# CANCER REGISTRY UNIT,

# CENTRE FOR CLINICAL RESEARCH - KEMRI

# FIVE-YEAR REPORT ON

# CANCER IN NAIROBI POPULATION (2009 – 2013)

**NCI-Kenya and MOH**

## Cancer incidence in Nairobi County, Kenya

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## Cancer Incidence in Nairobi County, Kenya

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Anne Korir, Nathan Okerosi, Rowland Osii, Isaac Kisiangani, Victor Rono, Steve Emai, Evans Kiptanui, RobaiGakunga, Samuel Gathere, Veronicah Manduku. Cancer Incidence report (2009-2013); Nairobi Cancer Registry; Feb 2018.

# NAIROBI CANCER REGISTRY (2009-2013)

# FOREWORD

In Kenya, cancer is the third leading cause of death after cardiovascular and infectious diseases. An estimated 40,000 new cases of cancer and 28,000 deaths due to cancer occurred in 2012accounting for 7% of all annual deaths in Kenya. The rise in the number of cases of cancer is largely due the ageing population and the increasing adoption of risky behaviors such as: unhealthy diets, inadequate physical exercise, tobacco use, harmful use of alcohol and infections.

Cancer registries provide information needed by governments and public health professionals to understand and address the cancer burden more effectively. As a research institution the data generated from the registry will be used to further research into the disease epidemiology and support other research; clinical and palliative care.

The data described in this report covers Nairobi County which is a small percentage (8%) of the population of Kenya and can provide insights into what is likely to be the situation in other parts of the country. It should therefore be utilized to come up with strategies to curb the burden of cancer in the country especially the common ones like breast and cervix among women, prostate and oesophagus among men. Many lives can be saved if people adopted healthy lifestyles that reduce the risk of cancers. There is need to invest in raising public awareness on the early signs and symptoms of common cancers and investing in infrastructure in hospitals for effective diagnosis and treatment.

KEMRI has continued to support the Cancer Registry Unit and will continue to build more capacity to undertake more epidemiological and etiological research. The registry has maintained population-based data for Nairobi County for over 15 years with recent expansion to include more counties to form the Kenya Population-Based Cancer Registry Program supported through Internal Research Grants from the government of Kenya.

The activities of the cancer registry will be further supported by the National Cancer Institute of Kenya (NCI-K) that is the coordinating national body for all cancer control programmes in Kenya. Through this collaboration we will build a more robust registry that can provide timely data to inform cancer control programmes in the country.

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**Dr. Veronicah Manduku,**
**Director,**
**Centre for Clinical Research**
**Kenya Medical Research Institute**

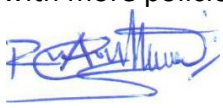
# PREFACE

Cancer registration in Kenya begun more than a decade ago with two population-based registries located over 400kms apart; the Eldoret Cancer Registry located at Moi University in the department of Haematology and Blood Transfusion which covers the Uasin Gishu County population and the Nairobi Cancer Registry at the Kenya Medical Research Institute (KEMRI) which covers the Nairobi County Population. Data from these two registries have over the years been utilized by the International Agency for Research on Cancer (IARC) to generate national estimates for the country for their GLOBOCAN project. The GLOBOCAN database provides up-to-date national level data estimates of incidence, mortality and prevalence for major types of cancer.

In an effort to understand the burden of cancer in Kenya, KEMRI established the Kenya Population-Based Cancer Registry launched on 6th February 2016 with the aim of aggregating cancer data from population-based cancer registries and providing up to date complete data on trends in incidence, mortality and survival from the regional registries. The registry is currently compiling data for the regions targeted in the initial phase and will soon avail the report to all stakeholders.

This report describes the incidence of cancer in Nairobi County in the five-year period 2009 to 2013. The data is collected from all health and non-health facilities mainly in Nairobi. The registry is population-based hence only residents of Nairobi are included in this analysis. The data has been summarized in tables and graphs to give the reader a quicker understanding of cancer trends in Nairobi.

The cancer registry works collaboratively with a number of stakeholders listed under the acknowledgement section without which a lot of the work done by the cancer registry would not have been possible. This work was supported by the US National Cancer Institute (US-NCI), Centre for Global Health (CGH) and the Kenya Government through Internal Research Grants to KEMRI. We hope you will find the data presented in the report useful and a guide to do further research, create awareness on cancer, initiate programmes to curb the high rates and come up with more policies to reduce the burden and improve the lives of our communities.



**Anne Rugutt Korir,**
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# 1 BACKGROUND AND POPULATION

## 1.1 BACKGROUND

The Nairobi Cancer Registry is a population-based registry established in the year 2001 after consultations between the National Cancer Institute (NCI) – Office of International Affairs, International Agency for Research on Cancer (IARC), Ministry of Health (MOH) and Kenya Medical Research Institute (KEMRI). The establishment of the registry was approved by the Scientific Steering Committee (SSC) and the Ethics Research Committees (ERC) of KEMRI and endorsed by the Ministry of Health and World Health Organization (WHO). Further permissions were obtained from the facilities that report data to the registry.

The registry is located at the Centre for Clinical Research (CCR), KEMRI headquarters, Nairobi. The registry aims to document cancer cases occurring in the population of Nairobi county, the capital city of Kenya.

The registry staffs are employees of KEMRI, and are assisted by contractual staff supported through grants. They make regular visits to several health facilities to document cancer cases and report to the registry office at KEMRI. The registrars have undergone training in cancer registration and surveillance and are paid a stipend to cover their transport costs to health facilities.

Nairobi Cancer Registry is a member of International Association of Cancer Registries (IACR) and one of the founding members of the East Africa Cancer Registry Network (EACRN) established in 2011, which grew to become the Africa Cancer Registry Network (AFCRN) in 2012. AFCRN supports activities of population-based cancer registries in sub-Saharan Africa through capacity building, joint research activities and technical support. It is the International Agency for Research (IARC) hub for sub-Saharan Africa region. The network has sponsored basic and advance trainings for cancer registrars in different regions in Africa.

The registries of Nairobi and Eldoret (located at Moi Teaching and Referral Hospital (MTRH)) have played a vital role in provision of data to the International Agency for Research on Cancer, a research arm of WHO. The data have been used to generate estimated cancer incidence rates for Kenya (Ferlay et al., 2008 and Ferlay et al., 2012). IARC has contributed immensely to the growth the registry through providing financial support and technical capacity building through short courses held in Lyon, France. A great achievement of the registry was having the data accepted for publication in IARC's Cancer Incidence in Five Continents (CI5 Volume 11) an indication that the quality of data generated from the registry met the required standards.

## 1.2 POPULATION

The registry covers the population of Nairobi. It is a large cosmopolitan and multicultural centre. Nairobi is one of the forty seven counties and is the capital city of Kenya. Inhabitants comprise all the major Kenyan ethnic groups: Kikuyu, Luo, Luhyia, Kalenjin, Kisii and Kamba among others. There is also a sizeable Asian community (originally from India and parts of Pakistan), Europeans and Somalis who have settled in Nairobi. The most recent population census in Kenya was in 2009 where annual population of Nairobi county was 3,138,639 (1,605,230 males and 1,533,139 females). Population estimates for subsequent years are done by the Central Bureau of Statistics in Nairobi, Kenya

The population estimates for the period 2009 to 2013 were used to generate incidence rates in this report. The population pyramid (Fig. 1.2) shows the typical pattern for modern urban Africa, with many young individuals, especially young adults in age range 20-39 who have migrated to the city to work, and a slight excess of males.

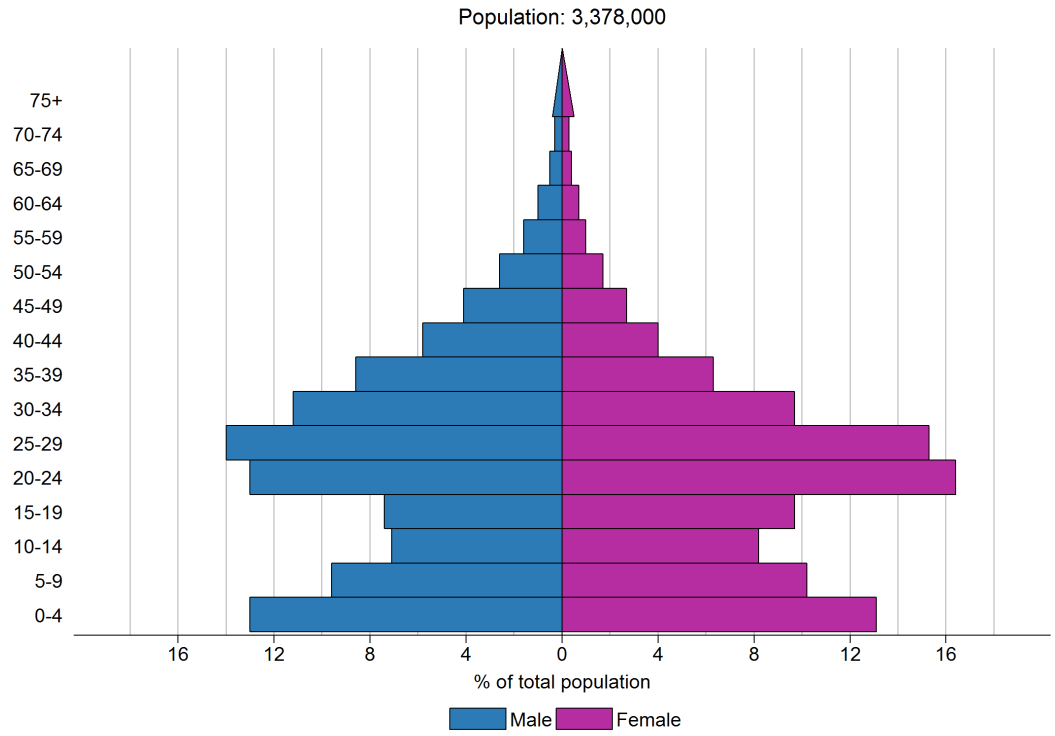



Fig 1. Estimated average annual population

**Geography:** The city stretches across 684 square kilometers of land and lies adjacent to the eastern edge of the Rift Valley and is situated 5450 ft (1661 metres) above the sea level. The Ngong hills occupy the western part of the city, Mount Kenya is located to the North of the city and Mount Kilimanjaro lies towards south-east.

**Constituencies:** The districts were reorganized in to seventeen constituencies namely; Westlands, Dagoretti North, Dagoretti South, Langata, Kibra, Roysambu, Kasarani, Ruaraka, Embakasi South, Embakasi North, Embakasi Central, Embakasi East, Embakasi West, Makadara, Kamukunji, Starehe and Mathare.

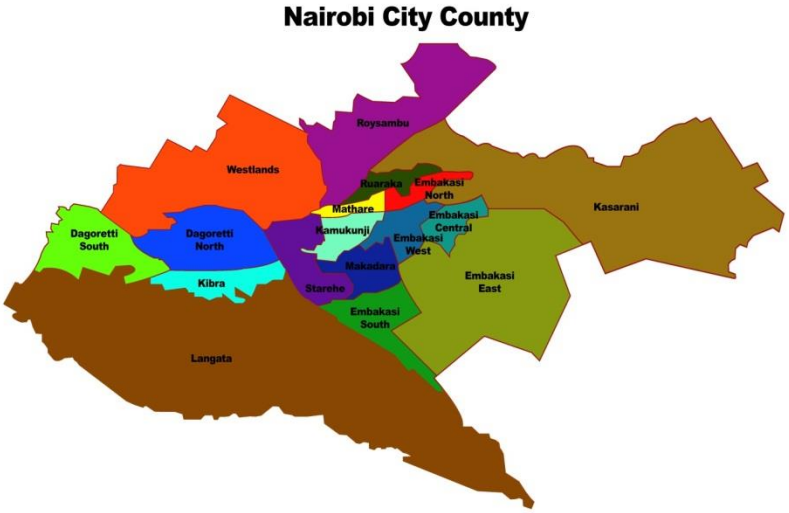



Fig 2. Nairobi map

# 2 METHODS

## 2.1 SOURCE OF DATA

Nairobi Cancer Registry undertakes active case finding by visiting and abstracting cancer cases from several health and non-health facilities in Nairobi. The facilities covered include:

**i. Hospital-based registries**

Kenyatta National Hospital, Eldoret hospital-based registry, Aga Khan and MP shah hospital-based registries contributed data to the population-based registry.

**ii. Government, private hospitals and cancer centres**

Cancer registry personnel actively collect data from various units within the collaborating hospitals and non-hospital sources (Table 1). Within the hospital, departments visited were: the Medical Records departments, radiotherapy units, haematology and histopathology laboratories, outpatient clinics, medical wards and imaging units.

