ADDIS ABABA UNIVERDITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE, DEPARTMENT OF CLINICAL ONCOLOGY

TREATMENT PATTERNS AND SURVIVAL OF PATIENTS WITH ORAL CAVITY CANCER: A RETROSPECTIVE ANALYSIS AT TIKUR ANBESSA SPECIALIZED HOSPITAL, 2022–2024

BY: WOLDEMARIAM BEKA, (CLINICAL ONCOLOGY RESIDENT)

THESIS TO BE SUBMITTED TO UNIVERDITY OF ADDIS ABABA COLLEGE OF HEALTH SCIENCE SCHOOL OF MEDICINE AS PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE SPECIALITY CERTIFICATE IN CLINICAL ONCOLOGY.

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ADVISOR'S APPROVAL SHEET

This is to certify that the thesis entitled "TREATMENT PATTERNS AND SURVIVAL OF PATIENTS WITH ORAL CAVITY CANCER: A RETROSPECTIVE ANALYSIS AT TIKUR ANBESSA SPECIALIZED HOSPITAL, 2022–2024" is submitted in partial fulfillment of the requirements for the Specialization Certificate in clinical oncology to the department of clinical oncology, Addis Ababa University college of health science and has been carried out by Dr Woldemariam Beka under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the Thesis to the Department.

Dr Yonas Dandana (Consultant Oncologist) _____ _____

Name of Advisor Signature Date

Declaration

I hereby declare that this research thesis is my original work and has not been presented by any other investigator and all the source materials used for this thesis have been duly acknowledged.

Dr. Woldemariam Beka (clinical Oncology senior resident)

Signature…….

Date……

Abstract

Background: Oral cavity cancer is an important cause of morbidity and mortality globally, with a disproportionate burden and late presentation in low- and middle-income countries. There is limited published data in the field from Ethiopia. This study aimed to describe the clinical and pathological characteristics, treatment patterns, and survival of oral cavity cancer patients treated at Tikur Anbessa Specialized Hospital (TASH), the country's major tertiary oncology referral center.

Methods: A retrospective study was conducted on all adult patients with primary oral cavity squamous cell carcinoma registered between January 1, 2022, and December 31, 2024, at Tikur Anbessa Specialized Hospital. Data were extracted from electronic medical records, patient charts, and radiotherapy registries. Descriptive statistics and Kaplan-Meier survival analysis were used to analyze the data, and multivariable Cox regression was used to identify independent predictors of survival.

Results: The study population had a median age of 50 years (interquartile range [IQR]: 42–58), with a male-to-female ratio of 2:1. The median duration of symptoms was six months (interquartile range [IQR]: 3-12), and 43% of patients presented with oral ulcers. Most patients presented with advanced disease, with 75 (82.4%) having clinical T3–T4 tumors and 66% being node-positive. The majority had Grade 1 cancer, and higher-grade tumors were associated with a higher N stage. The oral tongue was the most frequently affected subsite, accounting for 58 (63.7%) cases. Most participants had good performance status (71, 78%), and comorbidities were uncommon (15, 16%). Treatment was multimodal in 20 (22.0%), single modality in 28 (30.8%), and palliative in 31 (34.1%). Surgery was performed in 38 (41.8%) patients, curative radiotherapy in 31 (34.1%), and concurrent chemotherapy in 19 (20.7%). The median survival was 15.5 months, with 1- and 3-year survival rates of 57.8% and 32.4%, respectively. Advanced stage at presentation and lack of multimodality treatment were identified as independent predictors of poor survival.

Conclusion: The study shows that patients with oral cavity squamous cell carcinoma present at advanced stage. Overall survival is low and influenced by disease stage and access to curative treatment, underscoring the need for early detection, timely intervention, and improved treatment delivery in resource-limited settings.

Key words; oral cavity squamous cell cancer, oral cavity subsites, treatment patterns, overall survival, Tikur anbessa specialized hospital

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List of Abbreviations and Acronyms

AJCC	American joint committee on cancer
BRICS	Brazil, Russia,India, China and South Africa
CSM	Cancer specific mortality
CSM	Cancer specific mortality
ECE	Extra-capsular extension
GLOBOCAN	Global cancer observatory
LMIC	Low and middle income countries
LVSI	Lympho-vascular space invasion
NCCN	National comprehensive cancer network
NCDB	National cancer database
OCC	Oral cavity cancers
OC-SCC	Oral cavity squamous cell cancers
PNI	Peri-neural invasion
SCC	Squamous cell cancer
SEER	Surveillances epidemiology and end results
TASH	Tikur Anbessa specialized hospital
WHO	World health organization

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1 INTRODUCTION

1.1 Background

Oral cavity cancer (OCC), is the most common type of head and neck squamous cell cancer globally (1). The trend in incidence of oral cavity squamous cell cancer (OC-SCC) is rising, especially in low- and middle-income countries (LMICs), where mortality is disproportionately high (2). Although there is advancement in treatment options, the survival of OCC is still below 50% at 5 years, which varies according to different prognostic factors and geographic regions (3).

In Ethiopia, where cancer research is still limited, OCC is believed to constitute a significant portion of the cancer burden. Tikur Anbessa Specialized Hospital (TASH), manages the majority of cancer patients, including those with OCC. According to a retrospective study at TASH, OCCs account for 18% of cases and are the most common among head and neck squamous cell cancers (SCC) (4). Knowledge of disease characteristics, treatment patterns, and outcome determinants is vital for better planning of cancer prevention and treatment; however, there is limited in Ethiopia.

Tobacco use and excessive alcohol consumption are well-recognized etiological factors for OCC. The risk increases with the degree of exposure to each substance individually and is further amplified when both are used together (5). Continued tobacco use is also associated with poorer treatment outcomes and a higher likelihood of recurrence (6). However, a significant portion of patients with OCC has also report other risk factors; such as poor oral hygiene, immunosuppression, environmental exposures, and genetic susceptibility—may play a role (7, 8, 9, 10).

The management of OCC is complex due to its anatomic location, where preservation of vital functions and prevention of disfigurement are critical. Multidisciplinary involvement is associated with improved outcomes (11). The management options for OCC include surgery, radiotherapy, and chemotherapy, which can be administered as a single modality or in combination. The selection of a specific treatment modality or combination depends on the stage of the disease at presentation, the patient's performance status, the availability of expertise and resources, and the patient's preference (11, 12, 13).

There have been significant advancements in the treatment of OCC, including improvements in surgical reconstruction techniques, advanced radiotherapy methods, and newer systemic treatment options. Yet, the survival and prognosis of patients have shown no dramatic change, which can be attributed to a multitude of factors (14, 15). The treatment outcome for OCC depends on tumor-related factors (stage at presentation,

anatomic subsite, pathologic grade, extracapsular extension, lymphovascular invasion, and pathologic margin status), patient-related factors (age, sex, performance status, comorbidities), and treatment-related factors (16, 17, 18).

The stage of the tumor at presentation is an important prognostic factor, with survival exceeding 80% in early-stage LOC, while being significantly lower in advanced-stage disease (14). The anatomic subsite of the primary cancer also significantly affects outcomes, with tongue primaries associated with worse survival (19). Other adverse prognostic factors include increased lymph node density, the presence of extracapsular extension, perineural invasion (PNI), and advanced age at diagnosis (16, 17, 18).

Although there have been changes in treatment options, survival in OC-SCC has not improved significantly over time, with 5-year survival generally not exceeding 50%. Survival is highly heterogeneous globally, reaching over 50% at 5 years in high-income countries and falling below 20% in low-income countries. This variation may be attributed to delayed presentation, patient characteristics, and limited availability of resources and expertise for early diagnosis and appropriate treatment in LMICs.

Several tumor-, patient-, and treatment-related factors have been reported as predictors of survival in OC-SCC. Age, gender, and performance status are the most commonly reported patient-related factors. Advanced stage and grade are tumor-related factors frequently associated with poor outcomes, while treatment allocation is also a major predictor of survival in most studies.

TASH, as the largest cancer center in Ethiopia, presents a unique opportunity to generate evidence that addresses the existing scarcity of data on the treatment patterns and outcomes of OCCs.

1.2 Statement of the problem

Oral cavity cancer is the commonest among head and neck cancer and is associated with significant morbidity and mortality. Global evidence demonstrates that survival in oral cavity cancer is low, with particularly poor outcomes reported in sub-Saharan Africa. In Ethiopia, there are few retrospective studies that demonstrated OCC is the most common head and neck cancer, with the majority presenting at an advanced stage. However, detailed information on locally practiced treatment modalities and associated outcomes remains scarce. Such evidence is essential to improve early diagnosis, optimize treatment protocols, and guide efficient resource allocation. The absence of comprehensive national or institutional analyses highlights the need for a systematic retrospective evaluation of treatment patterns and outcomes of OC-SCC in Ethiopia.

1.3 Significance of the study

In Ethiopia, local research on treatment patterns and outcome determinants for OCC is limited, with only a few small institutional reports available. The current study is therefore significant in increasing knowledge of the treatment patterns and outcomes of OCC. It also informs guidelines and policymakers by providing evidence relevant to resource allocation and the standardization of treatment protocols. In addition the research provides basis for further research and offers lessons for other resource-limited settings, such as Ethiopia.

2 LITERATURE REVIEW

OC-SCC is the most common histologic type among oral cavity cancers (OCC). Males over 40 years of age are disproportionately affected (20). The oral cavity is classified into seven subsites based on the AJCC, with the oral tongue being the most commonly involved subsite in OC-SCC and associated with poorer overall outcomes (21). It is common in the sixth and seventh decades of life, males predominance and a male-to-female ratio ranging from 1.5:1 to 3:1 (22).

There is significant regional variation in the incidence and mortality of OC-SCC globally. In one review of oral and oropharyngeal cancers, a high incidence of oral SCC was reported in South and Southeast Asia, parts of Western Europe, and in Pacific regions (23). In some high-incidence regions, such as Southeast Asia, OC-SCC accounts for more than a quarter of the total cancer burden. For instance, in Southeast Asia and India, it represents up to half of the total cancer incidence, whereas it is relatively less prevalent in other regions, such as Japan and the UK (24, 25).

The trend in incidence and mortality of OC-SCC is heterogeneous across regions globally, due to differences in lifestyle, prevalence of risk factors, and availability of healthcare (20, 23, 26, 27). Among the BRICS nations, a review of the literature has shown an increase in the incidence of OC-SCC in China, India, and the Russian Federation, while the trend in Brazil and South Africa demonstrates stable or declining incidence over time (28). This trend in the BRICS nations highlights the impact of tobacco control policies implemented in Brazil and South Africa.

