FACTORS ASSOCIATED WITH LOSS TO FOLLOW-UP AND TREATMENT INTERRUPTION AMONG PATIENTS WITH OVARIAN CANCER AT MOI TEACHING AND REFERRAL HOSPITAL, KENYA

BY

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DECLARATION

I hereby declare to the best of my knowledge that the thesis titled "Factors associated with loss to follow-up and treatment interruptions among women with ovarian cancer at Moi Teaching and Referral Hospital, Kenya" submitted based on actual and original work carried by me. Any reference to the work done by any other person or institution or any material obtained from other sources has been duly cited and referenced. I further certify that this thesis has not been submitted for any award anywhere else. I am therefore presenting it for the award of Degree of Master of Medicine in Reproductive Health from the school of Medicine of Moi University, Kenya.

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DEDICATION

This work is dedicated to all patients fighting cancer worldwide.

In memory of my late brother, Eric Muruhuka Rusaki, and my late aunt Furahisha M’Baganda.

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LIST OF ABBREVIATIONS

ACT	Adjuvant Chemotherapy
AFP	Alpha-Fetoprotein
BMT	Bone Marrow Transplant
BRCA	Breast Cancer gene (BRCA1 and BRCA2)
CA	Cancer Antigen
CA-125	Cancer Antigen 125
CAR-T	Chimeric Antigen Receptor T-cell therapy
CBE	Clinical Breast Examination
CEA	Carcinoembryonic Antigen
CI	Confidence Interval
CML	Chronic Myeloid Leukemia
COVID-19	Coronavirus Disease 2019
CT	Computed Tomography
CXR	Chest X-Ray
DOR	Duration of Response
DWI	Diffusion Weighted Imaging
ECOG	Eastern Cooperative Oncology Group
EHR	Electronic Health Record
EOC	Epithelial Ovarian Cancer
FDA	Food and Drug Administration
FDG	Fluorodeoxyglucose
FIGO	International Federation of Gynecology and Obstetrics
GLOBOCAN	Global Cancer Observatory
GOG	Gynecologic Oncology Group

hCG	Human Chorionic Gonadotropin
HE4	Human Epididymis Protein 4
HPV	Human Papillomavirus
HR	Hazard Ratio
HRQoL	Health-Related Quality of Life
IDS	Immune Deficiency Syndrome
IL	Interleukin
LDH	Lactate Dehydrogenase
LTFU	Loss to Follow-Up
MDS	Myelodysplastic Syndromes
MHC	Major Histocompatibility Complex
MRI	Magnetic Resonance Imaging
MTRH	Moi Teaching and Referral Hospital
NACT	Neoadjuvant Chemotherapy
NCCN	National Comprehensive Cancer Network
NCI	National Cancer Institute
NEAD	No Evidence of Active Disease
NK	Natural Killer (cells)
OS	Overall Survival
pCR	Pathologic Complete Response
PET	Positron Emission Tomography
PFS	Progression-Free Survival
QOL	Quality of Life
RAD	Radiotherapy

RCT	Randomized Controlled Trial
RT	Radiotherapy
SBRT	Stereotactic Body Radiotherapy
SCT	Stem Cell Transplant
SNP	Single Nucleotide Polymorphism
SRS	Stereotactic Radiosurgery
TAM	Tamoxifen
TBI	Total Body Irradiation
TGF-β	Transforming Growth Factor Beta
TI	Treatment Interruption
TIL	Tumor-Infiltrating Lymphocytes
TNM	Tumor, Node, Metastasis
TTP	Time to Progression
VEGF	Vascular Endothelial Growth Factor
WBC	White Blood Cell

ABSTRACT

Background: Ovarian cancer presents a significant challenge in gynecological oncology, with over 1.4 million new cases and 700,000 deaths globally in 2020. Treatment typically involves surgery and chemotherapy, both of which significantly impact patients' quality of life. However, there is limited understanding of the factors contributing to loss to follow-up (LTFU) and treatment interruption (TI) among ovarian cancer patients in Sub-Saharan Africa.

Objective: This study aimed to identify sociodemographic and socioeconomic factors associated with LTFU and TI among women receiving treatment for ovarian cancer at Moi Teaching and Referral Hospital (MTRH).

Methods: A retrospective study analyzed records of 400 patients diagnosed with ovarian cancer and initiated on treatment in the gynecologic oncology service from January 1, 2015, to December 31, 2022. Data were collected using a researcher-designed questionnaire. The analysis summarized demographic and clinical characteristics. Categorical variables, such as education level, occupation, and marital status, were reported as frequencies and their corresponding percentages. Numerical variables, including age and distance from home to the hospital, were summarized using means/ medians, and their corresponding standard deviations/interquartile ranges. Comparisons were made using Student or Mann-Whitney t-tests and the Pearson Chi-squared test for proportions. The Kruskal-Wallis test was employed for multiple comparisons, with a p-value < 0.05 deemed statistically significant.

Results: Patient ages ranged from 6 to 87 years, with a mean of 48.6 ± 15.1 years. Half (51.4%) were aged 40-59 years, and 22.8% were 60 years and above. Most patients (73.9%) were unemployed and married (80.1%), with 90.9% having active health insurance. Rural residents constituted 64.1% of the patients, with travel distances to MTRH ranging from 3 to 850 km (median: 400 km; IQR: 45-150 km). The LTFU rate was 2.995 [95% CI 2.589–3.464] per 100 persons per month. Factors significantly associated with LTFU and TI included age, employment status, marital status, distance to hospital, and type of treatment.

Unemployed patients had an odds ratio (OR) of 2.36 (95% CI: 1.22–4.58) for LTFU and TI compared to employed ones. Patients without active health insurance had an OR of 3.94 (95% CI: 2.09–7.41) for being lost to follow-up, while younger patients (<40 years) had an OR of 2.37 (95% CI: 1.16–4.86).

Conclusion: Ovarian cancer patients at MTRH face a LTFU rate of 50.6% and a TI rate of 0.8%, influenced by factors such as significant unemployment, economic barriers, a younger age, lack of health insurance, and distance from the hospital.

Recommendation: Enhancing health insurance coverage, organizing outreach programs, and implementing awareness campaigns alongside telemedicine initiatives are essential to improve treatment adherence. Qualitative studies are also recommended.

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DEFINITION OF TERMS

Loss to follow-up: is when a patient with ovarian cancer has already completed treatment and then misses at least 2 consecutive appointments.

Treatment Interruption: is when a patient with ovarian cancer has started treatment and then missed at least one appointment while still receiving treatment.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Ovarian cancer represents one of the most significant challenges in the realm of gynecological oncology. Defined by the presence of malignant cells that develop in the ovaries, this disease is particularly concerning due to its ability to replicate uncontrollably. This unchecked growth leads to tumor formation that can invade surrounding tissues and organs, complicating treatment options and significantly impacting patient outcomes (Akter et al., 2022). As a major contributor to cancer-related morbidity and mortality, ovarian cancer significantly affects women's health globally. In 2022, the Global Cancer Burden data rated ovarian cancer as the fourth leading cause of cancer-related deaths among women, leading to nearly 325,000 new diagnoses and about 235,000 deaths worldwide each year. It accounts for over 4.3% of all cancer-related deaths in women (Filho et al., 2024).

Despite its significant global burden, the understanding of ovarian cancer in Africa is hampered by limited data and inadequate cancer control programs. The scarcity of comprehensive cancer registries across the continent means that most cancer statistics are based on estimates rather than robust epidemiological data. For instance, current estimates suggest a lower incidence rate of 4.2 per 100,000 in Africa (Rambau et al., 2020). This lack of reliable data is particularly concerning in sub-Saharan Africa, where the true magnitude and characteristics of ovarian cancer remain largely undefined. In East Africa, data from Kenya indicate that ovarian cancer constitutes 3.4% of all cancers and is the second leading cause of cancer-related deaths among women due to gynaecological neoplasms (Korir et al., 2015).

One of the primary challenges in diagnosing ovarian cancer is that early-stage symptoms are often subtle, non-specific, or absent. As a result, many patients are

diagnosed only at advanced stages of the disease, significantly complicating treatment and adversely affecting survival outcomes. The late presentation of symptoms leads to a cascade of medical interventions that may not be effective due to the advanced nature of the disease at the time of diagnosis (Jemal et al., 2011). Moreover, current statistics predominantly reflect data from urban cancer registries, overlooking the experiences and health outcomes of rural populations, which may face different barriers to care and have varying incidence rates (Korir et al., 2015). This disparity amplifies the public health crisis posed by ovarian cancer in low- and middle-income countries, emphasizing the urgent need for comprehensive cancer control strategies and therapeutic interventions tailored to the specific contexts of these regions (Rambau et al., 2020).

The management of ovarian cancer involves a multi-faceted approach that includes surgical intervention and chemotherapy. Surgical treatments, such as oophorectomy (removal of one or both ovaries) and adnexectomy (removal of the ovaries and fallopian tubes), are crucial for staging and reducing tumor burden in early-stage ovarian cancer. These procedures can be curative when the disease is confined to the ovaries. Surgical techniques vary based on the stage of cancer; advanced cases may require open surgical approaches, while laparoscopic techniques may be suitable for newly diagnosed tumors without metastatic spread (Falzone et al., 2021).

In conjunction with surgical management, chemotherapy plays a vital role in the treatment of ovarian cancer. Over the years, various chemotherapeutic agents have been employed, with platinum-based drugs (such as cisplatin and carboplatin) and taxane derivatives (including paclitaxel and docetaxel) being the most commonly used (Ledermann, 2018). The standard approach for treating advanced ovarian cancer typically involves a combination of these agents. After surgery, patients with low-

grade neoplasms (stage IA or IB) may receive elective chemotherapy, while first-line treatment for advanced cases generally involves administering platinum-based chemotherapy intravenously every three weeks for six cycles. For patients with stage III or IV cancer, neoadjuvant chemotherapy is often recommended, followed by debulking surgery and additional cycles of chemotherapy (Ledermann, 2018).

Recent advancements in treatment have explored the efficacy of combining carboplatin, paclitaxel, and bevacizumab, which have shown promise in enhancing first-line treatment outcomes for ovarian cancer patients (Falzone et al., 2021). Despite the initial survival benefits associated with these therapies, long-term survival rates remain a concern, particularly due to the high risk of recurrence. Studies indicate that even among patients who respond well to initial treatments, many experience relapses, necessitating subsequent lines of treatment that may not yield the same effectiveness (Friedlander et al., 2014).

Furthermore, the adverse effects of chemotherapy significantly impact patients' quality of life. Common side effects include nausea, vomiting, hair loss, renal complications, and neurotoxicity, which can lead to substantial physical and emotional distress (Akter et al., 2022). The psychological impact of cancer treatment cannot be overlooked; many patients develop anxiety and depressive disorders as a direct consequence of their illness and its treatment (Izycki et al., 2016). This emotional burden, coupled with the physical side effects, can contribute to poor adherence to treatment regimens and a higher likelihood of loss to follow-up.

While the adverse effects of chemotherapy are significant contributors to treatment discontinuation, numerous other barriers can impede patient adherence to treatment plans. Socioeconomic factors, including the high costs associated with cancer care,

play a crucial role in determining a patient's ability to complete treatment. Patients from lower socioeconomic backgrounds may struggle to afford necessary medications and transportation to medical facilities, leading to skipped appointments and interrupted treatments (Hansen, 2015). Cultural beliefs and attitudes toward cancer treatment can significantly influence adherence to prescribed therapies, as some patients may opt for alternative ttreatment or feeling stigmatized by their cancer diagnosis.

Emotional challenges, such as fear and uncertainty about the future, can further complicate treatment adherence. The duration of treatment, often prolonged and demanding, can lead to fatigue and frustration, contributing to patients' decisions to discontinue care (Yardley et al., 2015).

An essential aspect of understanding ovarian cancer outcomes lies in examining the clinical characteristics of patients. These characteristics, which include tumor stage, grade, histology, and response to treatment, can significantly influence both prognosis and treatment decisions. By analyzing these factors alongside sociodemographic and socioeconomic variables, we can gain a more comprehensive understanding of the challenges faced by women diagnosed with ovarian cancer, particularly in resource-limited settings (Friedlander et al., 2014; Cates et al., 2019).

In combination, these multifaceted issues underscore the urgent need to investigate and understand the factors associated with loss to follow-up and treatment interruption among ovarian cancer patients.

This study aims to identify and analyse these contributing factors among patients with ovarian cancer at Moi Teaching and Referral Hospital (MTRH). By shedding light on the challenges faced by this population, the research seeks to inform more effective

management strategies, enhance patient support systems, and ultimately improve health outcomes for those affected by ovarian cancer. Through a comprehensive understanding of the barriers to follow-up, and treatment adherence, healthcare providers can better tailor interventions that address the unique needs of patients in this vulnerable population. By prioritizing patient-centered approaches and incorporating insights from patients themselves, we can work toward reducing the burden of ovarian cancer and improving the overall quality of care.

1.2 Problem Statement

Over half (58%) of ovarian cancer patients are detected at an advanced stage (III or IV), which is associated with a significantly poorer prognosis and a higher likelihood of treatment complications and recurrence (Akter et al., 2022). The stark reality of late-stage diagnosis highlights a critical gap in early detection and intervention strategies, adversely affecting survival rates and overall quality of life for many women. Studies have shown that the prognosis for advanced-stage ovarian cancer remains grim, with only about 45% of patients surviving beyond five years after diagnosis (Beesley et al., 2013). This alarming statistic emphasizes the urgent need for improved early detection practices, public awareness campaigns, and healthcare accessibility to enable earlier diagnosis and treatment initiation.

In response to the increasing incidence of cancer, the government of Kenya has undertaken a variety of initiatives aimed at addressing this pressing public health issue. These efforts include establishing chemotherapy centers in several referral hospitals across the country, including Mombasa, Kisumu, Kakamega, Garissa, Nyeri, Nakuru, and Meru. Additionally, the government has procured diagnostic equipment for numerous county hospitals, which encompasses essential tools such as X-ray, CT

scan, ultrasound, and mammography machines. Moreover, there are already Sixteen Kenya hospitals that provide radiotherapy cancer treatment services as of December 2021, including Moi Teaching and Referral Hospital, Kenyatta National Hospital, Kenyatta University Teaching Referral and Research Hospital, Nakuru County Referral Hospital, Mombasa County Referral Hospital, Garissa County Referral Hospital, Kisii Teaching and Referral Hospital, Kilifi County Referral Hospital, Kimathi University(Nyeri), Kisumu County Referral Hospital, Cancer Care(K), Texas Cancer Center, EQURA(Eldoret), Nairobi West Hospital, Nairobi Hospital and Aga Khan Hospital, and Seven other cancer treatment centers have been proposed, and construction is progressing (Kioko et al. 2022). While these advancements show promise, they also reveal healthcare access and resource allocation disparities that can hinder effective cancer control.