In the medical records unit, disease index cards and patient-care registers were used to identify cancer cases.

The majority of the hospitals had computer based disease indices which were used to identify cancer cases. A few had disease index cards (cards that medical records staff list all cases of cancer after assigning ICD-10 code). The files were then retrieved from the filing cabinets and cancer information abstracted on to pre-designed case registration forms.

Mortality data in all hospitals were filed separately under lock and key. We obtained permission from hospitals to abstract cases where cancer is mentioned as cause of death.

**iii. The Hospice**

Data from the hospice is routinely collected and included in the registry. The hospice data provided current information on patients' status because of their close and constant follow up of their patients.

**iii. Vital Statistics – Mortality data**

Cancer-specific mortality data were obtained from death certificates at the civil registry of births and deaths in Nairobi.

The data from the death certificates are checked against the database in the registry office and if a case already exists then the status is updated. Cases not existing in the database are traced back to the facility where the patient received treatment to verify the information. Cases not traced at the facilities, and had detailed information including residence are entered in the data

base as “Death Certificate Only” (DCO) cases. Those with no information on residence are not included in the database as there is no way of ascertaining the validity of the information.

## 2.2 METHODS OF DATA COLLECTION

Active case finding methods is used to collect the data. This is a systematic process by which cancer cases eligible for registration or inclusion in the database are identified by trained health personnel and submitted to the registry. Cancer registrars make regular visits to the facilities to identify and abstract cases onto predesigned case registration forms. They were trained on procedures for the diagnosis and management of cancer patients in each facility for effective case finding and abstraction.

Filing systems are partially electronic in most of the facilities while others are fully manual. For those with partial electronic systems it is possible to produce a listing of all cancer cases seen at any one point to guide in identifying the patient files to be retrieved from the filling area. The hospital personnel are actively involved to provide file numbers and files of cancer patients.

The inclusion criteria are observed at all stages. All malignant tumours, borderline tumours of the brain and Central Nervous System and all mandatory variables as indicated in the Case Registration Forms (Appendix 1) are collected. The analysis in this report covers residents of Nairobi only.

## 2.3 DEATH CERTIFICATES

The registry actively collects data from death certificates in the civil registration of births and deaths office. These data is subjected to further checks in the registry to determine if the cases already exist in the database where the status (alive/dead) is updated accordingly. Cases not found in the database are followed up to the facilities to ascertain their validity and places of residence.

## 2.4 VARIABLE

The data items collected are relatively standard. They include:

Patient Details: Name, ID number, age/date of birth, gender, current residence, place of birth, religion, tribe/ethnicity, education level

Tumour: Incidence date, basis/method of diagnosis, primary site/topography (ICDO) code, histology/morphology (ICD-O) code, behaviour, grade and stage at diagnosis (TNM), concurrent illness, HIV status and laboratory report number.

Treatment(s): Initial and subsequent treatments – surgery, radiotherapy, chemotherapy, hormone therapy & symptomatic.

Sources of data: Hospital/laboratory name, hospital number, laboratory report number, date of abstraction

Follow-up: Patient status as at last date seen in hospital, last date of contact with physician/health-care provider or if dead - date of death, cause of death and hospice number.

## 2.5 CLASSIFICATION AND CODING

### i. Site and histology

Tumour site (topography) and histology (morphology) are coded according to the International Classification of Diseases for Oncology, Third Edition (ICD-0 3) (Fritz *et al.,* 2000). The pair of codes are converted automatically within the CanReg system to the appropriate code in the 10th revision of the International Classification of Diseases (ICD-10), which is used for tabulation of results.

### ii. Incidence date

The *incidence date* is primarily the date of first consultation or admission to a hospital or clinic for cancer, as this is a definite, consistent and reliable point in time which can be verified from records.

If this information is not available, the incidence date should be taken as the date of first diagnosis by a physician or the date of the first pathological report. Below is the hierarchical ranking of the highest to the least preferred date of incidence as described in the IARC manual "*Cancer Registration: Principles and Methods"* (Jensen et al., 1991).

### iii. Multiple primaries

The registry defined multiple primary cancers according to the rules of the IARC/IACR (2004) and they were recorded accordingly. The rules imply that only one primary cancer at a given site can occur in an individual, unless the second such cancer is of a completely different histological type. Laterality (tumours in the opposite side of paired organs) and time (tumours in the same organ, years later) are not considered as new primary cancers.

#### iv. Basis of diagnosis

Basis of diagnosis is recorded according to the ICD-0-3 coding scheme. Where multiple registrations are done for one cancer case the highest code is considered the most valid basis of diagnosis.

## 2.6 THE DATABASE

The registry migrated from CanReg (version 4) to CanReg (version 5) in the year 2012, and this software has been used in the data entry, management and analysis of the data in this report.

## 2.7 CONFIDENTIALITY

The registry adheres to IACR/IARC guidelines with respect to the preservation of confidentiality in connection with or during the process of collection, storage, use and transmission of identifiable data. All cancer registry personnel signed a declaration form requiring them to uphold patient ethics and confidentiality of patient records at all levels.

The data base is secured with passwords at entry and analysis level. Access to data processing room is restricted at all times. Requests for the release of data should be made in writing to the registry and a "Release for data form" should be duly filled and signed before data is released. Requests involving identification of individual subjects require special permission and approval from the KEMRI Ethics Committee with appropriate safeguards for confidentiality.

## 2.8 STATISTICAL METHODS

### 2.8.1 Age-specific rate

The age-specific rate is calculated simply by dividing the number of cancer deaths observed in a given age category during a given time period by the corresponding number of person years in the population at risk in the same age category and time period.
For cancer, the result is usually expressed as an annual rate per 100,000 person-years.

### 2.8.2 Age-standardization rate

An age-standardized rate (ASR) is a summary measure of the rate that a population would have if it had a standard age structure.
Standardization is necessary when comparing several populations that differ with respect to age because age has a powerful influence on the risk of dying from cancer.
The ASR is a weighted mean of the age-specific rates; the weights are taken from population distribution of the standard population.
The ASR is also expressed per 100,000.

### 2.8.3 Cumulative risk

Cumulative mortality is the probability or risk of individuals dying from the disease during a specified period.
For cancer, it is expressed as the number of new born children (out of 100, or 1000) who would be expected to die from a particular cancer before the age of 75 or (65 or 70) if they had the rates of cancer observed in the period in the absence of competing causes.
Like the age standardized rate, it permits comparisons between populations of different age structures.

# 3 RESULTS

During the five year period (2009-2013) a total of 10,344 cases of cancers (ICD -10 codes: C000-C959) were registered among Nairobi residents, 4,379 (42.3%) among men and 5,965 (57.7%) among women. These results are summarized in Figures 3a – 7.