Evidence on the epidemiology of cancer in sub-Saharan Africa is sparse. Data from GLOBOCAN, based on limited and less reliable cancer registries, do not classify OC-SCC as a major problem (20). Yet, some retrospective descriptive reports from certain parts of the continent suggest that its burden may be underreported (29, 30, 31). Reports from Sudan, where toombak dipping (the use of oral snuff mixed with calcium

bicarbonate) is very common, revealed that OC-SCC is the fifth most common malignancy, accounting for 9% of reported cases (32, 33).

In less developed regions, such as sub-Saharan Africa, the lack of evidence contributes to the already prevalent cancer care inequalities in the region. This is further compounded by low awareness, poor health infrastructure, high cancer care costs, adoption of Western lifestyles that increase risk factors, and negative attitudes of patients toward care and cancer screening (34, 35, 36).

In Ethiopia, few studies have addressed the epidemiology of OC-SCC, and these are generally small and institution-based. Most reports indicate a significant disease burden and that patients present at an advanced stage (4, 37, 38). However, there are no studies specifically addressing treatment patterns and outcomes, which makes this study particularly important.

Tobacco use (both smoked and smokeless) and excessive alcohol consumption are well-established etiological factors for OC-SCC. The risk increases with the intensity of exposure to each individually and rises further when both are used together (5). In a prospective study conducted in Taiwan to assess risk factors for oral SCC, tobacco smoking, betel quid use, and alcohol consumption were all significantly associated with oral SCC (39).

Smoking cessation is associated with a sharp reduction in cancer risk; a case–control study in the United States showed no excess risk after 10 years of abstinence(40). This finding is supported by data from a review conducted in the BRICS nations, where strict tobacco control policies have altered the trend of oral cancer in Brazil and South Africa (42, 43). In addition to its role as a risk factor, tobacco use is also associated with poorer treatment outcomes and a higher risk of recurrence among patients who continue to smoke (6).

Tobacco is also used in forms other than cigarettes. One example is oral snuff (dried and crushed tobacco leaves mixed with sodium bicarbonate, water, and other ingredients), which is used by more than 20% of the world's population and is the primary risk factor for oral cancer in certain regions (7, 39, 40). In regions where oral tobacco use is prevalent, the most commonly involved subsites are the buccogingival and labiogingival sulci, often with multifocal involvement. These tumors are associated with a high risk of recurrence due to the wide field cancerization effect (7, 39).

While tobacco and alcohol are established risk factors, a substantial proportion of patients with oral cavity cancer (OCC) report no exposure to either. In these patients, alternative etiological factors have been

implicated, including poor oral hygiene, chronic mucosal irritation, dietary factors, immunosuppression, environmental exposures, and genetic susceptibility (7, 8, 9, 10).

The distribution of risk factors for OC-SCC varies across regions, socio-demographic and cultural factors. In developed countries, alcohol and tobacco remain the predominant risk factors, with incidence trends generally stable or declining. In contrast, LMICs are affected by region-specific risk factors, such as oral tobacco use. Additionally, the adoption of Western lifestyles and increased exposure to carcinogens contribute to a disproportionately high incidence of OC-SCC in these regions (48, 49). Although data are limited in sub-Saharan Africa, smoking remains prevalent. There is also evidence supporting the cultural use of oral tobacco, including practices such as areca nut chewing (31, 50, 51).

Common clinical presentations of patients with OC-SCC include swelling, bleeding, and pain (48). The oral cavity is easily accessible for visual and tactile examination; yet, in developing regions such as Africa, patients often present late. Delayed presentation is a major obstacle in these settings, which already experience prolonged diagnostic and treatment delays in addition to patient-related delays (34, 53). Late presentation is associated with advanced stage disease at diagnosis and poorer outcomes (54, 55).

Treatment of OC-SCC must carefully consider the preservation of vital functions such as speech, breathing, and swallowing, while also addressing aesthetic outcomes. Optimal management is achieved through a multidisciplinary approach. Curative treatment of resectable OC-SCC typically involves complete surgical resection with reconstruction, with or without adjuvant radiotherapy (56, 57). However, in patients with more advanced disease, multimodality therapy is the standard curative treatment (54). The choice of specific treatment depends on factors such as the specific subsite, stage, patient performance status, availability of resources and expertise, and patient preference (12, 13, 58). For patients who are not candidates for curative treatment due to unresectable or metastatic disease, or poor performance status, treatment options are limited(58, 59).

The fundamental treatment principles for OC-SCC have remained largely unchanged over time; however, significant advancements in surgical techniques and radiotherapy technology have occurred. These improvements have led to better management of treatment-related complications and enhanced quality of life, although no substantial gains in overall survival have been observed (56, 57, 60). Treatment approaches are significantly associated with disease prognosis and the risk of treatment-related complications (56, 61). Treatment approaches vary significantly across different regions of the world, with patients in developing countries often presenting at a late stage and receiving less aggressive, palliative-oriented care (34, 36).

Treatment outcomes for OC-SCC depend on factors, including tumor-related factors, patient-related factors, and treatment-related factors (16, 17, 18).

Tumor-related factors, including tumor stage at presentation, primary site, and pathologic features, are important prognostic indicators. Analysis of the SEER database, demonstrates that oral tongue cancers are associated with higher cancer-specific mortality (CSM) as compared with cancers arising elsewhere in the oral cavity. Additionally, lack of surgical intervention, treatment with radiotherapy alone, advanced stage, and age ≥ 60 years are independently associated with increased CSM (19). In a study conducted in Taiwan involving 703 patients, disease stage and surgical treatment were significantly associated with survival. The 5-year survival rate reaching 72% for Stage I disease compared with only 13% for Stage IV disease (58). In Brazil, a study of 375 patients with oral cancer analyzed survival outcomes and identified advanced clinical stage (TNM), male gender, older age at diagnosis, delayed presentation, and delayed treatment as significant prognostic factors (59). Another study from Uganda also demonstrated better 5-year survival in early-stage patients (Stages I–II) compared with those with advanced-stage disease (Stages III–IV), with survival rates of 43.6% versus 20.7%, respectively. In this study, independent predictors of survival included clinical stage, histopathological grade, gender, and age at diagnosis, whereas tumor location and treatment group were not significantly associated with survival ($p > 0.05$) (60).

In addition to tumor invasiveness and disease extent, the patient's general health, age, and delays in presentation are also important prognostic factors (3, 66). However, the role of sex as a prognostic factor remains unconfirmed. In a case-matched comparison study, significant differences were observed in age at diagnosis, tumor anatomic site, smoking habits, betel nut chewing, and alcohol consumption, whereas no significant gender differences in survival were detected (62).

Treatment approach is also known to have prognostic value. In a retrospective analysis of data from the NCDB including 6,830 patients, neck dissection and treatment at academic or research institutions were associated with improved survival, whereas positive surgical margins, Medicare insurance, and adjuvant radiotherapy or chemotherapy were associated with poorer survival (57). In low-income countries with limited resources and expertise, treatment approach is one of the main factors contributing to poor outcomes (34, 64).

Although reports indicate very low survival rates in sub-Saharan Africa, there is limited evidence regarding contemporary treatment patterns, outcomes, and prognostic factors in the region (35, 64, 67). Similarly, in Ethiopia, available data are sparse, with only a few general maxillofacial and descriptive studies reported (4, 37, 38). This underscores the importance of conducting a comprehensive retrospective analysis using local data.

2.1 Conceptual frame work

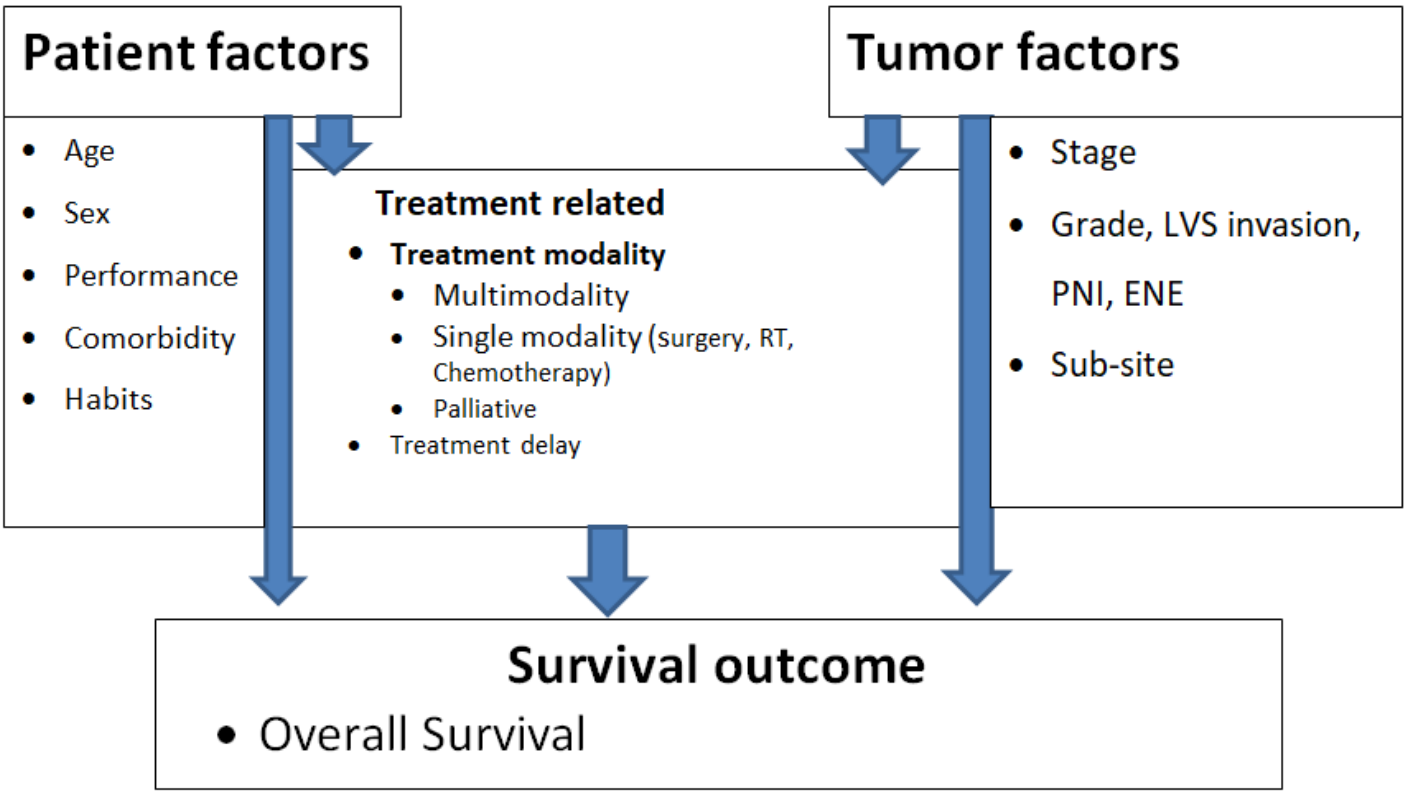

Figure I: Conceptual framework showing the relationship between patient factors, tumor characteristics, treatment-related factors, and overall survival in oral cavity cancer patients developed after reviewing the literature.

