from cancer in Africa is anticipated to rise considerably in the next 20 years. The principal factors contributing to this projected increase are the increasing proportion of elderly people, an overall decrease in deaths from communicable diseases other than HIV/AIDS, and the rising incidence of certain forms of cancer, notably lung cancer resulting from tobacco use (Lopez et al, 1998).

An important task of a cancer registry in a developing country like Tanzania is to measure the extent of the cancer problem, since many patients who are diagnosed and registered will not be treated because the adapted treatment is unavailable or too expensive (Valsecchi and Steliarova-Foucher, 2008). The other problem of cancer

treatment which involve mostly older patients is significant out-of –pocket expenditure mainly for prescription anticancer medicines and home care services (Langa et al, 2004).

In the USA the average 6-month, 1-year, and lifetime total treatment costs were $37,327, $42,218, and $48,803, respectively, and the median survival was 7 months for pancretic carcinoma. (Wei et al, 2000). Sixty one percent of this treatment costs are incurred in the first six months of treatment (Bailes, 1995).

In Tanzania some insurers like NHIF and NSSF do not cover anticancer medicines and hence the treatment of cancer is left to the government and the patients and few insurance companies like AAR which cover chemotherapeutic agents after new member with illiness has waited for twelve months. Patients are particularly hard hit, with the cost of non-covered services adding to their already significant nonmedical ex-penses, including lost productivity, transportation, and family care (Bailes, 1995) as the per capita income in Tanzania is USD 310 according to the UN report in 2004. One study in United States revealed that rural women with breast cancer were two and a half times more likely than urban women to report some need for help (Girgis et al, 2000) and this may be due to increased cost to access the facilities and resources for the management of breast cancer. All these results into medication restriction especially for those who lack prescription coverage particularly among vulnerable groups (Steinman, 2001) and can affect compliance to treatment unless there is coverage support mechanism (Kaa, 2007)

CHAPTER THREE

3. METHODOLOGY

3.1 Study sites

The study was done at Ocean Road Cancer Institute (ORCI), Dar es Salaam, Tanzania. The hospital was selected because it is the cancer referral hospital and many patients from all over the country are referred to the hospital for management of cancer. The other part involved private pharmacies that dispense anticancer drugs in Dar es Salaam.

3.2 Study design

To accomplish this study a cross sectional descriptive study was employed. Questionnaires were used to get information from patients regarding the affordability and availability of anticancer drugs at the ORCI in Dar es salaam, Tanzania. Interview to hospital health workers and private pharmacies dispensing personnel was conducted to availability and affordability of anticancer drugs. According to ORCI and WHO five leading causes of cancer deaths in males are prostate, mouth and oropharynx, esophagus, leukemia and lymphomas. In females the most cause of cancer deaths are cervix uteri, breast, mouth and oropharynx, leukemia and colon and rectal cancers (WHO, 2005). These were used as as indicator cancers for accessing availability and affordability of anticancer drugs at ORCI.

3.3 Study participants

The participants of this study were in-patients and out-patients attending clinic at ORCI and diagnosed with cancer or tumor of any form and those who are taking chemotherapy. Hospital pharmacists, doctors, nurses and private pharmaceutical personnel involved in the treatment of cancer were also interviewed to obtain information on anticancer medicines availability and affordability.

3.4 Sampling methodology

Convenient sampling was used to select patients for the study. The assumption was that almost all patients attending clinic at ORCI have cancer. Ten health workers at the chemotherapy clinic were also interviewed.

3.5 Inclusion and Exclusion criteria

3.5.1 Inclusion criteria.

- Patients diagnosed with cancer top five cancer in both males and female and attending at Ocean Road Cancer Institute clinic for not less than one month.
- Patients above 18 years of age.
- Patients who have already started chemotherapy or any other type of cancer medicines which does not involve radiotherapy or surgery alone.

3.5.2 Exclusion criteria

- Patients who have not been diagnosed with cancer
- Patients not prescribed medications for cancer
- Patient less than 18 years of age
- Patients using radiotherapy or surgery alone for the management of cancer

3.6 Instrument pre-test

The questionnaires were pretested for content validity and readability in 10 patients who met study criteria. Based on pilot testing, the questionnaires were revised and then used in the data collection.

3.7 Data collection procedures

Data collection were done by researcher and research assistants who were trained prior to the activity.

The detailed explanation about the study was given to the participants and any question regarding the study was addressed. They were then asked for their consent to participate in the research. After the patients have agreed to participate in the study

they were interviewed by the researcher or research assistants who filled the questionnaires for each consented patients.

The study involved three parts, patients, health workers and dispensing personnel in private pharmacies. In the first part questionnaires with open- and closed-ended questions were used to obtain information including personal demographics, medical history, number of medicines and missed medicines at the hospital, cost of the medicines for one course of treatment and their monthly income. The participants were also asked if they missed medicines in the day of the interview and the day proceeding the day of the interview.

The second part of the study consisted of the interview of the hospital pharmacy personnel, clinicians and nurses who were asked about the availability of most common used chemotherapeutic agents they keep at the hospital. Other questions involved the type of cancer the patient is suffering from, recommended treatment for each type of cancer and the availability of the anticancer and associated medicines at the institute.

Also private pharmacies with cancer treatment services were interviewed about the availability of the most prescribed medicines from the ORCI.

For the case of medical professionals and other hospital staff the researchers either interviewed them or give them the questions to answer.

3.8 Sample size

The sample size for the study was 384 patients. The number was obtained by applying the following statistical formula

$$n = \frac{t^2 xp(1-p)}{m^2}$$

Where

n =required sample size

t=confidence level at 95% (standard value of 1.96)

p= estimated prevalence of patients getting anticancer medicines at ORCI (0.5)
m=margin of error (standard value of 0.05)

$$n = \frac{1.96^2 x 0.5(1-0.5)}{0.05^2}$$

The number of private pharmacies used in the study was three (3) according to the available information from the ORCI where they send patients to purchase anticancer medicines.

Others who took part in the study with their number in the brackets are clinicians (3), nurses (5), pharmacists (2) working at the chemotherapy department of the ORCI and hospital administrators (2). These numbers of personnel were chosen to correspond with the number of available respective health workers working at the chemotherapy department at ORCI.

3.9 Data management and analysis

Responses in the questionnaires were coded and analysed using computer statistical programme, SPSS version 13.0 for Windows. Descriptive statistics was be used to report measures of central tendency and dispersion. P value was used and the level below 0.05 was considered statistically significant. The average availability of anticancer medicines at ORCI was found. The mean prices for the commonly used anticancer medicines at three private pharmacies were calculated. The frequency of the patients who reported missing the medicines because of unavailability was also calculated. The use of simple table, histogram, percentages and other presentations was done for the alternative sources of funds for purchasing of medicines and also for the number the number medicines prescribed.

The data obtained from the health workers and the hospital was qualitative (Interview guide attached). Data obtained was transcribed and coded and then analysed manually.

3.10 Ethical consideration

The proposal for this study was reviewed and passed both by School of Pharmacy and Directorate of Postgraduate Studies at MUHAS. Ethical clearance was obtained from MUHAS research and publication committee. The researcher then contacted the ORCI authority for permission to conduct the study at the cancer institute. The ORCI Ethical and Publication committee also gave ethical clearance and a permission to conduct the study. In addition, a full informed consent (Appendix 1) was obtained from the patients. Patients were provided with clear and regular information about the study, its purpose and advantage of the project and requested to participate in the study. The information obtained was made confidential to the researchers and no information was communicated to other people unrelated to the study showed anonymity.

Other health professionals at the hospital or private pharmacies participating in the study also gave informed consent.

3.11 Limitations

Some of the patients were not able to mention the type of cancer they were suffering from. So the interviewers had to ask for the organ affected by cancer.

CHAPTER FOUR

4. RESULTS

4.1 Characteristics of the respondents

A total of 384 patients were interviewed using questionnaires. Most of those who were interviewed were females (60.2%).

Table 4.1: Socio-demographic characteristics of the respondents

Characteristics	Number	Percentage
Sex		
Male	153	39.8
Female	231	60.2
Age group		
18-40	119	31.0
41-60	199	51.8
61+	66	17.2
Mean age/SD	47.73	13.82
Last education grade completed		
None	63	16.4
Primary	188	49.0
Secondary	93	24.2
College	38	9.9

Others	2	0.5
Occupation		
None	109	28.4
Peasants	136	35.4
Employed	83	21.6
Self Employed	45	11.7
Others	11	2.9

Table 4.1 shows that of the 384 cancer patients who were undergoing chemotherapy at ORCI about 40% were males and 60% of the respondents were females.