## 3.1 NUMBER OF CASES IN PERIOD, BY AGE GROUP & SEX

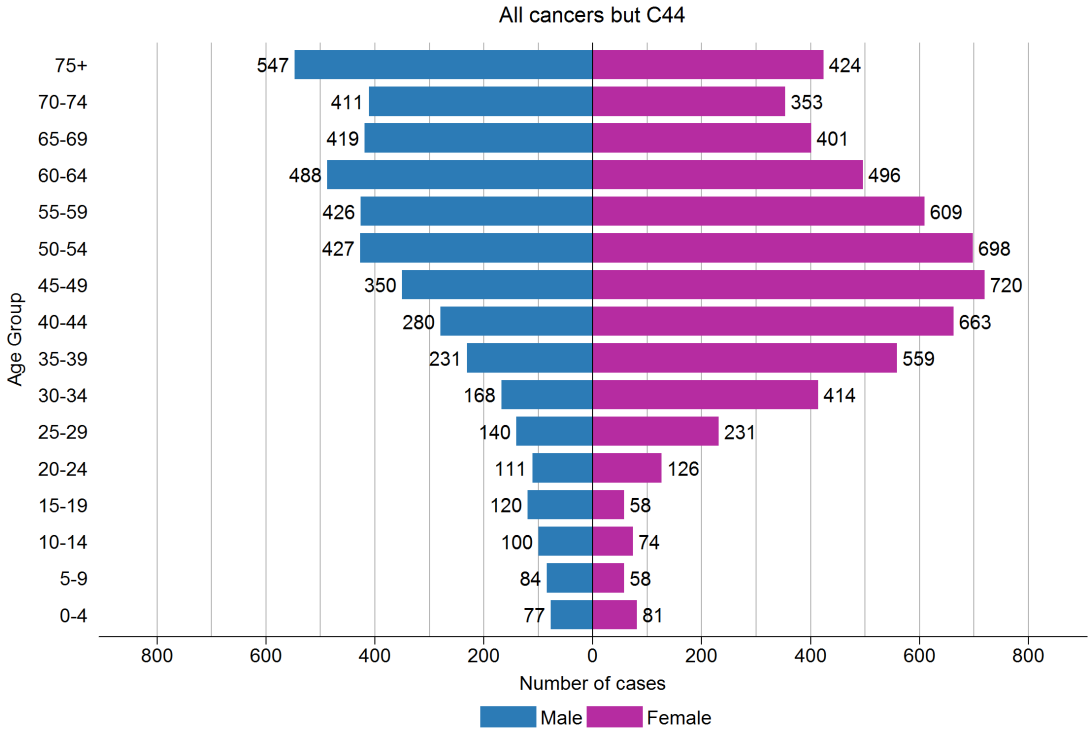



Fig 3a. Bar chart, distribution of cases by age group and sex

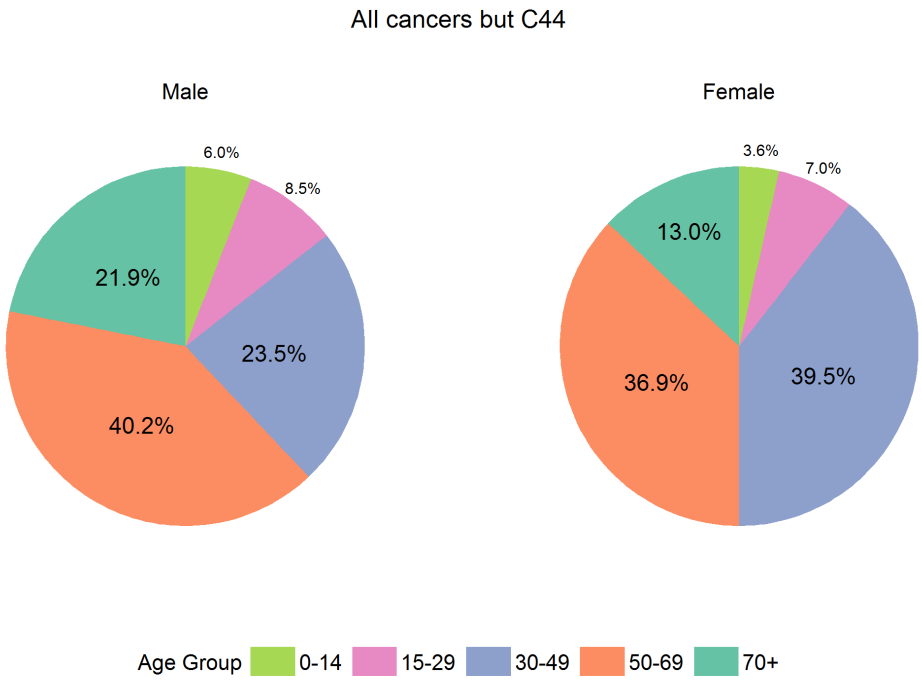



Fig 3b. Pie chart, distribution of cases by age group and sex

## 3.2 NUMBER OF CASES BY YEAR

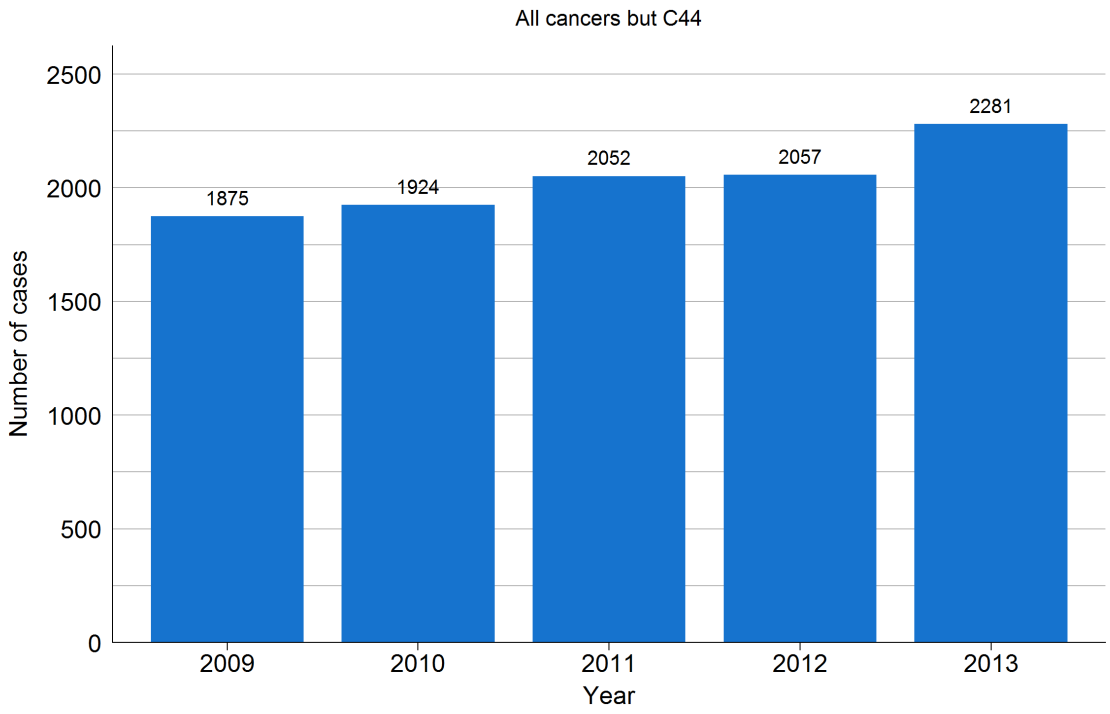



Fig 4. Number of cases by year

## 3.3 THE MOST COMMON CANCERS, BY SEX

**Number of Cases**

In men, prostate is the most commonly diagnosed malignancy with 835 cases, followed by mouth & pharynx (428 cases), lymphoma (387 cases), colorectal (371 cases) and oesophagus (336).

In women, breast is the most commonly diagnosed malignancy with 1,652 cases, followed by cervix (1,105 cases), colorectal (341), lymphoma (314) and oesophagus (272).

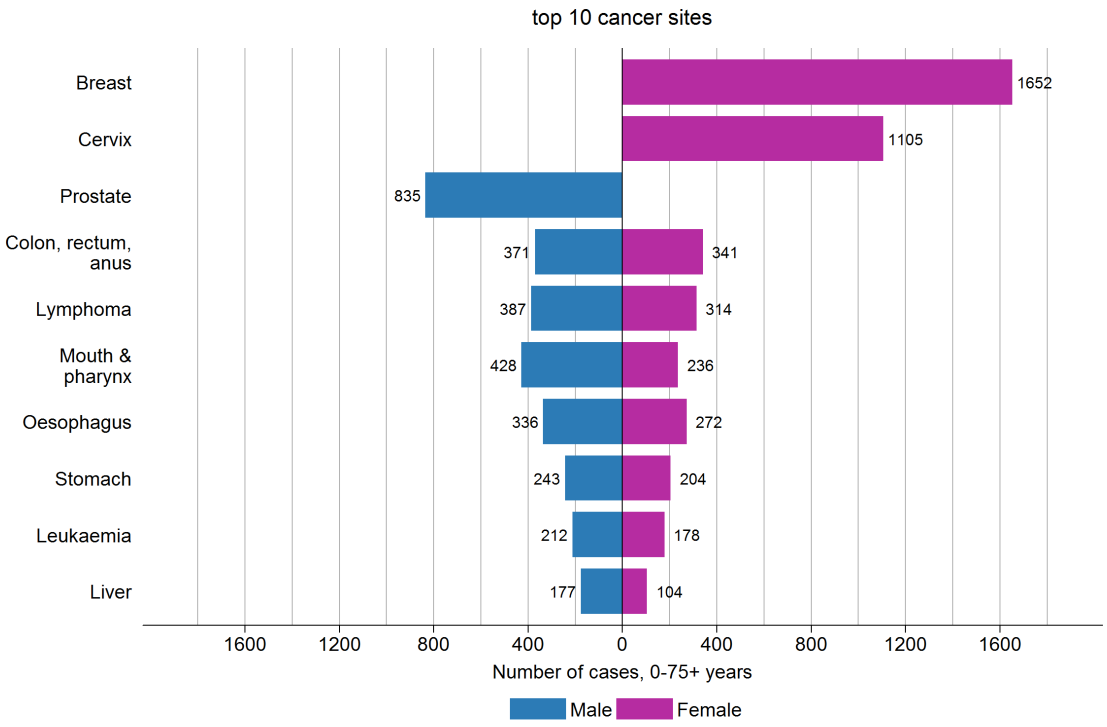



Fig 5a. Top 10 cancers, both sexes (Number of cases)

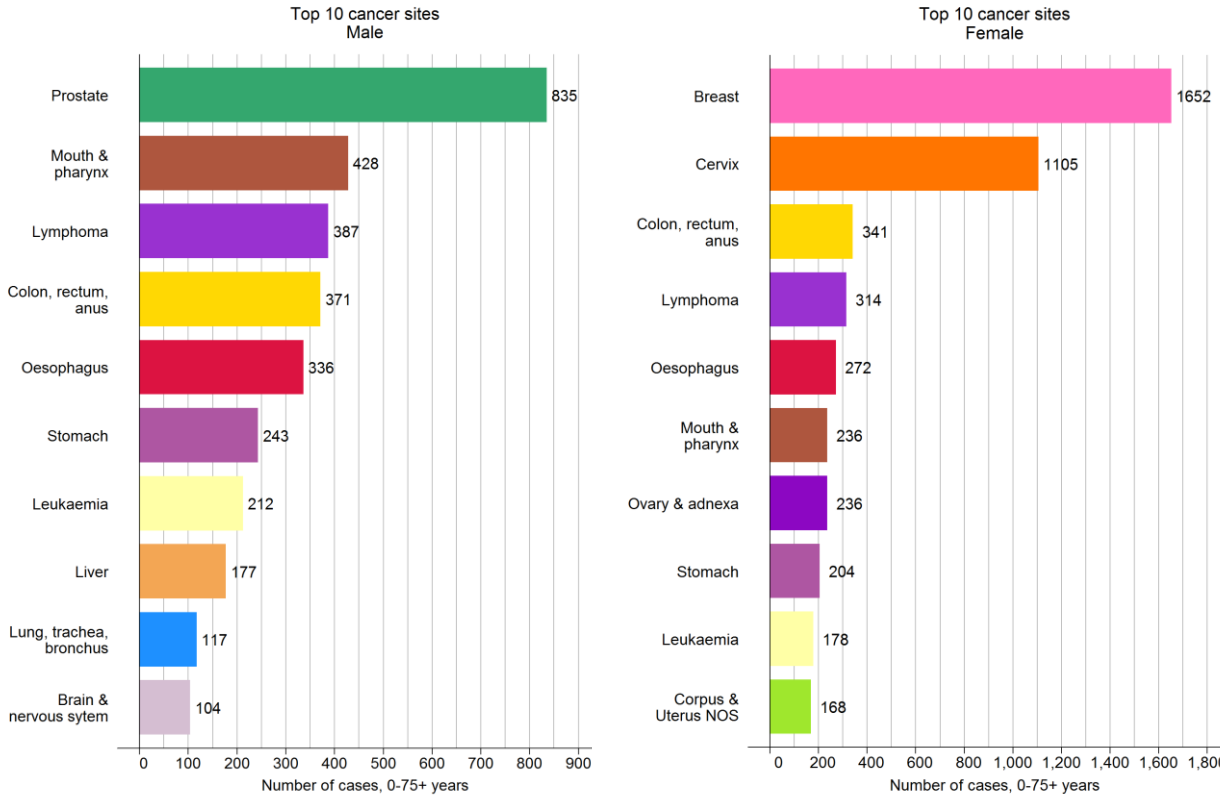



Fig 5b. Top 10 cancers, Males and Females (Number of cases)

## Age Standardized rates (ASR)

Fig. 6a shows bar charts of the age-standardized incidence rates (ASR) for the top cancers overall, in each sex.

In males, prostate cancer has the highest ASR (49.0 per 100,000) followed by Oesophagus (14.5 per 100,000).

In females, breast cancer has the highest ASR (58.4 per 100,000), followed by Cervix Uteri (38.5 per 100,000) and Oesophagus (14.2 per 100,000).

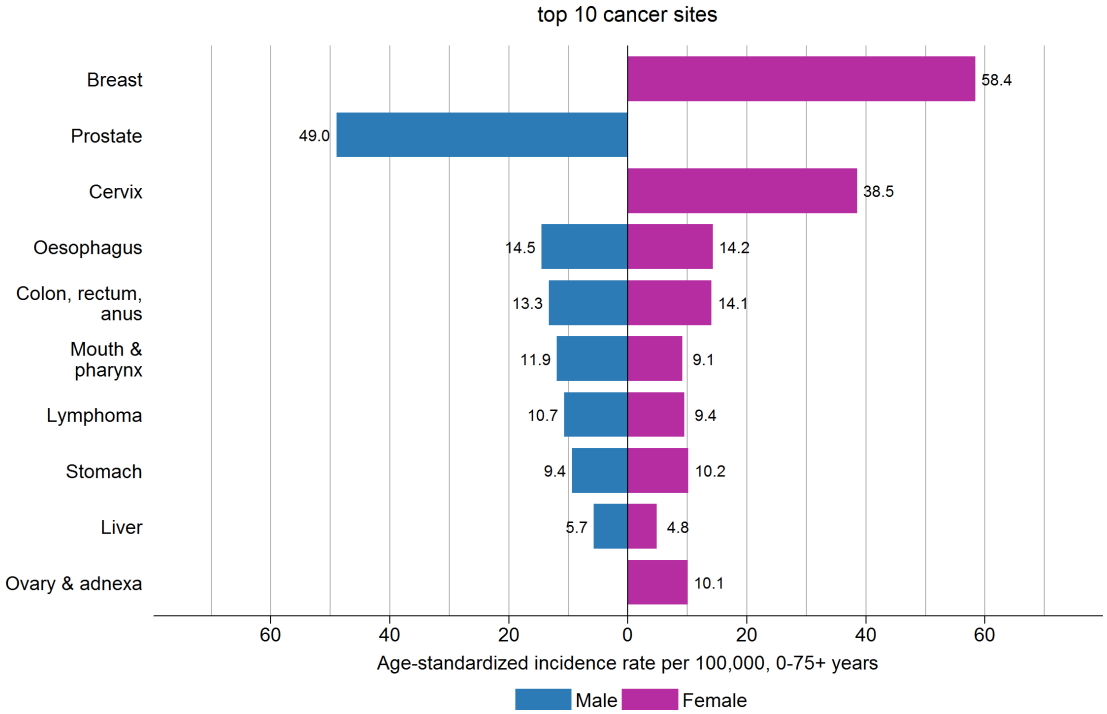



Fig 6a. Top 10 cancers, both sexes (Age-standardized rate per 100,000)

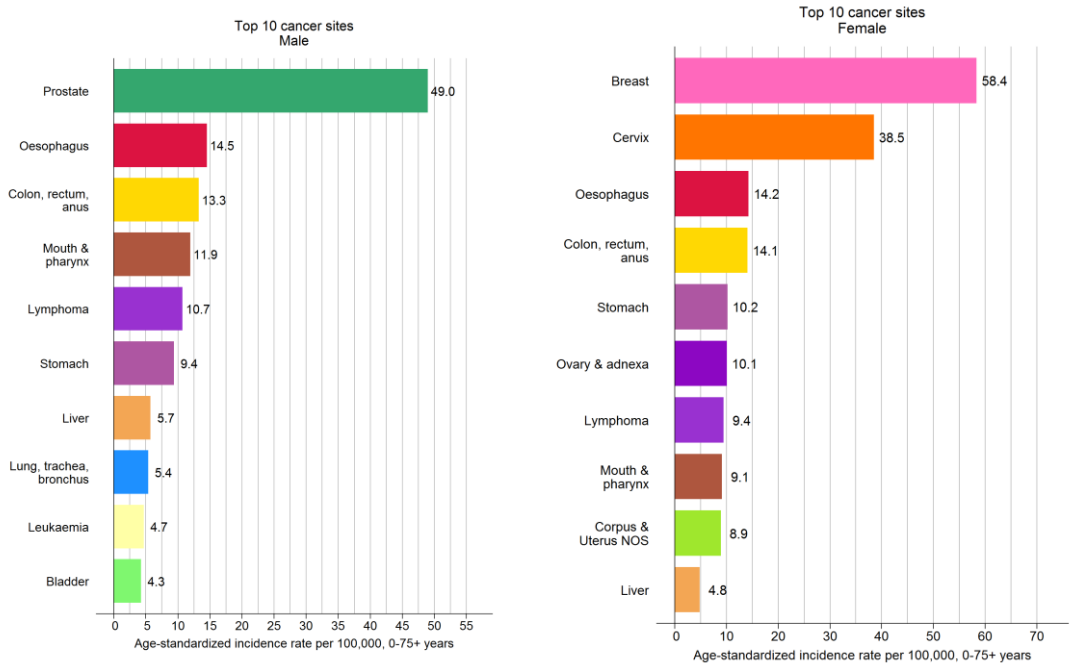



Fig 6b. Top 10 cancers, ASR

**Cumulative Incidence**

Cumulative incidence also known as incidence proportion describes the probability of one getting cancer before age of 74 years. Fig.7 shows the ranking of cases according to the cumulative incidence (0-74).