3 Objectives

3.1 General Objective

To assess the treatment patterns and survival outcomes of oral cavity cancer patients treated at Tikur Anbessa Specialized Hospital over a three-year period (2022–2024 GC).

3.2 Specific Objectives

- To describe the demographic and clinical characteristics of patients diagnosed with oral cavity squamous cell cancer.
- To analyze the staging distribution of these cancers.
- To describe the treatment modalities used.
- To evaluate the survival outcomes of patients diagnosed with oral cavity squamous cell carcinoma
- To identify predictors of adverse outcomes.

4 Methods and materials

4.1 Study area and period

The study was conducted at the Adult Oncology Unit of Tikur Anbessa Specialized Hospital from September 1 to October 30, 2025. Tikur Anbessa Specialized Hospital is one of Ethiopia's leading tertiary care centers, established at its current site in 1972. It serves as a major teaching hospital under Addis Ababa University, providing clinical and preclinical training across most medical disciplines. The hospital offers comprehensive inpatient and outpatient services, with a capacity of approximately 800 beds (64).

The Radiotherapy Center at Tikur Anbessa Specialized Hospital was established in 1998 (64). The Clinical Oncology Department is staffed by eight clinical oncologists, four medical physicists, eight radiotherapists, forty-one residents, clinical nurses, and other supportive staff. The scope of practice encompasses all solid tumors and selected hematologic malignancies. Services provided by the department include new cancer patient evaluation, chemotherapy administration, radiotherapy services, follow-up care, and palliative care.

Radiotherapy services are delivered using one linear accelerator (LINAC) and one intracavitary brachytherapy machine, primarily utilized for the management of cervical cancer and endometrial carcinoma. Chemotherapy services are provided on both inpatient and outpatient bases. Two inpatient wards, with a total capacity of 32 beds, are available for chemotherapy administration. For outpatient chemotherapy, two dedicated clinics operate six days per week.

4.2 Study Design

An institution-based Retrospective cohort study design was used.

4.3 Population

4.3.1 Source population

All oral cavity cancer patients at Tikur Anbessa Specialized Hospital (TASH) oncology center

4.3.2 Study Population

All patients with oral cavity squamous cell carcinoma treated at Tikur Anbessa Specialized Hospital (TASH) between 2022 and 2024 who met the inclusion criteria were included in the study.

4.3.3 Inclusion Criteria

Adult patients (≥18 years) with histologically confirmed oral cavity squamous cell carcinomas treated at TASH between 2022 and 2024 were included in the study.

4.3.4 Exclusion Criteria

- Patients with missing data on key variables, including date of diagnosis, primary site, histologic type, or stage group, were excluded.
- Patients with non-squamous cell histologic malignancies
- Patients with a second primary malignancy

4.4 Sample Size

The sample included all eligible patients diagnosed within the three-year period (2022–2024). Given the limited number of cases during this period, all eligible patients were included.

4.5 Data Collection

Data was retrieved from patient charts, pathology reports, radiotherapy records, and follow-up logs. A structured data abstraction form was used, covering; demographics, clinical and pathology features**,** treatment patterns and **o**utcomes**.**

Data on survival status and date of death for deceased patients were collected. When survival status could not be reliably determined from other sources, information was obtained through telephone interviews with the patient or a close relative.

4.6 Data quality management**;**

Three data collectors were trained on the data abstraction tool and employed for data collection. To ensure data quality, the abstraction tool was carefully prepared, and data collectors were trained on its use and the study objectives. The tool was piloted on a subset of records, demonstrating acceptable clarity and completeness, and was subsequently adopted for final data collection. In cases of incomplete recording, information was cross-checked from multiple sources. Medical record numbers were verified to prevent duplicate entries. Missing data were documented and assessed for sensitivity. Regular supervision and review were conducted throughout the data collection process to ensure accuracy and completeness.

4.7 Data Analysis

Data were cleaned, coded and analyzed using SPSS Version 27. For descriptive statistics (mean, median, frequencies, and proportions) were used to summarize the results of patient characteristics and treatment patterns. Chi-square test was applied to compare baseline characteristics and treatment groups. Kaplan-Meier method was employed for estimating overall survival, and between group differences was determined by log rank test. Cox proportional hazards regression was used to identify factors independently associated with overall survival. A p-value <0.05 was considered statistically significant.

4.8 Study Variables

4.8.1 Dependent variables

- Overall survival

4.8.2 Independent variables

I. Socio-demographic variables
   - Age
   - Sex
   - Residence

II. Clinico-pathologic characteristics,
   - Primary presentation
   - Duration of symptoms
   - Comorbidities (DM, HTN, HIV…)

- Life style habits (smoking, alcohol use)
- ECOG Performance Status,
- Stage of Cancer,
- Location of tumor
- Histologic features (grade, stage, LVSI, PNI, ECE, margin status)

III. Treatment related variables
- Treatment type (surgery, Radiotherapy, Chemotherapy, multimodality)
- Treatment intent
- Radiotherapy Delay,

4.9 Operational and standard definitions

I. **Treatment Pattern:** The specific regimens or combinations of therapeutic interventions administered to patients with oral cavity squamous cell carcinoma, as documented in the medical records. This includes surgery, radiotherapy, and chemotherapy, used alone or in combination.

II. **Oral cavity sub-sites:** Anatomical locations of the primary tumor within the oral cavity, classified according to the AJCC into six sub-sites (excluding the lip): buccal mucosa, alveolar ridge, floor of the mouth, hard palate, oral tongue, and retromolar trigon (65).

III. **Performance Status:** The patient's functional status at presentation, as documented in the medical records and assessed using the ECOG Performance Status Scale (0–5), where 0 indicates fully active and 5 indicates death (66).

IV. **Stage of OC-SCC:** The extent of disease at diagnosis, based on tumor size (T), regional lymph node involvement (N), and presence of distant metastasis (M), as documented in the medical records and classified according to the AJCC TNM staging system (65).

V. **Treatment Intent:** The overall goal of treatment, as documented in the medical records and determined by the treating physician.

a. **Curative intent:** Treatment intended to completely eradicate the cancer, with the goal of cure.

b. **Palliative intent:** Treatment aimed at alleviating symptoms, improving quality of life, and potentially prolonging survival, without the intent to cure the disease.

c. **Single-modality treatment:** Administration of only one curative treatment modality—either surgery alone or radiotherapy alone—without concurrent or sequential chemotherapy.

d. **Combined-modality treatment:** Administration of two or more curative-intent treatment modalities, such as surgery plus adjuvant radiotherapy**,** surgery plus adjuvant chemoradiotherapy, or definitive radiotherapy with concurrent chemotherapy**,** delivered either sequentially or concurrently as part of the initial treatment course.

VI. **Duration of symptoms**: The time interval from the onset of symptoms to the patient's first presentation to a healthcare facility, as reported by the patient and documented in the medical records, measured in months.

VII. **Comorbidity:** The presence of one or more additional medical conditions or diseases in a patient alongside the primary diagnosis of oral cavity squamous cell carcinoma, as documented in the medical records.

VIII. **Habits:** Regular lifestyle behaviors of patients, including tobacco use (smoking or smokeless), alcohol consumption, and khat chewing, as documented in the medical records or reported by the patient during telephone interviews.

IX. **Grade of OC-SCC:** The histopathological differentiation of oral cavity squamous cell carcinoma, as assessed by a pathologist and documented in the medical records. Tumors were classified as well-differentiated (Grade 1), moderately differentiated (Grade 2), or poorly differentiated (Grade 3) (67).

X. **Primary Presenting Symptom:** The main symptom that prompted the patient to seek medical care, as reported by the patient and documented in the medical records. Examples include ulcer, swelling, pain, bleeding, or difficulty in chewing or swallowing.

XI. **RT Intent:** The documented purpose of radiotherapy, categorized as definitive, adjuvant or palliative.

XII. **Chemotherapy Intent:** The clinical purpose of chemotherapy as documented in the medical record.

XIII. **Radiotherapy waiting time:** The time interval, in weeks, between the documented decision for curative radiotherapy and the initiation (first fraction) of radiotherapy treatment.

4.10 Dissemination of findings

Findings from this study will be disseminated through presentations at scientific conferences and publication in peer-reviewed journals.

4.11 Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of AAU. Patient confidentiality was maintained by coding data and removing identifiers. Since this is a retrospective chart review, individual patient consent was not mandatory.

5 Results

5.1 Study Population

A total of 133 cases were initially extracted from the patient registration logbook and reviewed using the electronic medical record system (Iwket-CARE). Exclusions included 5 cases because of in adequate documentation, 10 cases due to non-squamous histology (8 minor salivary gland cancers and 2 mucosal melanomas), 9 cases with non-oral cavity cancer (4 lip SCC, 2 tonsil SCC, 2 sino-nasal cancers, and 1 breast cancer), 6 cases with non- or ambiguous grading, 6 cases with missing staging data, 5 cases of recurrence, and 1 case with a second primary (cervical cancer), leaving a final dataset of 91 cases.