Despite these initiatives, the control of cancer remains hampered by several persistent challenges that undermine treatment efficacy and patient outcomes. Financial constraints significantly impede access to care, as many patients struggle to afford the high costs associated with cancer treatment, medications, and transportation to healthcare facilities. Research indicates that patients from lower socioeconomic backgrounds are particularly vulnerable, often facing financial hardships that lead to treatment delays or discontinuation (Hansen, 2015). The burden of healthcare costs can force patients to make difficult choices between essential living expenses and necessary medical care, resulting in skipped appointments and inadequate treatment adherence.

Late presentation to healthcare services is another critical issue that exacerbates the challenges faced by ovarian cancer patients. Many individuals remain unaware of the symptoms of ovarian cancer and the importance of early diagnosis. The nonspecific

nature of early symptoms, such as abdominal discomfort, bloating, and changes in appetite, can lead to misinterpretation and delays in seeking medical attention.

Furthermore, a lack of sufficient information about chemotherapy and its benefits can result in misconceptions and hesitancy to pursue treatment options. Many patients may also be influenced by cultural beliefs surrounding cancer, which can contribute to stigma and reluctance to engage with healthcare services (Oscar A., 2020).

Psycho-social factors play a significant role in the overall experience of ovarian cancer patients. Emotional distress, fear, and anxiety about the diagnosis and treatment can lead to significant psychological burdens. These emotional challenges can further complicate treatment adherence, as patients may become overwhelmed and disengage from their care plans. The psychological impact of cancer treatment, including anxiety and depression, can exacerbate these issues, leading to a cycle of non-adherence and worsening health outcomes. This emotional toll is particularly concerning in low- and middle-income countries, where mental health resources may be limited (Izycki et al., 2016).

Chemotherapy interruptions and loss to follow-up have been found to be associated with poorer overall survival rates and increased comorbidity among cancer patients. These interruptions can lead to disease progression, increased healthcare costs, and diminished quality of life, further complicating the clinical management of ovarian cancer. The repercussions of missed treatments extend beyond the individual, impacting families and communities, as the burden of care falls on loved ones and healthcare systems (Searle et al., 2020).

This study aims to determine the factors related to loss to follow-up and treatment interruption among patients with ovarian cancer at Moi Teaching and Referral

Hospital (MTRH). By identifying and analyzing the barriers that contribute to these issues, the research seeks to inform more effective management strategies, enhance patient support systems, and ultimately improve health outcomes for women affected by ovarian cancer. Understanding these factors is crucial for developing targeted interventions that can tackle the unique challenges faced by this vulnerable population, leading to improved adherence to treatment and better overall survival rates. Through a comprehensive approach that addresses both medical and psychosocial aspects of care, this study aspires to contribute to the ongoing efforts to mitigate the impact of ovarian cancer in Kenya and beyond.

1.2 Justification

Unpublished data from the Chandaria Cancer and Chronic Diseases Center (CCCDC_MTRH) revealed that in 2021, 39 out off 69 patients managed for ovarian cancer were lost to follow-up and had interrupted their treatment. This statistic highlights a critical gap in the continuity of care and underscores the urgency of addressing factors that contribute to treatment interruptions and loss to follow-up.

Research indicates that treatment adherence is vital for achieving optimal therapeutic outcomes, particularly in cancers like ovarian cancer, where delays in treatment can significantly worsen patient prognosis (Friedlander et al., 2014).

To our knowledge, no documented research in East Africa specifically explores the factors associated with and related to loss to follow-up and treatment interruptions among patients with ovarian cancer. This knowledge gap poses a considerable challenge for healthcare providers and policymakers who seek to implement effective interventions tailored to the unique context of the region. Without a clear understanding of the barriers that patients face, efforts to enhance care and support

systems may fall short of addressing the root causes of non-adherence. Literature from other regions suggests that factors such as socioeconomic status, access to healthcare facilities, and patient education play significant roles in treatment adherence (Hansen, 2015; Yardley et al., 2015). However, these insights may not fully apply to the East African context, making localized research essential.

The findings and recommendations of this study are poised to serve as a foundational baseline for the development of appropriate strategies aimed at enhancing follow-up care and management of ovarian cancer patients, as well as gynaecologic cancers more broadly. By identifying the specific factors contributing to treatment interruptions and loss to follow-up, healthcare providers can design targeted interventions that address these challenges. This approach not only aims to reduce morbidity and mortality associated with ovarian cancer but also seeks to improve the overall quality of life for affected individuals. Studies have shown that personalized care strategies can lead to improved treatment adherence and better health outcomes (Izycki et al., 2016).

Moreover, the findings of this study could have broader implications for public health policy, as they can inform decisions at both local and national levels. By shaping effective public health campaigns and educational programs, this research could promote awareness of ovarian cancer symptoms and the importance of early intervention. For instance, studies have demonstrated that increasing awareness among women about the signs of ovarian cancer can lead to earlier diagnoses and improved survival rates (Jemal et al., 2011). By fostering a more proactive approach to cancer care that prioritizes patient engagement and adherence, we can ensure that

women receive the necessary support to navigate their treatment journeys successfully.

This study is justified not only by the pressing need to address the issue of patient adherence to treatment but also by its potential to contribute meaningfully to the body of knowledge regarding ovarian cancer management in East Africa. By identifying barriers and proposing solutions, this research aims to support ongoing efforts to reduce the burden of ovarian cancer and improve the quality of care for patients throughout the region. Ultimately, enhancing our understanding of the factors influencing treatment adherence will be crucial for developing effective interventions that can lead to improved health outcomes and a better quality of life for women battling this challenging disease. Through a commitment to research and action, we can strive to mitigate the impact of ovarian cancer and empower patients to take an active role in their care.

1.3 Research Questions

1. What are the determinants of loss to follow-up among patients with ovarian cancer on follow-up at MTRH?
2. What are the factors associated with treatment interruptions among patients with ovarian cancer on treatment at MTRH?
3. What are the clinical characteristics of patients with ovarian cancer on treatment and follow-up at MTRH?

1.4 Objectives

1.4.1 Broad Objective

To identify the sociodemographic, socioeconomic, and clinical characteristics associated with loss to follow-up and treatment interruptions among patients receiving treatment for ovarian cancer at MTRH.

1.4.2 Specific Objectives

1. To describe the sociodemographic, socioeconomic, and clinical characteristics of patients with ovarian cancer on treatment and follow-up at MTRH.
2. To determine the Loss to follow-up rate and treatment interruption rate among ovarian cancer patients initiated on treatment and follow-up at MTRH.
3. To determine the patient-level factors associated with loss to follow-up and treatment interruptions among women receiving treatment for ovarian cancer at MTRH.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Ovarian cancer is recognized as one of the most lethal gynecological cancers, profoundly impacting women's health worldwide. While it can affect women of all ages, it is most commonly diagnosed in individuals aged between 55 and 64 years. Epithelial ovarian cancers account for approximately 90% of all ovarian tumors and predominantly occur in postmenopausal women. In contrast, germ cell neoplasms, which primarily affect women in their early twenties, represent about 5% of neoplasms. The remaining cases are attributed to sex cord-stromal neoplasms, which can occur at any age but are most frequently seen in women in their fifties (Doubeni et al., 2016).

One of the most critical challenges in managing ovarian cancer is the tendency for late-stage diagnosis. This characteristic makes ovarian cancer particularly deadly among gynecological malignancies. The prognosis for patients diagnosed at advanced stages is generally poor, with a 5-year survival rate of only 17% for those with late-stage disease. The late presentation of symptoms often contributes to this somber statistic, as early diagnosis remains the most relevant prognostic factor for improving survival outcomes (Beesley et al., 2013).

Several risk factors are associated with the development of ovarian cancer. Age is a significant contributor, with the risk increasing as women grow older. Additionally, a family history of ovarian cancer, the presence of familial cancer syndromes, and mutations in the breast cancer predisposition gene (BRCA) are critical hereditary factors that elevate risk. For example, women carrying a BRCA1 or BRCA2 mutation have a significantly higher lifetime risk of developing ovarian cancer, estimated to be between 20% and 44% (Antoniou et al., 2014; Kuchenbaecker et al., 2017).

Reproductive risk factors also play a role in the likelihood of developing ovarian carcinoma. Women who have children later in life or who have never had a full-term pregnancy face an increased risk. Other reproductive factors include reaching menopause at an older age and undergoing hormone treatment after menopause. These factors may influence the hormonal environment within the body, potentially contributing to the development of ovarian tumors (Huang et al., 2022; Lacey et al., 2010).

In addition to genetic and reproductive factors, various modifiable lifestyle and metabolic factors are linked to ovarian cancer risk. Smoking, alcohol consumption, physical inactivity, poor diet, obesity, and diabetes have all been identified as contributing factors. For instance, studies have shown that obesity can lead to an increased risk of several cancers, including ovarian cancer, due to its effects on hormone levels and inflammation (Sullivan et al., 2016; Yang et al., 2017). Furthermore, a systematic review indicated that physical activity may reduce the risk of ovarian cancer, highlighting the importance of lifestyle modifications in cancer prevention (Tzeng et al., 2018).

2.2 Epidemiology

Ovarian cancer is a significant health issue worldwide, ranking as the eighth most common cancer among women and accounting for approximately 3.4% of all cancer cases. In 2022, there were over 325,000 new cases of ovarian cancer reported globally, which underscores the substantial prevalence and impact this disease has on women's health and their resources. In that same year, ovarian cancer emerged as the second most common gynecological cancer, after cervical cancer, leading to 235,000 deaths worldwide (Filho et al., 2024). This alarming mortality rate is primarily due to late-stage diagnosis, as many women present with advanced disease. Symptoms of

ovarian cancer are often vague and nonspecific—such as abdominal bloating, pelvic pain, and changes in urinary habits—leading to delays in diagnosis and treatment (Goff et al., 2020). The lack of effective screening methods further complicates early detection efforts, contributing to the high mortality rates associated with this malignancy (Siegel et al., 2020).

The incidence of ovarian cancer varies significantly by geographic region, highlighting disparities in healthcare access and awareness. In sub-Saharan Africa, it was estimated that more than 18,000 cases of ovarian cancer were reported in 2022, which represented about 3-4% of all cancer incidents in the region. Ovarian cancer ranks as the fourth most common neoplastic disease among women (Muluken et al., 2022). In Kenya, ovarian cancer is the fifth most common cancer affecting women after breast, cervix, esophageal, and colorectal cancers. In 2022, there were about 1245 new cases, with about 895 deaths. It is one of the leading causes of cancer deaths among women, reflecting the broader trends seen in East African countries (GLOBOCAN, 2022). However, it is critical to note that these statistics are primarily derived from cancer registries located in urban centers. This urban-centric data may not accurately capture the incidence of ovarian cancer in rural communities, where access to healthcare, early diagnosis, and effective treatment options are often limited. Rural populations face significant barriers such as a lack of awareness, limited healthcare infrastructure, and cultural stigmas surrounding cancer, which can lead to further disparities in outcomes (Korir et al., 2015).

Understanding the epidemiology of ovarian cancer also involves recognizing the risk factors associated with the disease. Genetic predispositions, such as mutations in the BRCA1 and BRCA2 genes, significantly increase the risk of developing ovarian cancer. Women with these mutations have a lifetime risk of 20-40% for BRCA1 and

10-20% for BRCA2 carriers (Antoniou et al., 2003). Other risk factors include reproductive history, age at menarche, and lifestyle choices, such as obesity and smoking (McGuire et al., 2016).

2.3 Clinical Presentation

Ovarian cancer is frequently described as a stealthy and lethal disease, particularly affecting women over the age of 50. This demographic is at an elevated risk due to various biological and hormonal changes that occur with aging. One of the primary challenges in diagnosing early-stage ovarian cancer is the obscure and nonspecific nature of its symptoms, which can easily lead to misdiagnosis or delayed diagnosis. The subtlety of these symptoms complicates the identification of the disease in its initial stages, contributing to a poorer prognosis.

2.3.1 Symptomatology

Numerous studies have highlighted that women with ovarian carcinoma often experience more abdominal, digestive, and constitutional symptoms compared to those with benign neoplasms. For instance, research by Muhabat et al. (2016) reported that patients with ovarian cancer frequently present with persistent abdominal pain, bloating, and gastrointestinal disturbances, which can be mistaken for less serious conditions like irritable bowel syndrome or other gastrointestinal disorders. This symptom overlap complicates diagnosis and often leads to treatment delays.

2.3.2 Classification of Symptoms

The clinical presentations of ovarian cancer can be categorized into three main types: Acute, Subacute, and Incidental.

1. Acute Presentations:

    - Ascites: The accumulation of fluid in the abdominal cavity often results from tumor cell proliferation and peritoneal involvement, leading to significant discomfort and abdominal distension. Ascites is frequently associated with advanced disease and can severely impact quality of life (Bafandeh et al., 2018).

    - Pleural Effusion: This occurs when cancer spreads to the pleural space, causing fluid buildup around the lungs, which can lead to respiratory difficulties. Studies have indicated that pleural effusion is a common manifestation of metastatic ovarian cancer (Baker et al., 2020).

    - Bowel Obstruction: Tumors can invade or compress the intestines, leading to bowel obstruction, which is considered a surgical emergency. A study by McGowan et al. (2019) highlighted that bowel obstruction in ovarian cancer patients is often a sign of late-stage disease.

    - Venous Thromboembolism: The hypercoagulable state induced by malignancy, particularly in ovarian cancer patients, poses a notable risk for the development of venous thromboembolism, leading to increased morbidity (Khorana et al., 2022). This complication necessitates careful monitoring and prompt management to mitigate its effects on treatment outcomes.

