ADDIS ABABA UNIVERSITY

A Four- Year Survival Outcome of Ovarian Cancer Patients at Tikur Ambessa Specialized Hospital, Addis Ababa, Ethiopia

Thesis to be Submitted to the Department of Obstetrics and Gynecology, AAU, for Partial Fulfillment of Sub-Specialty Certificate in Gynecology Oncology

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Abstract

Introduction: Ovarian cancer poses a major public health issue in Ethiopia, yet its clinical characteristics within the local population are not well-studied. Thus, it is important to understand the ovarian cancer clinical features and survival outcomes in Ethiopia to get crucial insights into the disease's progression. It also helps to guide targeted interventions for early disease detection, treatment, and patient care strategies.

Objective of the study: To investigate the survival outcomes of ovarian cancer patients in Addis Ababa, Ethiopia.

Methodology: Retrospective cohort study was done on consecutive patients treated for ovarian cancer from 2020-2023 in TASH. A demographic and clinical information were collected using structured questionnaire. Kaplan-Meier survival curves were generated to assess survival outcomes, and Cox proportional hazards regression was used to identify prognostic factors associated with survival.

Result: The ovarian cancer median age of diagnosis was 45 yrs (with IQR of 38 - 55yrs) and ranging from 14 to 80 yrs. The median duration of symptoms was 3 months (with IQR of 2-6 month). The histologic distribution shows epithelial tumors of 80.7% including borderline tumors 6.4%, GCT 5.5% and SCST 11%.

The median OS for epithelial ovarian cancer was 36.6 months. The first, second- and third-year epithelial ovarian cancer over-all survival was 85.8%, 67.3% and 47.5% respectively. The progression free survivals (PFS) at 1st and 2nd year were 67.8% and 39.6% respectively with median progression free survival of 24.5 months. In cox proportional hazard regression, presence of residual disease (*HR = 3.19; 95% CI: [1.22-8.34]; p = 0.018*) and those patients treated with only chemotherapy as primary treatment (*HR = 4.48; 95% CI: [1.80-11.13]; p = 0.001*) were statistically associated with overall survival. Patients treated with interval debulking surgery were associated with shorter progression free interval as compared to PDS (*HR= 2.11; 95% CI: [1.06-4.21]; p = 0.033*).

Conclusion: Collectively, these findings illustrate both strengths and critical gaps in ovarian cancer care delivery. The high primary surgical rate is a positive indicator of institutional capacity, yet frequent distant recurrences, and very limited secondary surgical intervention point to opportunities for improvement.

Key Words: Ovarian cancer, Survival, Ethiopia

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List of abbreviation

AAU – Addis Ababa University

ECOG PS -- Eastern Cooperative Oncology Group Performance Status

EOC – Epithelial Ovarian Cancers

GCT – Germ Cell Ovarian Tumor

HDI – Huma Development Index

HIC – High Income countries

ICU- Intensive Care Unit

IDS -- Interval debulking surgery

LMIC – Low- and Middle-Income countries

NACT -- Neoadjuvant chemotherapy

OC – Ovarian cancer

OS – Overall Survival

PFS – Progression free survival

SCST – Sex-cord Stromal Tumors

TASH – Tikur Anbessa Specialized Hospital

WHO- World Health organization

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Introduction

Cancer has become one of the defining health challenges of our time. This disease is now a major cause of morbidity, death, and economic strain globally. In 2022, according to International Agency for Research on Cancer (IARC) there were about 20 million newly diagnosed cancer cases and 9.7 million deaths globally.(1) Current projections suggest that lifetime risk of developing cancer is around 20%, while mortality from the cancer is one in nine men and one in twelve women.(2) Similarly, in East Africa, including Ethiopia, there were 349 509 new cases and 236 904 cancer deaths in the year. (3) In Ethiopia, the epidemiological landscape is dominated mainly by high age-standardized incidence rates for breast (12.5 per 100,000), cervical (12.1), and colorectal cancers. There is also a rising prevalence of hematological and reproductive malignancies. (4)

Ovarian cancer (OC) is one of the most common causes of death among gynecological malignancies particularly in Sub-Saharan Africa (SSA). It ranks as the third leading cause of cancer death among women. (5) Mainly due to risk factors such as nulliparity, delayed childbearing, and hormone replacement therapy, historically it is commonly seen in high Human Development Index (HDI) countries. The incidence of OC is also rising rapidly in low-to-middle-income countries (LMICs). (6), (7) This shift is largely driven by increased life expectancy and lifestyle changes that alter the traditional reproductive profiles of these populations.

Ovarian cancer poses a major public health issue in Ethiopia, yet its clinical characteristics within the local population are not well-studied. It ranks as the second most prevalent reproductive cancer and the second leading cause of gynecological cancer deaths in the nation. Recent statistics reveal around 2054 new cases each year. (8) The most concerning aspect is the disease's progression. According to Awedew et al. 2022, the incidence increased by 24%, and mortality rose by 61% from 2010 to 2019. (4) Interestingly, the recent finding (2000-2021) also shows increasing trend in incidence by 106% and mortality by 146%.(8)

The absence of a national cancer registry and standardized reporting systems further complicates the understanding of this disease in Ethiopia. On a positive note, the

government has initiated a National Cancer Control Plan (2025–2029) aiming to reduce premature cancer deaths by 15% by 2029. (9)

The high mortality rate of ovarian cancer is largely due to its vague clinical symptoms, often resulting in misdiagnosis or late-stage detection. While advancements in cytoreductive surgery and chemotherapy have improved survival rates in high-income countries, outcomes in SSA remain poor. A large-scale study across SSA (2008–2014) showed a five-year survival rate of just 45%, much lower than those in North America and Europe. (10, 11) Multiple data from Ethiopia reflect these trends, with patients often presenting with advanced-stage epithelial tumors, leading to poorer prognoses (5, 10).

Understanding the clinicopathologic features is crucial for enhancing survival rates in Ethiopia. There is a significant lack of comprehensive data on how patient demographics and treatment methods affect survival within the Ethiopian healthcare system. This study aims to fill this knowledge gap by assessing the clinical characteristics and survival outcomes of ovarian cancer patients. The results will offer essential insights for healthcare providers, guide patient management strategies, and support the achievement of national cancer control goals.

Statement of the problem

Although there have been global advancements in cancer treatment, ovarian cancer continues to pose a serious and increasing threat to women's health. Worldwide forecasts predict a 42% rise in new cases by 2040, and the situation in Ethiopia is much higher. From 2010 to 2019, the country saw a 61% increase in deaths from ovarian cancer and a 60% increase in Disability-Adjusted Life Years (DALYs) (4). This epidemiological shift signals an urgent need to evaluate the factors contributing to these deteriorating outcomes.

However here in Ethiopia there's a gap in understanding the disease's unique characteristics within the local population. Ambiguous clinical symptoms that lead to diagnostic delays and obstacles to timely treatment further aggravate the issue. The relatively high occurrence of germ cell tumors and sex-cord stromal tumors in African and Ethiopian studies (12) underscores the need for accurate histopathological diagnosis. As we know inadequate pathology often results in misdiagnosis and unsuitable systemic therapy. (13)

Moreover, there is a scarcity of research on ovarian cancer survival and related factors. Without a clear grasp of local survival predictors, clinicians and policymakers in Ethiopia lack the specific data needed to enhance outcomes.

Significance of the study

Our research is of great importance to the Ethiopian healthcare system, as ovarian cancer is a silent threat. The results of our study could have a substantial impact on public health strategies aimed at enhancing ovarian cancer outcomes in Ethiopia. It may serve as a foundation for specific health education initiatives, such as increasing awareness of symptoms, and motivating women to seek early medical care. It can also be used in training healthcare professionals to identify the disease at an earlier stage.