Majority (52%) of the patients were aged between 41-60 years.

The mean age of the respondents in this study was 47.7 years. Most (49.0%) of the cancer patients had at least completed primary education and 16.4% had no formal education. Ten percent of the respondents had post-secondary school education.

Majority of the respondents had no formal employments with majority (35.4%) being peasants. Those who were employed in formal sectors were 21.6%.

Figure 4.1: Distribution of the age group of respondents with sex

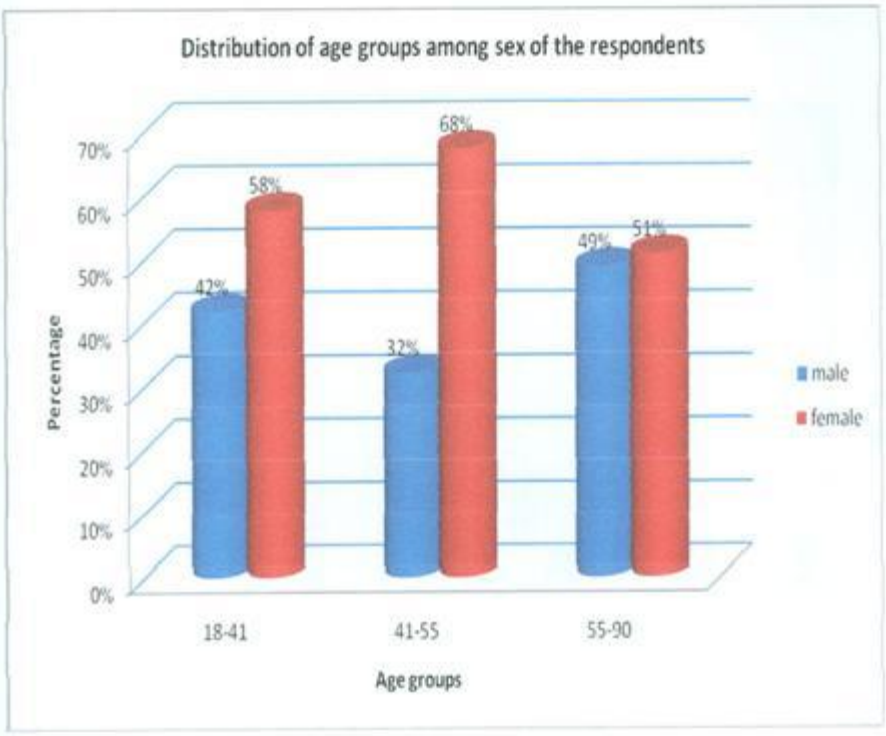


Figure 4.1 above shows that for all age groups female were many compared to males. For the age group 18-40 years females were 58% while males were 42%. For those aged between 41-55years females were 67.7%. For the age group 55-90 years females were 51% and males were 49%.

4.2 Location of the cancer of respondents

The respondents of the study were asked for the location of their diagnosed cancer. Most of the cancer patients reported having cancer involving the breast, gastrointestinal tract and cervix.

Figure 4.2: The location of the cancer as reported by respondents

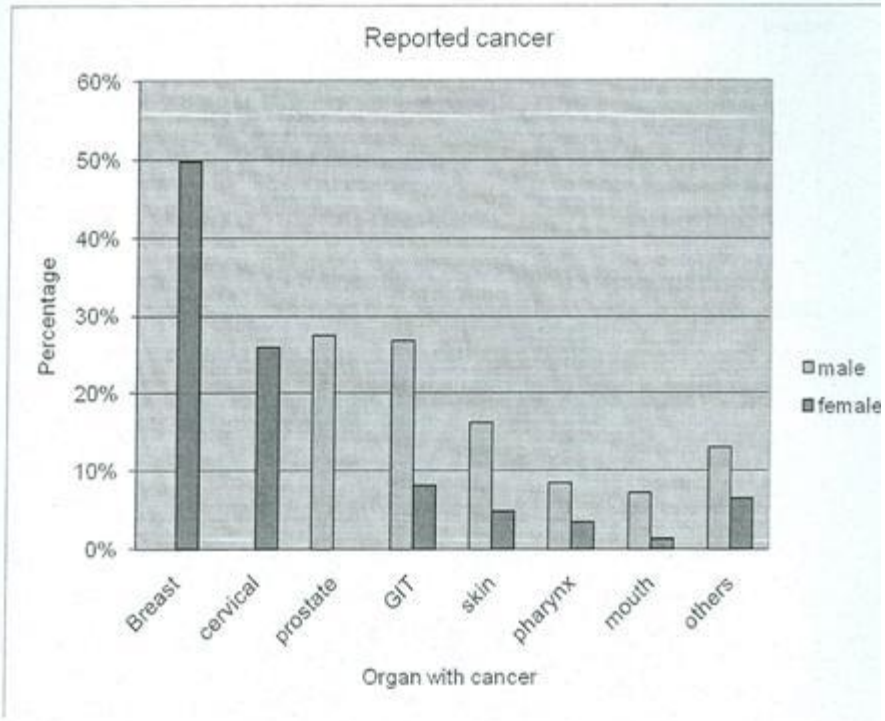


Figure 4.2 shows the position of the cancers reported by the respondents at ORCI. Breast cancer was the most (50%) reported cancer in females receiving chemotherapy. Cervical cancer was the second highly (26%) reported by women respondents. For men the most reported cancers were prostate cancer (27.5%) and cancers involving gastrointestinal tract (26.8%). Cancer of the skin was reported in 16% of men respondents.

Table 4.2: Cancer types by age groups of the respondents (n=384)

		Age group			
		18-40	41-55	55-90	p-value
Cancer type	Breast	25 (21.7)	60(52.2)	30(26.1)	
	Cervical	11 (18.0)	35(57.4)	15(24.6)	
	Prostate	4 (9.5)	9 (21.4)	29(69.0)	
	GIT	22 (36.7)	25(41.7)	13(21.7)	<0.001
	Skin	23 (63.9)	12(33.3)	1 (2.8)	
	Pharynx	10 (47.6)	7 (33.3)	4 (19.0)	
	Mouth	6 (42.9)	4 (28.6)	4 (28.6)	
	Others	18 (51.4)	9 (25.7)	8 (22.9)	
	X^2=84.3	df=14			

Table 4.2 shows the distribution of types of cancer reported within the age groups of the respondents. For breast cancer, many respondents (52.2%) were between the age group of 41-55 years. For the age group of 18-40 years the percentage of cancer patients was 21.7%. The rest (26.1%) were aged above 55 years. Table 4.2 also shows that cancer of the cervix was also reported my many respondents (57.4%) in the age group 41-55 years. The age groups 18-40 years and more than 55 years had the respondents of 18.0% and 24.6%. For the prostate cancer increased age was associated with the disease. More respondents (69%) who were above 55 years compared to those below 55 years (31%). Table 4.2 also showed that many of the patients with cancer of the skin were in the age group 18-40 which were about 63.9%. Those who were in the age group of 41-55years were 33.3% and the rest

(2.8%) were above 55 years. It can be seen that all the cancer were increasing with age with X^2=84.3 with df=14. The increase was statistically significant with $p<0.01$.

4.3 New cancer cases trends at ORCI for the period 2006-2009

The incidence of cancer reported at ORCI is increasing every year as shown from the hospital data. The number of cervical cancer patients is three times more than the number of the second leading cancer which has been Kaposi sarcoma from 2006-2009. The hospital is also responsible for the maintenance of the cancer registry in Tanzania and hence these are the cancer reports for the whole country.

Table 4.3: New cancer cases trend at ORCI for the period 2006-2009

Type of cancer	Year			
	2006	2007	2008	2009
Cervical cancer	955	1006	1288	1334
Kaposi sarcoma	295	404	418	447
Breast	244	245	275	322
Esophageal cancer	181	256	282	307
Head and neck cancers	155	206	244	272
Burkitt's lymphoma	201	199	226	245
Leukemias	46	78	87	103
Urinary bladder cancer	46	88	87	98
Skin cancer	40	108	111	123
Eye cancer	46	76	80	95
Others	598	472	382	390
TOTAL	**2807**	**3138**	**3480**	**3776**

Table 4.3 provides data for cancer incidences at ORCI for four years from 2006 to 2009. The reported leading cancers are cancers of the cervix, Kaposi sarcoma, breast cancer and esophageal cancer. Cancers involving only women such as cervical cancer and breast cancer are in the top three cancers reported. On the other hand,

cancers involving only men such as prostate cancer were not among the cancerous conditions registered at ORCI.