2. Subacute Presentations: Symptoms may manifest as:
    - Pelvic and Abdominal Pain: This is a significant symptom experienced by patients with ovarian cancer, which often manifests as a persistent dull ache or intermittent sharp pain. This symptom can frequently be misattributed to menstrual-related discomfort or gastrointestinal issues, leading to delays in diagnosis and treatment (Goff et al., 2020).
    - Bloating or Abdominal Distension: This symptom can be particularly troubling and may lead to decreased appetite, further complicating nutritional status (Aune et al., 2016).
    - Urinary Urgency or Frequency: Increased pressure on the bladder from tumor growth can lead to changes in urinary patterns, which can be misattributed to urinary tract infections (UTIs) (Katz et al., 2018).
    - Difficulty Eating: Many women report feelings of nausea, anorexia, and early satiety, which can contribute to weight loss and malnutrition. These symptoms are often overlooked, as they can be associated with a variety of benign conditions (McGuire et al., 2016).
    - Vaginal Bleeding: Although this symptom is more commonly associated with other gynecological cancers, it can occur in ovarian cancer as well, particularly in the presence of advanced disease.

4. Incidental Findings: Often, ovarian cancer is discovered incidentally during routine pelvic examinations or imaging scans performed for unrelated reasons. An estimated 15-20% of ovarian cancers are diagnosed as incidental findings during imaging, further complicating the understanding of the disease's prevalence (Huang et al., 2018). In some cases, patients may present with palpable inguinal or

cervical lymphadenopathies, rectal bleeding, or paraneoplastic syndromes, although these occurrences are rare (Lin et al., 2018).

Rare Presentations

An unusual pattern of metastasis has been documented, characterized by embolization of intestinal lymphatic vessels, which can lead to subsequent stromal invasion. This rare presentation has been described in a study by Gorey et al. (2014), emphasizing the importance of considering a wide range of symptoms and potential metastatic patterns in the diagnosis of ovarian cancer.

Challenges in Diagnosis

One of the most significant challenges in the management of ovarian cancer is the delayed presentation of the disease, which contributes substantially to its high mortality rate. While the early stages of ovarian cancer are potentially curable, many patients do not receive timely diagnoses. Factors contributing to this delay include:

- Uncertain Symptoms: Symptoms may be vague and easily attributed to benign conditions, leading to misdiagnosis. A study by Goff et al. (2020) highlighted how women often fail to recognize the significance of their symptoms and delay seeking medical attention.

- Poor Health Literacy: Many women lack adequate knowledge about the symptoms of ovarian cancer, which can hinder their ability to seek timely medical care (Mandić et al., 2003). Educational interventions have been shown to improve awareness and promote earlier medical consultations (Donnelly et al., 2015).

- Living Conditions: Socioeconomic factors can limit access to healthcare services, particularly in rural or underserved areas. Barriers to care often exacerbate delays in diagnosis and treatment (Siegel et al., 2020).

- Ignorance and Stigma: Cultural beliefs about cancer can lead to reluctance in seeking medical help, as well as fear of the disease. This stigma often prevents women from discussing their symptoms openly with healthcare providers (Torre et al., 2015).

- Late Referrals: Primary care providers may not recognize the significance of reported symptoms, leading to delayed referrals to specialists. Improving training for healthcare providers on recognizing potential signs of ovarian cancer is essential (Huang et al., 2018).

2.4 Diagnosis

2.4.1 Imaging

Imaging plays a crucial role in the diagnosis, management, and monitoring of ovarian cancer, particularly in identifying early-stage disease and differentiating between benign and malignant lesions. Advances in imaging technology have significantly improved the accuracy and effectiveness of ovarian cancer detection, which is vital for enhancing patient outcomes.

Ultrasound Advances

Recent developments in transvaginal ultrasound have greatly improved the assessment of ovarian neoplasms, offering a non-invasive and cost-effective initial imaging modality. This technique allows for detailed visualization of the morphology of the neoplasm, which is essential for determining whether a mass is likely malignant. According to Fleischer et al. (2012), the incorporation of transvaginal color Doppler

ultrasound has enabled radiologists to assess blood flow characteristics within the tumor. This is particularly important as neovascularization—an increase in blood vessel formation—often indicates malignancy; tumors typically require a robust blood supply to sustain their growth.

Moreover, transvaginal contrast-enhanced ultrasound provides even greater diagnostic accuracy by allowing for real-time visualization of vascularity within the tumor. Studies have shown that this technique can significantly enhance the detection of malignant ovarian masses compared to conventional ultrasound methods (Pérez-López et al., 2016). The ability to visualize the vascular architecture of ovarian tumors can help clinicians make more informed decisions regarding the management of ovarian masses.

CT Imaging

Computed Tomography (CT) remains the leading imaging modality for patients with confirmed ovarian cancer. It is essential for pre-treatment staging and for assessing therapeutic response. CT scans provide comprehensive information about the extent of the disease, including the presence of metastases in the abdomen and pelvis, which is crucial for staging according to FIGO (International Federation of Gynecology and Obstetrics) criteria. The use of contrast-enhanced CT allows for improved visualization of the tumor and surrounding structures, making it easier to identify lymph node involvement and distant metastases (Wang et al., 2017).

Furthermore, CT imaging is invaluable for monitoring treatment efficacy. By comparing baseline and follow-up scans, clinicians can assess changes in tumor size, the development of new lesions, and the overall response to chemotherapy or other treatment modalities. A study by Sato et al. (2018) emphasized the importance of CT

in evaluating therapeutic response, noting that changes in tumor volume are often correlated with patient outcomes.

MRI Utilization

Magnetic Resonance Imaging (MRI) has consistently demonstrated high specificity for detecting malignant lesions while maintaining similar sensitivity levels compared to ultrasound. This characteristic makes MRI a valuable tool for further evaluation in cases where ultrasound findings are equivocal. MRI is particularly beneficial for patients with normal tumor markers or for younger women considering conservative management options rather than radical surgery. The detailed soft tissue contrast provided by MRI makes it an excellent choice for mass characterization and for assessing the extent of disease (Sohaib & Reznek, 2007).

Research indicates that MRI can accurately differentiate between various types of ovarian tumors, including benign cysts, functional ovarian masses, and malignant tumors (Bach et al., 2017). The use of advanced MRI techniques, such as diffusion-weighted imaging (DWI) and dynamic contrast-enhanced MRI, can further enhance diagnostic accuracy by providing functional information about the tumor's cellular environment. For instance, DWI can help identify cellular density variations that are often present in malignant lesions, thereby improving differentiation between benign and malignant masses (Kumar et al., 2019).

PET/CT Imaging

Positron Emission Tomography (PET) combined with CT (PET/CT) is another advanced imaging modality that has gained traction in the evaluation of ovarian cancer. PET imaging utilizes radiotracers, such as fluorodeoxyglucose (FDG), to assess metabolic activity. This is particularly useful in identifying areas of increased

metabolic activity that may correspond to malignant tumors. Studies have shown that PET/CT can provide valuable information regarding the metabolic status of ovarian masses, aiding in the differentiation between benign and malignant lesions (Kumar et al., 2020).

PET/CT is particularly beneficial in assessing recurrence or metastatic disease after initial treatment. It can detect metabolic activity that may not be visible on CT scans alone, making it a powerful adjunct in the follow-up of patients with a history of ovarian cancer. Additionally, the combined modality allows for precise anatomical localization of metabolically active lesions, facilitating targeted biopsies or further surgical planning (Wang et al., 2021).

Laparoscopy

Although primarily a surgical intervention, laparoscopy also serves a diagnostic purpose in ovarian cancer. Laparoscopy allows for direct visualization of the ovaries and surrounding structures and can facilitate biopsy of suspicious lesions. This minimally invasive technique can be particularly useful in cases where imaging results are inconclusive. Laparoscopy can also provide real-time assessment of disease extent and help guide further therapeutic strategies (Bafandeh et al., 2018).

2.4.2 Tumor markers

Tumor markers play a crucial role in the diagnosis, management, and monitoring of ovarian cancer. These biochemical substances, often proteins, are typically produced by cancer cells or by the body in response to cancer. Several tumor markers have been extensively studied and utilized in clinical practice for ovarian cancer management.

Cancer Antigen 125 (CA 125)

Cancer antigen 125 (CA 125) is the most extensively used biomarker for ovarian carcinoma. It serves as a key tool in the diagnosis and monitoring of the disease. CA 125 levels are often elevated in women with ovarian cancer, making it a valuable marker for identifying malignancy. Additionally, CA 125 is used off-label for assessing an adnexal mass, where its elevation may indicate the presence of ovarian cancer or other gynecological conditions. It can be used alone or in combination with other serum biomarkers and pelvic ultrasound to enhance diagnostic accuracy (Fotopoulou et al., 2017). However, it is important to note that elevated CA 125 levels can also occur in benign conditions such as endometriosis, pelvic inflammatory disease, and benign ovarian cysts, which can complicate interpretation.

Carcinoembryonic Antigen (CEA)

Carcinoembryonic antigen (CEA) is a glycoprotein typically found in embryonic or fetal tissue, with serum levels usually declining to low or undetectable levels after birth. In adults, low levels of CEA may be found in the colon and may be elevated in certain malignant tumors, particularly mucinous malignancies that are linked to the gastrointestinal tract or the ovary (Khoo & Mackay, 1976). While CEA is not specific for ovarian cancer, elevated levels can be observed in some ovarian cancer patients, especially those with mucinous histology. Therefore, it can serve as an additional marker in the clinical assessment of ovarian tumors.

Cancer Antigen 19-9 (CA 19-9)

Cancer antigen 19-9 (CA 19-9) is another mucin protein that can be elevated in cases of EOC. However, its utility in the management of ovarian cancer is more limited compared to CA 125 and HE4 (Canney et al., 1985). CA 19-9 is primarily associated with pancreatic cancer and is not routinely used for ovarian cancer diagnosis.

Nonetheless, it may provide supplementary information in specific clinical scenarios, particularly when gastrointestinal involvement is suspected.

Alpha-Fetoprotein (AFP)

Alpha-fetoprotein (AFP) is a glycoprotein that is typically produced by the fetal liver and yolk sac. In adults, it is often elevated in certain germ cell tumors, particularly non-seminomatous tumors, and can also be found in hepatocellular carcinoma. In the context of ovarian cancer, AFP is essential for ruling out germ cell tumors, especially in younger patients with pelvic masses (Berek et al., 2021). Elevated AFP levels can indicate the presence of tumors such as yolk sac tumors or immature teratomas.

Human Chorionic Gonadotropin (hCG)

Human chorionic gonadotropin (hCG) is another important marker used primarily in the evaluation of germ cell tumors. Elevated hCG levels may indicate the presence of certain types of ovarian tumors, such as choriocarcinoma. Like AFP, hCG is essential for the differential diagnosis of ovarian masses, particularly in younger women (Berek et al., 2021). Monitoring hCG levels can also help assess treatment response and detect recurrence in patients with germ cell tumors.

Inhibin

Inhibin is a hormone produced by the ovaries, and its levels can be elevated in certain types of ovarian tumors, particularly sex-cord stromal tumors such as granulosa cell tumors. Inhibin can be used as a tumor marker in the diagnosis and monitoring of these specific tumor types (Ishikawa et al., 2014). Its measurement may provide additional information about tumor behavior and prognosis.

Human Epididymis Protein 4 (HE4)

Human epididymis protein 4 (HE4) has emerged as a significant biomarker in the assessment of epithelial ovarian cancer (EOC). HE4 is accepted for follow-up in patients with relapsing or spreading disease and may be particularly useful in detecting disease recurrence in patients with non-elevated CA 125 levels at the time of diagnosis. Studies indicate that HE4 can provide prognostic implications, helping to identify patients who may have a more aggressive form of the disease (Plotti et al., 2019). The combination of HE4 and CA 125 has been shown to improve the diagnostic accuracy for ovarian cancer, particularly in postmenopausal women.

Osteopontin

Osteopontin is a glycoprotein involved in cell signaling and the regulation of immune responses. Elevated levels of osteopontin have been associated with various cancers, including ovarian cancer. Some studies suggest that osteopontin may have potential as a biomarker for ovarian cancer diagnosis and prognosis, particularly when used in conjunction with other markers (Xie et al., 2016).

Limitations of Individual Biomarkers

The diagnostic sensitivity and specificity of individual serum biomarkers such as CA 125, CA 19-9, or CEA are not sufficiently high for the definitive diagnosis of epithelial ovarian cancer. As Guo et al. (2017) noted, the diagnostic value can be significantly enhanced by the combined detection of several serum biomarkers. Utilizing a panel of markers, along with imaging techniques, can improve diagnostic accuracy and facilitate better clinical decision-making. Furthermore, assessing hCG and AFP in young patients is crucial for differentiating germ cell tumors from epithelial ovarian cancers.

Incorporating multiple serum biomarkers into the diagnostic process allows for a more comprehensive evaluation of ovarian masses and can aid in tailoring management strategies based on individual patient profiles. This integrative approach ultimately enhances the ability to detect ovarian cancer early, monitor treatment response, and improve overall patient outcomes.

2.5 Types of ovarian cancer and specific tumor markers

Epithelial Ovarian Cancer

Epithelial ovarian cancer is the most common type, accounting for about 90% of ovarian cancers. It originates from the ovarian surface epithelium and is categorized into several subtypes:

- Serous Carcinomas:
    - High-Grade: Most common and aggressive, often diagnosed at an advanced stage. Associated with mutations in the TP53 gene.
    - Low-Grade: Less common, often develops from serous borderline tumors, and has a better prognosis.
- Mucinous Carcinomas:
    - Rare compared to serous carcinomas. Can be primary ovarian tumors or metastatic from the gastrointestinal tract. Mucinous tumors often present diagnostic challenges due to their similarities with benign tumors.
- Endometrioid Carcinomas:
    - Frequently associated with endometriosis. They can be aggressive but often respond well to treatment if detected early.
- Clear Cell Carcinomas:
    - Known for poor prognosis and resistance to chemotherapy. Often linked to endometriosis and may have unique treatment considerations.

Tumor Markers for Epithelial Ovarian Cancer

- CA 125: Most commonly used marker for monitoring response to treatment and detecting recurrence. Elevated levels can also occur in benign conditions.
- HE4 (Human Epididymis Protein 4): Used alongside CA 125 for improved diagnostic accuracy, particularly in postmenopausal women. Elevated in EOC and correlated with tumor burden.
- BRCA1/BRCA2 Genetic Testing: Not a tumor marker per se, but mutations in these genes increase the risk of EOC and inform treatment options.