Policymakers and healthcare providers could use these findings to guide resource allocation decisions. And it will not only benefit the Ethiopian healthcare system but also provide a reference for broader research in sub-Saharan Africa. Finally, it lays the groundwork for future research focused on interventions to lower mortality rates and enhance quality of life.

Ovarian cancer remains a formidable challenge in gynecologic oncology. As per the GLOBOCAN 2020 statistics, it ranks as the 7th and 8th most prevalent cancer and a leading cause of cancer-related deaths among women globally. (2) In 2020, there were about 314,000 new cases, nearly 207,000 fatalities, and over 823,000 women living with the disease within five years post-diagnosis. The future projections are increasingly alarming. By 2040, GLOBOCAN anticipates a 42% rise in new ovarian cancer cases, reaching over 446,000 diagnoses annually. Additionally, a 52% increase in deaths is expected, with annual fatalities surpassing 314,000. These statistics emphasize the critical need for progress in prevention, early detection, and treatment to tackle this escalating crisis. (6, 7).

In East Africa, particularly Ethiopia, the burden has grown significantly over the past decade. From 2010 to 2019, ovarian cancer saw a 61% increase (95% UI 20–117%). The disability-adjusted life years (DALYs) and age-standardized incidence rate increased by 60% (95% UI 16–123%) and 24% (95% UI −10 to 68%) respectively. (4) These numbers highlight an emerging public health issue that requires a deeper understanding of local survival factors.

Clinico-pathologic Patterns of Ovarian Tumors

The histological distribution of ovarian tumors shows significant geographic differences. In developed countries, the EOC accounts for 90% of cases, while GCT and SCST represent only 2–3% and 5–6% of cases, respectively. Conversely, data from Africa and Asia suggest a higher prevalence of GCT, accounting for between 10% and 15% of cases and SCST ~11-14%. (5, 14)

Recent Ethiopian data reflects a middle ground between these trends. In a significant cohort study, epithelial tumors remained the most common histology (73.0%), followed by germ cell tumors (8.2%) and sex cord stromal tumors (3.0%). (12) These findings have been mirrored in other studies, such as those conducted in Hawassa, suggesting a consistent histopathological profile across the Ethiopian regions. (15)

Risk and Protective Factors

The etiology of ovarian cancer is deeply rooted in hormonal and reproductive history. An Ovarian Cancer Association Consortium (OCAC) study demonstrated that each additional year of ovulation correlates with a 5% increase in risk, particularly for endometrioid and clear cell histotypes. (16) This indicates that factors like early menarche and late menopause increase ovarian cancer risk by extending a woman's ovulatory lifespan.

The use of the combined oral contraceptive pill is one of the most established protective factor.(17) Recent meta-analyses (2021) also suggest that progestin-releasing intrauterine devices and injected progestins reduce risk by approximately 40% and 35%, respectively. (18, 19)

While uncertain, evidence suggests IVF or clomiphene citrate may increase the risk of borderline tumors by 30–40%, though it remains unclear if the treatment or underlying infertility is the primary drive. (20)

Obesity also raises the odds, particularly for endometrioid and mucinous cancers. Adiposity fuels tumors through postmenopausal estrogen production and chronic inflammatory signaling (21, 22). Moreover, hereditary factors particularly mutations in the BRCA1 and BRCA2 genes are responsible for about 25% of the excess familial risk associated with ovarian cancer. (23)

Clinical Presentation and Management

Ovarian cancer is often described as a "silent killer" due to its vague initial presentation. Ony 46.3% went for medical treatment within a month of symptom onset according to one study of 1,500 women, with an average of 31 to 40 weeks elapsing from the first symptom to a definitive diagnosis. (24)

In Ethiopia, patients typically present with abdominal swelling and pain. These patients often have weight loss, palpable masses, and preoperative ascites. Notably, an elevated CA-125 marker is found in only about half of these cases. Nearly two-thirds of patients are already at FIGO stage II or III upon presentation. (12) In the broader African context, more than 80% of patients are diagnosed at advanced stages, often exacerbated by inadequate pathology services and limited healthcare resources. (13)

Standard care involves a combination of local (surgery, radiation) and systemic (chemotherapy, hormone therapy, targeted drugs) treatments. In large-scale real-world studies, 62–84% of women are diagnosed at late stages (III–IV). While aggressive

debulking surgery is the goal, it is often reserved for younger, fitter patients. Platinum-based drugs remain the cornerstone of first-line chemotherapy, though subsequent lines of therapy vary significantly. (25)

Ovarian cancer survival

Survival outcomes in Ethiopia and Sub-Saharan Africa (SSA) lag significantly behind Western benchmarks. In the US, the overall five-year survival rate is approximately 51%, though this is highly stage-dependent. The survival dropped from 92% at stage I to 25% at stage IV. (26, 27) High early mortality is also a concern in the USA, with one study showing 26% of stage III/IV patients dying within the first 90 days. This death is due to age, comorbidities, and lack of specialized gynecologic oncology care. (28)

The outcome of surgery (i.e. volume of residual disease) remains one of the most important predictors of survival. In this scenario neoadjuvant chemotherapy may be considered where the likelihood of optimal debulking is in doubt or is associated with unacceptable morbidity.(29)

In SSA, adjusted survival rates (one-year survival at 73%, three-year at 54%, and five-year at 45%) are lower than in the US/Europe, with epithelial tumors showing particularly poor outcomes. (10) In Addis Ababa, late-stage diagnosis (III/IV) and residual tumor presence after surgery increase the hazard ratio for death by nearly three-fold. (12)

Critical recent findings in Ethiopia highlight the "waiting time" as a modifiable survival factor. Women initiating treatment within 10 weeks of diagnosis achieved a five-year survival of 50%, whereas those who waited longer saw survival plummet to 25%. (30) Socioeconomic barriers, including lower income and singlehood leads to physical deterioration during the ineffective waiting period. (31)

Aim of the study

General Objective:

To investigate the survival outcome of ovarian cancer patients in Tikur Ambessa, Addis Ababa, Ethiopia.

Specific Objectives:

1. To describe the demographic and clinical characteristics of ovarian cancer patients in Addis Ababa.
2. To analyze the histopathologic features of ovarian cancer (histological types, grade, stage)
3. To assess the ovarian cancer survival rates based on clinic-pathologic variables
4. To determine the prognostic factors influencing ovarian cancer survival

Materials and Methods

Study Area and Setting

The study was conducted in the Tikur Ambessa Hospital Gynecology and Oncology Department, Addis Ababa. It is a 4-year retrospective study from January 1, 2020 to December 30, 2023. Tikur Ambessa Specialized Teaching Hospital is a tertiary referral hospital and the largest of all public hospitals in Addis Ababa. It is also one of few centers in the country where gynecologic oncology cases are being managed and it serves as a referral hospital for patients across the whole country.

Study Population

The study included all ovarian cancer patients diagnosed at this institution between January 1, 2020 to December 30, 2023.

The study design

Retrospective cohort study was done on consecutive patients treated for ovarian cancer from January 1, 2020 to December 30, 2023 in TASH.

Sample Size

Due to the rarity of the cases all ovarian cancer patients diagnosed and treated was included in the study.