Men in nairobi County are at higher risk of developing prostate cancer (6.0%) followed by Oesophagus cancer (1.9%), Non-Hodgkin lymphoma (1.2), cancer of the stomach (0.9%) and colon cancer (0.8%).

Women in Nairobi are a higher risk of developing breast (7.0%), cervix (4.5%), esophagus (1.9%), ovarian cancer (1.3%) and stomach (1.3%).

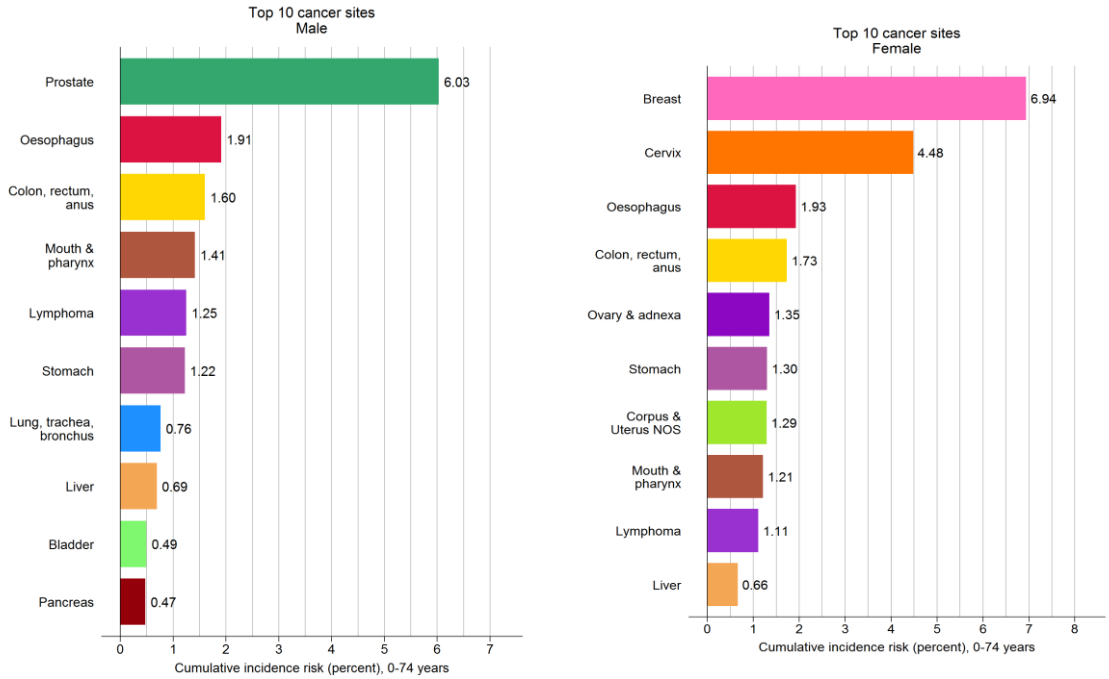



Fig 7. Top 10 cancers, cumulative risk, 0-74 years

## 3.4 AGE-SPECIFIC INCIDENCE RATES (MOST COMMON SITES) BY SEX

Fig. 9 shows graphs of the age-specific incidence rates for the top cancers among males and females. In males there is a steady increase in incidence with age for all cancers, particularly prostate cancer in men which shows a sharp increase in incidence between 50 and 75+ years.

In women the incidence rates of breast and cervical cancer are relatively high, and increase with age, although the rate of increase with age slows after menopausal age (50+).

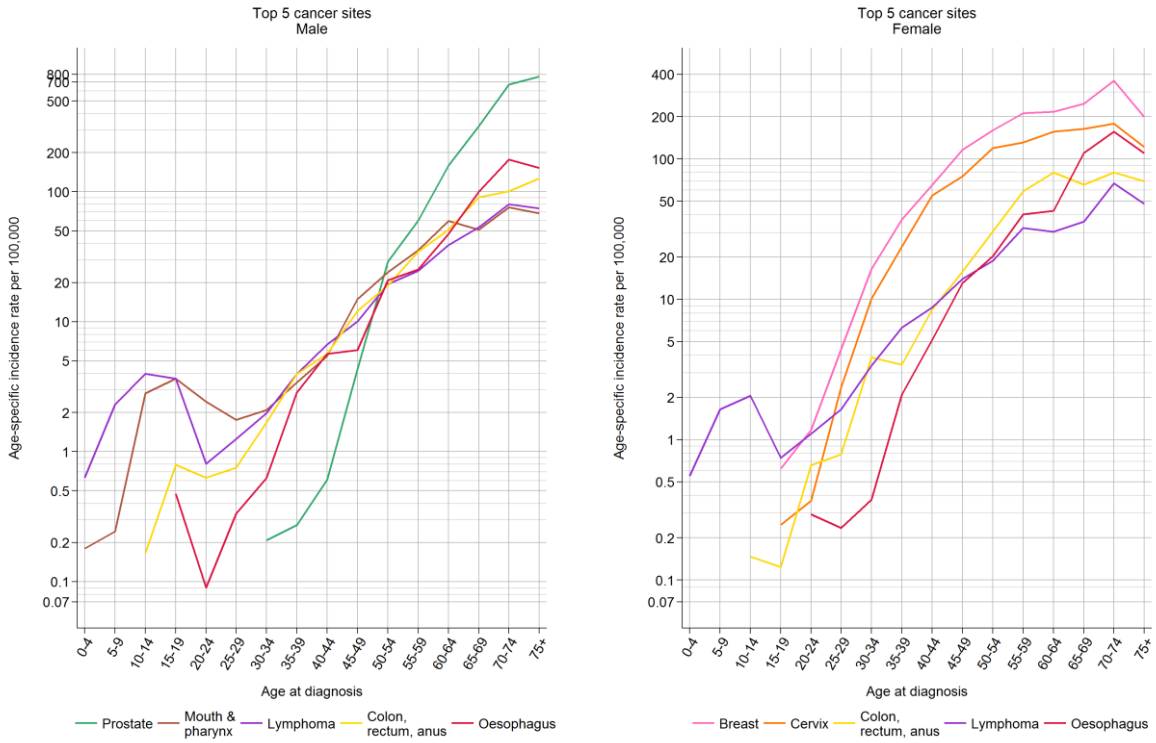



Fig 9. Age-specific incidence rates

## 3.5 CHILDHOOD CANCERS

The total number of childhood cancers registered for the period 2009-2013, Nairobi residents only, were 474 cases. Table 3.1 shows the frequency and number of childhood cancer cases. Leukemia was leading with 119 cases (25.1%), followed by lymphoma 79 cases (16.7%).

Table 3.1 Childhood cancers (ages 0-14) in Nairobi county, 2009-2013

| | | NUMBER OF CASES | | | | | REL FREQ (%) | RATES PER MILLION | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ICCC 3** | | **0-4** | **5-9** | **10-14** | **All** | ***M/F*** | | **0-4** | **5-9** | **10-14** | **Crude Rate** | **ASR** |
| I | LEUKAEMIA | 36 | 39 | 44 | 119 | *1.0* | 25.1% | 3.2 | 4.6 | 6.8 | 4.5 | **4.7** |
| Ia | Acute lymphocytic leukaemia | 25 | 25 | 26 | 76 | *1.3* | 16.0% | 2.2 | 3.0 | 4.0 | 2.9 | **4.7** |
| II | LYMPHOMA | **11** | **32** | **36** | **79** | *1.5* | 16.7% | 1.0 | 3.8 | 5.6 | 3.0 | **3.2** |
| IIa | Hodgkin disease | 0 | 15 | 19 | 34 | 2.4 | 7.2% | 0.0 | 1.8 | 2.9 | 1.3 | **1.4** |
| Iic | Burkitt lymphoma | 4 | 4 | 4 | 12 | 0.7 | 2.5% | 0.4 | 0.5 | 0.6 | 0.5 | **0.5** |
| III | CNS NEOPLASMS | **8** | **12** | **9** | **29** | *0.8* | 6.1% | 0.7 | 1.4 | 1.4 | 1.1 | **1.1** |
| IV | NEUROBLASTOMA | 3 | 0 | 0 | 3 | *0.2* | 0.6% | 0.3 | 0.0 | 0.0 | 0.1 | **0.1** |
| V | RETINOBLASTOMA | 35 | 2 | 0 | 37 | *2.7* | 7.8% | 3.1 | 0.2 | 0.0 | 1.4 | **1.3** |
| VI | WILMS TUMOUR | **29** | **13** | **1** | **43** | *0.3* | 9.1% | 2.6 | 1.5 | 0.2 | 1.6 | **1.5** |
| VIII | BONE TUMOURS | **2** | **5** | **14** | **21** | *0.8* | 4.4% | 0.2 | 0.6 | 2.2 | 0.8 | **0.9** |
| IX | SOFT TISSUE SARCOMAS | **19** | **20** | **19** | **58** | *1.9* | 12.2% | 1.7 | 2.4 | 2.9 | 2.2 | **2.3** |
| Ixc | Kaposi sarcoma | 0 | 3 | 4 | 7 | *6.0* | 1.5% | 0.0 | 0.4 | 0.6 | 0.3 | **0.3** |
| X | GERM CELL TUMOURS | 2 | 2 | 2 | 6 | *1.8* | 1.3% | 0.2 | 0.2 | 0.3 | 0.2 | **0.2** |
| | OTHER | 13 | 17 | 49 | 79 | | 16.7% | 1.1 | 2.0 | 7.6 | 3.0 | **3.3** |
| | **ALL** | **158** | **142** | **174** | **474** | **1.2** | **100.0%** | **13.9** | **16.8** | **26.9** | **18.0** | **18.6** |