Germ Cell Tumors

Germ cell tumors are rare and predominantly occur in younger women. They arise from the germ cells in the ovaries and can be classified into several types:

- Dysgerminomas:
    - The most common type in adolescents and young adults, resembling seminomas in males. These tumors are typically chemosensitive.
- Non-Seminomatous Germ Cell Tumors:
    - Includes Yolk Sac Tumors, which often produce AFP and are aggressive; Choriocarcinoma, associated with elevated hCG levels; and Teratomas, which can be mature (benign) or immature (malignant).

Tumor Markers for Germ Cell Tumors

- AFP (Alpha-Fetoprotein): Elevated in yolk sac tumors and some teratomas.
- hCG (Human Chorionic Gonadotropin): Elevated in choriocarcinoma and some other germ cell tumors.
- LDH (Lactate Dehydrogenase): Can be elevated in germ cell tumors and is used as a prognostic marker.

Sex-Cord Stromal Tumors

These tumors arise from the ovarian stroma and include a variety of subtypes, each with distinct characteristics:

- Granulosa Cell Tumors:
    - These slow-growing tumors can produce estrogen, leading to hormonal symptoms such as abnormal bleeding. They are often diagnosed at an early stage and generally have a good prognosis.
- Sertoli-Leydig Cell Tumors:
    - Can produce androgens, leading to virilization symptoms. They are rare and can be benign or malignant.
- Thecomas and Fibromas:
    - These are also included in the category of sex-cord stromal tumors and can present with similar symptoms.

Tumor Markers for Sex-Cord Stromal Tumors

- Inhibin: A key marker for granulosa cell tumors, with elevated levels indicating tumor presence.
- Estrogen Levels: Elevated in estrogen-producing tumors like granulosa cell tumors.

2.6 Management

The most difficult problem for a gynecologic oncologist today is identifying and treating ovarian cancer, and this is likely to continue for the foreseeable future. Surgery is the mainstay of ovarian cancer management, and it is critical in both diagnosis and treatment.

Nonetheless, significant progress in the use of chemotherapy for ovarian cancer has been made in the last 10-15 years, and the most efficient treatment for a patient with this condition is typically surgery and chemotherapy (Chu et al. 2011)

Adjuvant platinum-based chemotherapy improves survival in a large proportion of women with early-stage epithelial ovarian cancer (FIGO stage I/IIa). It may, however, be excluded in patients with well differentiated unilateral encapsulated tumor (stage 1a, grade 1) or complete, well, or modestly differentiated stage Ib (grade 1/2). Chemotherapy should be recommended for other women with early unstaged cancer or low-grade neoplasms (Winter-Roach and colleagues (2012).

Surgery has an essential contribution in the management of ovarian cancer. The goals are diagnosis, correct staging, therapeutic cytoreduction and palliative care. The reasoning and practice instructions have been described in numerous papers. To optimize the results for patients with ovarian cancer, clinical background, judgment, and a diverse set of operative skills are required. (Greer et al., 2004)**.**

A. Primary surgery

Staging surgery

Human cancer staging systems are intended to provide a standardized assessment of cancer spread at the time of diagnosis. If a patient's tumor is recurrent or progressing, the staging determined at the time of diagnosis does not necessarily change. Correct cancer staging is a critical component of ovarian cancer treatment because it influences both management and outcome (Chu et al. 2011).

Importance of Staging

Staging plays a pivotal role in the management of ovarian cancer for several reasons:

- Guiding Treatment Decisions: The stage of cancer at diagnosis informs the choice of surgical intervention, the need for adjuvant chemotherapy, and the overall treatment strategy. For example, early-stage cancers may be managed with surgery alone, while advanced-stage cancers typically require a combination of surgery and chemotherapy.

- Prognostic Indicator: The stage of cancer is one of the most significant prognostic factors. It helps predict the likely course of the disease and the patient’s survival chances. Understanding the stage can assist healthcare providers in counselling patients about their prognosis.

- Monitoring Treatment Response: Accurate staging provides a baseline to evaluate how well patients respond to treatment. This is particularly important in cases of recurrent disease, where initial staging may not change but therapy effectiveness needs assessment.

While the initial staging is essential, it is important to note that if a patient's tumor is recurrent or progressing, the original staging does not necessarily change. This consistency in staging helps healthcare providers develop a clear treatment approach based on the disease's initial extent.

Staging Statistics

Approximately 50% of patients with epithelial ovarian cancer are diagnosed at an early stage of the disease. Among these patients:

- Stage I: About 25% are diagnosed at this stage, indicating that the cancer is confined to the ovaries.
- Stage II: Around 15% are identified at stage II, where the cancer has spread to the pelvic region but remains within the abdominal cavity.
- The remaining 50% of patients present with advanced disease, which includes:
- Distant Metastases: Approximately 22% may have cancer that has spread to distant organs, such as the liver or lungs.
- Regional Lymph Node Involvement: About 19% may have dissemination to regional lymph nodes, indicating more extensive disease.
- Well-Localized Disease: Approximately 9% of patients may be classified as unstaged or have tumors that are well located at the time of diagnosis (Gligorijevic et al., 2019).

Surgical Staging Procedures

Surgical staging is a vital component of the management of ovarian cancer and often involves:

- Laparotomy:
    - This surgical procedure allows for direct visualization of the abdominal cavity, facilitating accurate assessment of the disease's extent. During laparotomy, the surgeon can identify any visible tumor spread and take biopsies from various sites.

Lymphadenectomy:

- The removal and examination of pelvic and para-aortic lymph nodes help determine if cancer has spread beyond the ovaries. This procedure is crucial for staging and can provide valuable prognostic information.

Assessment of Peritoneal Washings:

- Fluid obtained from the abdominal cavity can be analyzed for cancer cells, providing additional staging information. This procedure can help identify microscopic disease that may not be visible during surgery.

Imaging Studies:

- While not a surgical procedure, imaging studies such as CT scans or MRIs are often used in conjunction with surgical staging to assess the extent of disease and guide surgical planning.

Cytoreductive (debulking) surgery for advanced stage disease

Cytoreductive surgery, often referred to as debulking surgery, is a critical component of the management plan for patients with advanced-stage ovarian cancer. This procedure aims to remove as much of the tumor mass as possible, which can significantly improve patient outcomes, particularly for those with non-dysgerminomatous tumors.

Importance of Optimal Cytoreduction

For patients with advanced tumors, optimal cytoreductive surgery is associated with several key benefits:

- **Improved Survival Rates**: Studies have shown that patients who undergo successful cytoreductive surgery tend to have better overall survival rates.

This is particularly true for non-dysgerminomatous tumors, which are generally more aggressive and less responsive to chemotherapy compared to dysgerminomas (Berek et al., 2021).

- **Enhanced Response to Chemotherapy**: Reducing the tumor burden can enhance the effectiveness of subsequent chemotherapy. When a significant portion of the tumor is removed, the remaining cancer cells may be more susceptible to the effects of chemotherapy agents (Gordon et al., 2019).
- **Symptom Relief**: In addition to improving survival rates, cytoreductive surgery can help alleviate symptoms caused by large tumor masses, such as abdominal pain, bloating, and pressure on surrounding organs (Miller et al., 2020).

Considerations for Advanced Disease

While the benefits of cytoreductive surgery are clear, the advantages and risks of aggressive procedures in patients with metastatic disease must be thoroughly evaluated. Key considerations include:

- **Tumor Biology**: The specific type of tumor and its biological behaviour can influence the decision to pursue cytoreductive surgery. Understanding the characteristics of the tumor, including its responsiveness to chemotherapy and potential for recurrence, is crucial (Keeney et al., 2018).
- **Extent of Disease**: The stage of the disease and the extent of tumor spread must be carefully assessed. If advanced disease is encountered during the initial exploration, cytoreductive surgery should be attempted according to established principles for managing advanced epithelial ovarian cancer.

- **Technical Feasibility and Safety**: During the procedure, the surgeon should aim to remove as much tumor as is technically feasible and safe. This involves not only removing visible tumor masses but also addressing any microscopic disease that may remain. The surgical team must weigh the risks of extensive surgery against the potential benefits, considering factors such as the patient's overall health, the presence of comorbidities, and the likelihood of achieving optimal cytoreduction (Pignata et al., 2020).

Surgical Principles

The principles for performing cytoreductive surgery in advanced-stage ovarian cancer include:

- Comprehensive Assessment: Prior to surgery, imaging studies (such as CT scans) should be conducted to evaluate the extent of disease and plan the surgical approach.
- Exploratory Laparotomy: This procedure allows for direct visualization of the abdominal cavity, enabling the surgeon to assess the tumor's extent and determine the best approach for cytoreduction.
- Maximal Tumor Reduction: The goal is to remove as much tumor as possible while preserving surrounding organs and structures. This may involve resecting parts of the omentum, peritoneum, and affected lymph nodes.
- Multidisciplinary Collaboration: Cytoreductive surgery should be performed in a specialized center with a multidisciplinary team, including oncologic surgeons, medical oncologists, and supportive care providers. This collaboration is essential for optimizing patient outcomes and managing any complications that may arise.

- Postoperative Care: Following cytoreductive surgery, patients should be closely monitored for complications and managed with appropriate adjuvant therapies, including chemotherapy, to further reduce the risk of recurrence.

Primary debulking surgery

At least two-thirds of ovarian cancer patients have stage III or IV disease. This can impact both performance status and ability to undergo surgery. However, the more important predictor of prognosis in women with progressive ovarian cancer is the volume of residual disease after surgical debulking. Therefore, cancer women who are medically fit should generally have a primary laparotomy with total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, and maximum tentative optimal cytoreduction (Berek et al., 2021).

Theories underlying PDS as a treatment for ovarian cancer incorporate the occurrence of a small population of highly specialized cancer cells that drive tumor onset, expansion, and mutation and have the capability to self-renew and remodel all cellular heterogeneity in a tumor. Eliminating these cells prevents the regrowth of a treatment-resistant tumor and recurrence. An additional thought is that the number of cells treated with chemotherapy also diminishes, which lowers the number of cancer cells that have the potential to spontaneously mutate to build resistance during treatment.

With smaller volume of tumor, there is also a higher likelihood of tumor regression before resistance develops. Removal of large tumors may also increase sensitivity to chemotherapy because the remaining tumor cells theoretically divide more rapidly and are therefore better targeted. Smaller residual tumors are more effectively perfused, resulting in a higher tumor growth rate and more efficient delivery of

chemotherapy agents into the tumor, thereby increasing the effectiveness of chemotherapy. (Cummings et al., 2022).

Interval Debulking Surgery

Interval debulking surgery is a surgical approach performed after a course of neoadjuvant chemotherapy, typically consisting of two to four cycles. This strategy aims to remove the majority of the tumor before proceeding with additional adjuvant chemotherapy. The effectiveness and appropriateness of interval debulking surgery can vary based on several factors, including the initial surgical intervention and the expertise of the surgical team.

Definition and Process

- Neoadjuvant Chemotherapy: This treatment is administered before surgery to reduce the size of the tumor and make surgical removal more feasible. A part from downstaging the tumor, NACT is also used for treatment response assessment, treatment for High- risk tumors, and as component of a combined targeted therapies or immunotherapies.
- Interval Debulking Surgery: This secondary surgery is conducted after the initial cycles of chemotherapy, with the goal of removing as much of the remaining tumor as possible.
- Adjuvant Chemotherapy: Following Interval debulking surgery, patients typically receive additional chemotherapy to address any residual disease and reduce the risk of recurrence.

Clinical Benefits

Research indicates that interval debulking surgery can provide specific advantages under certain circumstances:

- Improved Surgical Outcomes: Interval debulking surgery may enhance the likelihood of achieving optimal cytoreduction, particularly in patients whose primary surgery was performed by non-specialized surgeons or was less extensive. In these cases, Interval debulking surgery allows for a more thorough removal of tumor tissue after initial chemotherapy (Tangjitgamol et al., 2013).
- Potential for Better Prognosis: Patients who undergo Interval debulking surgery, especially when primary surgery was inadequate, may experience improved survival rates compared to those who do not receive this intervention.

Considerations for Interval Debulking Surgery

- Surgical Expertise: The experience and specialization of the surgical team play a crucial role in the success of Interval debulking surgery. Surgery performed by gynecologic oncologists is associated with better outcomes due to their expertise in managing complex cases of ovarian cancer.
- Timing of Surgery: The timing between neoadjuvant chemotherapy and interval debulking surgery is critical. Proper scheduling ensures that the tumor is sufficiently reduced for optimal surgical intervention while minimizing the risks associated with delayed treatment.
- Patient Selection: Not all patients may benefit equally from IDS. Careful selection based on tumor response to chemotherapy and overall health status is essential to maximize the benefits of this surgical approach.

B. Secondary Surgery

In patients with recurrent, platinum-sensitive epithelial ovarian cancer, primary peritoneal cancer, or fallopian tube cancer, secondary surgical cytoreduction is a treatment option that is commonly performed worldwide. This approach involves surgically removing remaining tumor tissue after initial treatment, followed by chemotherapy. However, the efficacy of this intervention in improving survival outcomes has not been confirmed through phase 3 clinical trials. Secondary surgical cytoreduction does not yield a prolonged overall survival compared to chemotherapy alone, as indicated by Coleman et al. (2019).

- Indication for Secondary Surgery: Secondary cytoreduction is typically considered for patients who have experienced a recurrence of their disease but remain sensitive to platinum-based chemotherapy. The goal is to remove as much residual tumor as possible to enhance the effectiveness of subsequent chemotherapy.
- Complementary Role of Chemotherapy: Following secondary surgery, patients generally receive chemotherapy to target any remaining cancer cells. This combination aims to maximize treatment efficacy and potentially improve outcomes.
- Survival Outcomes: Current evidence suggests that secondary surgical cytoreduction does not significantly prolong general survival compared to chemotherapy alone.

Considerations

- Patient Selection: The decision to pursue secondary surgical cytoreduction should be carefully considered based on individual patient factors, including overall health, response to prior treatments, and the extent of disease recurrence.

- Surgical Expertise: As with primary and interval debulking surgeries, the success of secondary surgeries is influenced by the skill and experience of the surgical team, particularly in managing complex cases of recurrent ovarian cancer.
- Multidisciplinary Approach: A collaborative approach involving oncologists, surgeons, and supportive care providers is essential to optimize patient management and outcomes.

C. Chemotherapy

Chemotherapy has been a cornerstone in the systematic treatment of ovarian cancer, significantly impacting patient outcomes and survival rates. Ovarian cancer, often diagnosed at advanced stages, necessitates aggressive treatment strategies to improve prognosis. Key chemotherapeutic agents, including platinum compounds (such as cisplatin and carboplatin), taxanes (like paclitaxel), doxorubicin, and various alkylating agents, have demonstrated substantial antitumor potency and effectiveness in clinical settings.