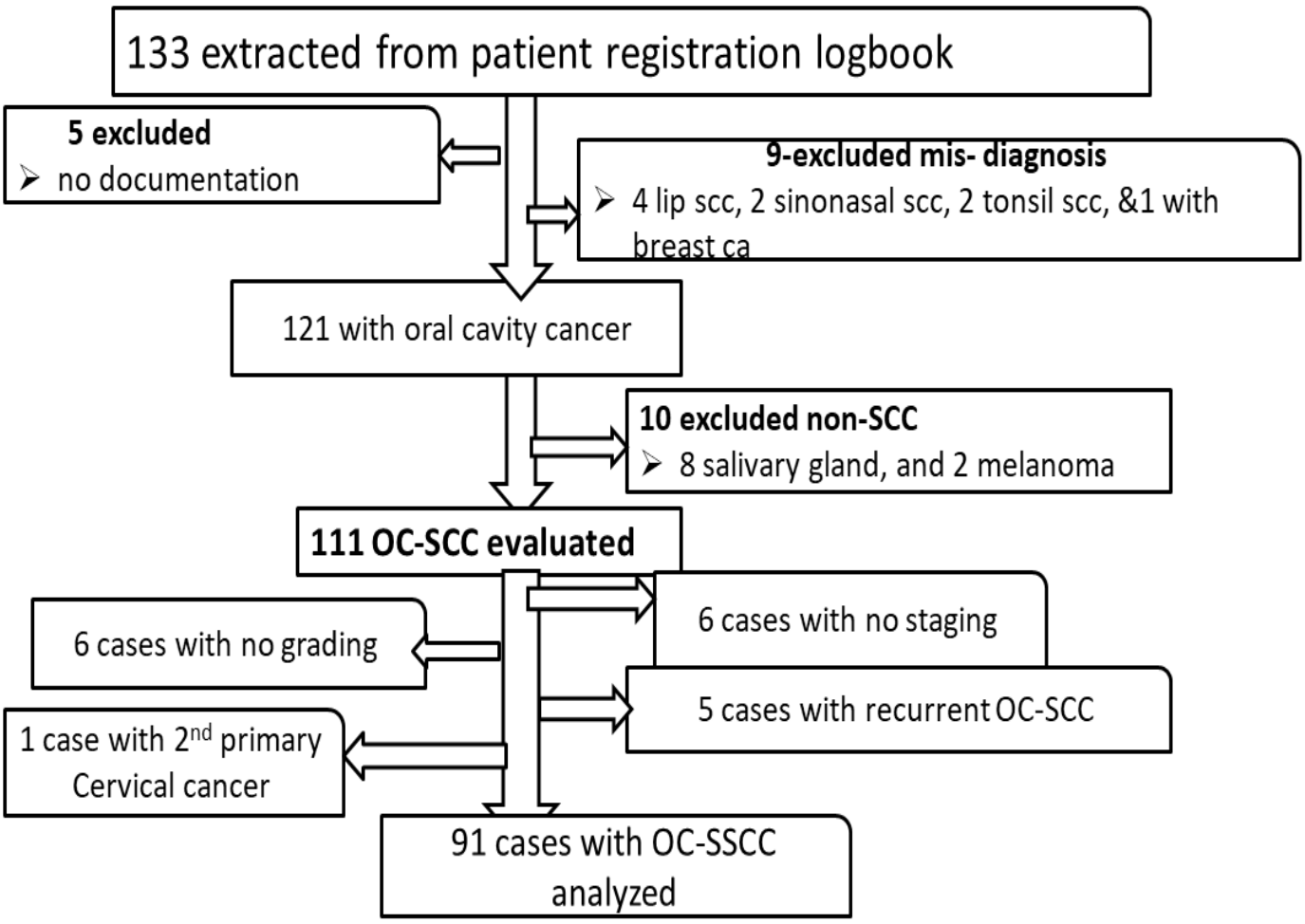

Figure II: PRISMA-style study flow diagram for the retrospective analysis of treatment patterns and survival outcomes of OC-SCC at Tikur Anbessa Specialized Hospital

5.2 Socio-demographic Characteristics

The median age of the study participants was 50 years (interquartile range [IQR]: 42–58; range: 24–87 years), with the majority of cases occurring between 40 and 59 years. Among the study participants, 60 (65.9%) were male, with a male-to-female ratio of 2:1, and the majority, 56 (70%), were from Addis Ababa. The overall prevalence of lifestyle habits among the study participants was 30.8%, including 17% who chewed khat, 12.1% who smoked, and 7.7% who consumed alcohol.

5.3 Baseline Clinicopathologic Characteristics

Most of the study participants, 71 (78%), had a good performance status (ECOG 0 or ECOG 1). The prevalence of any comorbidity was only 15 (16%), with hypertension being the most commonly observed, occurring in 8 (8.8%) of the cases.

The most frequent presentations were mouth ulcers (39, 42.9%) and swelling (34, 37.4%), whereas bleeding, pain, and difficulty opening the mouth were less commonly observed. Participants present with mean duration of delay of six months (interquartile range [IQR]: 3–12 months), with delays ranging from 1 to 36 months.

The oral tongue was the most commonly involved site (58 cases, 63.7%), followed by the buccal mucosa (13, 14.3%) and the alveolar ridge (8, 8.8%), while the floor of the mouth; retromolar trigon, and hard palate were less frequent. Most participants presented with advanced disease: 75 (82.4%) had clinical T3–T4 tumors and 60 (65.9%) had nodal involvement. Staging showed 51 cases (56.4%) at Stage IV, 27 (29.7%) at Stage III, 9 (9.9%) at Stage II, and 4 (4.4%) at Stage I.

In this study, Grade I (well-differentiated) tumors account 58.2% of cases. There was a significant association between tumor grade and clinical nodal stage ($p = 0.010$), characterized by an increase in tumor grade as nodal stages advanced (**Table 2**). Notably, Grade II–III tumors were found in 75% of N3 patients, a more than threefold increase compared with the 22.2% observed in N0 patients.

Table 1 Baseline clinical features and treatment patterns of oral cavity scc patients in TASH, December 2025(N=91)

Characteristics	Category	Frequency	Percent
ECOG performance score	ecog-3	4	4.4%
	ecog-2	16	17.6%
	ecog-1	47	51.6%
	ecog-0	24	26.4%
Comorbidity*	Hypertension	8	8.8%
	RVI	7	7.7%
	CVD	4	4.4
	DM	3	3.3
Main symptom at presentation	Ulcer	39	42.90%
	Swelling	34	37.4%
	Pain	6	6.6%
	Difficult mouth opening	5	5.5%
	Bleeding	7	7.7%
Duration of symptoms	>6 months	27	29.7%
	3-6 months	28	30.8%
	≤ 3 months	36	39.6%
Location of primary tumor in oral cavity sub-sites*	Oral tongue	58	63.7%
	Floor of mouth	5	5.5%
	Buccal mucosa	13	14.3%
	Alveolar ridge	8	8.8%
	Retromolar trigon	4	4.4%
	Hard palate	3	3.3%
Clinical T stage	T4b	14	15.4%
	T4a	32	35.2%
	T3	29	31.90%
	T2	12	13.21%
	T1	4	4.4%
Clinical N stage	N3	9	9.9%
	N2	27	29.7%
	N1	24	26.4%
	N0	31	34.1%
Clinical M stage	M1	3	3.3%
	M0	88	96.7%
AJCC stage	Stage 4	51	56.4%
	Stage 3	27	29.7%
	Stage 2	9	9.9%
	Stage 1	4	4.4%

Grade of cancer	Grade 3	14	15.4%
	Grade 2	24	26.4%
	Grade 1	53	58.2%
Pathologic risk factors*	LVSI	19	50.0%
	PNI	11	29.0%
	ECE	3	7.9%
	No	3	7.9%
	Uk	7	18.4%
Margin status*	Positive	13	34.3%
	Negative	25	65.78%
Pathologic node positive*	Yes	8	26.6%
	No	18	60.0%
	Not documented	4	13.4%
Treatment modality	None	12	13.2%
	Palliative	31	34.1%
	Single modality (RT or surgery only)	28	30.8%
	Multimodality	20	22.0%
Surgery done with curative intent	No	53	58.2%
	yes	38	41.8%
Radiotherapy type	No RT	44	48.4%
	palliative RT	19	20.9%
	adjuvant RT	18	19.8%
	definitive RT	10	11.0%
Chemotherapy intent*	Palliative	14	15.4%
	Induction	15	16.5%
	Adjuvant	5	5.5%
	Concurrent	19	20.9%

* Multiple responses were allowed and therefore percentages do not sum to 100%.

Table 2 Distribution of the tumor grades across the different clinical nodal stages, presented as frequency (n) and percentage (%) of OC-SCC in TASH December 2025

Clinical Nodal Stage	Grade 2-3 n(%)	Grade 1 n(%)	Total n(%)
N3	6 (75.0%)	2 (25.0%)	8 (100.0%)
N2	21 (58.3%)	15 (41.7%)	36 (100.0%)
N1	8 (40.0%)	12 (60.0%)	20 (100.0%)
N0	6 (22.2%)	21 (77.8%)	27 (100.0%)
Total	**41 (45.1%)**	**50 (54.9%)**	**91 (100.0%)**

5.4 Treatment patterns

Among the study participants, 79 (86.8%) were planned for curative treatment, and 71 (78%) received some form of treatment for oral cavity cancer. Treatment modalities included multimodality therapy (surgery plus adjuvant radiotherapy) in 20 (22.0%) of cases, single-modality therapy (either radiotherapy or surgery alone) in 28 (30.8%), and palliative treatment in 31 (34.1%) of cases.

Surgery was performed in 38 (41.8%) of the cases, with wide local excision being the most common procedure (45%), followed by partial glossectomy (42%). Among the operated oral cavity cancers, neck dissection was performed in 30 (78.9%) of cases, with unilateral modified radical neck dissection being the most common type, performed in 8 cases.

Radical radiotherapy was administered to 31 (34.1%) of the cases, among which adjuvant radiotherapy was the most commonly delivered, given in 17 (18.7%) of cases. Concurrent chemotherapy was administered in 19 (20.7%) cases, with cisplatin 40 mg/m² as the concurrent regimen in 15 cases; there was no documentation regarding the type of concurrent chemotherapy in the remaining 4 cases. The mean dose of radiotherapy for radically treated patients was 63.9 ± 6.9 Gray, and the mean length of RT interruption was 5 ± 12 days, ranging from 0 to 58 days. The mean RT waiting time was 17.5 ± 12.3 weeks, ranging from 2 to 48.9 weeks.

Some form of chemotherapy was delivered to 41 (45.1%) of the cases, with the most common regimen being concurrent cisplatin, followed by induction cisplatin/paclitaxel.