Table 4.4: Distribution of reported cancers by age, sex and medicines missed

		Cancer type								
Characteristics		Breast	cervical	prostate	GIT	skin	pharynx	mouth	others	p-value
SEX	Male	0(0)	1(2)	42(100)	41(68)	25(69)	13(62)	11(79)	20(57)	<0.001
	Female	115(100)	60(98)	0	19(32)	11(31)	8(38)	3(21)	15(43)	
Age groups										
	18-40	25(22)	11(18)	4(9.5)	22(37)	23(64)	10(48)	6(43)	18(51)	
	41-55	60(52)	35(57)	9(21.4)	25(42)	12(33)	7(33)	4(29)	9(26)	<0.001
	55-90	30(26)	15(25)	29(69)	13(22)	1(3)	4(19)	4(29)	8(23)	
Occupation										
None		34(30)	25(41)	11(26)	7 (12)	9(25)	6 (29)	3 (21)	14(40)	
Peasant		39(34)	24(39)	18(43)	25(42)	8(22)	8 (38)	5 (36)	9 (26)	0.008
Self employed		15(13)	2 (3)	3 (7)	8 (13)	10(28)	4 (19)	2 (14)	1 (3)	
Employed		25(22)	10(16)	6 (14)	17(28)	9 (25)	3 (14)	4 (29)	9 (26)	
Others		2 (2)	0	4 (10)	3 (5)	0	0	0	2 (6)	

Table 4.4 shows some cancers which are only prevalent to women such as breast and cervical cancer and others to males such as prostate cancer. Some cancers like skin cancer and cancer involving the gastrointestinal tract were distributed between both sexes. Table 4.4 also shows that 29.6% of the breast cancer respondents reported to have no any occupation, while 41% of the cervical cancer respondents had no occupation. For the prostate cancer 26.2% had reported to have no any economic activity.

Table 4.5: Medicines missed for different cancer types

Medicine missed	Cancer type								
	Breast	Cervical	Prostate	GIT	Skin	Pharynx	Mouth	Others	p-value
0	29(26)	11(18)	5(13)	10(17)	8(25)	4(19)	3(25)	6(18)	
1	21(19)	18(30)	13(33)	9(15)	2(6)	10(48)	2(17)	7(21)	0.055
2	38(34)	25(41)	9(23)	25(42)	12(38)	4(19)	1(8)	11(32)	
3	22(20)	5(8)	11(28)	13(22)	9(28)	2(10)	5(42)	8(24)	
4	2(2)	1(2)	2(5)	2(3)	1(3)	1(3)	1(3)	2(5.9)	
Medicines missed last visit									
0	33(30)	12(20)	4(10)	10(17)	8(24)	3(14)	3(25)	8(24)	
1	19(17)	19(31)	13(33)	7(12.1)	1(3)	10(48)	2(17)	6(18)	
2	36(32)	23(38)	10(26)	27(46.6)	13(39)	5(24)	1(8)	12(35)	0.007
3	21(19)	5(8)	10(26)	12(20.7)	10(30)	2(10)	5(42)	6(18)	
4	2(2)	1(2)	2(5)	2(3.4)	1(3)	1(5)	1(8)	2(6)	

Table 4.5 shows those who missed anticancer medicines prescribed at the day of the interview and the last visit. Those who reported missing four anticancer medicines were very few. The increased number of anticancer medicines prescribed was associated with out-of-stock at the hospital though the relationship was not significant at the time ($p=0.055$) of the interview while it was significant at the last visit ($p=0.007$).

4.5 Patients' income

Patients were asked about their average monthly income. Many patients were peasants and working in the informal sector and hence they were asked how much money they were earning for the whole month. The mean income for the respondents in this study was TSh 106,300 with standard error of TSh 17,373.

Table 4.6: Comparing age groups and sex with monthly income

		Monthly income				
		none	<100,000	100,001-500,000	>500,000	p-value
Age group	18-40	63(27.4)	13 (40.6)	20 (31.2)	23 (39.7)	
	41-55	98(42.6)	11 (34.4)	35 (54.7)	17 (29.3)	0.035
	55-90	69(30.0)	8 (25.0)	9 (14.1)	18 (31.0)	
	X^2=13.6	df=6				
Sex	Male	80(34.8)	18 (56.2)	23 (35.9)	32 (55.2)	0.007
	female	150(65.2)	14 (43.8)	41 (64.1)	26 (44.8)	
	X^2=12.2	df=3				

Table 4.6 compares age groups and average monthly income of the respondents. The data show that the age group of 41-55 years had high proportion (42.6%) of the respondents who did not earn any monthly income. Thirty percent of those who reported that they do not earn anything were above 55 years.

For those who reported getting above TSh 500,000/= per month, about 40% of them were in the age group of 18-40 compared to the 31% of the age above 55 years.

Table 4.6 shows that women had reported lower income compared to men. Of those who reported to have no any income 65% were females. Fifty six percent of those who reported to have income below Tsh 100,000 were males. Fifty five percent of those who reported earning the monthly income more than Tsh 500,000/= per month were males while 45% were female (X^2=12.15, df=3) and the relationship was significant (p=0.007).

Table 4.7: Comparison of the reported monthly income and medicines costs reported by the cancer patients (n = 394)

	Monthly income				
Medicines costs	none	1-100,000	100,001-500,000	>500,000	p=0.017
0-50,000	54(23.5)	8 (25.0)	12 (18.8)	11 (19.0)	
50,001-100,000	23(10.0)	6 (18.8)	8 (12.5)	10 (17.2)	
100,001-500,000	61(26.5)	6 (18.8)	31 (48.4)	14 (24.1)	
>500,000	92 (40.0)	12 (37.5)	13 (20.3)	23 (39.7)	
X^2=20	df=9				

Table 4.7 shows that 23.5% of cancer patients attending chemotherapy at ORCI and reported having no income bought their one course treatment at TSh 3,000-50,000. Forty percent of those who reported that they do not earn income got their medicines for one course of treatment at TSh 500,000 and they got the money from relatives and good samaritans. Those who were getting a monthly income of between TSh 100,001-500,000 18.8% bought their medicines for 50,000 of less and about 40% got their medicines for more than TSh 500,000. It can be seen that medicines costs increases with reported monthly income with X^2=20 df=9 and the relationship was statistically significant (p=0.017).

4.6 Health insurance status

Majority of the respondents did not have any health insurance coverage (n=279, 73%). This could imply that most of the cancer patients had to get medicines at the hospital or buy them from the private pharmacies out-of-pocket. Seventy one percent of the employed respondents had health insurance covering treatment at the Ocean Road Cancer Institute compared to 11% of the peasants who had health insurance.

Figure 4.3: Distribution of the health insurance within occupations (n=105)

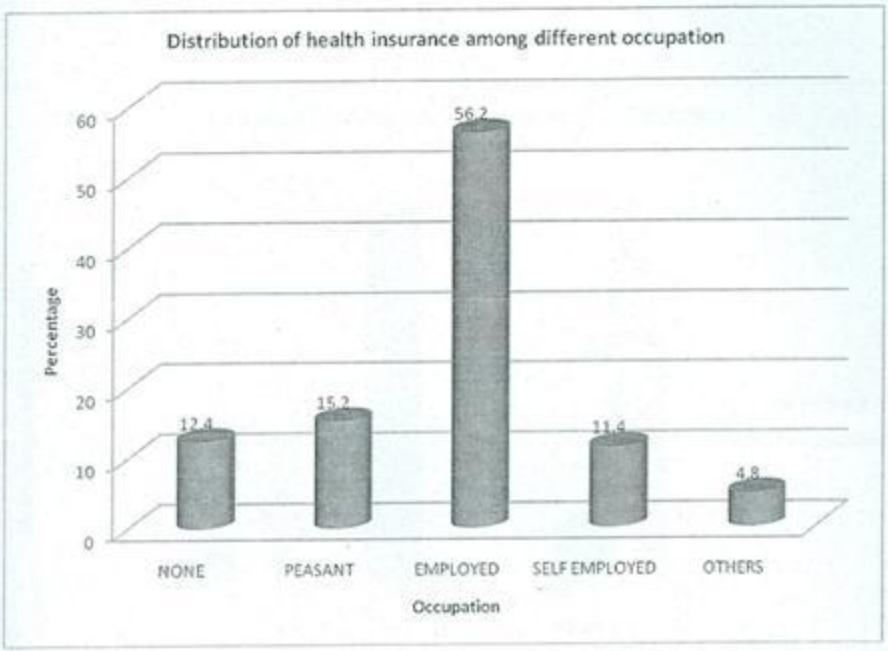


Figure 4.3 shows the distribution of the health insurance among different occupations of the cancer patients. Those who said were employed in the formal sector were more likely to have health insurance coverage (56.2%). The NHIF which was the most reported health insurance scheme provides health insurance coverage to a member, his/her spouse and four children / dependants.