Platinum compounds are particularly notable for their ability to induce DNA cross-linking, leading to apoptosis in cancer cells. Cisplatin and carboplatin have become essential components of first-line therapy, offering substantial improvements in response rates when used in combination with other agents. Taxanes, which disrupt microtubule function, also play a critical role in enhancing treatment efficacy. Together, these agents have transformed the therapeutic landscape for ovarian cancer, leading to better patient outcomes compared to monotherapy.

The combination of these agents is now standard practice in the treatment of ovarian cancer, enhancing effectiveness and minimizing the risk of resistance. Clinical trials have consistently shown that multi-agent regimens yield better target response rates

and longer disease-free survival compared to single-agent therapies. This approach is particularly important in the context of advanced ovarian cancer, where achieving a significant initial response can impact long-term survival.

The integration of chemotherapy with innovative treatment modalities, such as targeted therapies and immunotherapy, is currently an area of intense research. As our understanding of ovarian cancer biology evolves, the goal is to tailor treatment strategies to individual patient profiles, optimizing therapeutic outcomes while managing side effects effectively.

Efficacy of Combination Chemotherapy

The activity of various categories of anticancer medications has led to the widespread adoption of combination chemotherapy regimens. Research indicates that these combinations yield better target response rates and longer disease-free survival compared to single-agent therapies. For instance, cisplatin, when used in conjunction with other medications, has shown improved efficacy over its use as a single agent.

Response Rates

Combinations such as cisplatin with an alkylating agent like cyclophosphamide have demonstrated lifetime response rates of 60% to 70% in advanced ovarian cancer. Notably, 30% to 50% of patients experience complete clinical responses, with 10% to 30% achieving complete pathologic resolutions. These statistics highlight the significant impact of combination therapies on treatment outcomes.

Survival Rates

The long-term survival rates for patients on cisplatin-based regimens are promising, with 10-year overall survival estimates ranging from 20% to 30%. This underscores

the importance of effective chemotherapy in prolonging life for patients with advanced ovarian cancer (Kubicek et al., 2011).

Adverse Effects of Chemotherapy

Despite the benefits of chemotherapy, a significant number of patients experience adverse effects that can impact their quality of life and treatment adherence. The most commonly reported side effects include:

Fatigue and Weakness: Up to 95% of patients report feeling weak, and 90% experience exhaustion. These symptoms can severely limit daily activities and overall well-being.

Gastrointestinal Issues: Nausea (77%), vomiting (75%), and dry mouth (74%) are prevalent, affecting patients' ability to maintain adequate nutrition and hydration.

Hair Loss: Approximately 76% of patients experience alopecia, which can have psychological implications, particularly for women dealing with the societal stigma of hair loss.

Pain and Neurological Effects: Other significant adverse events include oral lesions (47%), neuralgia (49%), and less frequently reported issues such as diarrhea (31%), abdominal cramping (40%), headaches (43%), anaemia (37%), and memory disturbances (14%) (Alpert & Jacobson, 2019).

Impact on Treatment Adherence

The severity of chemotherapy-related symptoms can lead to interruptions in medical management. Factors such as social, economic, and systemic healthcare issues can result in delays, dose reductions, or even discontinuation of treatment. These interruptions may ultimately lead to suboptimal care for patients with ovarian cancer.

Quality of Life

The interference of side effects with daily activities can diminish patients' quality of life, causing distress and impacting their ability to adhere to treatment protocols.

Healthcare System Challenges: Research highlights that the cumulative burden of adverse effects, alongside external factors, complicates treatment adherence. For example, patients may prioritize managing side effects over continuing therapy, leading to potential gaps in care (Gorey et al., 2014; Wyatt et al., 2015).

D. FOLLOW-UP FOR MALIGNANT EPITHELIAL TUMORS

There is no evidence to show that intensive clinical monitoring during follow-up after completion of primary surgery and chemotherapy with early initiation of chemotherapy in asymptomatic women with recurrent disease improves overall survival or quality of life. In asymptomatic patients with CA125 progression and small volume disease or no radiological evidence of recurrence, it is appropriate to delay starting chemotherapy. However, there may be a subset of patients who are suitable for secondary debulking surgery at the time of recurrence. The objectives of follow-up include:

• Early recognition and prompt management of treatment-related complications, including provision of psychological support.

• Early detection of symptoms or signs of recurrent disease.

• Collection of data regarding the efficacy of any treatment and the complications associated with those treatments in patients treated in clinical trials.

• Promotion of healthy behavior, including screening for breast cancer in patients with early-stage disease, and screening for cervical cancer in patients having conservative surgery.

There are no evidence-based guidelines regarding the appropriate follow-up schedule. During the first year following treatment, patients are seen every 3 months with a gradual increase in intervals to every 4–6 months after 2 years and then annually after the fifth year. At each follow-up, the patient should have her history retaken, including any change in family history of cancers and attention to any symptoms that could suggest recurrence; a physical and pelvic examination should be performed. This is an opportunity to refer appropriate patients for genetic testing if it was not done at diagnosis or during treatment. CA125 has traditionally been checked at regular intervals, but there has been debate regarding the clinical benefit of using CA125 progression alone as a trigger for initiating second-line chemotherapy. A large (MRC OV05-EORTC 55955) study showed that treating asymptomatic patients with recurrent ovarian cancer with chemotherapy on the basis of CA125 progression alone did not improve survival, and early treatment in asymptomatic patients had a negative impact on quality of life. This study has generated considerable debate regarding the use of CA125 for follow-up, but most agree that it is reasonable not to immediately initiate treatment unless there is a clear clinical indication to do so. The timing of treatment should depend on the patient's symptoms, in addition to clinical and radiological findings.

Imaging tests such as ultrasonography of the pelvis, CT, MRI, and/ or positron emission tomography (PET) scans should be performed when the clinical findings or the tumor markers suggest possible recurrence.

There appears to be no benefit to initiating chemotherapy in an asymptomatic patient with recurrent disease based only on rising CA125 levels in the absence of clinical symptoms or radiological evidence of recurrence. In asymptomatic patients with small volume disease and no radiological evidence of recurrence, close observation is a

reasonable option, as well as entry into an appropriate clinical trial or possibly a trial of tamoxifen may be considered. A Cochrane database systematic review of tamoxifen in unselected women with recurrent ovarian cancer reported a 10% objective response and a 32% disease stabilization rate. The patients treated were heterogeneous and included asymptomatic patients with rising CA125 levels, and symptomatic patients with chemotherapy-resistant disease who had been heavily pretreated and had a poor performance status. GOG 198 compared tamoxifen and thalidomide in women with recurrent Stage III or IV epithelial ovarian, tubal, or peritoneal cancer who had completed first-line chemotherapy, and who subsequently had Gynecologic Cancer InterGroup (GCIG) documented CA125 progression. The study reported that women who received thalidomide had a 31% increased risk of disease progression (HR 1.31), compared with those who were given tamoxifen. The median progression-free survival was 3.2 months in the thalidomide group versus 4.5 months in the tamoxifen group. This suggests that tamoxifen may have a role in selected patients with a rising CA125 level, and the relationship between estrogen receptor positivity and benefit of tamoxifen in this patient population is being evaluated in current studies. In the PARAGON trial the role of anastrozole in 54 asymptomatic patients with rising CA125 was investigated in a phase 2 design. The primary endpoint was clinical benefit at 3 months and this was observed in 18 patients (34.6%; 95% CI, 23%–48%). The median duration of clinical benefit was 6.5 months (95% CI, 2.8–11.7). Most patients progressed within 6 months of starting anastrozole but 12 (22%) continued treatment for longer than 6 months. The role of hormonal therapy in this setting remains uncertain.

A follow-up surveillance regime for patients with Stage IA dysgerminoma is outlined as per:

- Surveillance:

  Baseline CT chest, abdomen, and pelvis, if not performed preoperatively

  Repeat CT or MRI, abdomen and pelvis at 3 months after surgery

  Repeat CT or MRI abdomen plus pelvis at 12 months

  Pelvic ultrasound alternate visits (not when having CT scan) for 2 years if non dysgerminoma and for 3 years if dysgerminoma

  Chest X-ray at alternate visits

- Clinical examination:

  1st year: Monthly

  2nd year: 2 monthly

  3rd year: 3 monthly

  4th year: 4 monthly

  Years 5–10: 6 monthly

- Tumor marker follow-up (Samples: serum AFP and hCG, LDH and CA 125 (regardless of initial value))

  0–6 months: 2 weekly

  7–12 months: 4 weekly

  12–24 months: 8 weekly

  24–36 months: 12 weekly

  36–48 months: 16 weekly

  48+ months: 6 monthly until year 10 (Berek J.S, 2021).

WHO/ECOG performance status

The World Health Organization had adopted a performance status score of patients from the Eastern Cooperative Oncology Group (ECOG) (published in 1982) to be considered for selection of specific cancer individuals in clinical trials and adequate care.

WHO/ECOG performance status is useful in deciding who is fit for radical radiotherapy or for the quite toxic chemotherapy required for non-small cell lung cancer. Grade 3 and 4 are automatically unfit for the potentially curative therapies but may be suitable for palliative regimes. Grade 2 patients can often tolerate chemotherapy or radiotherapy but most will not tolerate surgery.

The WHO/ECOG performance status is relevant in considering eligibility for the radical radiotherapy or fairly toxic chemotherapy. Grade 3 and 4 subjects are obviously unsuitable for possibly curative treatments but may be acceptable for palliative schemes. Grade 2 individuals can generally withstand chemotherapy or radiotherapy, but most will not be able to cope with surgery.

The ECOG performance status is not a good discriminator for fitness for surgery.

Table 1: WHO/ ECOG performance status score

ECOG	Description
0	Fully active, able to carry on all pre-disease performance without restriction.
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work.
2	Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours.
3	Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours.
4	Completely disabled. Cannot carry on selfcare. Totally confined to bed or chair
5	Dead

2.7 Determinants of Loss to follow-up

Most sub-Saharan countries have not devoted as considerable attention to cancer control as they have to other non-communicable diseases like diabetes and hypertension. This makes it difficult for patients to be assessed and to obtain adequate care for their conditions.

WHO and other contributors have outlined the factors that contribute to inadequate cancer control, such as difficulties in reaching health facilities, limited financial resources, travel constraints, and lack of awareness of risk factors. Very few studies have been conducted in Africa to assess the extent of and motives for dropping out of cancer services, from the initial identification of the disease to the receipt of therapy and completion of the appropriate follow-up sessions. (Tchounzou R et al, 2019).

Among the major program and patient-oriented considerations in the treatment of gynecological cancer is post-treatment monitoring. For patients undergoing treatment for advanced disease, serious side effects and complications of the illness can occur that necessitate follow-up and involvement of oncology specialists. Several studies have related socio-demographic aspects such as age, religion, marital status, distance from the treatment center and the educational status to the LTFU of cancer treatment. (Misu P et al, 2010) (Ezechi et al, 2014)

Little of this research, though, has been carried out in rural areas, so not much is understood about LTFU for gynecological malignancy patients in rural areas. In a survey conducted in Rwanda, they reported that the single factor associated with earliest LTFU in the controlled study was the stage of the cancer at presentation. Individuals with stage 3 or 4 cancer at presentation were significantly more eligible to LTFU following the primary consultation than those with stage 1 or 2 cancer, but this

distinction was marginally statistically relevant. Numerous papers have examined the relationship between advanced disease at the time of diagnosis and poor survival as opposed to LTFU. A limited number of trials that evaluated stage of presentation and LTFU in South India revealed similar relationships between late stage of the cancer and LTFU. (Habinshuti P, et al. 2020)

Patients who enter the health care system at a more advanced stage of the disease may choose to receive treatment in other facilities if a cure in the regular health facility is judged improbable. In addition, other studies have shown that a considerably larger percentage of patients whose stage was undetermined at presentation were more likely to LTFU than patients whose condition was classified as stage 1 or 2, even though the figures are small and the confidence interval wide. An Indian study reported that individuals with an unstaged cancer had a high probability of LTFU, which is consistent with a Nigerian study reporting that the vast proportion of patients had LTFU before staging (Misu P et al. 2010).

An unadjusted review demonstrated that HIV-positive patients were less likely to be LTFU after a first consultation than HIV-negative patients, but this result did not remain significant after adjustment for cancer stage at presentation. This non-significant but evocative relationship seems to be attributable to the possibility that HIV-positive patients may already be receiving treatment in an HIV care centre and are already involved in their care. Some earlier papers also showed comparable results, while a study in southwestern Nigeria reported no significant correlation between HIV status and LTFU in patients with cervical cancer. An additional paper highlighted important relationships between domicile and delayed LTFU. People coming far regions were more likely to have LTFU than those coming from nearest the cities. This observation is in accordance with previous studies that have indicated

that patients who travel longer distances to the health care facility are more susceptible to be LTFU. Patients with decreased physical performance (ECOG 2+) or with missing ECOG were less prone to be LTFU after their second appointment in comparison to those with an ECOG of 0. Patients who received palliative treatment were much more susceptible to LTFU than patients who received curative care. In certain systems, palliative care services are offered in nearby local facilities to minimize the cost of travel (Misu P et al. 2010).

CHAPTER THREE: METHODOLOGY

3.1 Study design

This study was a retrospective study.

3.2 Study Area

The study was carried out at Moi Teaching and Referral Hospital (MTRH), the second biggest national referral hospital in the Republic of Kenya, located in the western part of the country, Uasin Gishu County, Eldoret city. MTRH hosts a gynecological oncology service that has an outpatient follow-up unit and an inpatient unit for women in need with a capacity of 32 beds.

3.3 Study Population

Records of patients with ovarian cancer initiated on treatment in the gynecologic oncology service in the period of study were reviewed.

3.4 Study period

Data was reviewed for patients who were seen between 1st January 2015 to 31st December 2022.

3.5 Eligibility Criteria

3.5.1 Inclusion Criteria

Data for patients with the following characteristics were reviewed:

- Patients with a diagnosis of ovarian cancer made between 1st January 2015 and 31st December 2022.
- Patients who have been initiated on treatment between 1st January 2015 and 31st December 2022.

3.5.2 Exclusion criteria

Women on planned palliative chemotherapy at the time of diagnosis.