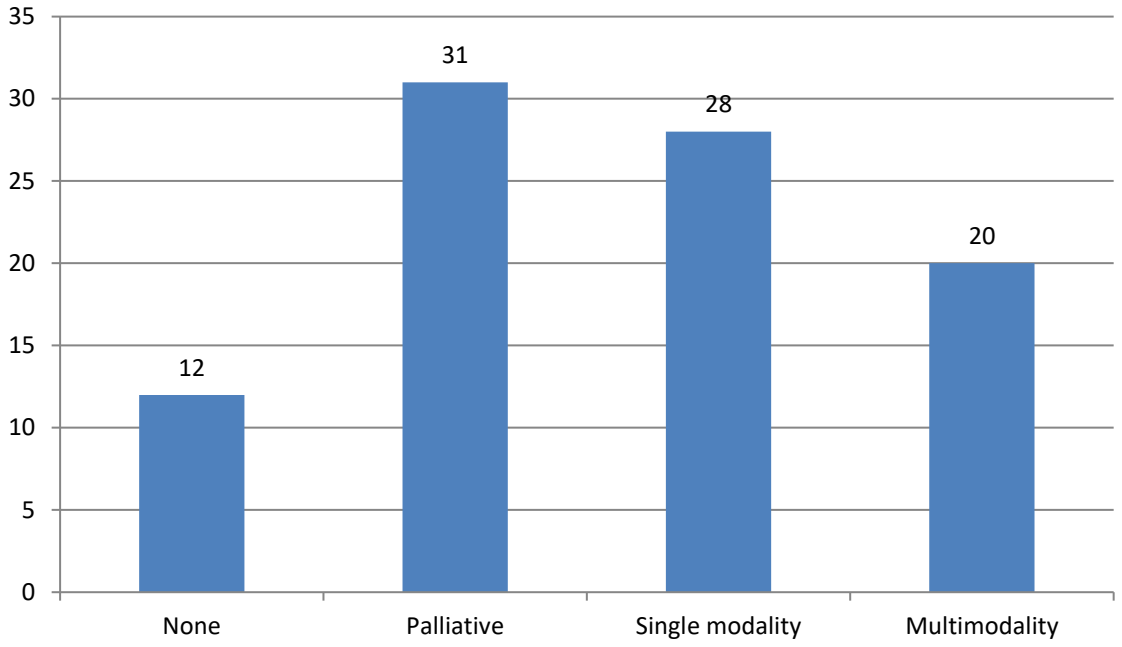

Figure III. treatment modality among OC-SCC patients in TASH December 2025 (N=91)

5.5 Survival analysis

The median duration of follow-up was 11.1 months (interquartile range [IQR]: 4.04–24.10), with individual observation periods varying significantly, ranging from 1.2 to 44.4 months. During the follow-up period, there were 48 (52.7%) deaths, 25 (27.5%) patients were alive, and 18 (19.8%) were lost to follow-up.

The Kaplan–Meier estimator was used to estimate median survival and survival rates at one and three years. The estimated median survival time for the cohort was 15.5 months (95% CI: 7.96–23.04). The survival rates at one and three years were 57.8% and 32.4%, respectively.

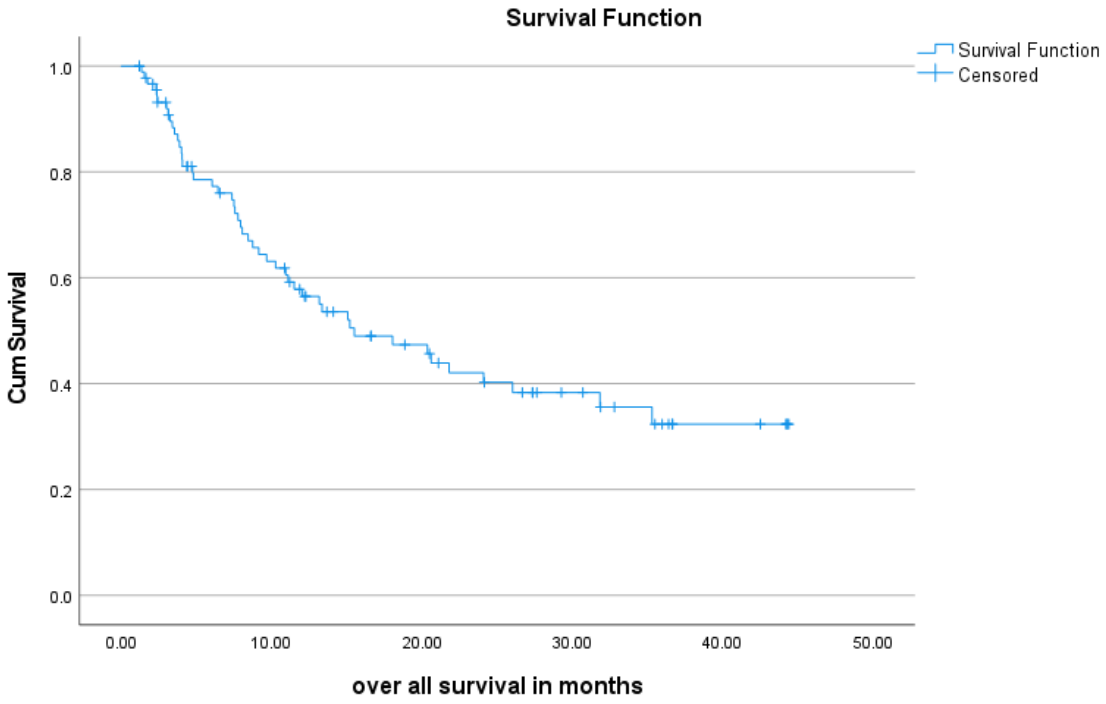

Figure IV. Kaplan Meier curve, overall survival of OCSCC in TASH, December 2025

5.6 Predictors of survival

Univariate analysis identified potential predictors of survival (Table 3). Five variables—sex, ECOG performance status, primary subsite, prognostic stage, and treatment modality—were included in the final multivariate Cox regression model. The analysis showed that advanced-stage disease was independently associated with significantly worse overall survival compared with early-stage disease (aHR = 8.38; 95% CI: 1.84–38.10; p = 0.006). Treatment modality was also a significant predictor of survival (p = 0.009). Patients who received no treatment or palliative care had a significantly higher risk of death compared with those treated with multimodality therapy (aHR = 2.46; 95% CI: 1.21–4.99; p = 0.013). In contrast, there was no statistically significant difference in survival between patients treated with single-modality therapy and those who received multimodality treatment (aHR = 1.10; 95% CI: 0.51–2.41; p = 0.800).

Table 3. Univariate analysis for Predictors of Survival in OC-SCC patients in TASH, December 2025

Variables	p-value	HR	95% CI for HR
Sex	.145	0.63	0.34 – 1.17
Age (≤ 55 vs >55 years)	.763	1.10	0.59 – 2.05
ECOG PS	.153	1.48	0.83 – 3.60
Comorbidity	.661	0.86	0.43 – 1.72
Primary involved sub-site	.199	0.67	0.36 – 1.24
Stage	.001	10.97	2.53 – 47.57
Grade (low vs high)	0.397	0.781	0.441 – 1.383
Treatment modality	<.001	-	-
Note. HR = hazard ratio; CI = confidence interval; p-values are two-tailed.			

5.7 Follow-up status and attrition analysis

Of the 91 patients included in the analysis, 73 (80.2%) were successfully followed up, while 18 (19.8%) were lost to follow-up. As shown in Table 4, no statistically significant differences were observed between patients who were retained and those lost to follow-up regarding age, sex, lifestyle habits, performance status, primary tumor subsite, histologic grade, or treatment modality (all $p > 0.05$). In both groups, the majority of patients were younger than 55 years, male, and had good performance status. Worst- and best-case scenario analyses yielded 3-year overall survival estimates of 24.6% and 35.1%, respectively. Importantly, the study's conclusions regarding predictors of survival remained consistent under both scenarios, supporting the robustness of the findings despite the relatively high attrition rate.

Table 4 Comparison of baseline characteristics between OC-SCC patients retained and loss to follow-up in TASH December 2025 (n = 91)

Characteristics	Retained 73 (80.2%)	Lost 18 (19.8%)	P-value
Age (years			**0.934***
>55 years	26 (28.6%)	5 (27.8%)	
<55 years	52 (71.2%)	13 (72.2%)	
Sex			**0.942***
Male	48(65.8%)	12(66.7%)	
Female	25(34.2%)	6(33.3%)	
Life style habits			**0.122***
Yes	26 (35.6%)	3 (16.7%)	
No	47 (64.4%)	15(83.3%)	
Performance status			**0.507***
Poor	15 (20.5%)	5(27.8%)	
Good	58 (79.5%)	13(72.2%)	
Primary subsite			**0.796***
Tongue	47 (64.4%)	11(61.1%)	
Non-tongue	26 (35.6%)	7(38.9%)	
Grade			**0.557***
High (Grade 2-3)	34 (46.6%)	7(38.9%)	
Low (grade 1)	39 (53.4%)	11(61.1%)	
Stage			**1.000α**
Advanced (stage III-IV)	63 (86.3%)	16(88.89%)	
Early (stage I-II)	10 (13.7%)	2(11.20%)	
Treatment modality			**0.454***
Palliative or none	33 (45.2%)	10 (55.6)	
Single modality	22 (30.1%)	6 (33.3)	
Multimodality	18 (24.7%)	2 (11.1%)	