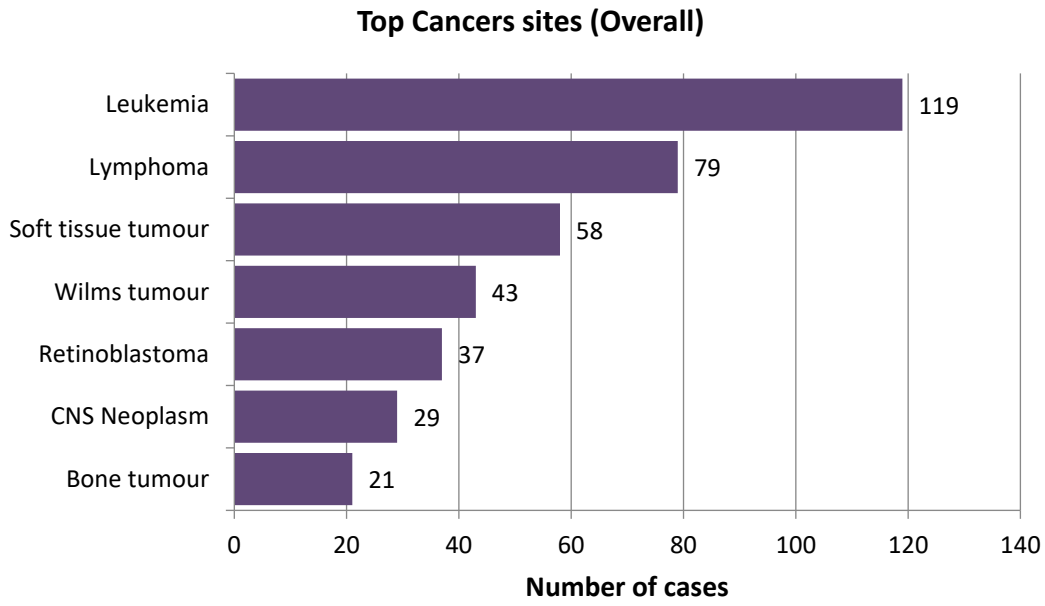



Fig.10 Top 5 Childhood Cancers (overall) in Nairobi County

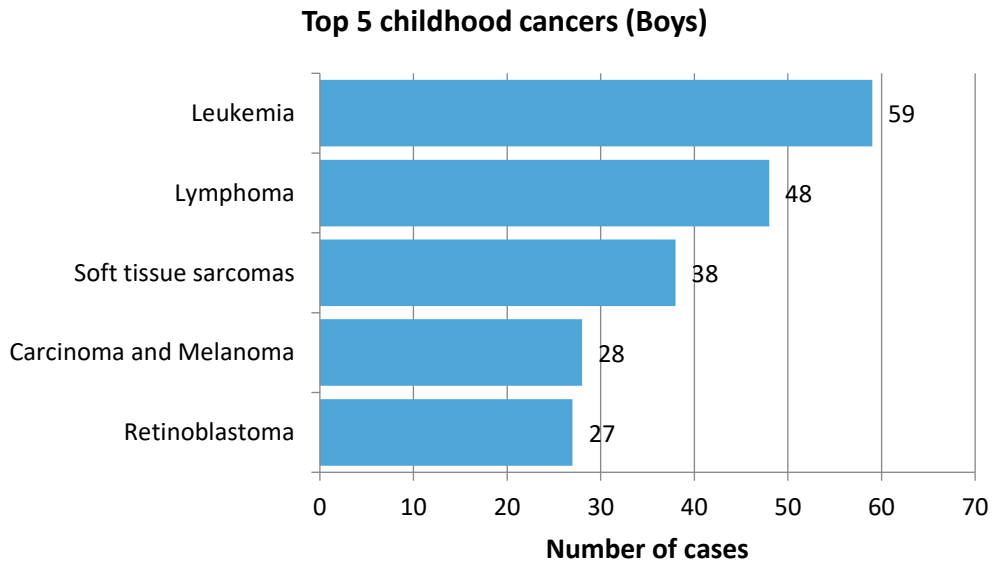



Fig. 11 Top 5 Childhood Cancers (Boys) in Nairobi County

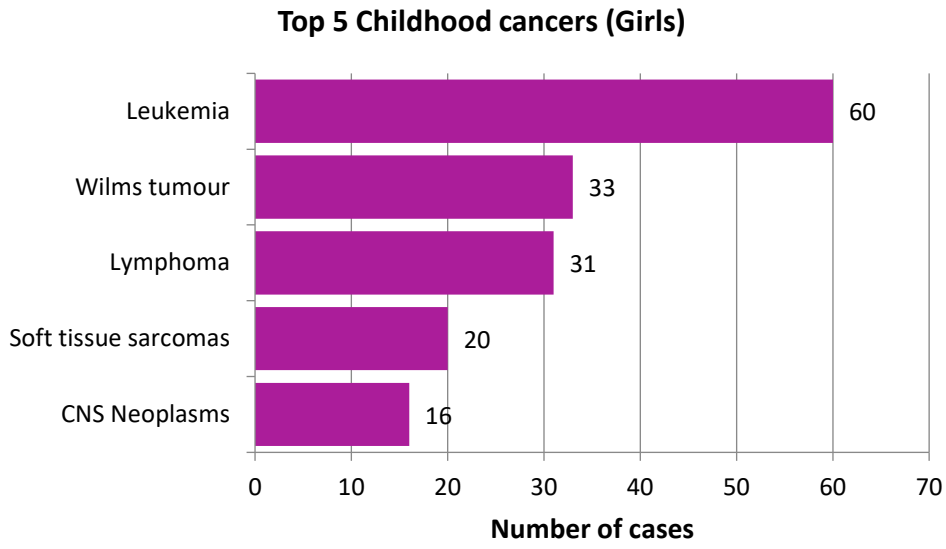



Fig. 12 Top 5 Childhood Cancers (Girls) in Nairobi County

## 3.6 HEAD AND NECK CANCERS

Head and neck cancers accounted for 916 (8.9%) of the total cases registered for the reporting period (2009-2013). Nasopharyngeal cancers wereleading in this category, followed by cancer of the mouthand thyroid.

Nasopharyngeal and laryngeal cancers show male predominance with a male to female ratio of 2.5:1 and 3.6:1 respectively. On the other hand cancers of the thyroid show female predominance with male to female ratio of 1:3.6.

Table 3.2 Numbers of Head and Neck Cancer, by Sub-site, Nairobi County, 2009-2013

| ICD (10th) | SITE | 0-9 | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70+ | Total | % of all cancers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C00 | Lip | 1 | 4 | 0 | 1 | 11 | 7 | 3 | 3 | 30 | 0.3 |
| C01-02 | Tongue | 0 | 2 | 3 | 10 | 18 | 30 | 17 | 15 | 95 | 0.9 |
| C03-06 | Mouth | 2 | 1 | 7 | 14 | 26 | 35 | 29 | 26 | 140 | 1.4 |
| C07-08 | Salivary glands | 0 | 0 | 7 | 7 | 5 | 4 | 5 | 6 | 34 | 0.3 |
| C09 | Tonsil | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 6 | 0.1 |
| C10 | Other oropharynx | 0 | 0 | 1 | 1 | 1 | 3 | 7 | 1 | 14 | 0.1 |
| C11 | Nasopharynx | 1 | 45 | 47 | 32 | 51 | 48 | 34 | 13 | 271 | 2.6 |
| C12-13 | Hypopharynx | 0 | 1 | 3 | 7 | 5 | 12 | 4 | 4 | 36 | 0.3 |
| C14 | Pharynx unspecified | 0 | 2 | 1 | 4 | 7 | 9 | 7 | 8 | 38 | 0.4 |
| C30-31 | Nose, sinuses etc. | 1 | 5 | 3 | 3 | 9 | 8 | 8 | 7 | 44 | 0.4 |
| C32 | Larynx | 0 | 0 | 3 | 2 | 15 | 33 | 27 | 22 | 102 | 1.0 |
| C73 | Thyroid | 0 | 1 | 14 | 20 | 23 | 19 | 18 | 11 | 106 | 1.0 |
| | **Total H&N** | **6** | **61** | **89** | **101** | **172** | **209** | **159** | **119** | **916** | **8.9** |
| **ALL** | **All Sites** | **300** | **352** | **608** | **1372** | **2013** | **2160** | **1804** | **1735** | **10344** | **100.0** |

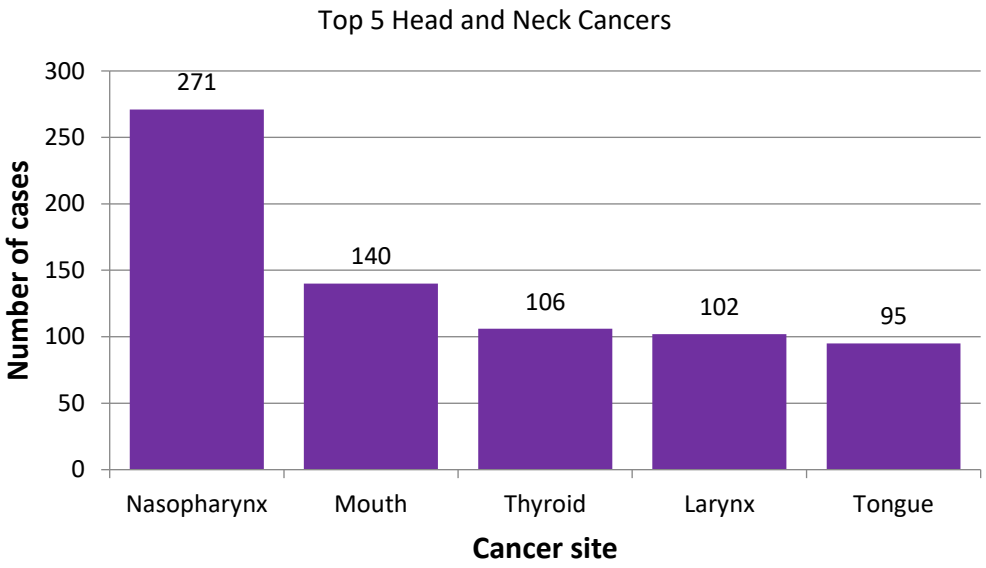



Fig.13 Top Five Head and Neck Cancers by Site, Nairobi county

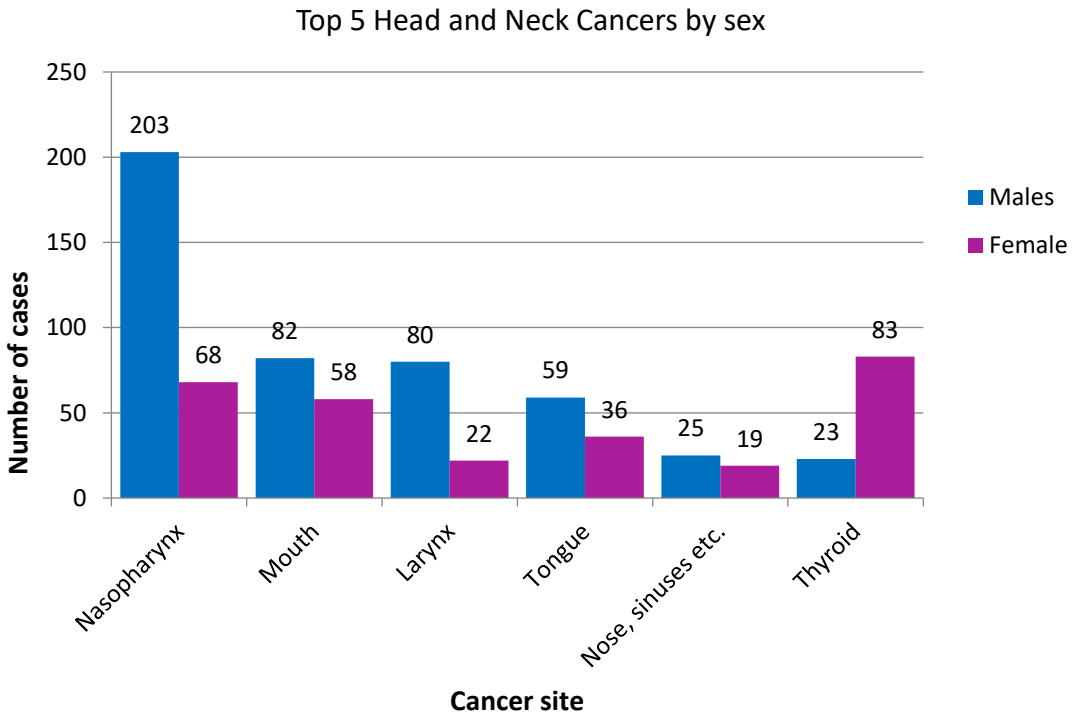
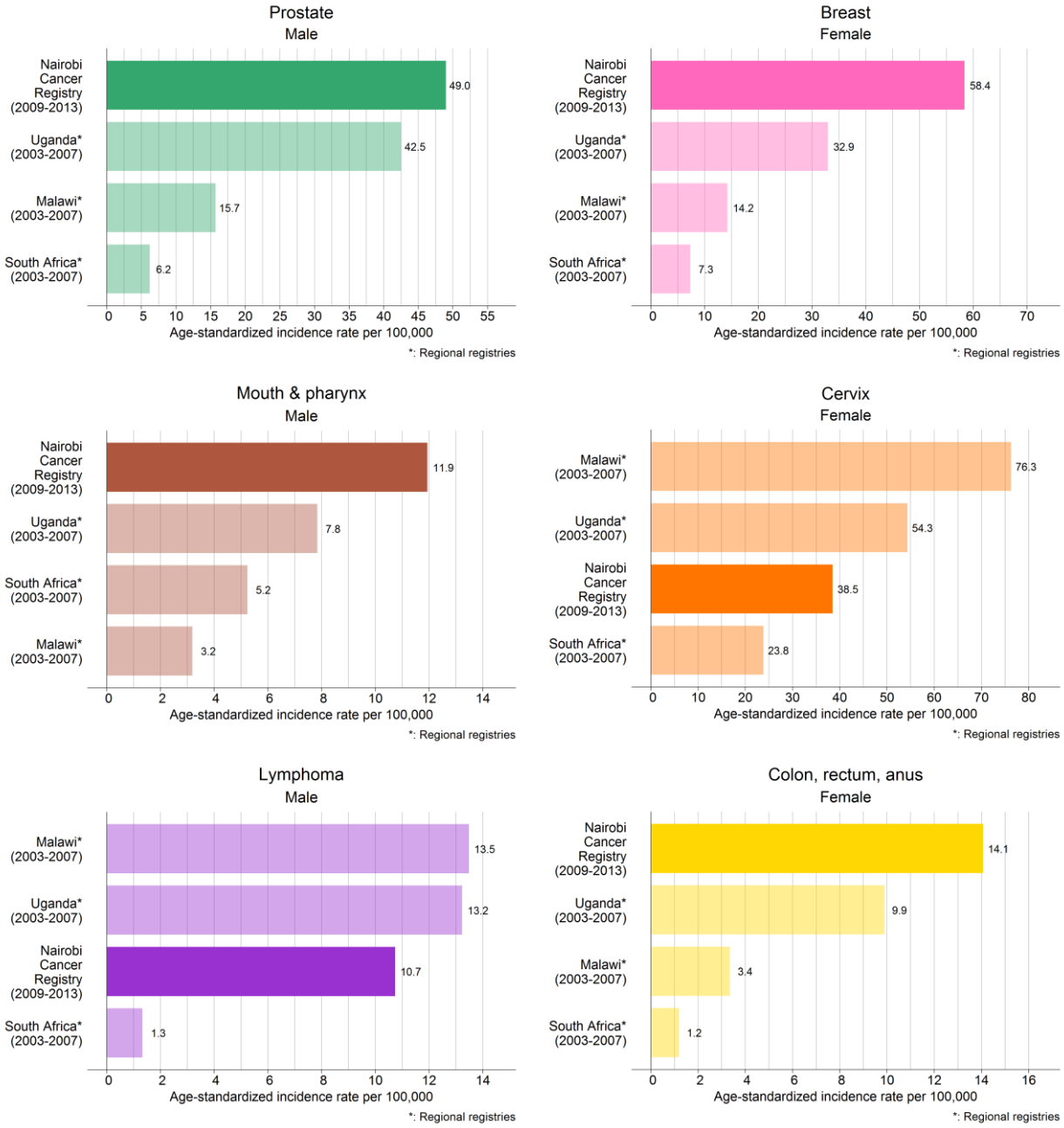