Data Analysis:

Data was analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, mean, and standard deviation) was used to summarize the clinicopathologic data. The primary endpoint of the study analysis was overall survival. Person time is the time from the date of pathologic diagnosis to the date of last contact. Kaplan-Meier survival curves were generated to assess survival outcomes, and Cox proportional hazards regression was used to identify prognostic factors associated with survival and P-value <0.05 was used as significant association.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Ovarian cancer confirmed histologically (any histological subtype) or cytology showed cancer and treated with surgery or chemotherapy.

Exclusion Criteria:

- Patients with missing histopathological data.
- Those diagnosed before the study period for which they are on follow up or on palliative treatment.
- Ovarian malignancy patients who had concomitant other malignancy

Study Variables

Independent Variables: age, parity, place of residence, cancer stage, histologic subtype, histologic grade, comorbidities, treatment type, size of residual tumor, lymph node status, tumor marker (CA-125 level)

Dependent Variable: Survival of ovarian cancer patients

Data Collection Procedure

The structured format prepared and written clearly by English is attached on annex 1. The cases were recruited by the researcher and the data was collected by the trained collector. The operation logbook, ward admission logbook, chemotherapy daycare logbook and pathology report logbooks was used as an entry point for recruiting cases or collection of medical record number and names of patients with a diagnosis of ovarian tumor or ovarian mass or ovarian cancer. Then detailed data was collected from patient medical records and pathology reports from patients treated at both gynecology and oncology wards.

Accordingly, 248 patients were registered to receive management for ovarian abnormalities with a diagnosis of ‘ovarian tumor’, ‘ovarian mass’ or ‘ovarian cancer’. Out of these 27 patient documents were not found for data collection.

One hundred forty-three (221) patient documents were available for data collection and the following patients were excluded from analysis. First, 86 patients were found to have only benign pathology. Another five patients were not included in the study because the file was incomplete. This means there is no histopathology or cytology evidence of malignancy. Seven other patients either had the disease diagnosed before the study period for which they are on follow up or recurrent disease diagnosed during study period.

Fourteen of the remaining 123 ovarian malignancy patients had concomitant other malignancy, i.e, nine patients had Colo-rectal cancer including appendiceal adenocarcinoma, four patients had cervical cancer and one endometrial cancer. Note that the histopathology indicated of either different histology or couldn't clearly indicate metastasis. Thus, a total of 109 patients were included in the data analysis. For these patients the patient characteristics, clinical management and outcome information were collected from patient documents.

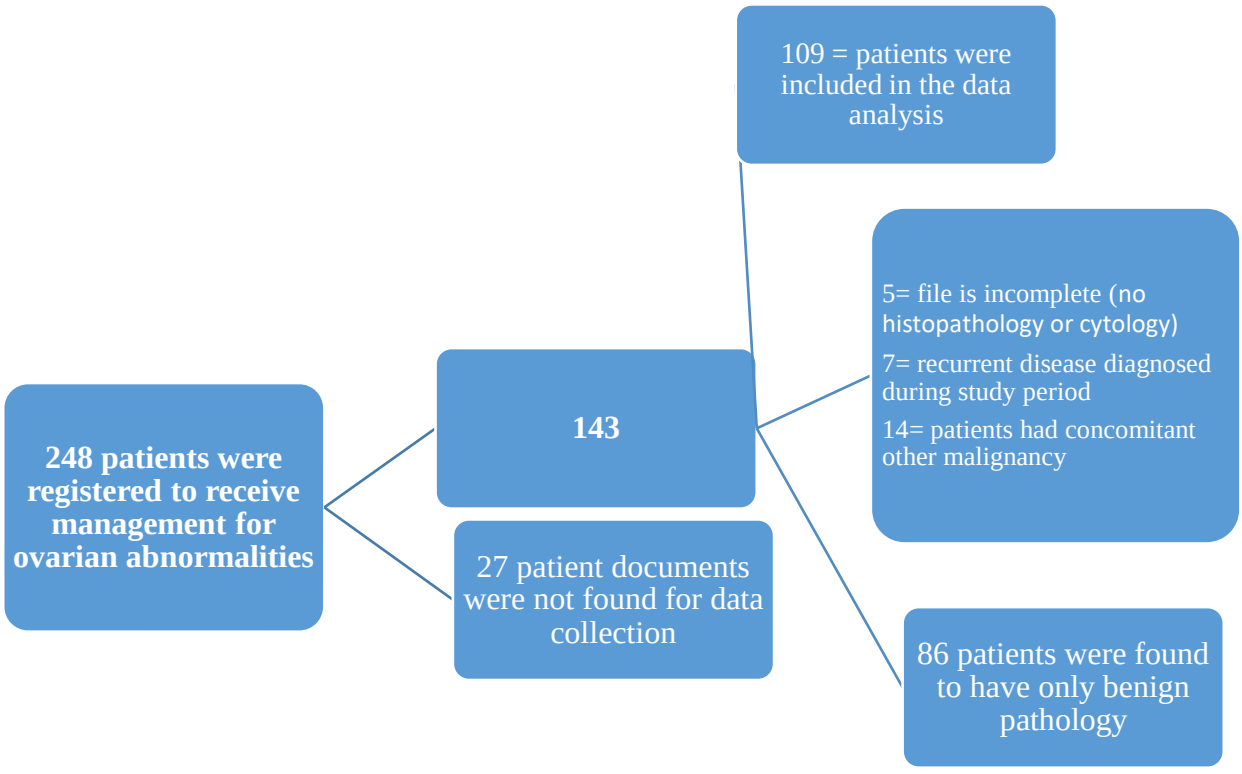


Figure 1: Summary of data collection procedure

Ethical Considerations:

- Ethical approval: Ethical clearance was obtained from the Ethics Review Committee of Department of Obstetrics and Gynecology, College of Health Sciences, Addis Ababa University. All information gathered from records and patients was treated with strict confidentiality. Personal identifiers were removed, and the data were used exclusively for research purposes.
- Data protection: All collected data were stored securely, and access was limited to the research team.

The limitations of the study

The reproducibility of the data in other populations and practice settings remain uncertain because treatments and follow-up was from a single center retrospective study.

Result

Patient Characteristics

Most of the patients 59.6% (n=65) reported their place of residence to be Addis Ababa. Only small percentage of patients used community health insurance 19.3% and the rest paid out of their pocket.

The ovarian cancer median age of diagnosis was 45 yrs (with IQR of 38 - 55yrs) and ranging from 14 to 80 yrs. The mean number of pregnancies was 2.4 (SD=2.4) and about 45% (n=49) of the cases were nulliparous or primiparous. Only 11.9% of patients have ever used hormonal contraceptives in their life time. Twenty-two patients (20.2%) had a history of infertility or fertility treatment.

Although in majority of the patients there is incomplete data regarding family history, four patients (3.7%) had a history of breast and/or ovarian cancer in the family. About 22% (n=24) patients had a medical comorbidity while on treatment for ovarian cancer. The medical comorbidities include hypertension, diabetus mellitus or other chronic medical illness documented by physician.

Clinical Presentation

Majority of patients (49.5%) has ECOG performance status 0 or 1 at the time of initial presentation. Regarding clinical presentations abdominal pain was seen in 69.7% and abdominal swellings seen in 79.8% were the frequent presentation symptoms. However, vaginal bleeding (10.1%), ascites (47.7%) and early satiety (42.2%) were seen at their presentations.

The median duration of symptoms was 3 months (with IQR of 2-6 month). However, the median waiting duration (from time of first visit and date of surgery) was 89 days. The mean CA-125 amount at presentation was 1174.9. The vast majority of patients were in advanced stage at presentation 72.4% (n=79).