* Pearson Chi-Square p-value.
α fisher exact test p-value

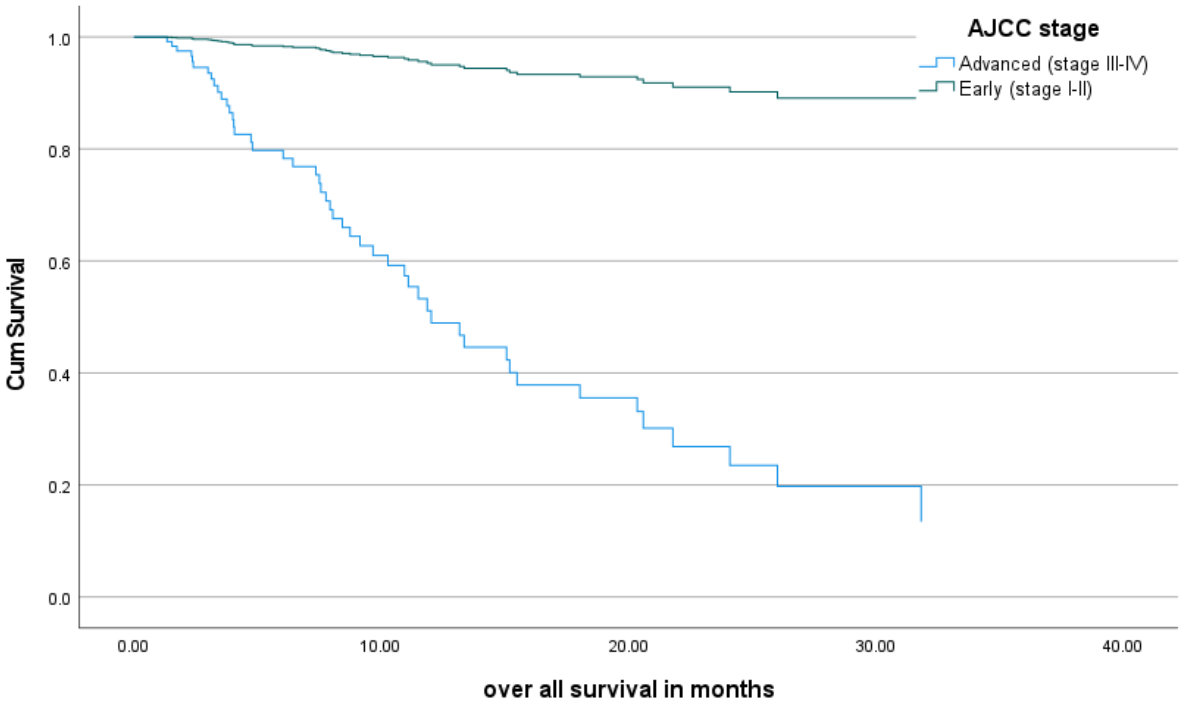

Figure V. overall survival by stage of cancer of OC-SCC in TASH December 2025

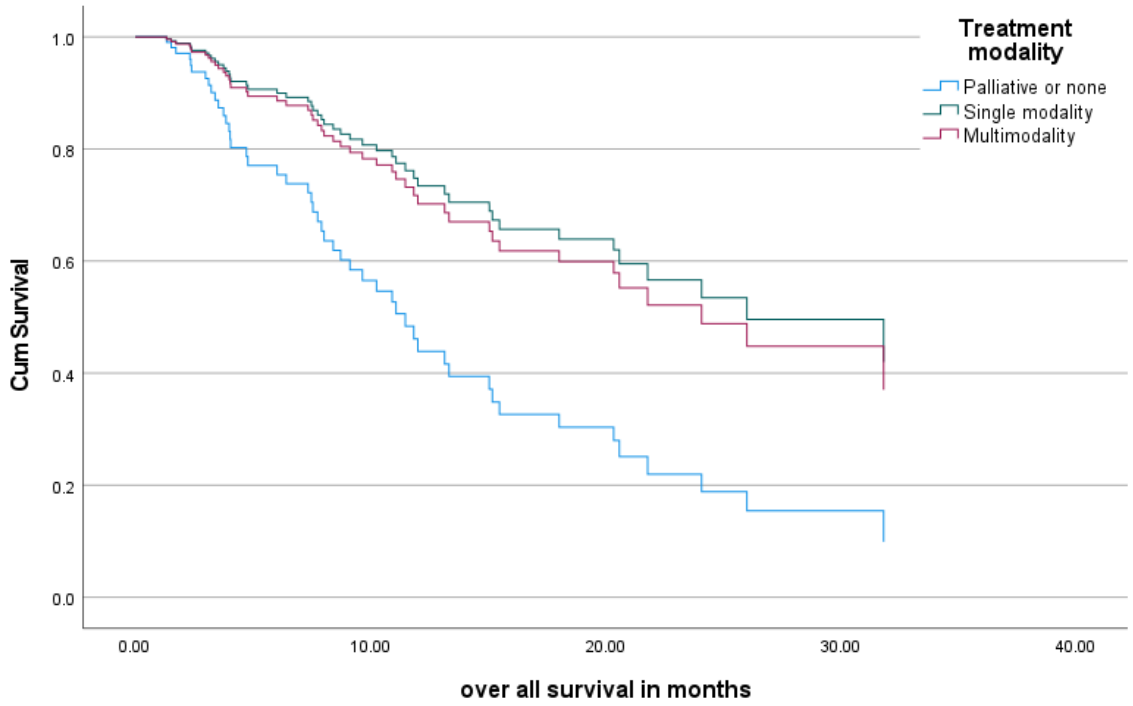

Figure VI. Overall survival by treatment group, of cancer of OC-SCC in TASH December 2025

5.8 Discussion

This study describes the clinicopathologic features, treatment patterns, and survival outcomes of patients with oral cavity squamous cell carcinoma in a resource-limited setting. The median age of the study participants was 50 years, which is similar to reports from previous studies at TASH and other studies in LMICs, which reported a median age of 50–60 years (4), (58). However, this is younger compared with reports from high-income countries, which consistently report a median age of 60–65 years (59), (68).

Our data indicate that only 31% of the cohort practiced lifestyle habits linked to OC-SCC, and the prevalence of smoking was notably low at 12.1%. Although this low smoking rate is consistent with national trends in Ethiopia, it contradicts established global reports that identify tobacco use as an almost universal risk factor in the majority of OC-SCC cases (3), (69).

Consistent with patterns in many LMICs, where 70–85% of OC-SCC cases present at an advanced stage, more than 50% of the participants in our study were diagnosed with Stage IV disease according to the AJCC 8th edition (34). Furthermore, we observed that advanced clinical nodal stages (N2 and N3) were significantly linked to higher-grade, poorly differentiated tumors ($p = 0.010$). In line with this, there was a significant delay in presentation, with a median duration of symptoms of six months, which is commonly attributed to poor awareness, misinterpretation of symptoms, limited access to healthcare, and delayed referral to specialized oncology centers (34), (70).

The oral tongue was identified as the primary tumor subsite (63.7%), mirroring patterns typically seen in Western cohorts. This contrasts with Southeast Asian studies, where buccal mucosa involvement is more common—a variation likely explained by the localized impact of betel quid use (19), (68). These regional variations in the predominantly involved subsites are partly explained by the typical risk factors prevalent in each region. In the absence of any prominent risk factors identified in our study, the predominance of oral tongue involvement may be due to advanced stage at presentation or multisite involvement. When patients present with Stage IV disease or multisite involvement, the original site of origin can often be obscured.

Based on the WHO classification of head and neck cancers into Grade I, II, and III, 58.2% of our study participants had well-differentiated Grade I cancer. This is consistent with reports from other studies, which consistently show that well-differentiated cancers account for more than 50% of cases (58), (60). While histologic grade has traditionally been considered a prognostic factor, its independent impact on survival remains inconsistent once tumor stage and nodal status are taken into account (3), (59). This is consistent with our findings, in which tumor grade was associated with a higher N stage but did not independently predict survival on multivariable analysis.

The preferred approach for locally advanced disease is multimodality treatment (11). In contrast with this treatment was single modality in 30.8%, multimodality in 20%, and only palliative treatment in 34.1% of cases. Because treatment modality depends on tumor stage, performance status, and resource availability, existing limitations in surgical expertise, radiotherapy machine availability, and advanced disease at presentation make the low rate of curative treatment expected. This was also seen in previous study in TASH (4).

Radiotherapy was given to 34.1% of the cases; the mean radiotherapy dose was 63.9 Gy, which is higher than previously reported at TASH. This increase may be due to the availability of a LINAC machine, which can deliver higher doses of radiotherapy with acceptable toxicity, unlike in previous reports where radiotherapy was

delivered using a cobalt machine with 2D technique (4). The median duration of radiotherapy (RT) interruption was five days, and there was a prolonged radiation delay, with a median RT waiting time of 17.5 weeks, which may partially explain the relatively shorter survival in our study population. Treatment delays and poor outcomes have been studied previously and were consistently associated with worse survival in prior studies (71), 75).

The overall survival in our study was short, with a median survival of 15.5 months and 1-year and 3-year survival rates of 57.8% and 32.4%, respectively. This contrasts with reports from Taiwan, Brazil, and other high-income countries, where 5-year survival can reach up to 50% (62, 63, (68). In contrast, there are similar reports to our study from sub-Saharan Africa and other LMICs (60), (73). Stages of the cancer and treatment modality were independent predictors of survival in our study.

AJCC stage of cancer integrates tumor size, depth of invasion, nodal involvement, and distant metastasis, all of which directly influence resectability and treatment selection, and is a central prognostic factor. In this study, advanced stage at diagnosis emerged as the strongest independent predictor of poor overall survival, with patients presenting with Stage III–IV disease experiencing an almost eightfold higher risk of death compared with those diagnosed at an early stage. This finding is consistent with established evidence in oral cavity squamous cell carcinoma and has also been reported in multiple single-institution studies (59), (60), (74).

Treatment modality was also independently associated with survival. Patients who received none or palliative care alone had significantly worse outcomes compared with those treated with multimodality therapy. In contrast, survival did not differ significantly between patients treated with single-modality therapy and those treated with multimodality therapy, which may be due to patient selection, underlying performance status, comorbidities, or resource-related factors rather than true equivalence between treatment approaches. Patients treated with curative intent had better survival than those receiving palliative care or no treatment, consistent with NCCN recommendations (11).

Survival outcomes in our study were low, which may be attributed to advanced disease at presentation, limited healthcare resources, and prolonged waiting times for curative treatment. Which often precludes the timely delivery of definitive therapy, resulting in a substantial proportion of patients fail to receive curative treatment. In our cohort, the delay in initiating radiotherapy was particularly pronounced, with a mean waiting time exceeding 17 weeks. Which are a well-established adverse prognostic factor, as multiple studies have

consistently demonstrated an association between prolonged waiting times and reduced survival in head and neck cancers (74, 75).

In our cohort, nearly 20% of patients were lost to follow-up; however, sensitivity analyses demonstrated consistent predictors of survival, suggesting that loss to follow-up is unlikely to significantly affect the study conclusions.

Taken together, these findings accentuate the significance of early-stage diagnosis and access to curative-intent, multimodality treatment in improving survival. However, the wide confidence intervals—particularly for disease stage—suggest limited precision, likely related to the small sample size and number of events, and warrant cautious interpretation.

Strengths: The strengths of this study include its pioneering nature as the first report on survival outcomes of oral cavity squamous cell carcinoma in Ethiopia. Additionally, the use of real-world data from a national referral center enhances the clinical relevance and applicability of the results to resource-limited settings. We also employed multiple strategies to reduce missing data, including cross-checking from multiple records and telephone interviews, which enhanced data completeness and reliability. Furthermore, the impact of loss to follow-up was addressed through sensitivity analyses, which confirmed the stability of the findings.

Limitations of the study: First, the retrospective, chart-review–based design limited the availability and accuracy of some clinically important variables and is inherently vulnerable to information and selection bias. Additionally, approximately one-fifth of patients were lost to follow-up, which could potentially affect survival estimates, although sensitivity analyses suggested that the main findings were robust. Finally, this was a single-institution, hospital-based study, which may limit the generalizability of the results to the broader population.

Conclusion: The study highlights that patients with oral cavity squamous cell carcinoma often present at an advanced stage. Overall survival remains suboptimal and is significantly influenced by disease stage and access to curative treatment, underscoring the need for early detection, timely intervention, and improved treatment delivery in resource-limited settings.

Recommendations: This study highlights late-stage presentation and limited access to timely curative treatment as major determinants of poor survival in oral cavity squamous cell carcinoma. To improve outcomes, healthcare professionals should strengthen early detection and ensure timely treatment and follow-up. Policymakers should expand radiotherapy and chemotherapy capacity to reduce treatment delays, while

researchers should further investigate factors contributing to late presentation and develop locally feasible, evidence-based management guidelines.

6 References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics 2022: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2024;74(2):115-143. doi:10.3322/caac.21834.

28. Yu Z, Wu Y, Cao Y, Cheng P. Epidemiological trends and age-period-cohort effects on lip and oral cavity cancer burden across the BRICS from 1992 to 2021. Front Oncol. 2025 Feb 17;15:1539417.