3.6 Sampling Size

To have enough numbers to determine the proportion loss to follow-up, the Fisher's formula was utilized to calculate the sample size: $n = \frac{z_{\alpha}^2 p(1-p)}{d^2}$, where n is the sample size, z_{α} is the normal deviation from the desired confidence interval.

P is the proportion of the population with the characteristic of interest. Here we used 15.1% (Habinshuti P et al., 2020), the proportion of early loss to follow-up in ovarian cancer.

1-P=q, is the proportion of the population without the desired characteristic.

d is the degree of precision. We used 5% as degree of precision.

Then, $n = \frac{(1.96)^2 \times 0.151\,(1-0.151)}{(0.05)^2}$ = 196.9. i.e we select 197 cases.

To determine factors associated with Loss to follow-up in the literature k=6 (Habinshuti P et al., 2020) factors have been found to be associated. Thus, to have enough power, we used:

$n = \frac{10 \times k}{p} = \frac{10 \times 6}{0.15} = 400$

Since the sample for factors was higher, thus we reviewed 400 records to address all the objectives.

3.7 Sampling Methods

A total of 518 records of women who were initiated on treatment for ovarian cancer at Moi Teaching and Referral Hospital (MTRH) between January 2015 and December 2022 were utilized for this study. A consecutive recruitment method was employed, with the sampling interval calculated as follows:

- Total Population (N): 518
- Desired Sample Size (n): 400
- Sampling Interval (K): $K = \frac{N}{n} = \frac{518}{400}$ = 1.29 ~ K= 1

Since K rounds down to 1, every patient record was sampled consecutively. This approach ensured that all eligible patients were included until the target sample size of 400 was achieved.

3.8 Data Collection

Patients were identified using the hospital register, and the files of all patients managed for ovarian cancer were retrieved. The data collection process involved the review of the patients' files to gather all necessary information, using a researcher-designed questionnaire. No interview was conducted.

The information collected included:

- Demographic Data: Age, marital status, education level, and socioeconomic status.
- Social and Economic Data: Employment status, income level, and access to healthcare services.
- Gynecological and Obstetrical History: Previous pregnancies, menstrual history, and any relevant gynecological conditions.
- Current Pathology History: Details of the ovarian cancer diagnosis, treatment modalities, and follow-up records

3.9 Data Management

Data was entered using SPSS version 21 and analyzed by using Stata Software version 14.0. Quantitative variables are presented as mean ± standard deviation when the distribution was normal or as median with interquartile range when the distribution was not symmetric. To compare the means between 2 variables, the Student or Mann-Whitney tests were used, while the Pearson Chi2 test was used to

compare the proportions. For multiple comparisons, we used the Kruskal-Wallis test. Probability (p-value) < 0.05 was considered statistically significant.

3.10 Data Analysis

Preliminary analysis involved a summary of the study participants' demographic and clinical characteristics. Categorical variables such as education level, occupation, and marital status were summarized as frequencies and their corresponding percentages. Numerical variables such as age and distance from home to hospital were summarized using means/ median and their corresponding standard deviations/ interquartile ranges.

Further analysis was done as per each objective, as summarized in the table below.

Objective	**Outcome**	**Independent**	**Statistical Test**
One: To determine the Loss to follow-up rate and treatment interruptions rate among ovarian cancer patients initiated on treatment.	LTFU (Yes or No) & treatment interruption (yes or no) – binary categorical variable	-	Frequency and proportion
Two: To determine socio-demographic, socioeconomic and clinical characteristics of patients with ovarian cancer who interrupted their treatment or were lost during follow-up at MTRH	Education level, marital status, age, Occupation religion– categorical variable		Frequency and proportion for categorical and means and standard deviation for continuous.
Three: To determine the patient-level factors associated with loss to follow-up and treatment interruptions among women receiving treatment for ovarian cancer at MTRH	LTFU (Yes or No) & treatment interruption (yes or no) – binary categorical variable	Age & distance to hospital – Numerical HIV status, education level, religion, occupation	Mann Whiney U test/ ttest Chi Square test /Fisher's test Binary Logistic regression

The study findings were presented using figures, tables, and graphs. All the test results were considered statistically significant if p- value was less than 0.05.

3.10 Ethical Considerations

The required documents were submitted to Moi Teaching and Referral Hospital/Moi University - Institutional Research and Ethical Committee (MTRH/MU-IREC) and approved (0004363).

Privacy was maintained at all levels of the study.

The data was protected using a password on the computer, and confidentiality was maintained, including removing identifiable parameters in case of sharing the information.

CHAPTER FOUR: FINDINGS

4.1 INTRODUCTION

The findings are based on 400 ovarian cancer patients who were diagnosed and initiated on treatment between 1st January 2015 and 31st December 2022 and followed for five years. Records of patients with ovarian cancer initiated on treatment in the gynecologic oncology service during the period of study were reviewed.

4.2 Socio-Demographic, Socioeconomic, and Clinical Characteristics

Table 2: Socioeconomic-demographic characteristics

Characteristics	Values
Age in groups	
Missing	1
< 40 years	103 (25.8%)
40-59 years	205 (51.4%)
≥60 years	91 (22.8%)
Employment status	
Missing	6
Unemployed	291 (73.9%)
Employed	103 (26.1%)
Marital status	
Missing	8
Single	54 (13.8%)
Married	314 (80.1%)
Widowed/divorced	24 (6.1%)
Level of education (completed)	
Missing	13
No formal education	22 (5.7%)
Primary education	136 (35.1%)
Secondary education	107 (27.6%)
Tertiary education (college & university)	122 (31.5%)
Residence	
Missing	11
Urban	142 (35.9%)
Rural	253 (64.1%)
Religion	
Missing	2
Christian	392 (98.5%)
Muslim	6 (1.5%)
Distance between residence and hospital (kms)	
Missing	11
Median (IQR)	100.0 (45.0-150.0)
Range	3 – 1010
Transport cost for a trip to the hospital (Kes)	
Missing	11
Median (IQR)	400.0 (150.0-500.0)
Range	20 – 2500
Health insurance	
Missing	14
Not active	35 (9.1%)
Active	351 (90.9%)

The age of patients ranged from 6 to 87 years, with a mean of 48.6 ± 15.1 years. Half (51.4%) of the patients were aged between 40-59 years, and 22.8% were aged 60 years and above. A majority (73.9%) were unemployed and married (80.1%), with 90.9% having active health insurance. Rural residents contributed 64.1% of the patients, with a distance from residence to MTRH ranging from 3 to 1010 km, and a median distance of 400 km (IQR 45-150).

Table 3: Clinical characteristics

Characteristics	Value
Parity	
Missing	43
Median (IQR)	4.0 (2.0-5.0)
Range	0 – 13
Duration of chief complaint before diagnosis in months	
Missing	22
<= 6	256 (67.7%)
7-12	88 (23.3%)
> 12	34 (9.0%)
Was staging done	
Missing	6
No (unstaged)	45 (11.4%)
Yes (staged)	349 (88.6%)
Clinical staging	
Missing	51
Stage I	132 (37.8%)
Stage II	43 (12.3%)
Stage III	107 (30.7%)
Stage IV	67 (19.2%)
Recurrence status	
Missing	1
No	357 (89.5%)
Yes	42 (10.5%)
HIV status	
Missing	7
Negative	383 (97.5%)
Positive	10 (2.5%)
Hypertension	
No	374 (93.5%)
Yes	26 (6.5%)
Diabetes Mellitus	
No	395 (98.8%)
Yes	5 (1.3%)
Duration of Treatment in weeks	
Missing	12
Median (IQR)	18.0 (3.0-24.0)
Range	0 – 86
Type of treatment	
Missing	4
chemotherapy only	49 (12.4%)
surgery only	69 (17.4%)
adjuvant chemotherapy	235 (59.3%)
Neoadjuvant chemotherapy	43 (10.9%)
Duration of follow-up in months	
Missing	8
Median (IQR)	9.0 (2.0-24.0)
Range	0 – 100

The parity ranged from 0 to 13, with a median parity of 4 (IQR 2-5), and all (100%) patients had no family history of ovarian cancer. Duration of complaints before diagnosis ranged from 1 to 25 months, with a median of 5 months (IQR 3.7), where a majority (67.7%) had a duration of less than 7 months, and a large (49.9%) had stage III or IV ovarian cancer. The recurrence rate was 10.5%. The median duration of treatment was 18 weeks. About 2.5% were seropositive, 6.5% had hypertension, and 1.3% had diabetes. A majority (59.3%) were given adjuvant chemotherapy, 17.4% had surgery only, 12.4% had chemotherapy only, while 10.9% had neoadjuvant chemotherapy.

4.3 Loss to Follow-Up Rate and Treatment Interruption Rate

Table 4: Loss to follow-up and treatment interruptions

Variables	Total
Disease outcome	
Missing	1
Alive	152 (38.1%)
Died	45 (11.3%)
LTFU/TI	202 (50.6%)
Treatment interruption	
Missing	1
No	396 (99.2%)
Yes	3 (0.8%)

The loss to follow-up and treatment interruption rate was 2.995 [95% CI 2.589 – 3.464] per 100 persons per month, i.e., out of 100 patients, 3 patients will be lost to follow-up or interrupt the treatment in a month.

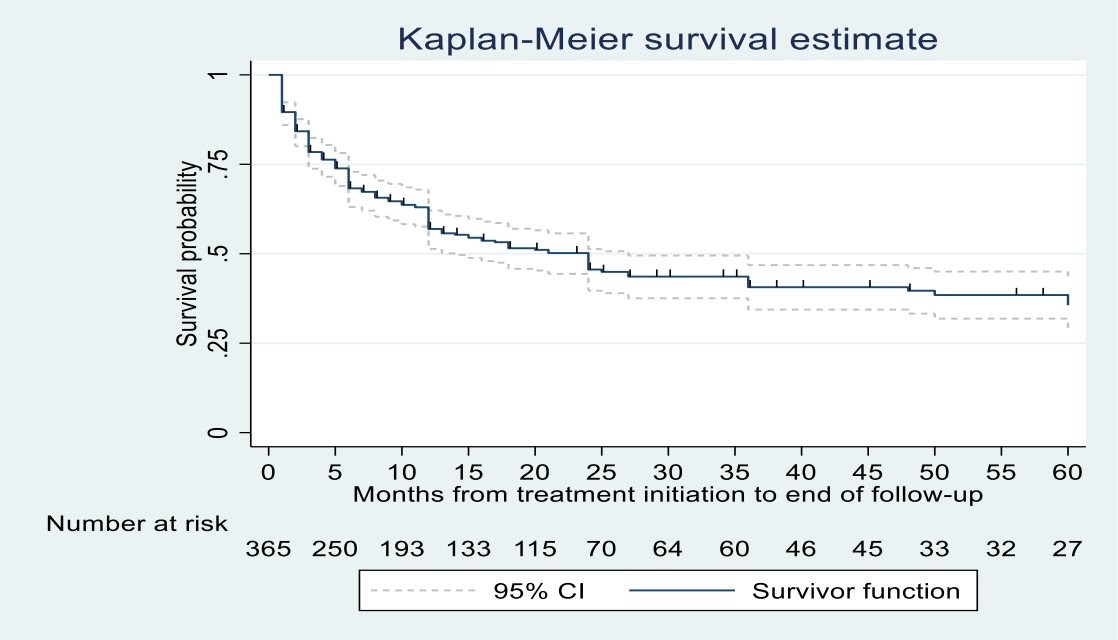

Figure 1: Probabilities of loss to follow-up

The median survival time is 24 months (2 years) with a likelihood of survival (not lost to follow-up) by the 5th year at 35.6%.

4.4 Patient-Level Factors Associated with Loss to Follow-Up and Treatment Interruption

Table 5: Demographic and clinical characteristics by lost to follow-up

Variables	Lost to follow-up		cHR [95%CI]	p-value	aHR [95%CI]	p-value
	No (n=197)	Yes (n=202)				
Age in groups						
Missing	0	1				
< 40 years	43 (41.7%)	60 (58.3%)	Ref		2.37[1.16-4.86]	0.018
40-59 years	115 (56.1%)	90 (43.9%)	0.63[0.45-0.89]	0.009	1.73[0.99-3.00]	0.051WH
≥60 years	40 (44.0%)	51 (56.0%)	1.00[0.67-1.49]	0.991	Ref	
Employment status						
Missing	3	3				
Unemployed	117 (40.2%)	174 (59.8%)	Ref		2.36[1.22-4.58]	0.011
Employed	78 (75.7%)	25 (24.3%)	0.24[0.16-0.38	<0.001	Ref	
Marital status						
Missing	2	6				
Single	15 (27.8%)	39 (72.2%)	Ref		1.76[0.93-3.33]	0.081
Married	172 (54.8%)	142 (45.2%)	0.43[0.30-0.62]	<0.001	Ref	
	9 (37.5%)	15 (62.5%)	0.86[0.47-1.60]	0.639	2.17[1.17-	0.014

Widowed/Divorced					4.04]	
Level of education						
Missing	6	7				
No formal education	7 (31.8%)	15 (68.2%)	Ref		Ref	
Primary education	56 (41.2%)	80 (58.8%)	0.59[0.32-1.10]	0.097	1.70[0.68-4.25]	0.258
Secondary education	57 (53.3%)	50 (46.7%)	0.35[0.19-0.67]	0.001	1.81[0.71-4.60]	0.216
Tertiary education	72 (59.0%)	50 (41.0%)	0.32[0.17-0.60]	<0.001	1.95[0.78-4.89]	0.153
Residence						
Missing	0	5				
Urban	99 (69.7%)	43 (30.3%)	Ref		Ref	
Rural	99 (39.1%)	154 (60.9%)	3.21[2.25-4.57]	<0.001	1.64[0.93-2.89]	0.090
Distance to hospital						
Missing	4	6				
Median (IQR)	100.0 (10.0-130.0)	125.0 (94.0-170.0)	1.00[1.00-1.00]	<0.001	1.00[1.00-1.00]	<0.001
Health insurance						
Missing	2	12				
Not active	5 (14.3%)	30 (85.7%)	Ref		3.94[2.09-7.41]	<0.001
Active	191 (54.4%)	160 (45.6%)	0.30[0.20-0.45]	<0.001	Ref	
Duration of chief complain before diagnosis category						
Missing	4	18				
<= 6 months	152 (59.4%)	104 (40.6%)	Ref		Ref	
7-12 months	31 (35.2%)	57 (64.8%)	1.92[1.36-2.71]	<0.001	1.61[1.05-2.45]	0.027
> 12 months	11 (32.4%)	23 (67.6%)	1.71[1.03-2.84]	0.036	1.25[0.69-2.26]	0.465
Clinical staging						
Missing	13	38				
Stage I	83 (62.9%)	49 (37.1%)	Ref		Ref	
Stage II	29 (67.4%)	14 (32.6%)	0.79[0.42-1.48]	0.459	0.79[0.40-1.55]	0.492
Stage III	37 (34.6%)	70 (65.4%)	2.33[1.60-3.39]	<0.001	1.41[0.83-2.37]	0.200
Stage IV	36 (53.7%)	31 (46.3%)	1.63[0.97-2.77]	0.067	1.20[0.62-2.34]	0.586
Recurrence status						
Missing	0	1				
No	174 (48.7%)	183 (51.3%)	Ref			
Yes	24 (57.1%)	18 (42.9%)	0.70[0.43-1.16]	0.165		
HIV status						
Missing	1	6				
Negative	193 (50.4%)	190 (49.6%)	Ref			