Table 1: Socio-demographic and reproductive patient characteristics

		Frequency	Percent
Total		109	100%
Place Of Residence	Addis Ababa	65	59.6
	Out Of Addis Ababa	41	37.6
	Uk	3	2.8
Mode Of Payment	Out Of Pocket	88	80.7
	Community Health Insurance	21	19.3
Age	<30 Yr	12	11.0
	30-39yr	20	18.3
	40-49 Yr	37	33.9
	50-59 Yr	20	18.3
	60-69 Yr	14	12.8
	70 And Above	6	5.5
Parity	0-1	49	45.0
	2-3	26	23.9
	>/=4	28	25.7
	Missing	6	5.5
History Of Hormonal Contraceptive Use	Yes	13	11.9
	No	81	74.3
	Uk	15	13.8
History Of Infertity	Yes	22	20.2
	No	81	74.3
	Uk	6	5.5
Comorbidity	Yes	24	22.0
	No	81	74.3
	Uk	4	3.7

Table 2: Clinical and pathological characteristics of the patients

		Frequency	Percent
Total		109	100%
Abdominal Pain	Yes	76	69.7
	No	29	26.6
	Uk	4	3.7
Abdominal Swelling	Yes	87	79.8
	No	20	18.3
	Uk	2	1.8
Vaginal Bleeding	Yes	11	10.1
	No	96	88.1
	Uk	2	1.8
Palpable Mass	Yes	69	63.3
	No	36	33.0
	Uk	4	3.7
Ascites	Yes	52	47.7
	No	55	50.5
	Uk	2	1.8
Weight Loss	Yes	22	20.2
	No	79	72.5
	Uk	8	7.3
Early Satiety	Yes	46	42.2
	No	35	32.1
	Uk	28	25.7
Duration Of Symptom Month	0-3	56	51.4
	4-6	23	21.1
	>/=7	23	21.1
	Missing	7	6.4
Stage Of The Disease	1	19	17.4
	2	11	10.1
	3	48	44.0
	4	31	28.4

Histopathologic characteristics

The histopathologic confirmation of ovarian cancer was done only in 106 cases (97.2%) and three cases diagnosed by cytology from ascites or pleural fluids. Epithelial tumors accounts for 80.7% (n=88) including borderline tumors 6.4% (n=7), Germ cell tumors 5.5% (n=6) and Sex cord stromal tumors 11% (n=12). Serous carcinoma accounts 76.5% (n=61) of all epithelial ovarian cancers. In sub-group analysis of serous carcinoma, majority is a high-grade serous accounting for 91.8% (n=56) while low grade serous ovarian cancer is 8.2% (n=5). However, Mucinous ovarian cancer only accounts for 7.5% (n=6) this study. It is important to note that in 8.75% (n=7) cases the histology report didn't specify which category of epithelial ovarian cancer it was.

Table 3: Histopathologic characteristics

		Frequency	Percent
Histo-pathology	Epithelial	80	73.4
	GCT	6	5.5
	SCST	12	11.0
	Borderline tumor	8	7.3
	Carcinoma on cytology	3	2.8
	Total	109	100.0
WHO EOC histology type	Endometroid	1	1.3
	LG Serous carcinoma	5	6.3
	Mixed carcinoma	1	1.3
	Mucinious OC	6	7.5
	Not specified	7	8.8
	Serous carcinoma	56	70.0
	Undifferentiated	4	5.0
	Total	80	100.0

Treatment Modalities

Surgical treatment was provided as primary treatment modality in 84.4% (n=92) of patients. Out of these patients 15 (13.8%) were given NACT and then interval debulking surgery was done.

In advanced stages (III &IV), whether PDS or IDS, optimal debulking surgery was done in 48 (77.4%) patients. There were 9 patients in which the surgery was sub-optimal accounting for 14.5%. The mean residual tumor size after surgery was 4.44cm (SD=1.4).

Seventeen patients (15.6%) were, however, treated with upfront chemotherapy alone due to either advanced disease making it inoperable at presentation or after exploratory laparotomy. However, majority 85.3% (n=93) of patients were treated with chemotherapy as either ACT or for recurrence.

The most common chemotherapy drug prescribed as first line treatment was combination of Paclitaxel and Carboplatin accounting for 89.2% (n=83), while BEP only given in 10.8% (n=10). There were 45 (41.3%) patients who developed recurrences after primary treatment with surgery and/or chemotherapy but five patients progressed while on chemotherapy. Abdominal peritoneal recurrence and distant recurrence accounted for 44.4% (n=20) each while isolated local recurrence only in 11.1% (n=5). In addition to this, 26 patients were given second-line chemotherapy for recurrent ovarian cancer accounting for 57.7% of all patients (n=45) with recurrence.

For the recurrent diseases, secondary debulking surgery was done only in 6 (13.3%) patients, while second round of the previous chemotherapy in 27 (60%).

Table 4: Treatment and Surgery Information

		Frequency	Percent
	Total	109	100
Type of primary treatment provided	PDS	64	58.7
	Upfront chemotherapy	17	15.6
	NACT and IDS	15	13.8
	Surgery alone	13	11.9
Surgery Type(n=92)	Optimal debulking surgery	51	55.4
	Sub-optimal debulking surgery	9	9.7
	Staging surgery	29	31.5
	Not staged/ incompletely staged	3	3.2
Residual Tumor Present	yes	9	8.3
	no/uk	100	91.7
Disease Recurrence	yes	45	41.3
	no	40	36.7
	uk	24	22.0
Site Of Recurrence(n=45)	Localized recurrence	5	11.1
	Abdominal/peritoneal recurrence	20	44.4
	Distant recurrence	20	44.4

Survival Outcomes

During this follow up there were 41 patients who died (37.6%) and 68 patients were censored (62.4%). Epithelial ovarian cancer resulted in the majority of the deaths 90.2% (n=37). Only one death is accounted to sex-cord stromal tumors and germ cell tumors (2.4%) each. The median OS for epithelial ovarian cancer was 36.6 months. The first, second- and third-year epithelial ovarian

cancer over-all survival was 85.8%, 67.3% and 47.5% respectively. The progression free survivals (PFS) at 1st and 2nd year were 67.8% and 39.6% respectively with median survival of 24.5 months.