3. Janot F, Klijanienko J, Russo A, Mamet JP, De Braud F, El-Naggar A, et al. Prognostic value of clinicopathological parameters in head and neck squamous cell carcinoma: a prospective analysis. Br J Cancer. 1996 Feb;73(4):531–8.

4. Fekadu A, Rick TJ, Tigeneh W, Kantelhardt EJ, Incrocci L, Jemal A. Clinicopathology and Treatment Patterns of Head and Neck Cancers in Ethiopia. JCO Glob Oncol. 2022 Aug;(8):e2200073.

5. Blot WJ, McLaughlin JK, Winn DM, Austin DF, Greenberg RS, Preston-Martin S, et al. Smoking and drinking in relation to oral and pharyngeal cancer. Cancer Res. 1988 June 1;48(11):3282–7.

6. Eltohami YI, Sulaiman AM. Recurrence in Oral Squamous Cell Carcinoma Associated with Wide Field of Cancerization: Analysis of 93 Cases. Indian J Otolaryngol Head Neck Surg. 2023 Sept;75(3):1329–35.

7. Patil S, Arakeri G, Alamir AWH, Patil S, Awan KH, Baeshen H, et al. Is toombak a risk factor for oral leukoplakia and oral squamous cell carcinoma ? A systematic review. J Oral Pathol Med. 2020 Feb;49(2):103–9.

8. Gupta B, Bray F, Kumar N, Johnson NW. Associations between oral hygiene habits, diet, tobacco and alcohol and risk of oral cancer: A case–control study from India. Cancer Epidemiol. 2017 Dec;51:7–14.

9. Li M, Fan Y, Zhang X, Hou W, Tang Z. Fruit and vegetable intake and risk of type 2 diabetes mellitus: Meta-analysis of prospective cohort studies. BMJ Open. 2014;4(11).

13. Eltohami Y, Ahmed A, Suleiman MS. Clinical presentation of wide field of cancerization associated with oral squamous cell carcinoma. Int J Dent. 2023;2023:7530295. doi:10.1155/2023/7530295.

11. NCCN [Internet]. [cited 2025 Sept 14]. Guidelines Detail. Available from: https://www.nccn.org/guidelines/guidelines-detail?category=1&id=1437

12. Wong T, Wiesenfeld D. Oral Cancer. Aust Dent J [Internet]. 2018 Mar [cited 2025 Sept 7];63(S1). Available from: https://onlinelibrary.wiley.com/doi/10.1111/adj.12594

13. Chow LQM. Head and Neck Cancer. Longo DL, editor. N Engl J Med. 2020 Jan 2;382(1):60–72.

14. Jones AS. Prognosis in mouth cancer: Tumour factors. Eur J Cancer B Oral Oncol. 1994 Jan;30(1):8–15.

15. Asio J, Kamulegeya A, Banura C. Survival and associated factors among patients with oral squamous cell carcinoma (OSCC) in Mulago hospital, Kampala, Uganda. Cancers Head Neck. 2018 Dec;3(1):9.

16. Myers JN, Greenberg JS, Mo V, Roberts D. Extracapsular spread: A significant predictor of treatment failure in patients with squamous cell carcinoma of the tongue. Cancer. 2001 Dec 15;92(12):3030–6.

17. Gil Z, Carlson DL, Boyle JO, Kraus DH, Shah JP, Shaha AR, et al. Lymph node density is a significant predictor of outcome in patients with oral cancer. Cancer. 2009 Dec 15;115(24):5700–10.

18. Fagan JJ, Collins B, Barnes L, D'Amico F, Myers EN, Johnson JT. Perineural Invasion in Squamous Cell Carcinoma of the Head and Neck. Arch Otolaryngol Neck Surg. 1998 June 1;124(6):637.

19. Farhood Z, Simpson M, Ward GM, Walker RJ, Osazuwa-Peters N. Does anatomic subsite influence oral cavity cancer mortality? A SEER database analysis. The Laryngoscope. 2019 June;129(6):1400–6.

20. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024 May;74(3):229–63.

21. Muller S, Tilakaratne WM. Update from the 5th Edition of the World Health Organization Classification of Head and Neck Tumors: Tumours of the Oral Cavity and Mobile Tongue. Head Neck Pathol. 2022 Mar 21;16(1):54–62.

22. Siegel RL, Giaquinto AN, Jemal A. Cancer statistics, 2024. CA Cancer J Clin. 2024 Jan;74(1):12–49.

23. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol. 2009 Apr;45(4–5):309–16.

24. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024 May;74(3):229–63.

25. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncol. 2009 Apr;45(4–5):309–16.

26. Conway DI, Purkayastha M, Chestnutt IG. The changing epidemiology of oral cancer: definitions, trends, and risk factors. Br Dent J. 2018 Nov;225(9):867–73.

27. GBD 2019 Lip, Oral, and Pharyngeal Cancer Collaborators, Cunha ARD, Compton K, Xu R, Mishra R, Drangsholt MT, et al. The Global, Regional, and National Burden of Adult Lip, Oral, and Pharyngeal Cancer in 204 Countries and Territories: A Systematic Analysis for the Global Burden of Disease Study 2019. JAMA Oncol. 2023 Oct 1;9(10):1401.

35. Yu Z, Wu Y, Cao Y, Cheng P. Epidemiological trends and age-period-cohort effects on lip and oral cavity cancer burden across the BRICS from 1992 to 2021. Front Oncol. 2025 Feb 17;15:1539417. doi:10.3389/fonc.2025.1539417.

29. Dimba EAO, Gichana J, Limo AK, Wakoli KA, Chindia ML, Awange DO. An audit of oral diseases at a Nairobi centre, 2000–2004. Int Dent J. 2007 Dec;57(6):439–44.

30. Korir A, Okerosi N, Ronoh V, Mutuma G, Parkin M. Incidence of cancer in N airobi, K enya (2004–2008). Int J Cancer. 2015 Nov;137(9):2053–9.

31. Aminu K, Aladelusi TO, Adisa AO, Ezeagu CN, Salami AA, Nwafor JN, et al. Epidemiology, literacy, risk factors, and clinical status of oral cancer in East Africa: A scoping review. Adeoye J, editor. PLOS ONE. 2025 Feb 21;20(2):e0317217.

32. Osman T, Satti A, Bøe O, Yang YH, Ibrahim S, Suleiman A. Pattern of malignant tumors registered at a referral oral and maxillofacial hospital in Sudan during 2006 and 2007. J Cancer Res Ther. 2010;6(4):473.

33. Eltohami YI, Suleiman AM. Clinical Presentation of Wide Field of Cancerization Associated with Oral Squamous Cell Carcinoma. Gasparro R, editor. Int J Dent. 2023 Mar 17;2023:1–7.

34. Omotoso O, Teibo JO, Atiba FA, Oladimeji T, Paimo OK, Ataya FS, et al. Addressing cancer care inequities in sub-Saharan Africa: current challenges and proposed solutions. Int J Equity Health. 2023 Sept 11;22(1):189.

35. Faggons C, Mabedi C, Shores C, Gopal S. Review: Head and neck squamous cell carcinoma in sub-Saharan Africa. Malawi Med J. 2015 Oct 29;27(3):79.

43. Ali K. Oral cancer – the fight must go on against all odds. Evid Based Dent. 2022 Mar;23(1):4-5. doi:10.1038/s41432-022-0243-1. PMID:35338315.

37. Gebretsadik A, Bogale N, Geleta D, Melaku N, Dulla D. Nasopharyngeal, tongue and laryngeal cancer in Southern Ethiopia: a seven-year retrospective cross-sectional review. ecancermedicalscience [Internet]. 2024 Oct 8 [cited 2025 Sept 7];18. Available from: https://ecancer.org/en/journal/article/1784-nasopharyngeal-tongue-and-laryngeal-cancer-in-southern-ethiopia-a-seven-year-retrospective-cross-sectional-review

38. Ararso G. Patterns of Primary Oral and Maxillofacial Malignancies among Patients seen at Tikur Anbessa Comprehensive Specialized Hospital – A retrospective study. Int J Oral Maxillofac Surg. 2024 Nov;53:10.

39. Lin WJ, Jiang RS, Wu SH, Chen FJ, Liu SA. Smoking, Alcohol, and Betel Quid and Oral Cancer: A Prospective Cohort Study. J Oncol. 2011;2011:1–5.

40. Blot WJ, McLaughlin JK, Winn DM, Austin DF, Greenberg RS, Preston-Martin S, et al. Smoking and drinking in relation to oral and pharyngeal cancer. Cancer Res. 1988 June 1;48(11):3282–7.

41. Flor LS, Reitsma MB, Gupta V, Ng M, Gakidou E. The effects of tobacco control policies on global smoking prevalence. Nat Med. 2021 Feb;27(2):239–43.

42. Cunha ARD, Prass TS, Hugo FN. Mortality from oral and oropharyngeal cancer in Brazil: impact of the National Oral Health Policy. Cad Saúde Pública. 2019;35(12):e00014319.

43. Scully C, Bagan J. Oral squamous cell carcinoma: overview of current understanding of aetiopathogenesis and clinical implications. Oral Dis. 2009 Sept;15(6):388–99.

44. Patil S, Arakeri G, Alamir AWH, Patil S, Awan KH, Baeshen H, et al. Is toombak a risk factor for oral leukoplakia and oral squamous cell carcinoma ? A systematic review. J Oral Pathol Med Off Publ Int Assoc Oral Pathol Am Acad Oral Pathol. 2020 Feb;49(2):103–9.

45. Lee LA, Huang CG, Tsao KC, Liao CT, Kang CJ, Chang KP, et al. Human Papillomavirus Infections are Common and Predict Mortality in a Retrospective Cohort Study of Taiwanese Patients With Oral Cavity Cancer. Medicine (Baltimore). 2015 Nov;94(47):e2069.

47. Sreeramareddy CT, Pradhan PM, Sin S. Prevalence, distribution, and social determinants of tobacco use in 30 sub-Saharan African countries. BMC Med. 2014 Dec;12(1):243.

48. Scott SE, Grunfeld EA, McGurk M. Patient's delay in oral cancer: a systematic review. Community Dent Oral Epidemiol. 2006 Oct;34(5):337–43.

49. PubMed entry [Internet]. [cited 2025 Sept 6]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24839739

50. Gómez I, Seoane J, Varela-Centelles P, Diz P, Takkouche B. Is diagnostic delay related to advanced-stage oral cancer? A meta-analysis. Eur J Oral Sci. 2009 Oct;117(5):541–6.

51. Bramati C, Abati S, Bondi S, Lissoni A, Arrigoni G, Filipello F, et al. Early diagnosis of oral squamous cell carcinoma may ensure better prognosis: A case series. Clin Case Rep. 2021 Oct;9(10):e05004.