Almost all the cancer patients (98%) who reported that they are members of health insurance they were under the NHIF (n=102, 26.6% of all the respondents). Fifty nine percent of females' respondents had no health insurance compared to 41% of males. Of those who are registered with NHIF 63% were female. One male and one female reported to have registered with Community Health Fund (CHF) in which peasants and those in informal sectors in the rural areas contribute some amount of money so that they can receive treatment in health facilities when they fall ill. Majority of the cancer patients (72.9%) had no any health insurance, and those with health insurance coverage, 26.6% were registered with NHIF. Only zero point five percent of the cancer patients reported to have Community Health Fund.

Figure 4.4: Association of health insurance with medicines financing at ORCI

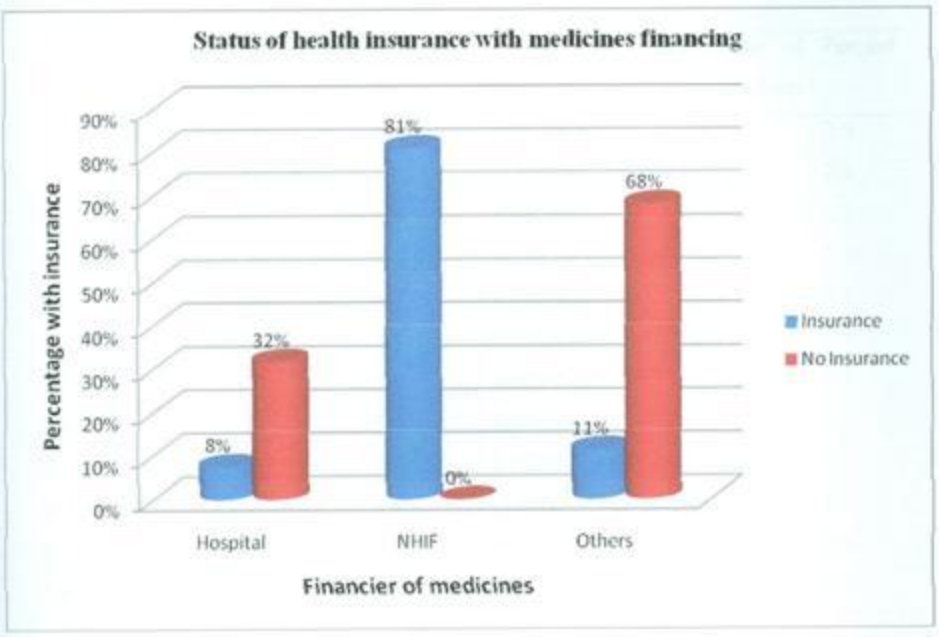


Figure 4.4 above shows that having health insurance was related with anticancer medicines financing. Those who reported that they had health insurance, 81% were financed by NHIF to purchase anticancer medicines. Those with no health insurance were more likely to use other sources involving out-of-pocket money to purchase the anticancer medicines.

4.7 Referral status

Among the respondents, a total of 357 patients (93%) were referred to ORCI from other hospitals all over the country. About 33 percent of the respondents reported being referred from Muhimbili National Hospital. Other patients were referred from hospital like Bugando (5.5%), KCMC (13%), Mbeya referral (3.9%), Dodoma (3.1%), Bombo, Tanga (2.9) and Zanzibar (3.1%).

Most of the cancer patients interviewed come from upcountry as shown in table 4.7 below

Table 4.8: The region of residence of the respondents

REGION	Number of respondents	Percent	Region	Number of respondents	Percent
DAR	88	22.9	UNGUJA	10	2.6
KILIMANJARO	48	12.5	KIGOMA	9	2.3
TANGA	33	8.6	RUKWA	9	2.3
MOROGORO	20	5.2	RUVUMA	9	2.3
DODOMA	18	4.7	TABORA	9	2.3
MBEYA	17	4.4	MARA	8	2.1
MWANZA	15	3.9	SHINYANGA	8	2.1
PWANI	15	3.9	SINGIDA	8	2.1
IRINGA	13	3.4	LINDI	4	1
MTWARA	13	3.4	PEMBA	4	1
KAGERA	12	3.1	MANYARA	3	0.8
ARUSHA	10	2.6	SUMBAWANGA	1	0.3

Table 4.8 shows the regions of residence of respondents who were being treated at ORCI during the time of the interview. Majority of the patients (23%) came from Dar es Salaam. Others came from upcountry and had to stay at the hospital or with relative residing in Dar es Salaam.

4.8 Number of anticancer medicines prescribed per patient

Table 4.9 shows he number of anticancer medicines prescribed to the patients at once ranged from 1-4 with an average of 2 medicines per patient.

Table 4.9: Number of cancer medicines per patient prescribed at once in the period between March 2010 and May 2010 (n=374)

Number of medicines	Number of respondents	Percentage
1	86	22.99
2	175	46.8
3	102	27.3
4	11	2.9

Most of the patients (97.1%) were prescribed 1-3 anticancer medicines. Those who were prescribed two anticancer medicines were 46.8%. Very few (2.9%) were prescribed four anticancer medicines at once.

Figure 4.5: Distribution of number of medicines prescribed among males and females

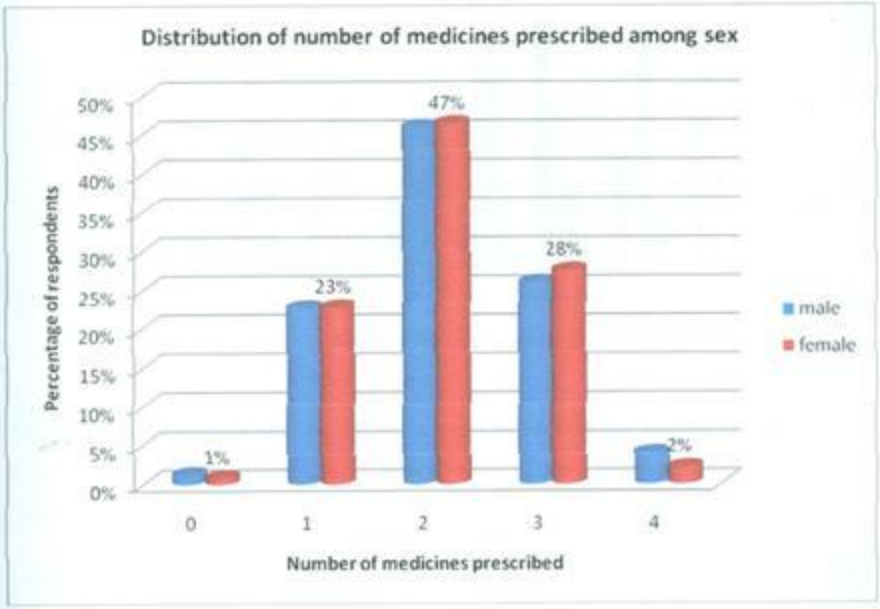


Figure 4.5 indicates that there were no statistically significant differences for the number of medicines prescribed among males and females. For both males and female about 46% were prescribed two medicines, with very few respondents (2% for males and 1% for females) prescribed more than three anticancer medicines. For those who reported being prescribed one anticancer medicine at the ORCI they were about 22.7% for all sexes. Twenty six percent of males and 27% females were prescribed three medicines. For those who were prescribed four medicines 4% were males and 2% were females.