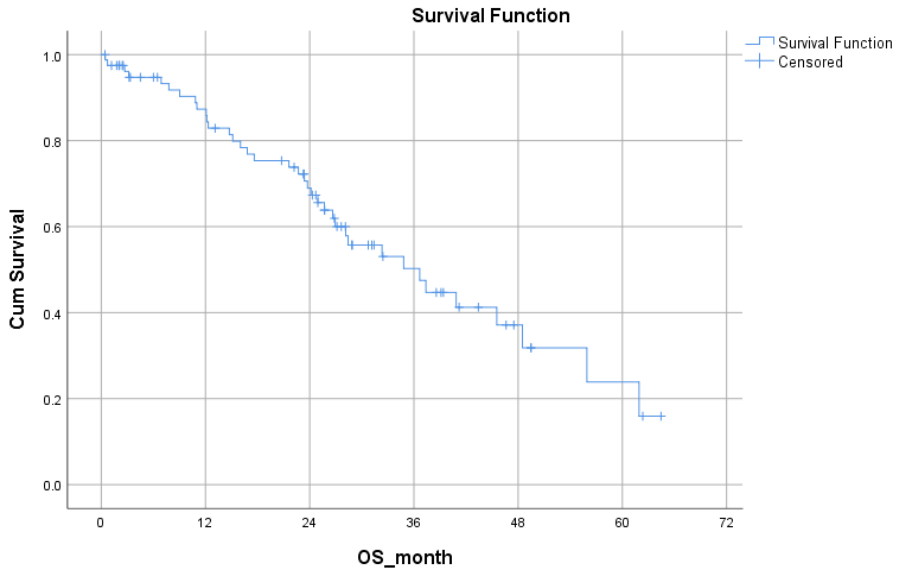


Figure 2: Overall survival curve for epithelial ovarian cancer

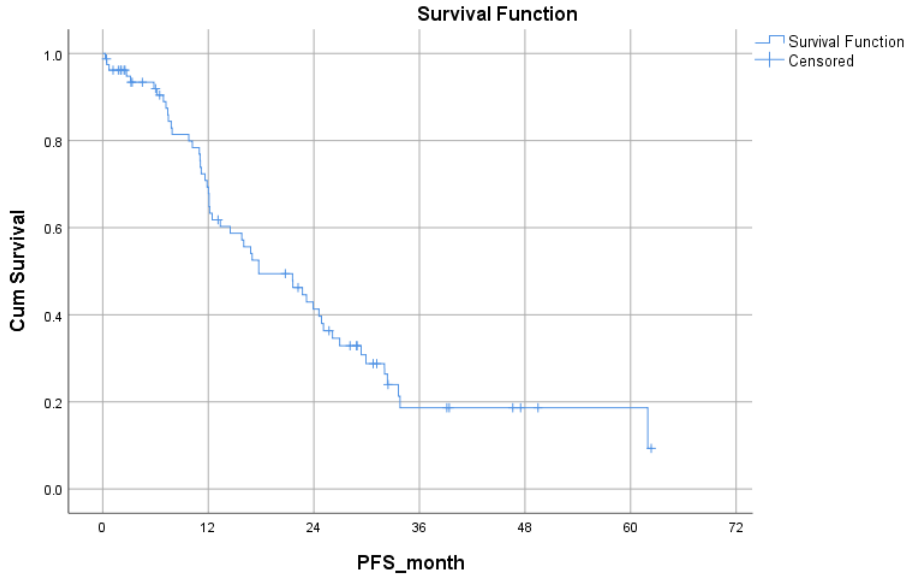


Figure 3: Progression Free survival curve for epithelial ovarian cancer

The median Overall Survival (OS) for this study varied significantly based on the primary treatment approach (*p = 0.001*). Patients who underwent Primary Debulking Surgery (PDS) achieved the longest median OS at 48.4 months. In contrast, those treated with Interval Debulking Surgery (IDS) and Chemotherapy only had substantially shorter median survival times of 24.8 months and 21.6 months, respectively.

A univariate Cox regression analysis was conducted to evaluate factors influencing mortality. The results indicated that treatment with chemotherapy alone significantly increased the risk of death *(HR = 4.37; 95% CI: 1.83–10.43; p = 0.001*). Additionally, residual tumor following surgery was strongly associated with worse survival outcomes (*HR = 2.88; 95% CI: 1.16–7.12; p = 0.022*). Although advanced disease stage (*HR = 2.97; 95% CI: 0.90–9.75; p = 0.072*) and interval debulking surgery (*HR = 2.13; 95% CI: 0.92–4.89; p = 0.074*) demonstrated a trend toward higher mortality risk, neither reached statistical significance in the univariate analysis.

A multivariate Cox regression model was used to determine independent prognostic factors. Patients receiving only systemic therapy and presence of residual tumor were statistically significant predictors of OS following adjusting for confounders. Patients receiving only systemic therapy had a four-fold increase in the risk of death (*HR = 4.48; 95% CI: [1.80-11.13]; p = 0.001*) and residual tumor following surgery three-fold increase of mortality (*HR = 3.19; 95% CI: [1.22-8.34]; p = 0.018*).

It is important to interpret the high hazard ratio for the chemotherapy-only group within its clinical context. All (100%) of these patients were diagnosed at advanced stages (III or IV), and the majority (76.9%) presented with poor performance status (PS), which likely precluded aggressive surgical intervention.

Table 5: Cox proportional hazard regression for OS in epithelial ovarian cancer

Characteristics		*Unadjusted HR*				*Adjusted HR*			
		p	*HR*	*95.0% CI for HR*		*p*	*HR*	*95.0% CI for HR*	
				Lower	*Upper*			*Lower*	*Upper*
Residual_disease		0.022	2.88	1.16	7.12	0.018	3.19	1.22	8.34
Stage	3&4	0.072	2.97	0.90	9.75	0.288	1.96	0.56	6.79
Treatment type	PDS								
	Chemotherapy only	0.001	4.37	1.83	10.43	0.001	4.48	1.80	11.13
	NACT & IDS	0.074	2.13	0.92	4.89	0.234	1.67	0.71	3.93