Fig. 14 Top Five Head and Neck Cancers (numbers) by site and sex, Nairobi

## 3.7 COMPARISON OF SUMMARY RATES WITH OTHER REGISTRIES (IN SAME REGION)

Figure 15 shows a comparison of the age standardized incidence rates in Nairobi Cancer Registry (2009-2013) with those observed in Malawi (2003-2007), South Africa (2003-2007) and Uganda (2003-2007) (CI5 X, 2013).



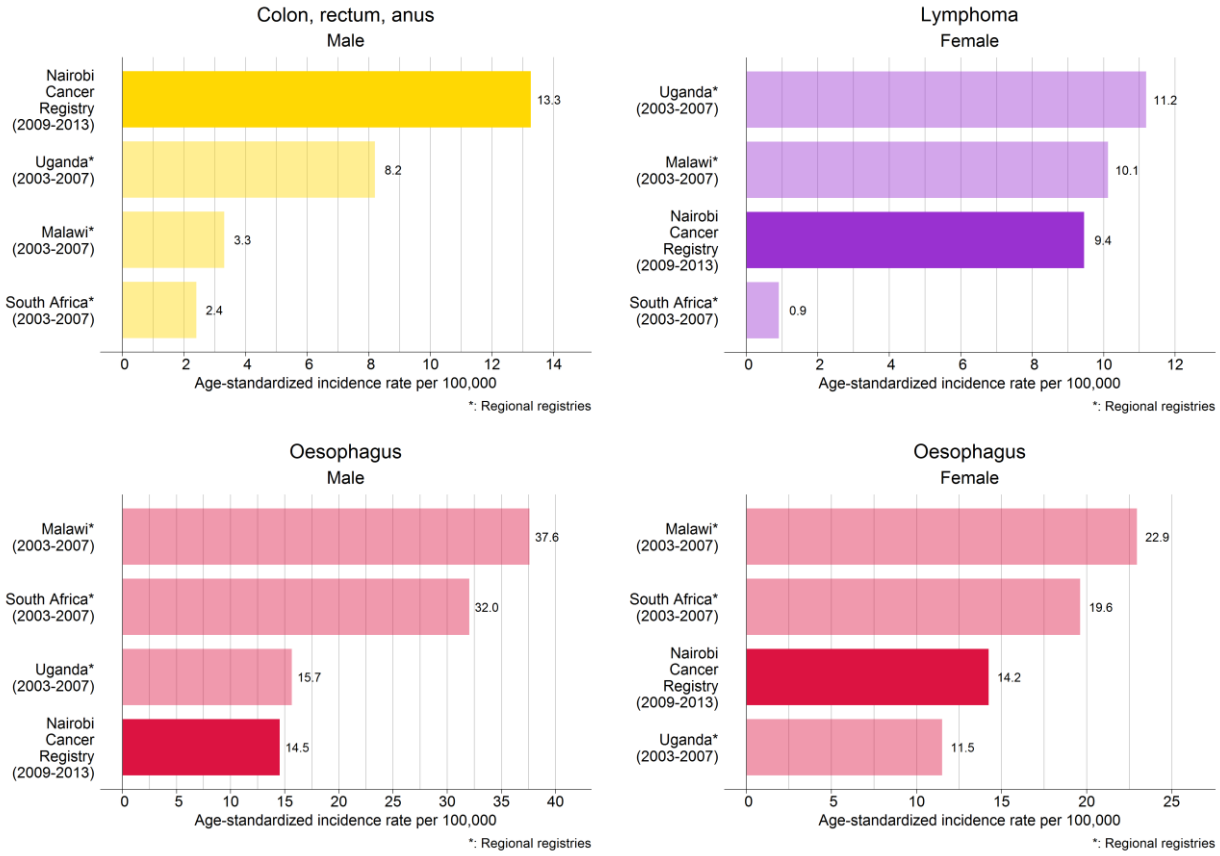



Fig 15. Comparison with other registries

## 3.8 Basis of Diagnosis (DCO / Clinical / MV) by site

The percentage of cases at the major sites that were registered on the basis of information from a death certificate only (DCO) and with morphological verification (MV) - that is, based on cytology or histology (of the primary tumour, or a metastasis).

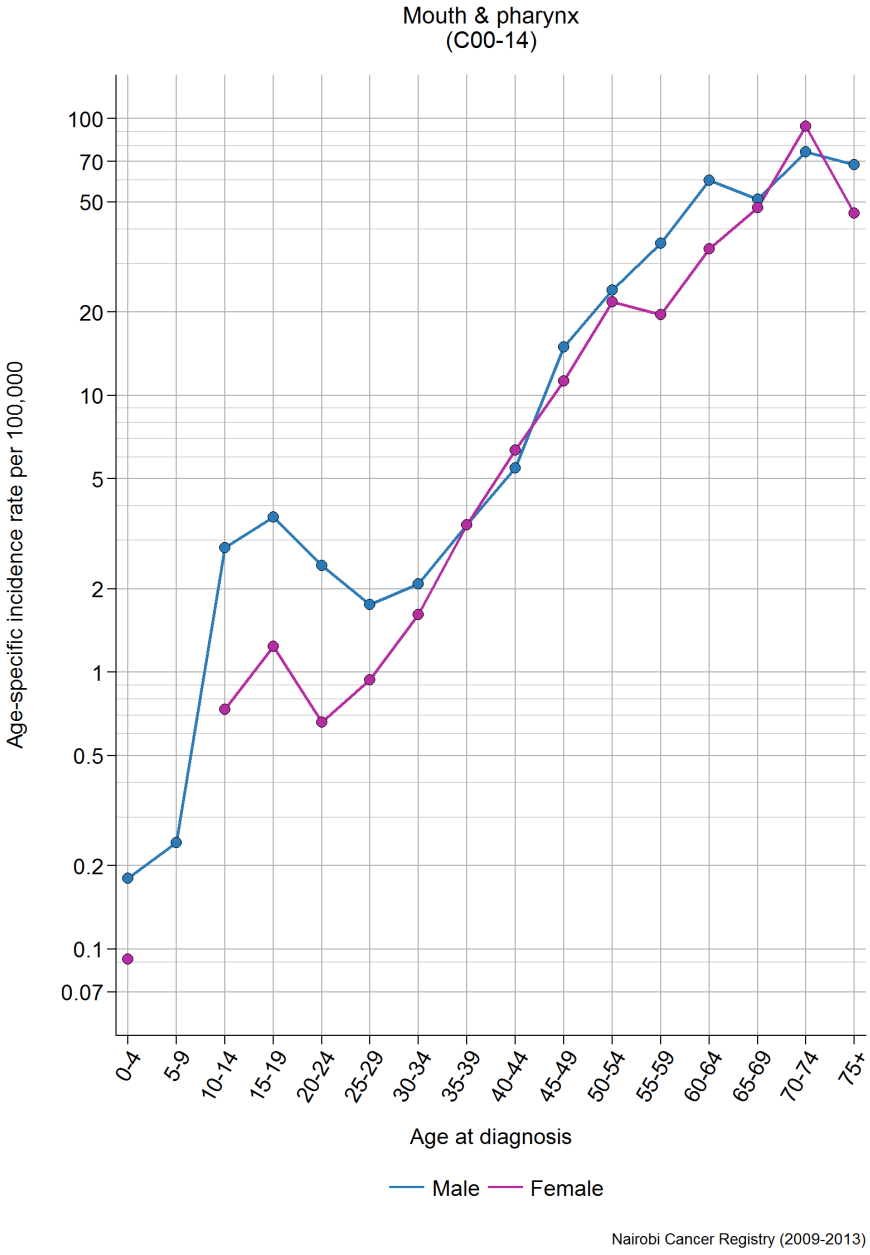
Table 3.3 Basis of diagnosis (DCO/Clinical/MV) by site

| Cancer site | ICD-10 | No. Cases | % total | Basis of diagnosis | | |
|---|---|---|---|---|---|---|
| | | | | % DCO | % Clinical | % M.V |
| Mouth & pharynx | C00-14 | 664 | 7.5 | 6.3 | 9.0 | 84.6 |
| Oesophagus | C15 | 608 | 6.8 | 8.2 | 19.4 | 72.4 |
| Stomach | C16 | 447 | 5.0 | 9.4 | 16.1 | 74.5 |
| Colon, rectum, anus | C18-21 | 712 | 8.0 | 4.9 | 14.9 | 80.2 |
| Liver | C22 | 281 | 3.2 | 21.0 | 9.6 | 69.4 |
| Pancreas | C25 | 176 | 2.0 | 9.7 | 39.8 | 50.6 |
| Larynx | C32 | 102 | 1.1 | 3.9 | 12.7 | 83.3 |
| Lung, trachea, bronchus | C33-34 | 201 | 2.3 | 9.5 | 15.9 | 74.6 |
| Melanoma of skin | C43 | 45 | 0.5 | 2.2 | 0.0 | 97.8 |
| Breast | C50 | 1652 | 18.6 | 4.8 | 13.1 | 82.1 |
| Cervix | C53 | 1105 | 12.4 | 3.7 | 19.0 | 77.3 |
| Corpus & Uterus NOS | C54-55 | 168 | 1.9 | 3.6 | 10.7 | 85.7 |
| Ovary & adnexa | C56 | 236 | 2.7 | 10.2 | 19.9 | 69.9 |
| Prostate | C61 | 835 | 9.4 | 5.6 | 24.8 | 69.6 |
| Testis | C62 | 17 | 0.2 | 0.0 | 23.5 | 76.5 |
| Kidney & urinary NOS | C64-66,68 | 119 | 1.3 | 6.7 | 11.8 | 81.5 |
| Bladder | C67 | 124 | 1.4 | 5.6 | 14.5 | 79.8 |
| Brain & nervous sytem | C70-72 | 198 | 2.2 | 4.5 | 19.2 | 76.3 |
| Thyroid | C73 | 106 | 1.2 | 3.8 | 8.5 | 87.7 |
| Lymphoma | C81-85,90,88,96 | 701 | 7.9 | 1.0 | 1.0 | 98.0 |
| Leukaemia | C91-95 | 390 | 4.4 | 4.6 | 0.3 | 95.1 |
| All sites | All | 8887 | 100.0 | 5.9 | 14.5 | 79.7 |