Figure 4.6: The number of anticancer medicines prescribed for different cancer types

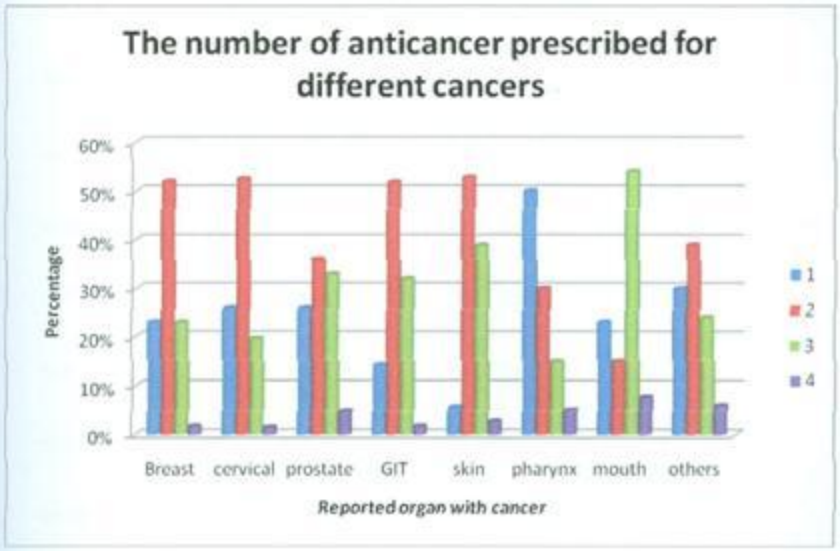


Figure 4.6 above shows that for different types of cancers the number of anticancer medicines prescribed ranged from 1-4 but majority were prescribed two anticancer medicines.

For the cancer involving mouth the numbers of anticancer prescribed were three for majority of the patients (54%).

4.9 Cost of anticancer medicines incurred by the patients for every course of treatment

Two hundred and ninety three cancer patients reported having used their own money to purchase anticancer medicines. The mean cost for the purchase of the medicines incurred by cancer patients, their relatives or sponsors for every course of treatment was Tsh 151,010 (3,000-800,000) equivalent to USD 125. The median cost was TSh 98,000.

The mean cost for medicines for one prescription was about 79.4% of the monthly total income with a range of 55%-104%. These costs of buying anticancer medicines are mostly paid by patients and their relatives.

Table 4.10: Proportion of patients with different cancer types with respective costs incurred to purchase medicines (n=259)

	Medicines cost (TSh)				
Cancer type	≤50,000	50,001-100,000	100,001-500,000	>500,000	p-value
Breast	23 (21)	8 (7)	37 (32)	47 (41)	
cervical	27 (44)	7 (11.5)	12 (20)	15 (25)	
prostate	10 (24)	5 (12)	15 (36)	12 (29)	<0.001
GIT	5 (8)	11 (18)	21 (35)	23 (38)	
skin	2 (6)	10 (28)	8 (22)	16 (44)	
pharynx	12 (57)	2 (10)	2 (10)	5 (24)	
mouth	3 (21)	2 (14)	3 (21)	6 (43)	
others	3 (8.6)	2 (6)	14 (40)	16 (46)	

X^2=65.8 df=21

*Numbers in the brackets are percentages

Table 4.9 shows the reported cost for buying one course of medicines from private pharmacies. For breast cancer, 21% of patients reported paying anticancer medicines costs for costs of TSh 3,000- 50,000 for one course of treatment while 40.9% were paying TSh 500,000-800,000.

Table 4.9 also shows that for patients with cervical cancer who were paying TSh 3,000-50,000 for anticancer medicines were 44.3%. Eleven point five percent of these patients were paying TSh 50,001-100,000 per month. On the other hand 24.6%cervical cancer patients who reported paying Tsh 500,000-800,000.

For prostate cancer about 24% of the respondents reported paying TSh 3,000-50,000 and 29% of them reported earning more than TSh 500,000-800,000.

Qualitative interview from one of the hospital staff also confirms the higher costs of the medicines incurred by patients.

Patients are left to find their medicines at the respective pharmacies. When medicines are available patients get them at no cost, when they are out-of-stock they must buy them from private pharmacies. Sometimes when medicines are available and we happen to have a patient who is considered unable to buy medicines, drugs are reserved to make sure the patient completes his/her scheduled treatment courses (Pharmacy staff, ORCI)

4.10 Alternative sources of funding for medicines financing

The ORCI was able to provide free anticancer medicines to about 25% of the respondents who were on chemotherapy treatment. Twenty two percent of the respondents purchased their medicines in private pharmacies through NHIF. Majority of the patients (52.6%) purchased their medicines using their own money or support from relative, good Samaritans or friends. There were no other formal sources of medicines financing for the hospital or patients.

4.11 Medicines missed in the last visit

About eighty percent of all cancer patients who were on chemotherapy reported missing at least one medicine in their last visit (three weeks before the day of the interview). The average number of medicines missed was 1.66 (0 4). Of those who were diagnosed with breast cancer, 25.9% reported getting medicines at the hospital. The remaining 75% reported missing 1-4 medicines of their regimens.

The study shows that 20.1% of the respondents did not get one anticancer medicine the last visit before the day of the interview. Those who reported to have missed two medicines were 33.1%. Those who said that they missed three medicines in their last visit were 18.5%. Those missed 4 anticancer medicines prescribed were 3.1%. Twenty one percent of the respondents did not miss the medicines at the hospital during their last visit.

4.12 Medicines missed during the day of the interview

The mean number of medicines missed by the respondents on the day of the interview was 1.63 (0-4) while the mean number of cancer medicines prescribed was 2.08 (0-4). There was a correlation between the number of medicines missed at the day of the interview and the prescribed medicines with Pearson's correlation coefficient of 0.607 ($p= 0.01$)

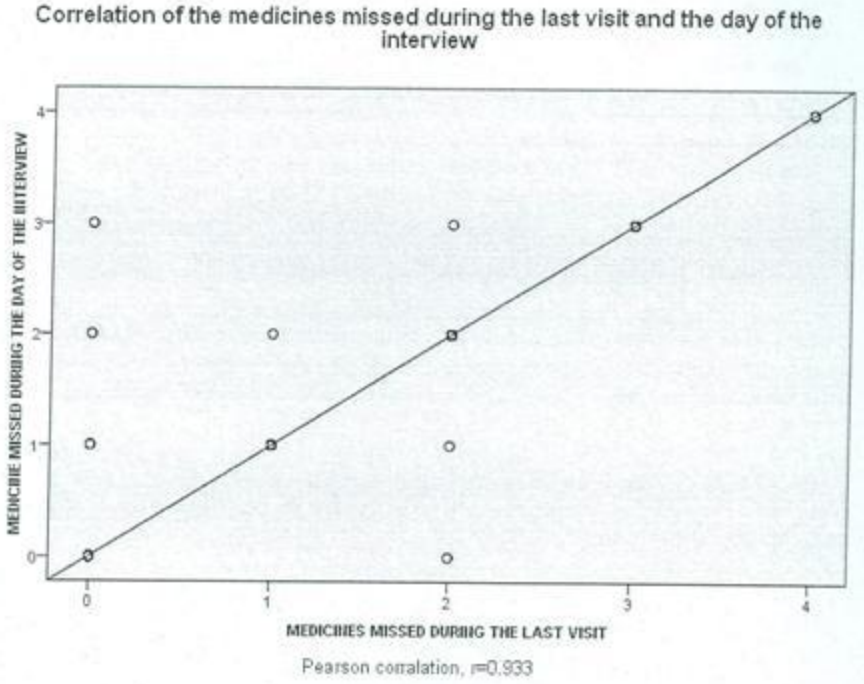
About 21% of patients reported to have missed one anticancer medicine at the hospital during the day of the interview. About a third (32.6%) of the patients reported to have missed two prescribe medicines for their use. About 20% of the patients reported missing three anticancer medicines they were using. Also 3.6% of the patients reported missing anticancer medicines they were prescribed the day of the interview.

4.13 Correlation of number of medicines missed in two visits

The study showed that there was a correlation between the medicines missed at the day of the interview and the number of medicines missed the last visit (Pearson's correlation, $r =0.933$) (Figure 4.9). The correlation was significant at $p=0.01$ levels.

This means that there was a very high probability that when the patient misses the medicines in the first visit will continue to miss it in the next visit.