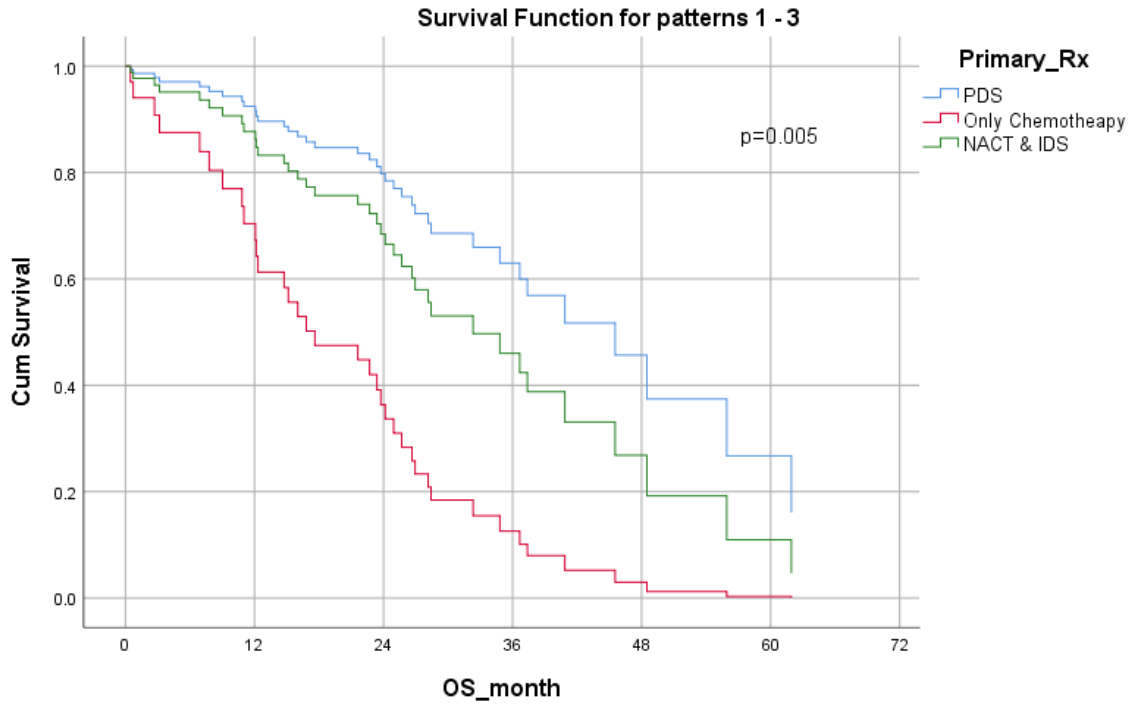


Figure 4 Overall survival function based on treatment type

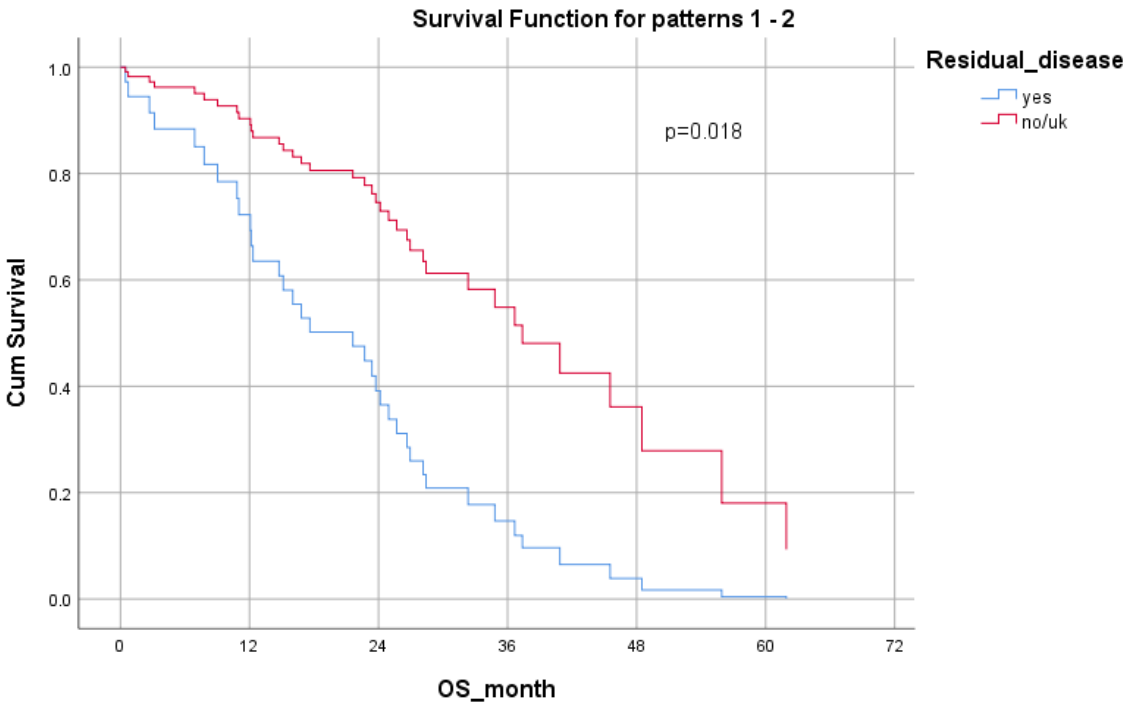


Figure 5: Overall survival function based on residual disease

As compared to those undergoing IDS (11.8 months; $p = 0.008$) the median Progression-Free Survival (PFS) for patients undergoing PDS (24.8 months) was significantly longer. Adjusted for disease stage and residual tumor volume, IDS remained significantly associated with a shorter progression-free interval (*AHR = 2.11; 95% CI: [1.06-4.21]; p = 0.033*).

Table 6 Cox proportional hazard regression for PFS in epithelial ovarian cancer

Characteristics		*Unadjusted HR*				*Adjusted HR*			
		p	*HR*	*95.0% CI for HR*		*p*	*HR*	*95.0% CI for HR*	
				Lower	*Upper*			*Lower*	*Upper*
Residual_disease		0.049	2.40	1.00	5.76	0.068	2.30	0.93	5.65
Stage	3&4	0.047	2.56	1.01	6.49	0.22	1.84	0.69	4.87
Treatment type	PDS								
	Chemotherapy only	0.034	2.35	1.06	5.22	0.053	2.24	0.98	5.10
	NACT & IDS	0.008	2.45	1.25	4.80	0.033	2.11	1.06	4.21

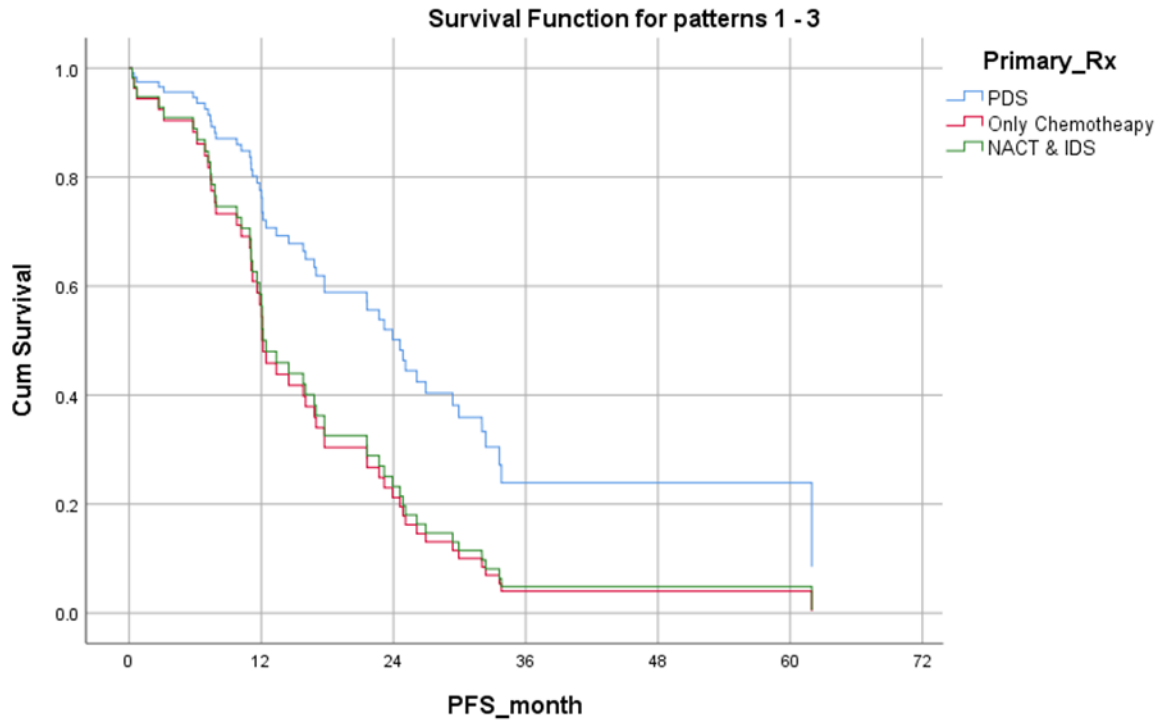


Figure 6 Progression free survival function based on treatment type

Discussion

Putting Our Findings in Perspective

This is one of only a small number of studies in Ethiopia that has taken a close look at the real-life presentation, treatment, and survival of women with ovarian cancer. The results are encouraging in some ways, sobering in others. In our group of patients, the median overall survival reached 36.6 months and progression-free survival 24.5 months. One year after diagnosis, 85.8% were still alive; however, at three years, that figure was significantly dropped to 47.5%. Most women (80.7%) had the epithelial type of ovarian cancer and, as is so often the case here, the majority presented with advanced disease. When we looked at everything that might influence outcomes, the single clearest predictor of a poorer prognosis was residual disease left after surgical treatment.

Patient Characteristics

The median age in the present study is consistent with Ethiopian data reporting medians of 46–47 years and LMIC findings (mean 49.9 years), but substantially younger than the 63 years observed in high-income countries. (12, 32, 33) This difference may reflect Ethiopia's young population structure, a higher proportion of non-epithelial histologies that occur in younger women.

A 45% of patients (with a mean number of pregnancies being 2.4) in our cohort were nulliparous or primiparous, aligning with the mean of three pregnancies reported here in Addis Ababa previously (12) and the well-established protective role of higher parity against ovarian cancer. Nulliparity increases ovarian cancer risk by approximately 24% compared with having one child (34), and compared with nulliparity, ever giving birth was associated with decreased odds for serous tumors by 30%. (35) Presence of low uptake of oral contraceptives, 10.4%, likely exacerbates this risk profile in our setting.