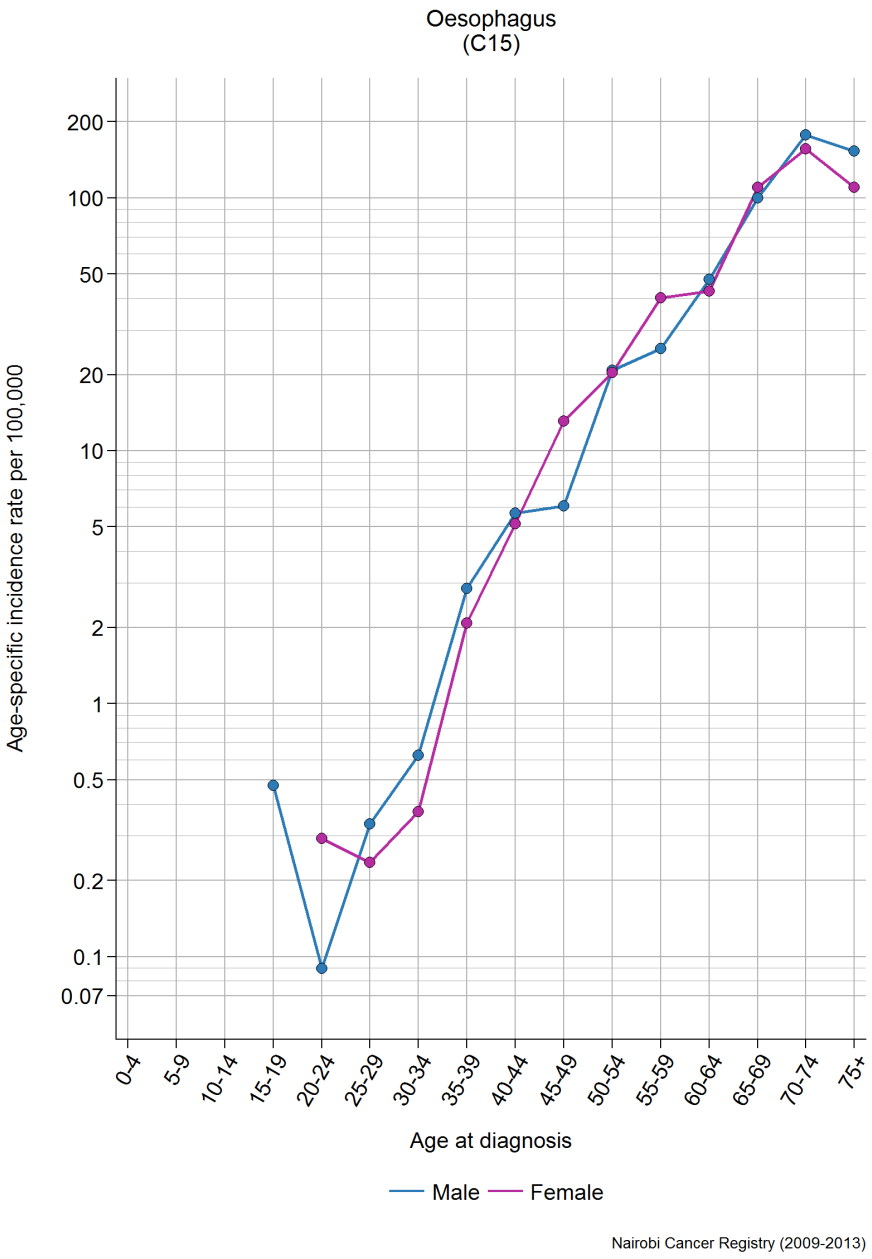
# 4 APPENDIX

## 4.1 Graphs

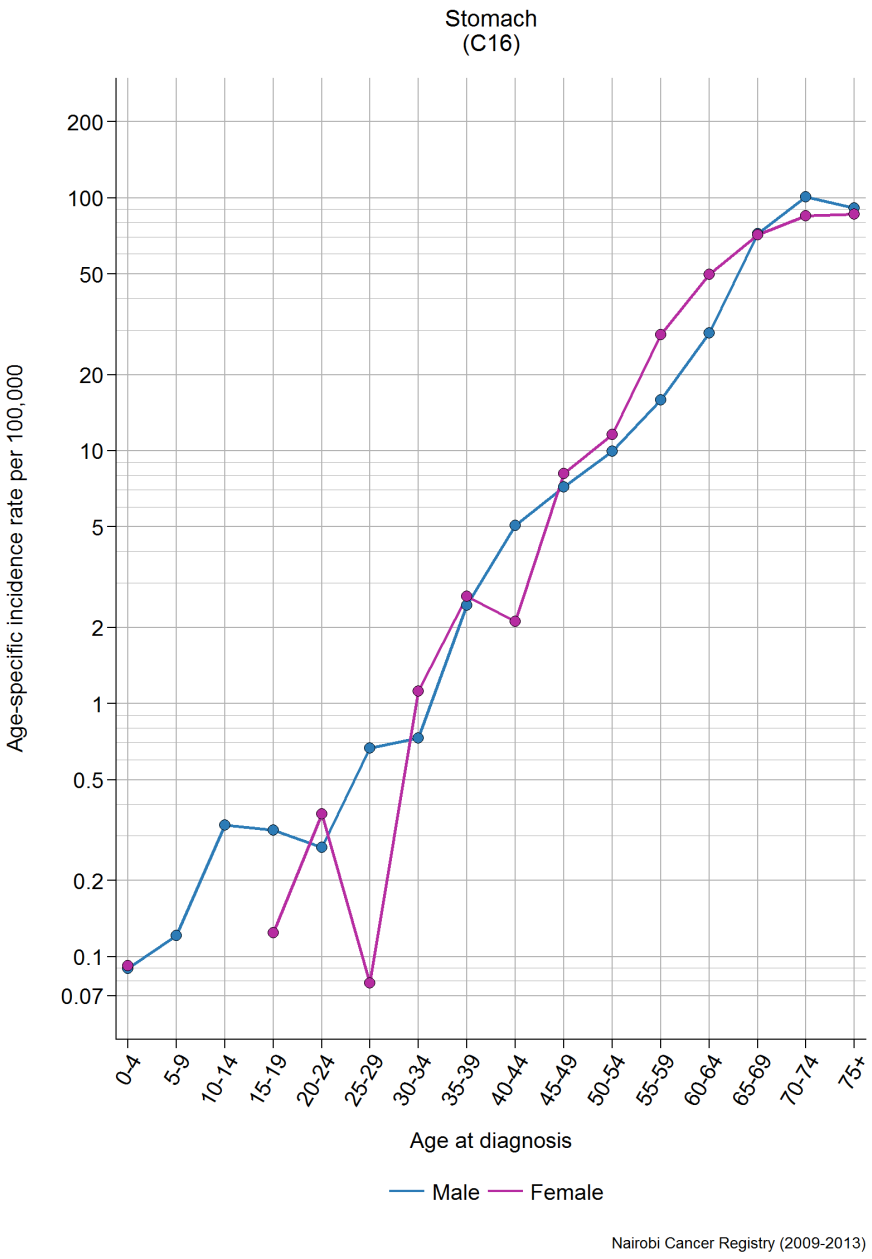
### 4.1.1 Age-specific incidence rate



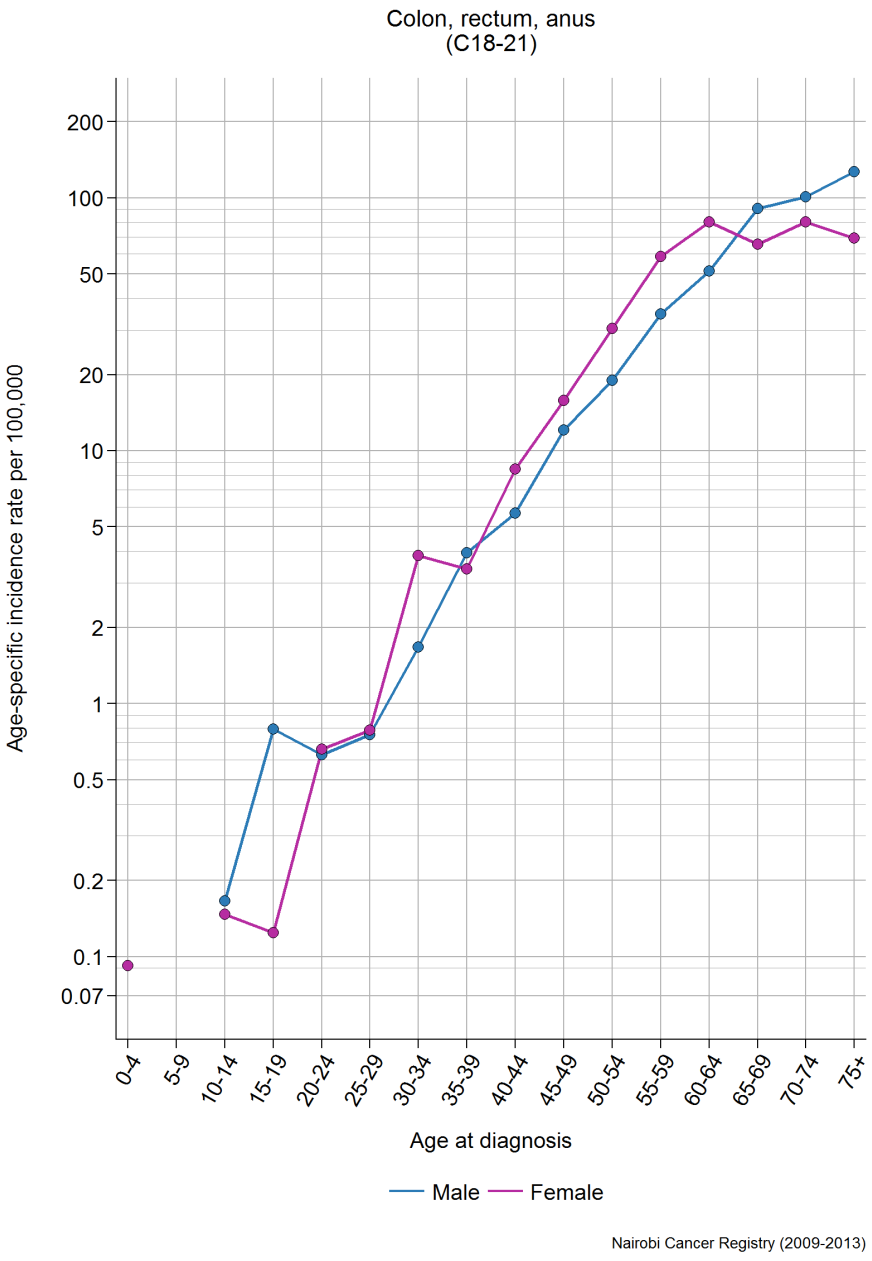

Appendix fig 1. Mouth & pharynx: Age-specific incidence rate per 100,000



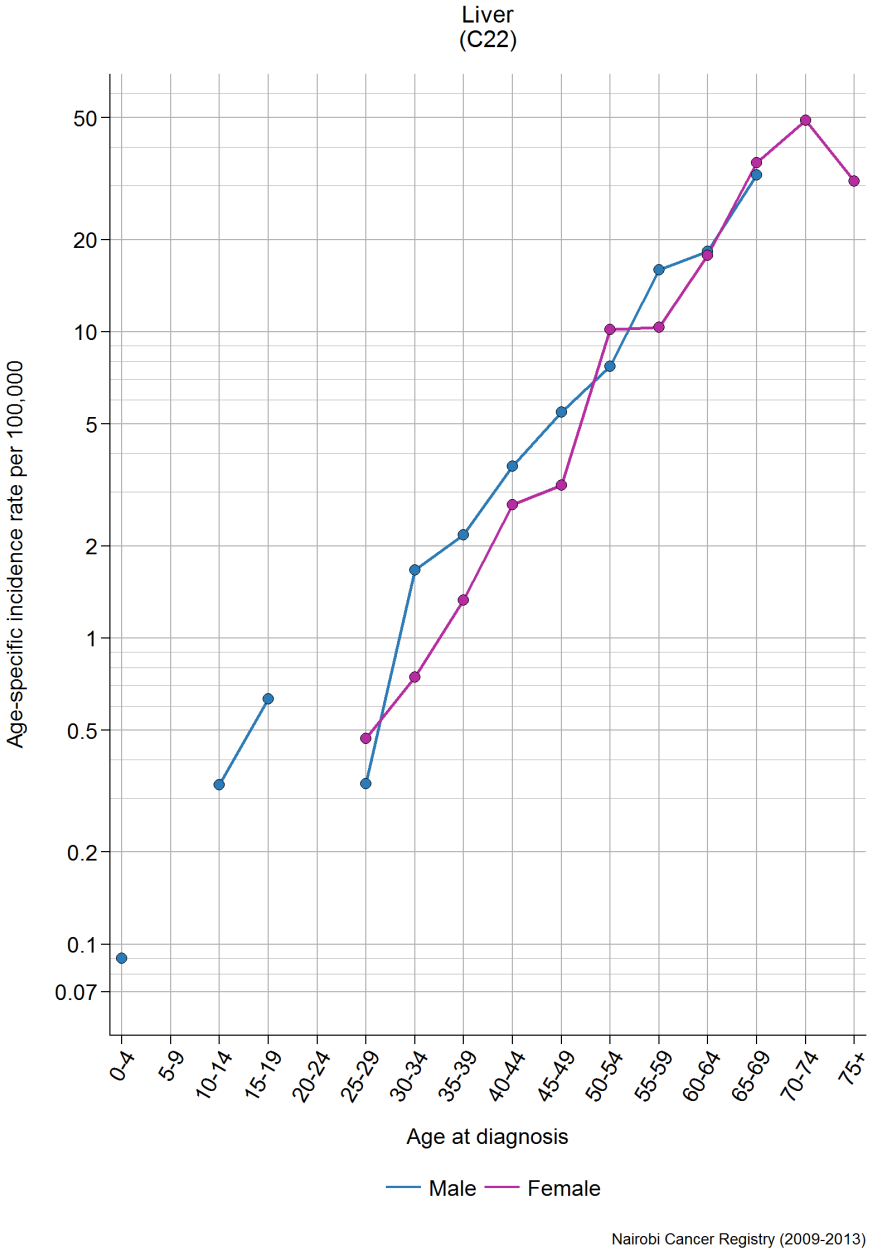

Appendix fig 2. Oesophagus: Age-specific incidence rate per 100,000