Figure 4.7: Correlation of the number of medicines missed in two visits



4.14 Steps taken after missing the anticancer medicines

About 70% of the respondents had to buy anticancer medicines from private pharmacies after missing them at the ORCI. Few patients (2%) said they have terminated treatment at one point since they could not afford medicines sold in private pharmacies. The consequences of terminating treatment could be very bad in cancer patients as it was found from the key informants.

Interrupting treatment at one point can have a very serious effect because it will increase burden both to the patients and health system (ORCI staff)

4.15 Availability of medicines surveyed at the hospital

About half of the generic anticancer medicines surveyed at the ORCI pharmacy at the time of interview between 17th March to 17th May 2010 were out of stock and were generic. Out of the 11 medicines surveyed, 5 were not in stock during the survey period. Brand medicines were rarely present at the ORCI. Of all the medicines surveyed at the time of the study there was only one brand which was Xeloda®.

Table 4.11: Availability of most prescribed medicines at ORCI at the period of interview

Name of the drug	Present	Absent	Generic	Brand
Cisplatin (50mg/50ml)		✓		
Cyclophosphamide (500mg)	✓		✓	
Vincristine (5mg/5ml)		✓		
Vinblastine (10mg/10ml)		✓		
5-Fluorouracil (500mg)	✓		✓	
Doxorubicin (50mg)		✓		
Etoposide (100mg)		✓		
Goserilin (10.8mg)	✓		✓	
Capecitabine (500mg tabs)	✓			✓
Anastrazole (1mg)	✓		✓	
Tamoxifen (20mg tabs)	✓		✓	

Table 4.11 shows the availability of anticancer medicines at ORCI pharmacy and chemotherapy department. Of the 11 anticancer medicines surveyed six were always present at the hospital pharmacy while 5 out-of-stock at the day of the interview.

4.16 Prices of selected medicines in the private pharmacies in Dar es Salaam

Most (80%) of the anticancer medicines sold at the retail private pharmacies were generics at the private pharmacies.

Table 4.12: The prices of selected anticancer medicines from private pharmacies

Name of the medicine	Unit	Retail prices (TSh)			
		Pharmacy 1	Pharmacy 2	Pharmacy 3	Median
Cisplatin (50mg/50ml)	50ml	20,000	15,000	19,500	18,167
Cyclophosphamide powder (500mg)		5,000	4,500	4,000	4,500
Vincristin 5mg/5ml	5ml	5,000	4,000	3,750	4,250
Vinblastine 10mg/10ml	10ml	14,500	-	-	14,500
5-FU 500mg	5ml	3,000	1,500	3,000	2,500
Doxorubicin 50mg	Powder	60,000	40,000	55,000	51,667
Etoposide 100mg	5ml	-	11,000		11,000
Goserelin 10.8mg	Implant	**399,000**	130,000	420,000	316,333
Tamoxifen 20mg	30 tabs	9,000	6,300		7,650
Capecitabine 500mg	120 tabs	**744,000**	-	-	744,000
Oxaliplatin100mg	Powder	140,000	100,000	-	125,000
Chlorambucil 2mg	25 tab	**125,000**	25,000	-	75,000

Anastrozole tabs	28 tabs	267,700	-	-	267,700
Mitomycin 40mg	Powder	149,050	-	-	149,050
Cytarabine 100mg	Powder	12,500	-	-	12,500

Table 16 shows the prices of the three pharmacies which sell medicines directly to cancer patients. There was wide variation between prices of the same products in the three different pharmacies. For example the prices of chlorambucil (2mg) tablets ranged from TSh 25,000 to Tsh 125,000. In all the medicines surveyed there was no more than one cancer medicine. Also some types of anticancer medicines such as anastrozole tablets, mitomycin (40mg) and cytarabine (100mg) were stocked only in one pharmacy only and hence there were no price comparison between the pharmacies.

It was also shown from the study that drugs sold as generic were much cheaper compared to the originator brands for the same medicines. For instance, generic goserelin 10.8mg was sold at TSh 130,000 while the price for the originator brand ranged between TSh 399,000 and TSh 420,000.

Also there was poor availability of anticancer medicines at the private pharmacies in Dar es salaam. For instance, drugs such as capecitabine, mitomycin and vinblasine that are commonly used for cancer treatment at ORCI were only available in one pharmacy.

4.17 Comparison between medicine prices with the monthly income of the lowest wage of the government worker.

To assess affordability the mean prices of anticancer medicine were compared with the number of days a patient needs to work in order earn such an income

Table 4.13: Comparison of mean prices of one unit of anticancer medicines with daily income of patients

Name of anticancer medicine	Mean price (Tshs)	Time (days) to work to earn the money as reported by patients
Cisplatin 50mg/50ml	18,167	5.1
Cyclophosphamide 500mg	4,500	1.2
Vincristin 5mg/5ml	4,250	1.2
Vinblastine 10mg/10ml	14,500	4.2
5-FU 500mg	2,500	0.72
Doxorubicin 50mg	51,667	14.7
Etoposide 100mg	11,000	3
Goserelin 10.8mg	316,333	89.4
Tamoxifen 20mg	7,650	2.16
Capecitabine 500mg	744,000	210
Oxaliplatin100mg	125,000	35.4
Chlorambucil 2mg	75,000	21.3
Anastrozole tabs	267,700	75.6
Mitomycin 40mg	149,050	42
Cytarabine 100mg	12,500	3.6

Comparing the above medicines cost with the lowest government income did not give much difference as the government lowest salary was not very different from the reported income.

Figure 4.8: Affordability of selected anticancer medicines

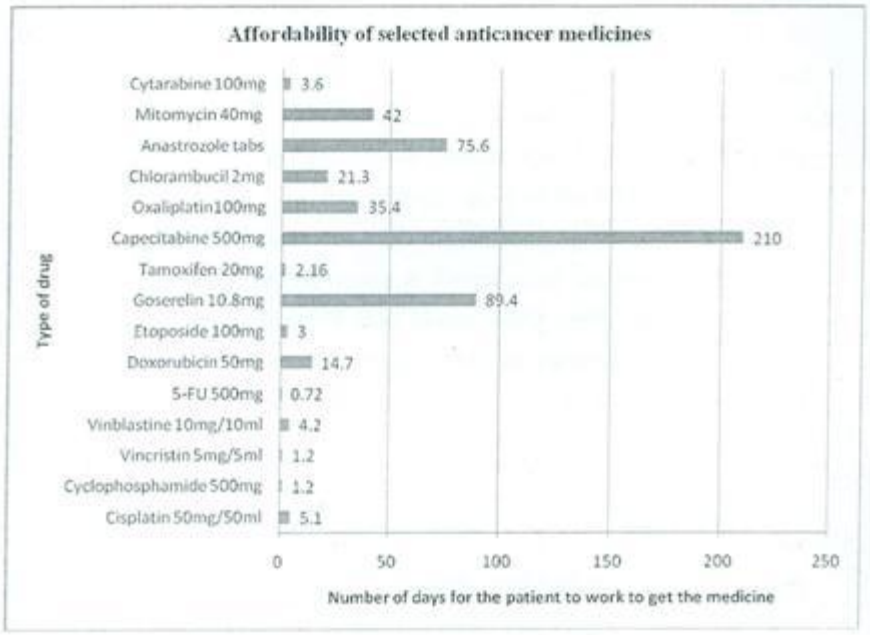


Figure 4.8 shows that for the respondents interviewed the time to work to be able to buy one prescribed anticancer medicine ranged from 1.2 days (cyclophosphamide) to 210 days (capecitabine). This is in the case the patient is prescribed one unit and one drug. When the patient is prescribed more than one unit or more than one drug the number of days to work to get the prescribed medicines increases.

CHAPTER FIVE

5. DISCUSSION

In this study females were many (60.2%) compared to males respondents (39.2%). This may be because there are ongoing campaigns about women cancer such as the one conducted by MEWATA for detection and treatment of women breast cancer. This also corresponds with the study done by Kazaura et al (2007) at ORCI which showed that 62.1% of the respondents were females. Because of these campaigns, the majority of the women respondents had breast cancers, contrary to the national statistics which shows cervical cancer as the leading cancer and the cause of all gynaecological admission in Dar es salaam (Ngwale et al, 2001). However, the data from the ORCI hospital show that cervical cancer is the leading cancer among patients. This also corresponds with data from WHO which rank cervical cancer as the most frequent cancer among women in Tanzania, and the most frequent cancer among women between 15 and 44 years of age (WHO, 2009). According to these statistics, women (15 years or above) at risk of cervical cancer in Tanzania are 10.97 millions. WHO estimates the annual number of cervical cancer cases to be 7515 with annual number of deaths to be 6009 (WHO/ICO, 2010).