52. Oliver R, Clarkson JE, Conway D, Glenny AM, Macluskey M, Pavitt S, et al. Interventions for the treatment of oral and oropharyngeal cancers: surgical treatment. In: The Cochrane Collaboration, editor. Cochrane Database of Systematic Reviews [Internet]. Chichester, UK: John Wiley & Sons, Ltd; 2007 [cited 2025 Sept 8]. p. CD006205.pub2. Available from: https://doi.wiley.com/10.1002/14651858.CD006205.pub2

53. Chen Y, Zhong NN, Cao LM, Liu B, Bu LL. Surgical margins in head and neck squamous cell carcinoma: A narrative review. Int J Surg. 2024 June;110(6):3680–700.

58. Chow LQM. Head and neck cancer. N Engl J Med. 2020 Jan 2;382(1):60–72. doi:10.1056/NEJMra1715715.

55. Hoda N, Moza A, Amith KP, Sabitha KS. Immunotherapy versus targeted therapy in management of recurrent squamous cell carcinoma of oral tongue. Oral Oncol Rep. 2024 June;10:100447.

56. Alterio D, Marvaso G, Ferrari A, Volpe S, Orecchia R, Jereczek-Fossa BA. Modern radiotherapy for head and neck cancer. Semin Oncol. 2019 June;46(3):233–45.

57. Luryi AL, Chen MM, Mehra S, Roman SA, Sosa JA, Judson BL. Treatment Factors Associated With Survival in Early-Stage Oral Cavity Cancer: Analysis of 6830 Cases From the National Cancer Data Base. JAMA Otolaryngol Neck Surg. 2015 July 1;141(7):593.

62. Chen YK, Huang HC, Lin LM, Lin CC. Primary oral squamous cell carcinoma: an analysis of 703 cases in southern Taiwan. Oral Oncol. 1999 Mar;35(2):173-179. doi:10.1016/s1368-8375(98)00101-8. PMID:10435152.

59. Leite ICG, Koifman S. Survival analysis in a sample of oral cancer patients at a reference hospital in Rio de Janeiro, Brazil. Oral Oncol. 1998 Sept;34(5):347–52.

60. Asio J, Kamulegeya A, Banura C. Survival and associated factors among patients with oral squamous cell carcinoma (OSCC) in Mulago hospital, Kampala, Uganda. Cancers Head Neck. 2018 Dec;3(1):9.

61. Ndayisabye H, Ndagijimana A, Biracyaza E, Umubyeyi A. Factors Associated With Oral Cancer Adverse Outcome at the Rwanda Military Hospital, a Retrospective Cross-Sectional Study. Front Oral Health. 2022 Mar 18;3:844254.

62. Lin NC, Hsu JT, Tsai KY. Difference between Female and Male Patients with Oral Squamous Cell Carcinoma: A Single-Center Retrospective Study in Taiwan. Int J Environ Res Public Health. 2020 June 4;17(11):3978.

63. Aminu K, Aladelusi TO, Adisa AO, Ezeagu CN, Salami AA, Nwafor JN, et al. Epidemiology, literacy, risk factors, and clinical status of oral cancer in East Africa: A scoping review. Adeoye J, editor. PLOS ONE. 2025 Feb 21;20(2):e0317217.

64. AAU | Addis Ababa University [Internet]. [cited 2025 Dec 13]. Available from: https://aau.edu.et/pages/A-A-U-%20-S-e-r-v-i-c-e-s/%20%20detail?title=Tikur~Anbessa~Specialized~Hospital~(TASH)~

65. American Joint Committee on Cancer. Lip and Oral Cavity. In: Greene FL, Page DL, Fleming ID, Fritz AG, Balch CM, Haller DG, et al., editors. AJCC Cancer Staging Manual [Internet]. New York, NY: Springer New York; 2002 [cited 2025 Oct 2]. p. 23–32. Available from: http://link.springer.com/10.1007/978-1-4757-3656-4_3

66. ECOG Performance Status Scale - ECOG-ACRIN Cancer Research Group [Internet]. [cited 2025 Sept 18]. Available from: https://ecog-acrin.org/resources/ecog-performance-status/

67. WHO Classification of Tumours Online [Internet]. [cited 2025 Dec 23]. Available from: https://tumourclassification.iarc.who.int/welcome/#

68. Hoffman HT, Karnell LH, Funk GF, Robinson RA, Menck HR. The National Cancer Data Base Report on Cancer of the Head and Neck. Arch Otolaryngol Neck Surg. 1998 Sept 1;124(9):951.

69. Belete H, Mekonen T, Connor JP, Chan G, Hides L, Leung J. Tobacco smoking in Sub-Saharan Africa: A systematic review and meta-analysis. Drug Alcohol Rev. 2025 May;44(4):1079–91.

70. Zhang X, Liu D, Dong H, Li Y, Zhang Y, Wang X, et al. Factors associated with delay in presentation among patients for oral cancer. J Comp Eff Res. 2019 Sept;8(12):1003–71.

71. Fortin A, Bairati I, Albert M, Moore L, Allard J, Couture C. Effect of treatment delay on outcome of patients with early-stage head-and-neck carcinoma receiving radical radiotherapy. Int J Radiat Oncol. 2002 Mar;52(4):929–36.

72. Van Harten MC, De Ridder M, Hamming-Vrieze O, Smeele LE, Balm AJM, Van Den Brekel MWM. The association of treatment delay and prognosis in head and neck squamous cell carcinoma (HNSCC) patients in a Dutch comprehensive cancer center. Oral Oncol. 2014 Apr;50(4):282–90.

73. Dalvie S. Head and neck cancer in Africa. South Afr J Oncol [Internet]. 2019 May 23 [cited 2025 Sept 7];3. Available from: https://www.sajo.org.za/index.php/sajo/article/view/67

74. Kijowska J, Grzegorczyk J, Gliwa K, Jędras A, Sitarz M. Epidemiology, Diagnostics, and Therapy of Oral Cancer—Update Review. Cancers. 2024 Sept 14;16(18):3156.

Appendix-I

Oral Cavity Cancer – Retrospective Data Abstraction Form

A. **Study Administration & Eligibility**

1. Study ID: ____
2. Data source(s): □ 1 Chart □ 2 I-care □ 3 RT records □ 4 others_____

B. **Demographics & Baseline**

1. Age at diagnosis (years): ____
2. Sex: □ 1 Male □ 2 Female
3. Residence: □ 1 Urban □ 2 Rural □ 99 Unknown
4. Region: _____
5. Performance status at treatment decision (ECOG): □ 0 □ 1 □ 2 □ 3 □ 4 □ 99 Unknown
6. Medical comorbidities (check all that apply): □ DM □ HTN □ HIV □ TB □ CV disease □ Other: _____

C. **Risk Factors & Habits**

1. Smoking status? □ 0 No □ 1 yes

   If yes how much (Pack-years): ____

2. Alcohol use: □ 0 No □ 1 Yes □ 99 Unknown
3. Khat use: □ 0 No □ 1 Yes □ 99 Unknown
4. Betel quid/areca: □ 0 No □ 1 Yes □ 99 Unknown

D. **Presentation & Diagnostic Timeline**

1. Date of first symptom: ____
2. Date of first healthcare visit: ____
3. Date of histologic diagnosis (index biopsy): ____
4. Date of first cancer-directed treatment: ____
5. Primary presenting symptoms (check all): □ 1Ulcer □ 2 Pain □ 3 Bleeding □ 4 Mass/swelling □ 5 Trismus □ 6 Dysphagia □ 7 Dysarthria □ 8 Tooth mobility □ 9 Neck mass □ 10 Other: _____
6. Delay intervals (auto-calc in sheet):_____

   • Patient delay = First visit − First symptom

• Treatment delay = Treatment start − Diagnosis

E. **Primary Tumor Characteristics**

1. Primary site (oral cavity): □ 1 Tongue (ant 2/3) □ 2 Floor of mouth □ 3 Buccal mucosa □ 4 Alveolar ridge □ 5 Retromolar trigon □ 6 Hard palate □ 7 Oral (labial) mucosa/lip □ 8 Other: ____
2. T stage : □ Tx □ T1 □ T2 □ T3 □ T4a □ T4b □ 99 Unknown
3. N stage: □ Nx □ N0 □ N1 □ N2a □ N2b □ N2c □ N3a □ N3b □ 99 Unknown
4. M stage: □ M0 □ M1 □ 99 Unknown
5. prognostic stage group (AJCC-8): □ I □ II □ III □ IVA □ IVB □ IVC □ 99 Unknown

G. **Treatment Intent & Modality**

1. Intent of initial treatment: □ 1 Curative □ 2 Palliative □ 3 Best supportive care
2. Initial treatment modality: □ Surgery alone □ RT alone □ Surgery→Adjuvant RT □ Surgery→Adjuvant CCRT □ Definitive CCRT □ Neoadjuvant chemotherapy→Surgery □ Neoadjuvant chemotherapy→Surgery + RT □ Palliative RT □ Palliative chemo □ Other: ____

H. **Surgery Details (if applicable)**

1. Primary surgery: □ Wide local excision □ Hemiglossectomy □ Subtotal/Total glossectomy □ Marginal mandibulectomy □ Segmental mandibulectomy □ Composite resection □ Maxillectomy □ Other: ____
2. Neck dissection: □ None □ Selective (levels ___) □ MRND □ RND □ Bilateral

I. **Radiotherapy (if applicable)**

1. RT indication: □ Definitive □ Adjuvant □ Palliative
2. RT start date: ____
3. RT end date: ____
4. Unplanned treatment breaks (days): ____
5. Completion status: □ 1 Completed as planned □ 2 Dose reduction □ 3 Stopped early □ 99 Unknown

J. **Systemic Therapy (if applicable)**

1. Timing: □ Neoadjuvant □ Concurrent □ Adjuvant □ Palliative
2. Regimen (specify): □ Cisplatin weekly □ Cisplatin q3wk □ Carboplatin/5-FU □ TPF □ Cetuximab □ cisplatin/paclitaxel □ carboplatin paclitaxel □ Other ____
3. Cycles received: __

K. **Response & Outcomes**

1. Last follow-up date: ____
2. Vital status at last follow-up: □ 1 Alive NED □ 2 Alive with disease □ 3 Dead of disease □ 4 Dead other cause □ 99 Unknown
3. Date of death (if applicable): ____
4. Follow-up duration from diagnosis (months): ____ (auto-calc in sheet)

N. **Data Quality & Notes**

1. Overall completeness (abstractor): □ 1 ≥90% □ 2 70–89% □ 3 <70%
2. Duplicate record cross-check done: □ 1 Yes □ 0 No
3. Comments (clarify any unusual findings, staging edition, protocol deviations, etc.)_____