Positive	4 (40.0%)	6 (60.0%)	1.53[0.68-3.47]	0.303		
Any existing chronic illness						
Missing	0	0				
No	181 (50.0%)	181 (50.0%)	Ref			
Yes	17 (44.7%)	21 (55.3%)	1.33[0.84-2.09]	0.224		
Type of treatment						
Missing	3	1				
Chemotherapy only	33 (67.3%)	16 (32.7%)	Ref		Ref	
Surgery only	23 (33.3%)	46 (66.7%)	3.42[1.80-6.48]	<0.001	3.11[1.38-6.99]	0.006
Adjuvant chemotherapy	126 (53.6%)	109 (46.4%)	1.77[0.97-3.24]	0.062	1.64[0.80-3.35]	0.173
Neoadjuvant chemotherapy	13 (30.2%)	30 (69.8%)	4.02[2.05-7.90]	<0.001	2.21[0.94-5.22]	0.070

Age, employment status, marital status, distance to hospital, health insurance, duration of complaint, and type of treatment were significantly associated with loss of follow-up and treatment interruption. Adjusting for other variables in the model, young patients (<40 years) were 2.37 times more at risk of being lost to follow-up and treatment interruption than those aged 60 years and above. The unemployed were 2.36 times more at risk than employed patients, while widowed/divorced patients were 2.17 times more at risk of loss to follow-up than married patients, and those with no active health insurance were 3.94 times more at risk of loss to follow-up.

CHAPTER FIVE: DISCUSSION

5.1 Discussion of Sociodemographic, Socioeconomic, and Clinical Characteristics

The sociodemographic and socioeconomic characteristics of ovarian cancer patients at Moi Teaching and Referral Hospital provide valuable insights into the population's circumstances and the potential barriers they face in accessing care.

5.1.1 Age Distribution

The age distribution of ovarian cancer patients reveals critical insights into the demographics affected by this disease. A substantial 51.4% of patients fall within the age range of 40-59 years, indicating that this is a prevalent age bracket for diagnosis. This aligns with findings from Siegel et al. (2020), based on data from the United States, which report that approximately 60% of ovarian cancer cases are diagnosed in women aged 40-64, highlighting the significance of this demographic.

Interestingly, 15% of patients in this study are under 40 years old, indicating that ovarian cancer can significantly affect younger women. This prevalence is notably higher than the 2-5% range reported by GLOBOCAN (2020), which suggests that ovarian cancer is primarily associated with older age groups. Additionally, 33.6% of patients are aged 60 years and above, reflecting the increased risk associated with advancing age. Research by Tinker et al. (2019) in Canada further supports the notion that the incidence of ovarian cancer rises significantly in women over 60.

The mean age of diagnosis is reported to be 48.6 years, further emphasizing that many women are diagnosed during their prime years, which is a crucial period for family and career development. Research by Chan et al. (2019), conducted in the United Kingdom, indicates that early detection significantly improves survival rates, making

it imperative to implement educational initiatives that promote awareness of ovarian cancer symptoms and risk factors among women in this age group.

Moreover, healthcare providers should consider age-specific approaches when developing screening guidelines and treatment plans. A study by Kauff et al. (2016) in the United States emphasizes that younger women, who may face unique challenges related to fertility preservation, require tailored discussions about their options. Meanwhile, older women often need support managing comorbidities alongside cancer treatment, highlighting the importance of a multifaceted approach to patient care.

5.1.2 Employment Status

A striking 73.9% of ovarian cancer patients are unemployed, reflecting broader economic challenges faced by this population. This high unemployment rate significantly impacts patients' ability to access healthcare, including transportation and treatment costs. Research indicates that financial strain is a critical barrier to accessing cancer care. For instance, a study by Nussbaum et al. (2021) conducted in the United States found that 62% of ovarian cancer patients reported experiencing financial toxicity, leading to delays in treatment and increased psychological distress.

Unemployment also adversely affects mental health. A study by Rogers et al. (2022) in the United Kingdom reported that 58% of unemployed women with ovarian cancer experienced high levels of anxiety, while 47% reported depressive symptoms, complicating their ability to engage in treatment and recovery. Furthermore, Berek et al. (2020), based on research in the United States, highlighted that 65% of ovarian cancer patients struggle with out-of-pocket costs, which can become overwhelming, especially for those without stable income.

This situation underscores the necessity for supportive services, such as financial assistance programs and job training initiatives, to help patients maintain their employment status and facilitate access to necessary medical care. Programs providing financial support for transportation and treatment costs can alleviate some burdens faced by unemployed patients. Additionally, a study by Metzger et al. (2021) found that vocational rehabilitation services improved employment outcomes for 72% of cancer survivors in Canada, emphasizing the importance of integrating these services into oncological care.

5.1.3 Marital Status

The majority of ovarian cancer patients (80.1%) are married, suggesting strong support systems that can be beneficial for emotional and logistical support during treatment. Research indicates that social support plays a crucial role in the well-being of cancer patients. For instance, a study in India by Shanta et al. (2018) found that 75% of married patients reported higher levels of emotional support, positively correlating with treatment adherence and better mental health outcomes.

However, the presence of single and widowed/divorced individuals (19.9%) indicates that some patients may face additional challenges related to social support. In a study conducted in Nigeria by Adebamowo et al. (2020), 32% of single and divorced women with ovarian cancer experienced significant feelings of isolation, negatively impacting their overall well-being and treatment adherence. The study highlighted that cultural factors often influence the availability of support networks for these individuals, leading to increased vulnerability.

Moreover, financial burdens can differ significantly based on marital status, particularly in lower-income settings. Research by Adeyemi et al. (2021) in Ghana

revealed that 60% of single ovarian cancer patients struggled more with the financial aspects of care, as they often lack a partner to share these responsibilities, exacerbating their emotional and financial stress during treatment.

5.1.4 Education Level

The educational attainment of ovarian cancer patients shows a concerning trend, with 5.7% being illiterate and a significant portion (35.1%) having only primary education. Limited education can hinder health literacy, affecting patients' understanding of their diagnosis, treatment options, and the importance of follow-up care.

In a study conducted in India by Gupta et al. (2019), it was found that 40% of ovarian cancer patients had only primary education, which correlated with lower health literacy levels. Patients with limited education often struggle to comprehend complex medical information, leading to challenges in making informed decisions regarding their treatment.

Similarly, research from Nigeria by Adebamowo et al. (2020) reported that 22% of ovarian cancer patients were illiterate, with those lacking formal education more likely to experience difficulties in understanding their treatment plans. The study emphasized that lower educational levels are associated with poorer health outcomes, as patients may not fully adhere to prescribed treatments or follow-up care.

In contrast, a study from Brazil by Da Silva et al. (2021) found that only 15% of ovarian cancer patients had higher education, indicating that a significant number still face barriers in accessing health information. This lack of education can lead to increased anxiety and uncertainty during the treatment process, further complicating patient care.

5.1.5 Residence

The data show that 64.1% of ovarian cancer patients reside in rural areas, which poses unique challenges regarding access to healthcare services. The median distance to the hospital is reported at 400 km, with some patients traveling up to 1010 km to receive care. This significant logistical barrier can hinder regular follow-up visits and disrupt treatment continuity.

Research conducted in India by Sharma et al. (2020) found that 70% of ovarian cancer patients in rural regions faced difficulties accessing specialized care, contributing to delays in diagnosis and treatment. The study highlighted that long travel distances often lead to missed appointments, adversely affecting patient outcomes.

In Nigeria, a study by Okwuosa et al. (2021) reported similar findings, with 65% of women living in rural areas experiencing challenges related to transportation and healthcare access. The authors noted that these logistical issues often resulted in lower treatment adherence, further complicating the management of ovarian cancer.

To address these challenges, strategies such as mobile health clinics or telemedicine could be implemented. A study by Makhdoom et al. (2022) in South Africa demonstrated that telemedicine significantly improved access to care for rural patients, with 80% reporting greater satisfaction with their treatment process and increased adherence to follow-up appointments.

5.1.6 Religion

The overwhelming majority of ovarian cancer patients (98.5%) identify as Christian, reflecting the predominantly Christian demographic of Western Kenya, the catchment area for Moi Teaching and Referral Hospital (MTRH). While this finding may not significantly influence health beliefs or treatment preferences in this context, it highlights the cultural backdrop against which these patients navigate their treatment journeys. Previous research, such as a study by McCaffrey et al. (2021) in the United States, indicates that religious beliefs can often provide emotional support during treatment, contributing to better psychological resilience among cancer patients.

In Nigeria, a study by Adebayo et al. (2020) highlighted that 90% of ovarian cancer patients utilized their religious beliefs as a source of comfort, with many attending church services regularly for spiritual and emotional support. This community engagement often fosters a supportive environment that can enhance treatment adherence and overall well-being.

Moreover, understanding the role of faith in patients' lives can help healthcare providers engage with them more effectively. A study by Johnson et al. (2022) in South Africa found that integrating faith-based support systems into cancer care improved treatment adherence by 75% among patients who actively participated in religious communities.

5.1.7 Transportation and Costs

The reported transportation costs for ovarian cancer patients have a median of 400 Kenyan shillings, which can represent a significant financial burden, particularly for those who are unemployed or have low incomes. The wide range of transport costs, ranging from 20 to 2500 Kenyan shillings, highlights the economic strain on patients.

A study conducted in Kenya by Mwangi et al. (2021) found that 50% of ovarian cancer patients faced difficulties in affording transportation, which often led to treatment interruptions. The study revealed that patients who spent more than 10% of their monthly income on transport were more likely to miss follow-up appointments and experience delays in receiving necessary treatments.

Additionally, research from Uganda by Obeng et al. (2020) reported similar findings, where 40% of patients indicated that high transportation costs were a barrier to consistent care, contributing to poorer health outcomes. These financial constraints can exacerbate existing health disparities and lead to increased mortality rates among vulnerable populations.

To address these costs, implementing subsidies or partnerships with local transportation services could facilitate greater access to necessary medical care. For instance, a pilot program in South Africa demonstrated that providing transportation vouchers to cancer patients improved appointment adherence by 60%, significantly enhancing treatment continuity (Smith et al., 2022).

5.1.8 Health Insurance

With 90.9% of ovarian cancer patients having active health insurance, this is a positive indicator of access to healthcare services. This high percentage suggests that most patients can access necessary treatments without facing overwhelming financial burdens. However, the remaining 9.1% without insurance represent a vulnerable group that may encounter significant treatment disruptions due to financial constraints.

Research conducted in Kenya by Ndungu et al. (2021) found that uninsured patients were 50% more likely to experience interruptions in their cancer treatment, leading to poorer health outcomes and increased mortality rates. The study emphasized that financial barriers often prevent these individuals from seeking timely medical care, exacerbating their health challenges.

Furthermore, a study by Mwanga et al. (2020) highlighted that uninsured patient reported higher levels of anxiety and stress related to their treatment options, which can negatively impact their overall well-being and treatment adherence.

To address this issue, strategies aimed at enrolling uninsured patients in health insurance programs, such as the Social Health Authority (SHA), could enhance treatment adherence and improve health outcomes. A pilot program in Kenya showed that enrolling patients in the health insurance programs, increased treatment adherence by 70% among previously uninsured individuals (Karanja et al., 2022).

5.1.9 Parity and Family History

The median parity of 4.0 (IQR 2.0-5.0) indicates that many women in this cohort have experienced multiple pregnancies. This finding is consistent with studies from countries like Uganda and Tanzania, where high median parities among ovarian cancer patients have also been reported. For instance, research by Obeng et al. (2020) noted a median parity of about 5, reflecting similar cultural and reproductive health dynamics. However, this high parity contradicts the understanding that increased parity is a protective factor against ovarian cancer.

While this cohort's findings align with many studies in low-resource settings that report low rates of family history of ovarian cancer, it is notable that a study by

Manda et al. (2021) in Mozambique found that over 90% of ovarian cancer patients had no familial links to the disease.

5.1.10 Duration of Chief Complaint Before Diagnosis

This research indicates that 67.7% of patients presented with symptoms for less than 7 months before diagnosis. In Uganda, Obeng et al. (2020) found that around 60% of patients reported symptoms for several months, highlighting significant awareness issues.

In Tanzania, Msuya, J. S., et al. (2020) revealed that approximately 70% of women were diagnosed with advanced-stage ovarian cancer, with nearly 50% diagnosed at stage III or IV.

Seropositivity

The reported seropositivity rate of 2.5% aligns with findings from studies in low-resource countries, such as Kumar et al. (2018), which reported a seropositivity rate of 2.7% in India. In these contexts, seropositivity can vary significantly based on local infectious disease prevalence. It is important to note that there is no established relationship between HIV seropositivity and ovarian cancer.

Hypertension

The prevalence of hypertension at 6.5% is relatively low compared to other studies in poor countries. For example, Akinwunmi et al. (2020) reported rates as high as 20% among ovarian cancer patients in Nigeria. This indicates that comorbidities like hypertension are common in cancer patients, particularly in regions where lifestyle factors and access to healthcare contribute to higher rates of cardiovascular diseases.

Diabetes

The diabetes prevalence of 1.3% is notably lower than findings from studies in Kenya by Nwankwo et al. (2019), which often report rates between 5% and 15% in ovarian cancer populations. This discrepancy may highlight differences in population demographics, lifestyle factors, and healthcare resource availability in these countries.