The mean age of the respondents was 47.7 years. This age is important as it is the age group in which most people are involved in the economic activities. In this study most of the respondents were unemployed peasants. This may have an affect on their purchasing power due to unstable income. Also the National Health Insurance Fund which is the public health insurance body is not providing health insurance services to the peasants and their families which are the majority of Tanzanians. Majority of the patients (73%) had no health insurance and they had to purchase their anticancer medicines using out-of-pocket money. These results are similar to those reported by Chernichovsky et al (2009) who indicated that at least 50% of the total funding sources for medicines in Tanzania are private.

The study shows that only 27% of the population had an insurance. This means that majority (73%) of the patients past pay for their own treatment whenever anticancer drugs are not available. This raises a question of affordability of medicines and

completion of the prescribed courses of cancer treatment (Jack et al, 2006; Jackson, 1998). Also this lack of health insurance has been shown to be associated with increasing advanced stages of cancers among the patients (Kuzmiak et al, 2008).

The average number of the medicines missed at the hospital was 1.66 in the last visit preceding the day of the interview. During the day of the interview the average number of medicines missed was 1.63. Correlation test was done to determine whether there was systematic relationship between the medicines missed in the two consecutive visits. The correlation was highly positive at Pearson correlation coefficient of 0.933. It can be concluded that there is high possibility that when the patient misses anticancer medicines at one visit he/she will misses them the next visit. The reason for this could be the procurement procedures in which the ORCI get their medicines.'

Most of the patients were referred from upcountry or suburban areas in Dar es salaam. This is an important obsevation because rural residence affects accessibility of the chemotherapy and other services (Sankaranarayanan et al, 2010). Also it can be predicted that those who are coming very far from Dar es salaam are incurring many other direct and indirect costs which in one way or another can affect the purchasing power of anticancer medicines prescribed (Kim, 2007).

Most patients reported that their income was very low (mean income of TSh 106,300). This income is almost the same as the minimum wage of the Tanzanian civil servant which is TSh 104,000, an indication that most of the patients treated at ORCI are from poor families. Also majority of the patients treated at the hospital were peasants and hence they do not have any other means of extra income apart from what they earn in their occupation. Health care charges for diagnosis, seasonal incomes, transport costs and waiting time all interact to make access to health care and affordability of medicines a major barrier for the poor patients (Chuma, 2010). Patients' income is important because it determines the ability to purchase prescribed medicines. Low income has also been shown to present financial difficulties which

can be one of the reasons for some patients not to adhere to chemotherapy schedules (Adisa et al, 2008) .

The mean expenditure on anticancer chemotherapy for the patients at ORCI was TSh 151,000 per prescription, hence in many ways unaffordable to most of the cancer patients attending at the chemotherapy department. These expenditure amount does not take into consideration the amount of money used directly or indirectly to chemotherapy treatment. Other studies which have been done in developed countries have shown that getting medicines from private pharmacies make the treatment unaffordable (Saleh et al, 2005), since affordability is usually termed as financial accessibility (Oliver et al, 2004).

Comparing mean expenditure on anticancer medicines by patients with reported monthly income of TSh 106,000, or the lowest government paid salary of TSh 104,000, in 2010 it can be concluded that anticancer medicines used by patients at ORCI are unaffordable to most Tanzanians. The problem of affordability can be compounded by the fact that patients in most African countries, including Tanzania come to the hospital with advanced stage of disease at the time of diagnosis (WHO, 2008). This delay in getting treatment has poor prognosis and hence the aim of treatment is usually palliation (Redmond, 1998).

Patients usually perceive medicines for management of their illnesses as most important way of assessing health system (Jitta et al, 2002). These monthly cost incurred by the patients for filling the anticancer prescription is important as most of the patients attended at ORCI have to purchase medicines at one point or another in their course of treatment and most of those have to do it out-of-pocket.

The study showed that more than 70% of the respondents did not get prescribed anticancer medicines at the hospital. Also at the time of survey, 50% of the mostly prescribed medicines at the hospital were out-of –stock. The study has shown similar results as reported by Cameron et al (2008) in which they showed that the average public sector availability of generic medicines was 29.4%-54.4% across WHO regions. Frequent out-of-stock of anticancer medicines at ORCI may be due to

high demand and intensive utilization of the services (Shayo, 2002) as shown by yearly increase in number of cancer patients attending ORCI. Cancer patients with low social economic status are highly affected by the poor availability of medicines as they are less likely to receive these services because they can not afford them from private pharmacies (Cheung et al, 2010). This is another example of inequality in accessing medicines, which is the concern in the absence of an effective mechanism to protect the poor from high health expenditures (Carasso et al, 2009).

The prices of anticancer medicines in private pharmacies ranged from one day to several months for one course of treatment. The price of medicines, their availability and affordability are the major determinants of access to treatment (Ewen et al, 2006). The anticancer medicine prices has been shown to be very high both by the patients and the survey conducted in the private retail pharmacies in Dar es salaam. This has resulted into unaffordability for the patients attending ORCI chemotherapy. A similar study that was done in China also showed that for most low income workers, medicines are unaffordable compared to high income workers (Cheung et al, 2010).

In this study many anticancer medicines supposed to be present were rarely available. A survey conducted in low-income countries showed that drugs are scarce in the public sector and unaffordable in private pharmacies and hence the burden to patients (Gelders et al. 2006). This also is in accordance with WHO which estimates that 50% of the patients in poor countries like Tanzania lack access to effective treatment with medicines (Cameron et al, 2008). Majority of the patients who got their medicines at ORCI are not guaranteed of consistent supply of medicines to complete their treatment courses. This has been shown by some people reporting getting medicines for cancer at one course and missing them at the next course. This may result to patients not complying with treatment regimen which may lead to fatal consequences.

The study also found that the budget allocated for the purchase of anticancer medicines was too small to cater for the growing number of patients at ORCI. With the annual budget of TSh 1.6 billions for purchasing medicines at the ORCI, the government through Ministry of Health and Social Welfare was able to give only

around TSh 300-600 millions. According to the available estimates at ORCI this amount of money is enough to treat only about 1,000 cancer patients. With the new cancer patients of 4,000 patients per year this means that the hospital is able to provide chemotherapy for less than 25% cancer patients. This inadequate funding for anticancer medicines has also been noted by International Union Against Cancer in its position paper of 2008/2009 indficating that there is insuficient funding in the public health sector (UICC, 2008).

According to the Tanzania Health Policy, the government is supposed to provide medicines for free to all cancer patients (National Health Policy, 2003). However, this study found that majority of the patients (75%) had to get their medicines either through out-of-pocket (52.6%) or their health insurance (22.1%). The findings of the study done by McIntyre et al (2006) also showed that 50- 90% of the population in low income countries such as Tanzania do pay for their own medicines. This is due to lack of social insurance and inadequate subsidized public services. Also the study done in USA showed out-of-pocket cost of up to 60% for the total cost of prostate cancer treatment (Jayadevappa et al, 2010). Unfortunately, this creates classes of people who can afford treatment and those who can not afford. In the present study patients who had health insurance coverage for their anticancer medicines were those who are employed especially in formal sectors or had their relatives employed in the formal sector. Some health funding groups such as Community Health Fund reported by some cancer patients do not fund the purchase of anticancer medicines.

This study showed that 27% of the patients had health insurance. In low income country like Tanzania only a small fraction of the population has social health insurance and a few can afford private insurance; the rest must pay out of pocket and, if they cannot afford it, they may not receive treatment at all (UICC, 2008). Sometimes they have to sell assets or go into debt to meet the costs of medicines and health care (Chuma et. al, 2010). This lack of health insurance can affect treatment adherence to patients on cancer medicines (Ward et al, 2008) as uninsured patients are more likely to face difficulties in paying for care (Weinick et al, 2005). Those who have social health insurance were mostly the government workers because in recent years the government has introduced the policy requiring all the employees in government institutions to have health insurance. NHIF provides insurance services

to government employees, their spouses and four children and/or legal dependants. It is seen that as many people join NHIF, accessibility and affordability of medicines among patients in Tanzania will improve. Other modes of health care financing such as Community Health Fund need to be strengtened in order to cover for and improve availability of anticancer medicines to people in the non-government sector. Such initiatives will improve health care and reduce morbidity and mortality in cancer patients (Roetzheim et al, 2000 Carsin et al 2008).