Medical comorbidities were documented in 22% of our patients during treatment, a rate that, while lower than the 55% reported among general cancer patients in eastern Ethiopia (36), highlights the challenge of integrated care in resource-limited settings. The chronic medical illnesses include hypertension, diabetes mellitus, renal or liver diseases that may worsen toxicity.

Clinico-pathologic Patterns of Ovarian Tumors

The duration of symptoms in this study (mean = 5.9 months (range: 1–48 months)). It indicates that there is a significant diagnostic delay before patients sought care. Ovarian cancer often presents with nonspecific symptoms that may be attributable to benign gynecologic or gastrointestinal conditions. The median waiting duration defined as a duration from time of first visit and date of surgery was nearly 3 months (89 days). This delay directly contributes to the high proportion of advanced-stage disease at presentation and poorer outcome. Similarly, according to Every Woman Study™ LMIC Edition, the median waiting duration was around 3 months (with country-level variation up to 11 months). Patients having waiting time > 10 weeks had risk of death 36% higher as compared to waiting time ≤ 10 weeks. (30, 32)

The advanced-stage presentation (stage III-IV, 72.4%) and diagnostic delays observed here align with the well-documented "silent" nature of ovarian cancer. This is amplified in our contexts by lack of awareness, socioeconomic barriers and infrastructural factors. A retrospective study on 128 ovarian cancer cases managed at Kenyatta National Hospital also noted a 78% FIGO III–IV disease. (37, 38)

In the present study, EOC was predominant accounting for 80.7% of cases (including 6.4% borderline tumors), while germ cell tumors (GCT) comprised 5.5% and sex cord-stromal tumors (SCST) 11%. This distribution is consistent with other Ethiopian studies on ovarian malignancies, though proportions of non-epithelial subtypes vary. (39) In Addis Ababa epithelial histology was reported in 73.0%, with germ cell tumors at 8.2% and sex cord-stromal tumors at a lower 3.0%. (12) At the same time data from Hawassa University showed ~60%, alongside notable SCST representation (~31% of malignant tumors). (15) This indicates that there is a significant proportion of SCST in our setup and our patient population may have different genetic makeup.

The distribution of OC by histological subtype, have documented higher proportions of GCT (up to ~10-11%) and SCST (up to ~10-15%) among SSA women. (5) The Kenyan study also shows 81% is attributed to epithelial ovarian cancer which us similar to our finding. (38)

In Every Woman Study LMIC epithelial counterpart was 86.3% and it also consistently shows higher high-grade serous proportions (60–75%). In our study the proportion of high grade serous in epithelial group is 91.8% of all serous ovarian cancers and it is much higher than these studies. (32)

The histological profile in this study, a higher non-epithelial proportion has important clinical and public health implications for Ethiopia and similar LMIC settings. Accurate histopathological classification is essential for risk stratification and tailored therapy. Future multicenter studies with centralized pathology review would help refine these patterns and inform national cancer control strategies.

Treatment Patterns and Recurrence

An 84.4% of patients undergone surgery as primary treatment with 13.8% were managed NACT and IDS. This strategy is improve the likelihood of complete cytoreduction in patients presenting with advanced and initially unresectable disease. (29) The remaining 15.8% of patients received upfront chemotherapy without surgery. It reflects extensive disease burden, poor performance status, or logistical barriers to operative care. This high overall surgical utilization rate in our set-up is encouraging and indicates reasonable access to operative services.

The 77.4% optimal debulking rate for advanced-stage (III & IV) ovarian cancer within our setup rate is consistent with outcomes reported in western countries. A broad PCS success rate of approximately 67% in advanced stages in these countries. However, high-volume institutions report complete cytoreduction (R0) rates ranging from 77% to 91%. Our rate of 77.4% suggests that our surgical outcomes are approaching the performance standards of specialized tertiary referral centers. This suggests a high level of surgical expertise and effective patient selection. In HICs, there has been a rapid and documented shift toward NACT. The usage is increasing by roughly 11.8% annually, growing from 18.9% to 40.6% in recent years. In contrast, our setup utilized NACT+IDS in only 13.8% of cases. The fact that we maintained a high optimal debulking rate (77.4%) despite a low NACT rate suggests that our surgical team is successfully achieving aggressive cytoreduction at the outset. (40, 41)

Recurrence developed in 41.3% of patients following primary treatment, with the minority of recurrences manifesting as local recurrence (11.1%). This recurrence rate is plausible given the advanced stage at diagnosis in most patients. The predominance of distant rather than locoregional recurrence underscores the systemic nature of ovarian cancer and the limitations of locoregional therapy alone. In patients with recurrence only 13.3% underwent secondary debulking surgery indicating that a management of recurrent disease was highly constrained. This low rate of secondary cytoreduction is typical of LMIC settings, where re-operative surgery demands advanced surgical skills and of course the predominance of the distant recurrence.

In contrast, selected patients in HICs with platinum-sensitive recurrence and favorable disease distribution are frequently offered secondary cytoreductive surgery, supported by randomized trials demonstrating survival benefit in appropriately chosen candidates. (42, 43) In a high-volume center, good performance status, limited disease burden, and no ascites/carcinomatosis can predict success of secondary cytoreductive surgery. This secondary cytoreductive surgery + platinum-based chemotherapy improve PFS and, in selected cases, OS compared to chemotherapy alone only when complete resection is feasible. However, in Ethiopia and other LMICs, recurrent disease management is more commonly palliative or chemotherapy-based.

Survival outcomes

Patients with epithelial ovarian cancer had a median overall survival (OS) of 36.6 months. Survival rates were encouraging, with 85.8% of patients surviving at least one year, 67.3% reaching the two-year mark, and 47.5% making it to three years. Additionally, the median progression-free survival (PFS) was 24.5 months. These outcomes are noteworthy given that 72.4% of patients presented with advanced-stage disease, a factor typically associated with poorer prognosis.

Compared to earlier data from Ethiopia which showed a 1-year OS of 78% and 2-year OS of 59%, with an estimated median survival around 32.5 months, it demonstrates potential improvements in care delivery over time. However, in the same earlier study sub-analysis the clinical patients had improved survival as compared to registry patients. (12) The relatively favorable survival figures likely reflect the high rate of primary surgical intervention (84.4%), appropriate use of NACT+IDS

in a subset of advanced cases, and platinum-based chemotherapy, which together achieved meaningful disease control in many patients.

A population-based registry analysis from sub-Saharan Africa reported 1-year observed survival of 73.4%, 3-year survival of 54.4%, and 5-year survival of approximately 45% for ovarian cancer. (10) In Kenyan study a median overall survival was 18 months, with 1-, 3-, and 5-year observed survival rates of 68.0%, 42.2%, and 26.6%, respectively, indicating lower survival as compared to our study. (38) However, the survival curves still demonstrate the typical pattern of ongoing risk beyond 3 years, driven by recurrence (41.3% in this series) and limited options for secondary intervention (only 13.3% underwent secondary debulking).

In the multivariate Cox regression analysis, the residual disease and primary treatment type (with chemotherapy) are statistically significantly associated with overall survival (OS). This finding underscores the prognostic importance of optimal primary surgical intervention.