Treatment

Adjuvant chemotherapy was administered to 59.3% of patients, aligning with findings from a study in India by Bristow et al. (2013), which reported that approximately 70% of patients received adjuvant chemotherapy after optimal debulking surgery. This highlights the importance of adjuvant therapy in preventing recurrence, particularly in advanced-stage cases. In contrast, a study in Nigeria by Adebamowo et al. (2019) found a lower rate of 30%, indicating variations in treatment protocols and patient selection due to resource constraints.

Regarding surgery alone, 17.4% of patients underwent this treatment, consistent with findings from a study in Bangladesh by Miller et al. (2018), where 15% of patients were treated solely with surgery, particularly in early-stage cases. However, a study in Ethiopia by Kuo et al. (2020) reported a higher percentage of 25% receiving surgery alone, suggesting that treatment decisions might vary based on healthcare availability and practice patterns in low-resource settings.

The 12.4% of patients receiving chemotherapy alone is comparable to findings from a study in Egypt by Friedlander et al. (2017), which documented 10% of patients in similar situations. This underscores a common scenario where patients may not be candidates for surgery due to advanced disease or other comorbidities. Conversely, a

study in Pakistan by Liu et al. (2015) reported a higher percentage of 20%, indicating that some healthcare systems may have different thresholds for administering chemotherapy without surgical intervention.

For neoadjuvant chemotherapy, the 10.9% receiving this treatment is supported by a study in India by Keeney et al. (2016), which found that 12% of patients were treated with neoadjuvant therapy. This approach is increasingly recognized for its role in managing advanced ovarian cancer. However, a more recent study in Uganda by Pignata et al. (2020) indicated a higher usage of neoadjuvant chemotherapy at 18%, suggesting a growing acceptance of this strategy in clinical practice, even in low-resource settings.

Duration of Treatment and Follow-Up

The study findings indicate a median duration of treatment of 18 weeks and a follow-up period of 9 months in ovarian cancer management, providing valuable insights when compared to findings from various studies across different countries.

The 18-week treatment duration aligns with practices observed in India, where a study by Agarwal et al. (2017) noted similar durations for initial chemotherapy regimens. This period facilitates the timely administration of chemotherapy, allowing patients to assess their response to treatment quickly. In contrast, a study in Nigeria by Adebamowo et al. (2019) reported a treatment duration averaging around 10 weeks, which may reflect variations in healthcare resources and treatment protocols that impact patient management.

Regarding follow-up, the average duration of 9 months aligns with findings from Brazil, where Silva et al. (2018) reported an average follow-up period of 6 to 12

months for monitoring recurrence and managing late treatment effects. In contrast, a study conducted in Ethiopia by Kuo et al. (2020) found that follow-up durations were often shorter, averaging approximately 6 months, primarily due to challenges in accessing healthcare. This suggests that while follow-up care is critical, significant disparities exist, highlighting the need for improved support systems in low-resource settings. Notably, both the cited works fall short of the ideal 5-year follow-up period recommended for optimal monitoring and management of most ovarian cancer.

5.2 Discussion of Loss to Follow-Up Rate and Treatment Interruptions

5.2.1 Loss to follow-up and treatment interruption rate

Impact of Loss to Follow-Up

The loss to follow-up rate of 50.6% observed in this study is significantly higher compared to other contexts. For example, Benson et al. (2017) reported a LTFU rate of approximately 20% among ovarian cancer patients in the United States.

In contrast, studies in low-resource countries reveal similar or greater challenges. A study in Nigeria by Akinyemiju et al. (2019) found a LTFU rate of 47% among ovarian cancer patients, indicating systemic barriers in healthcare access.

Treatment Interruptions

The low percentage of treatment interruptions (0.8%) in this study is promising but contrasts with findings from Davis et al. (2021), who reported a 5% interruption rate in high-resource settings. In low-resource contexts, Nambatya et al. (2021) found that up to 10% of patients in Uganda experienced treatment interruptions due to side effects and lack of support systems.

5.2.2 Probabilities of loss to follow-up

Medium Survival Time

This study indicates a medium survival time of 24 months (2 years). This is similar to findings from Akinyemiju et al. (2019), who reported a median survival of around 18 to 24 months for ovarian cancer patients in Nigeria. They attributed these survival rates to late-stage diagnosis and limited access to healthcare.

Likelihood of Survival by Year 5

The likelihood of survival by year 5 in this study is 35.6%. In contrast, Khan et al. (2020) found that only about 30% of ovarian cancer patients in Pakistan survived beyond five years.

5.3 Discussion of patient-level factors associated with loss to follow-up and treatment interruptions

5.3.1 Demographic and clinical characteristics by lost to follow-up

Age

This study indicates that patients younger than 40 years are 2.37 times more likely to be lost to follow-up compared to those aged 60 years and above. This finding aligns with Akinyemiju et al. (2019), who reported that younger women in Nigeria faced a 30% higher rate of LTFU due to barriers such as childcare responsibilities and limited access to healthcare resources.

Employment Status

The data shows that unemployed patients are 2.36 times more at risk of LTFU than employed patients. Research by Khan et al. (2020) supports this, indicating that 45% of unemployed ovarian cancer patients in Pakistan cited financial instability as a reason for missing follow-up appointments. This highlights the critical role of employment in maintaining continuity of care.

Marital Status

Our findings state that widowed or divorced patients are 2.17 times more likely to be lost to follow-up than married patients. This is corroborated by Mokhtar et al. (2021), who found that 40% of unmarried patients in Egypt reported feeling isolated, which negatively impacted their motivation to seek follow-up care. In contrast, married patients often benefit from stronger social support networks.

Health Insurance

The data indicates that patients without active health insurance are 3.94 times more likely to be lost to follow-up. This finding resonates with Onyango et al. (2020), who observed that 60% of ovarian cancer patients in Kenya without health insurance experienced significant barriers to accessing care, leading to higher rates of LTFU. The financial burden of treatment without insurance can deter patients from attending follow-up appointments.

Distance to Hospital

While data in this study may not include specific metrics for distance, literature suggests significant impacts. Huang et al. (2018) found that patients living more than 10 kilometers from healthcare facilities were 48% less likely to attend follow-up appointments. Transportation challenges and associated costs were major barriers for these patients.

Duration of Complaint and Type of Treatment

Although not detailed in my findings, the duration of symptoms can be critical. Nambatya et al. (2021) reported that patients with prolonged symptoms often faced late-stage diagnoses, leading to a 25% higher likelihood of missing follow-up care due to the complexity of treatment regimens.

5.4 Strengths and Limitations of the Study

5.4.1 Strengths of the study

- The study addresses an important and under-researched area in ovarian cancer care, specifically loss to follow-up and treatment interruptions, which can significantly impact patient outcomes.
- Utilizing a retrospective cohort design allows for the analysis of existing data over several years, providing insights into trends and patterns in treatment adherence.
- With a target of 400 records, the study aims to include a substantial number of patients, enhancing the statistical power and reliability of the findings.
- The study was conducted in a level VI, ISO certified hospital
- The findings may help identify barriers to care and inform the development of targeted interventions to improve follow-up rates and treatment adherence, thereby enhancing patient outcomes.

5.4.2 Limitations of the Study

- While the study aims for 400 records, the sample may not be representative of all ovarian cancer patients, particularly those in rural areas or those who do not seek treatment.
- On medical records, some files had incomplete or missing data.
- We were not able to identify the patients who died outside the facility.
- External factors such as changes in healthcare policies, availability of resources, or public health crises (like the COVID-19 pandemic) could affect patient engagement but could not be accounted for in the study.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

1. The sociodemographic, socioeconomic, and clinical characteristics of ovarian cancer patients revealed significant insights into the population served at Moi Teaching and Referral Hospital. A substantial proportion of loss to follow-up and treatment interruption patients are in prime years (below 40 years), and high unemployment rates indicate economic barriers that directly impact healthcare access and treatment adherence.
2. The loss to follow-up rate was significantly high at 50.6%, underscoring a critical need for targeted interventions to enhance patient engagement and retention in care. Conversely, the treatment interruption rate was minimal at 0.8%, suggesting that once patients begin treatment, they are generally able to maintain adherence.
3. The analysis of patient-level factors associated with loss to follow-up identified key determinants, including younger age, unemployment, lack of health insurance, and distance from the hospital. These factors underscore the importance of addressing both economic and logistical barriers to improve follow-up rates and overall patient outcomes.

6.2 Recommendations

1. Government and Health System Policymakers

- Health Insurance and Funding: To maintain the health insurance coverage and funds for cancer care.
- To organize outreaches to improve access to treatment for patients in rural areas.

2. Public Health and Community Engagement

- Local Health Initiatives: Develop local health programs focusing on cancer prevention and early detection, targeting high-risk populations.

3. Healthcare Providers and Hospitals

- Patient Tracking and Telemedicine: Implement robust patient tracking systems and integrate community health services for follow-up of patient in remote areas.

4. Researchers and Academics

- Qualitative Studies: Conduct qualitative studies to explore patient experiences and to elucidate the mortality rate.

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APPENDICES

Appendix 1: Data Collection Tool

1. Sociodemographic and socioeconomic characteristics of study participants in Ovarian cancer:

- Age: - below 20 years
  - 20-34 years
  - 35- 44 years
  - 45 - 54 years
  - 55 - 64 years
  - 65 - 74 years
  - 75 - 84 years
  - above 85 years
- Parity:
- Address:
- Address category: - Rural
  - Urban
- Distance between residence and hospital:
- Transport price for a trip to the hospital
- Education level: - Above secondary
  - Below secondary
- Marital Status: - Married
  - Single
  - Widowed
- Religion: - Christian
  - Muslim
- Ethnic group:

- Employment Status: - Employed
  - Unemployed
- Health Insurance: - Active insurance
  - No insurance
- Family History of Ovarian Cancer

2. Disease-related characteristics:

- Duration of chief complaint prior to diagnosis: - less than 6 months
  - 6–11 months
  - 12 months or more
- Histological type of cancer
- Stage of the disease
- Recurrent
- HIV Status: - HIV-positive
  - HIV-negative
- Any coexisting chronic illness:
- Duration of treatment
- Type of treatment
- Duration of follow-up

Appendix 2: Budget

Items	**Quantity**	**Unit Price (Kshs)**	**Total (Kshs)**
Stationery & Equipment			
Printing Papers	15 reams	500.00	7,500.00
Black Cartridges	4	2,000.00	8,000.00
Writing Pens	1 packet	500.00	500.00
Flash Discs	1	2,000.00	2,000.00
Box Files	2	200.00	400.00
Document Wallets	4	50.00	200.00
Sub total			**18,700.00**
Research Proposal Development			
Printing drafts & final proposal	10 copies	500.00	5,000.00
Photocopies of the final proposal	6 copies	100.00	600.00
Binding of copies of the Proposal	5 copies	100.00	500.00
Sub total			**6,100.00**
Personnel			
Biostatistician	1	35,000.00	35,000.00
Grammar reviewer	1	50,000	50,000
Research assistant	2	20,000	40,000.00
Sub total			**125,000.00**
Thesis Development			
Printing of drafts and final thesis	10 copies	800.00	8,000.00
Photocopy of final thesis	6 copies	200.00	1,200.00
Binding of thesis	6 copies	300.00	1,800.00
Publication	1	20,000	20,000.00
Sub total			**31,000.00**
Total			**139,300.00**
Miscellaneous Expenditure			**10,000.00**
Grand Total			**190,800.00**

Appendix 3: IREC Approval

MTRH/MU-INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

Reference: IREC/350/2022
Approval Number: 0004363

13th March, 2023

Dr. Daniel Bisimwa Izuba,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Izuba,

DETERMINANTS OF LOSS TO FOLLOW UP AND TREATMENT INTERRUPTIONS AMONG WOMEN WITH OVARIAN CANCER AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

This is to inform you that ***MTRH/MU-IREC*** has reviewed and approved the above referenced research proposal. Your application approval number is ***FAN: 0004363***. The approval period is **13th March, *2023- 12th March, 2024***.
This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, Material Transfer Agreements (MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MTRH/MU-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MTRH/MU-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MTRH/MU-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from ***MOH at the recommendation of NACOSTI*** for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MTRH/ MU-IREC.***

Prior to commencing your study; you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and other relevant clearances from study sites including a written approval from the CEO-MTRH which is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH) and its satellites sites.

Sincerely,

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
13 MAR 2023
APPROVED

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SOD

Appendix 4: Hospital Approval (MTRH)

An ISO 9001:2015 Certified Hospital

MOI TEACHING AND REFERRAL HOSPITAL

Telephone: (+254)-0532033471/2/3/4
Fax: 0532061749
Email: ceo@mtrh.go.ke/ceosoffice@mtrh.go.ke

NANDI ROAD
P.O. BOX 3-30100
ELDORET,KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

13th March, 2023

Dr. Daniel Bisimwa Izuba,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

DETERMINANTS OF LOSS TO FOLLOW UP AND TREATMENT INTERRUPTIONS AMONG WOMEN WITH OVARIAN CANCER AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

You have been authorised to conduct research within the jurisdiction of Moi Teaching and Referral Hospital (MTRH) and its satellites sites. You are required to strictly adhere to the regulations stated below in order to safeguard the safety and well-being of staff, patients and study participants seen at MTRH.

1. The study shall be under Moi Teaching and Referral Hospital regulation.
2. A copy of MTRH/MU-IREC approval shall be a prerequisite to conducting the study.
3. Studies intending to export human bio-specimens must provide a permit from MOH at the recommendation of NACOSTI for each shipment.
4. No data collection will be allowed without an approved consent form(s) to participants unless waiver of written consent has been granted by MTRH/MU-IREC.
5. Take note that **data** collected must be treated with due confidentiality and anonymity.

The continued permission to conduct research shall only be sustained subject to fulfilling all the requirements stated above.

The approval period is **13th March, 2023 – 12th March, 2024.**

13/03/2023

DR. WILSON K. ARUASA, *MBS, EBS*
CHIEF EXECUTIVE OFFICER

c.c. - Senior Director, Clinical Services
- Director, Nursing Services
- HOD, HRISM

MOI TEACHING AND REFERRAL HOSPITAL
CEO
APPROVED
13 MAR 2023
SIGN.....
P. O. Box 3-30100, ELDORET

All correspondences should be addressed to the Chief Executive Officer
Visit our Website: www.mtrh.go.ke
TO BE A GLOBAL LEADER IN THE PROVISION OF EXCEPTIONAL MULTI-SPECIALTY HEALTH CARE, TRAINING AND RESEARCH