In this study the number of anticancer medicines prescribed per patient varied from one to four. The existence of combination therapy is expected in the management of patients with cancer (Katzung, 2006) as it improves survival compared to single chemotherapeutic agents (Wagner et al 2010, Stewart et al, 2010). The lack of some of anticancer medicines therefore affects the management of cancer patients as most medicines needed for combination therapy might not be available at the hospital.

Inadequate availability of anticancer medicines at ORCI and the high prices of these drugs in the private pharmacies together with longer treatment regimens create a huge financial burden to the patients especially those with no health insurance. This has been shown by the study done by Finkelstein et al (2009) which showed that being actively treated for cancer increases the mean annual out-of-pocket medical expenditures by $1,170 compared with people without cancer.

The findings of this study indicate that the mean amount of money incurred by patients to buy medicines for management of cancer was very high despite exemption policy of cancer patients from paying for the care. This cost does not take into account the amount of money patient incurred to travel to ORCI and other associated costs bearing in mind that majority of the patients were referred from upcountry and most of them had to stay with relative in Dar es Salaam while on treatment. Because of the cost associated with travelling to ORCI and costs of living in Dar es Salaam, most of the suspected cancer patients from different areas in Tanzania are unable to go to ORCI for diagnosis and treatment (Mosha et al, 2009). Comparing the costs of anticancer medicines incurred by the patients to the monthly income of the patients the medicines are not affordable. These costs did not take into account the other costs such as transport incurred by the patients and their relatives.

According to WHO the cost of medicines for chronic diseases which are taken everyday is considered affordable when it is equivalent to one day's wage (HAI, 2009). But the mean cost of the medicines reported by cancer patients at ORCI was 151,010 per prescription which were very high and equivalent to 43 days wage of lowest paid government worker. These high costs of medicines usually present as economic barrier to treatment (Ndom, 2008).

The annual budget to purchase anticancer medicines and other medicines at ORCI is about 600 millions Tanzanian shillings. Such a small budget is not sufficient to buy all the required anticancer medicines for the patients. As a result most of the patients attending the chemotherapy department were not able to get medicines at ORCI and therefore had to buy them from private pharmacies. This is heavy burden to both patients and their relatives taking into account the high prices of anticancer medicines and low income among patients and their caregivers (Hopkins et al, 2010). Furthermore, not all the patients who missed the medicines at the hospital were able to afford the medicines from the private pharmacies.

The study has shown that there were no alternative sources of medicines for patients at the ORCI other than NHIF and out of pocket expenditure from their relatives and other peoples. Unfortunately, this creates inequalities among the patients since those with money or employed are likely to be treated (WHO, 2008). The hospital should in this case discuss with the MOHSW to see if there can be a subsidy for those who are getting medicines from private pharmacies.

The prices of some of the medicines at the three pharmacies which dispense anticancer medicines to patients were also very high. Some of the medicines were also not available in these pharmacies. The price for the three week course of treatment for the drug Capecitabine which was only present in one pharmacy was TSh 744,000. This is extremely unaffordable to many patients as it is more than a seven- month wage for the lowest income government employee. The high costs of managing chronic illness like cancer have been shown in Kenya to be the main barrier in chronic illness management (Porter et al, 2009). Most of the cancers in developing countries are preventable (Ngoma, 2006), but in the absence of proper methods for preventing cancer in Tanzania, the existence of curative methods such as chemotherapy should be emphasized and anticancer medicines should be accessible

to all cancer patients. In the study done in USA two-third of the elderly patients reported difficult in paying prescription and one-fourth decreased medication use because of cost of the medicines (Tseng et al, 2007). This can also be expected in Tanzania as some of the patients treated at ORCI reported absconding treatment for sometime to look for financial assistance to buy medicines.

According to the Millenium Development Goal Report in order to judge affordability, it is necessary to establish a benchmark that relates the cost of medicines to income. One day's wages might be considered an affordable monthly cost for medicines that are required on a continuous basis for the remainder of a patient's life. For income, a readily and widely available benchmark for the country's poor is the earnings of the lowest-paid government worker (Mendis, 2007). The lowest reported monthly income for the patients who were being treated at ORCI was TSh 106,300 (about USD 75.9). This amount corresponds with the lowest paid government worker salary which is TSh 104,000.

In comparing the prices of the generic medicines with those of the brand medicines, it was shown that the generic medicines were much cheaper compared to the branded one. For instance, the price of generic Goserelin (10.8mg) injection was about one-third the price of the brand equivalent. Emphasize should therefore be put on purchasing generic drugs which are less expensive than the brand ones both at the hospital and private pharmacies. In this case generic medicines will be more cost effective compared to the brand medicines but the problem sometimes arise as most patients consider generics as being inferior to brand names (Himmel et al, 2005). Also other studies (Carroll, 1995, Karim et al, 1996, Kirking et al, 2001) have shown that generic medicines can effectively treat many illnesses while reducing health care budget for the hospital and patients.

Another issue in the area of anticancer price might be the lack of competition between the private pharmacies. Some of the medicines such as capecitabine 500mg tablets were dispensed in only one pharmacy. This is likely to result in monopoly of the market and increase in price indiscriminately. The findings of this study show that when only the innovator brand is available for the treatment of the illness, as in

the case of capecitabine the problem of affordability is noticed as patients have to work many months to be able to buy one course of treatment.

The study showed that generic medicines were much cheaper compared to the innovator brands for the same medicines. As shown, the price for a single dose of generic chlorambucil was TSh 25,000, while the innovator brand was sold at TSh 125,000. Other studies done elsewhere have also shown that generics are sold at lower prices compared to their innovator brand equivalents and hence can be used to serve resources in health system (King et al, 2002; Haas et al, 2005). To increase access and affordability, promotion of generic medicines and improved availability of medicines in the public sector are required (Babar, 2007).

CHAPTER SIX

6. Conclusions and Recommendations

6.1. Conclusions

The totals of 384 patients treated at chemotherapy department of the ORCI were interviewed in this study. About 60.2% of the respondents were females. The average reported income of the patients attended at the chemotherapy department was TSh 106,000. Reported average cost for filling one prescription of anticancer medicines was TSh 151,000. At ORCI the re was only about 50% of the anticancer survey prescribed at any one time of the survey. The reported number of medicines missed at the time of interview was 1.66 and at previous visit was 1.63.

The survey of cost of anticancer medicines in nearby private pharmacies raged from TSh 2500 to TSh 744,000 per unit pack . This show that on average people had to use more money than they earn to buy anticancer medicines.

NHIF had been shown to act as reliable source of medicines financing for those who were members (27%). Other had to pay out-of-pocket.

6.2 Recommendations

Anticancer medicines at ORCI, which is the only referral hospital specialised in the management of cancer patients in Tanzania has been shown to be very low. Erratic supply of anticancer drugs at the hospital affects the cancer patients continuity of care. As a result, cancer patients are impoverished by expenditure on expensive anticancer medicines. The government should make sure the medicines are available at the ORCI to all patients.

Patients refered to ORCI should be told that medicines might not be free of charge and hence they should think of other means of financing of their medicines. NHIF has become the only insurance scheme which finances medicines for all its member. The government should introduce other schemes which cater for all Tanzanians especially in the area of anticancer medicines.

The study looked at those cancer patients getting treatment at the chemotherapy department only. There might be some patients who were prescribed medicines but did not finish the treatment because of the affordability. Another study should be conducted to find out the proportion of patients who are prescribed medicines but do not access anticancer medicines at the hospital and private retail pharmacies.

Other methods to mobilize medicines and funds for buying medicines should be employed so that when the medicines are not available at the hospital patients can get them at subsidized costs.

Patients should be educated about the importance of generic drugs over the brand ones. This will help patients interms of serving money and buying enough drugs for their treatment. When prescribing and directing patients to purchase anticancer drugs from private retail pharmacies, doctors and pharmacists should inform patients about generic products available to the market and their costs.

CHAPTER SEVEN

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