One Meta-Analysis shows a maximal cytoreductive surgery continued to be the strongest predictor of median survival time ($p<0.001$). Accordingly, each 10% increase in percent maximal cytoreductive surgery was associated with a 5.5% increase in median survival time (95% CI, 3.3% to 7.8%). Even after controlling for maximal cytoreductive surgery, the effect of percent stage IV disease was no longer significant. (29)
Similarly, in 2024 Nigeria cohort optimal debulking (<1 cm residual) showed a borderline independent association with 35% better progression-free survival in multivariate Cox. (44)

A treatment with chemotherapy only (no surgical intervention) is independently associated with shorter overall survival (OS) and is one of the most consistent and robust prognostic observations in advanced epithelial ovarian cancer.
In a 2025 single-institution cohort, chemotherapy-only patients (older, poorer performance status, lower albumin) had 3-year OS of 14.0% vs. 61.1% with surgery. Interestingly, out of 176 advanced EOC patients starting neoadjuvant chemotherapy, 21.6% never underwent interval cytoreductive surgery. In multivariate Cox analysis adjusting for clinically relevant covariates, chemotherapy-only was independently associated with fourfold increase of death. (45)

A 2026 pooled analysis of multiple studies reported median OS of only 13.18 months (*95% CI 4.83–21.53*) for chemotherapy-only vs. surgery + chemotherapy (*pooled HR 1.95, 95% CI 1.67–2.27*). These findings persist after adjustment for stage, histology, and comorbidities, underscoring that surgery confers a survival benefit beyond selection bias in fit patients. (46, 47)

It is prudent to note that in our study also those who took only chemotherapy as primary treatment were entirely stage 3&4 and majority had poor performance status (PS) indicating their prognostic importance.

In our study, patients treated with interval debulking surgery were associated with shorter progression free interval as compared to PDS (*HR = 2.11; 95% CI: [1.06-4.21]; p = 0.033*) adjusted for residual disease and stage. In contrary to our findings, in the Nigerian retrospective cohort the differences between IDS and PDS (*HR=1.28, 95% CI 0.82–2.01, p=0.282*) among women with advanced EOC showed no statistically significance. (44)

In addition, trials like the SCORPION trial and CHORUS trial showed no significant difference in OS between PDS and NACT with IDS. (29, 48) Pooled meta-analyses of five trials also confirm no difference in PFS (*HR 1.03, 95% CI 0.92–1.16*) or OS, although NACT-IDS consistently improves complete resection rates and reduces severe perioperative morbidity. (45)
However, evidence of shorter PFS with IDS has emerged in more recent trials. Target-trial emulation (2024) showed clear PFS advantages for PDS (19.7 vs. 15.7 months, particularly when R0 resection is achieved at PDS. (46)

Most interestingly, the TRUST trial (ENGOT-ov33/AGO-OVAR OP7), 2025, reported median PFS of 22.1 months (PDS) vs. 19.7 months (NACT-IDS), with a statistically significant secondary-endpoint benefit for PDS. (49)

A 2026 pooled data a systematic review, meta-analysis and study-level meta-regression of randomized controlled trials revealed no significant difference in OS (*HR =0.95; 95 % CI: 0.87–1.04; P =0.26*) or PFS (*HR =0.94; 95 % CI: 0.85–1.03; P =0.16*). No clinically meaningful OS benefit was observed for upfront surgery in subgroup analyses by stage and residual disease. It is

also true for meta-regression results even in trials with very high complete cytoreduction rates. (50)

Thus, our finding may be related to selection bias (like high tumor burden, unresectable disease at presentation or poor performance status). It can aso be due to induced platinium resistance, delay between diagnosis and definitive surgery, small number of patients and short follow up period of the study.

Conclusion and Recommendation

Our findings illustrate both strengths and critical gaps in ovarian cancer care delivery. The high primary surgical rate is a good indicator of institutional capacity, but the very limited secondary surgical intervention points to opportunities for improvement.

The independent association of residual disease and chemotherapy-only with shorter OS in multivariate Cox models is clinically relevant. The future efforts should focus on quality improvement initiatives aimed at achieving complete gross resection.

To track progress and address ongoing differences, population-based registries and multicenter collaborations across Ethiopia and sub-Saharan Africa is vital. Using treatment advances with earlier detection strategies offers the greatest potential to narrow the survival gap with high-income countries.

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Index A

Structured Research data collection format of Survival of Ovarian Cancer Patients at Tikur Ambessa Specialized Hospital.

All the information collected during this study will be kept strictly confidential and will not affect patient treatment nor have any significant impact on the patient health. The data will be anonymous and will be stored securely and only accessible to the collector and researcher. It will be destroyed after data analysis is completed. The results of this study will be reported in aggregate form, ensuring that individual participants cannot be identified.

1. Case code_____
2. Age____
3. Place of residence
    a. Addis Ababa
    b. Urban outside Addis Ababa
4. Type of payment
    a. Health Insurance coverage
    b. Out of pocket
5. Date of first visit_____
6. Date of admission written _____
7. Date of admission_____
8. Date of surgery_____
9. Date of first cycle chemotherapy initiated in Primary chemotherapy____
10. Date of death_____
11. Date of last visit_____
12. Condition of the patient on last visit
    a. She is in remission
    b. Improving but not in remission
    c. Deteriorating/ only on palliative care

Risk factors/protective factors

13. ECOG performance status
    a. 0
    b. 1

c. 2
d. 3
e. 4

14. Any known medical condition (HIV, Hypertension, Diabetes mellitus or other documented by treating physician for which she is taking medication)
    a. Yes
    b. No
15. Family history of ovarian and breast cancer
    a. Yes
    b. No
    c. Unknown
16. Parity_____
17. Hormonal contraceptive use
    a. Yes
    b. No
    c. Unknown
18. Infertity history
    a. Yes
    b. No
    c. Unknown

Presenting symptoms

19. Abdominal swelling
    a. Yes
    b. No
    c. Unknown
20. Abdominal/lower back pain
    a. Yes
    b. No
    c. Unknown
21. Vaginal bleeding
    a. Yes

b. No
c. Unknown

22. Weight loss
    a. Yes
    b. No
    c. Unknown
23. Mass palpable
    a. Yes
    b. No
    c. Unknown
24. Ascites present
    a. Yes
    b. No
    c. Unknown
25. Early satiety present
    a. Yes
    b. No
    c. Unknown
26. Duration of symptoms in months_____

Laboratory findings

27. Lymphocyte to Neutrophil ratio at admission for initial treatment_____
28. CA-125 at admission for initial treatment _____

Disease and treatment characteristics

29. What type of primary treatment provided?
    a. Primary debulking surgery and Adjuvant chemotherapy
    b. Neo-adjuvant chemotherapy and interval debulking surgery
    c. First-line chemotherapy alone for in operable patients
    d. Surgery alone
30. If surgery done for ovarian tumor, what type?
    a. Fertility sparing staging surgery
    b. Complete staging surgery

c. Optimal debulking surgery
d. Sub-optimal debulking surgery
e. Not staged

31. Histo-pathologic Diagnosis _____

32. Grade
    a. High grade
    b. Low grade
    c. Not applicable

33. Lymph node involvement
    a. Involved
    b. Not involved
    c. Unknown

34. Residual tumor present
    a. Yes
    b. No

35. Size of residual tumor if present_____

36. Stage of the disease
    a. Stage 1
    b. Stage 2
    c. Stage 3
    d. Stage 4

37. Type of chemotherapy drugs
    a. Carboplatin and paclitaxol
    b. BEP
    c. Others
38. Was there disease Recurrence?
    a. Yes
    b. No
39. Date of recurrence _____
40. Site of recurrence _____
41. What treatment modality provided for the recurrence?
    a. Secondary debulking surgery
    b. Second round of the previous chemotherapy
    c. Second line chemotherapy
    d. Nothing but supportive care