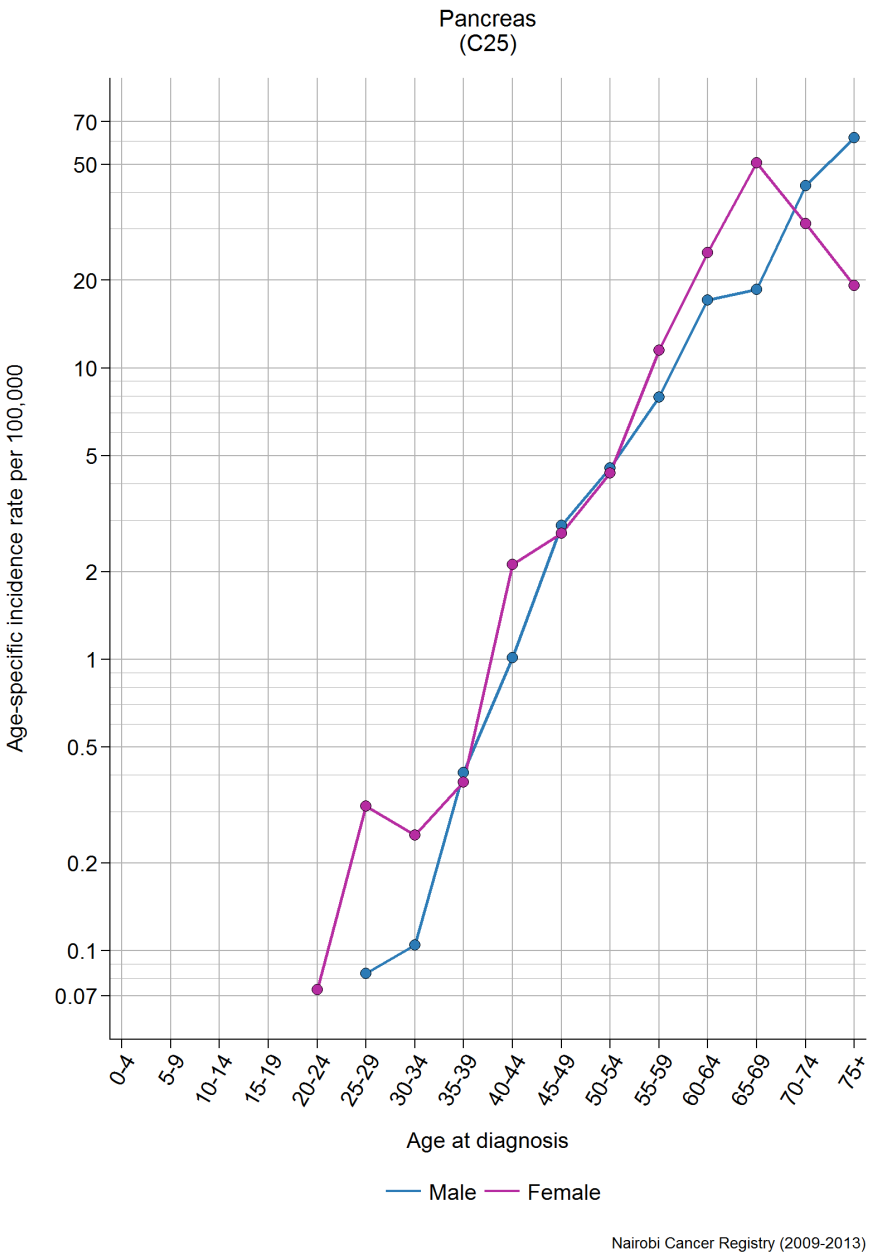

Appendix fig 3. Stomach: Age-specific incidence rate per 100,000



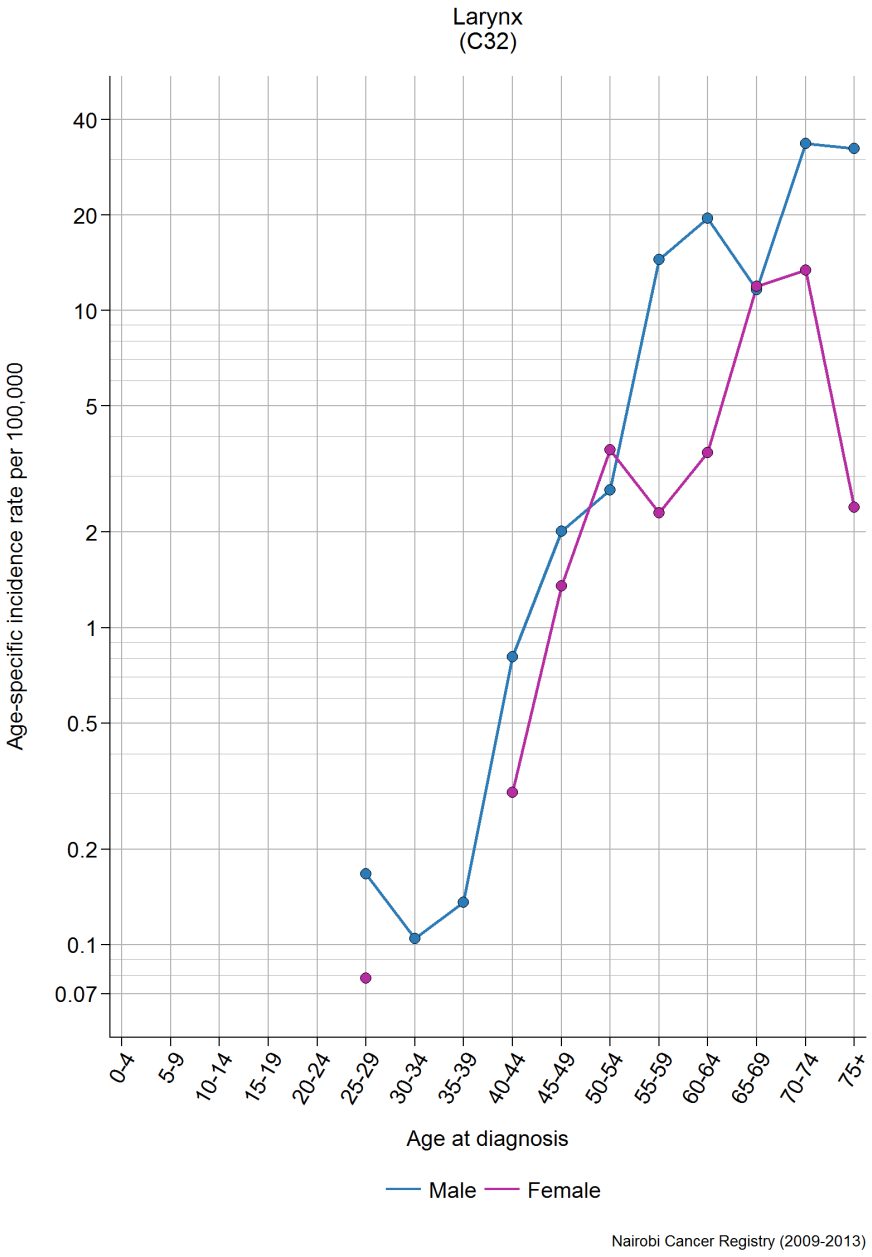

Appendix fig 4. Colon, rectum, anus: Age-specific incidence rate per 100,000



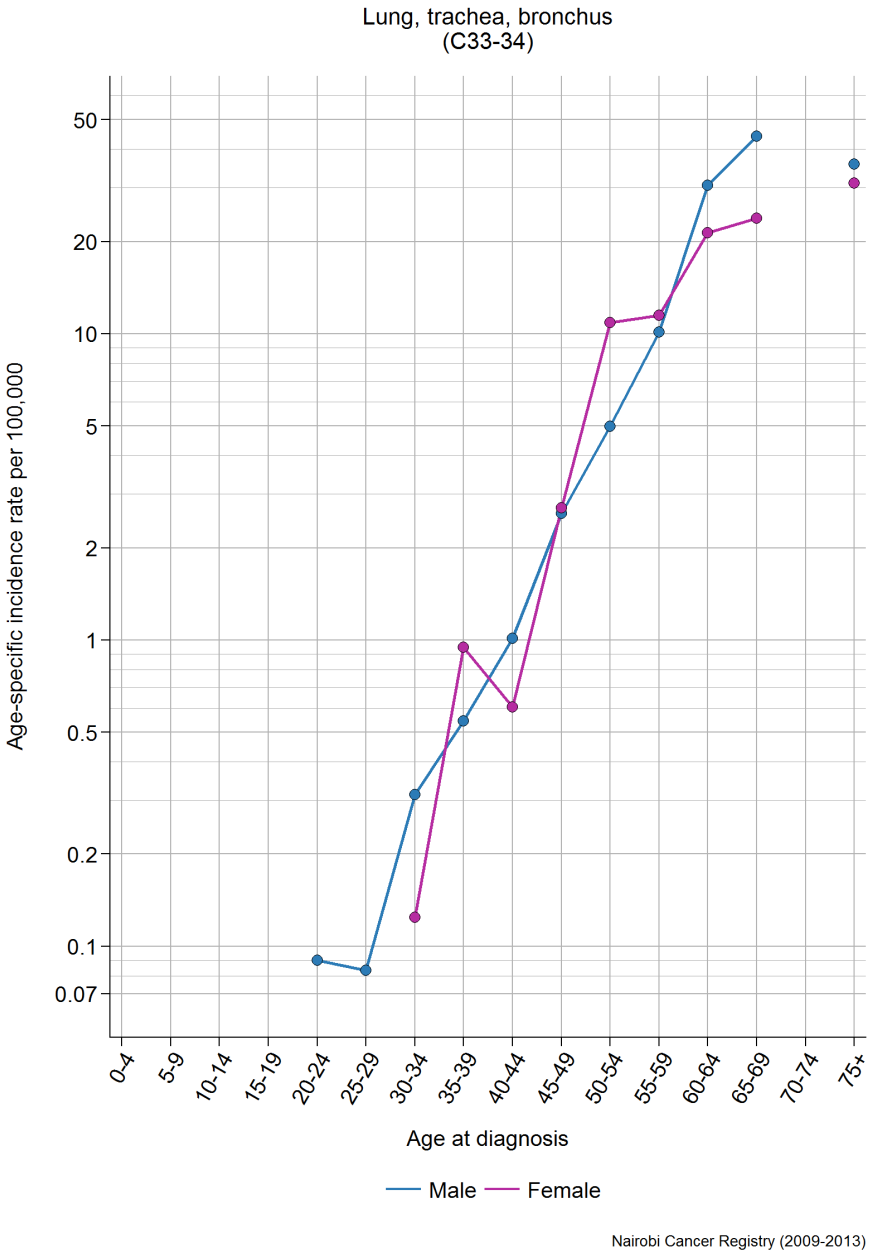

Appendix fig 5. Liver: Age-specific incidence rate per 100,000



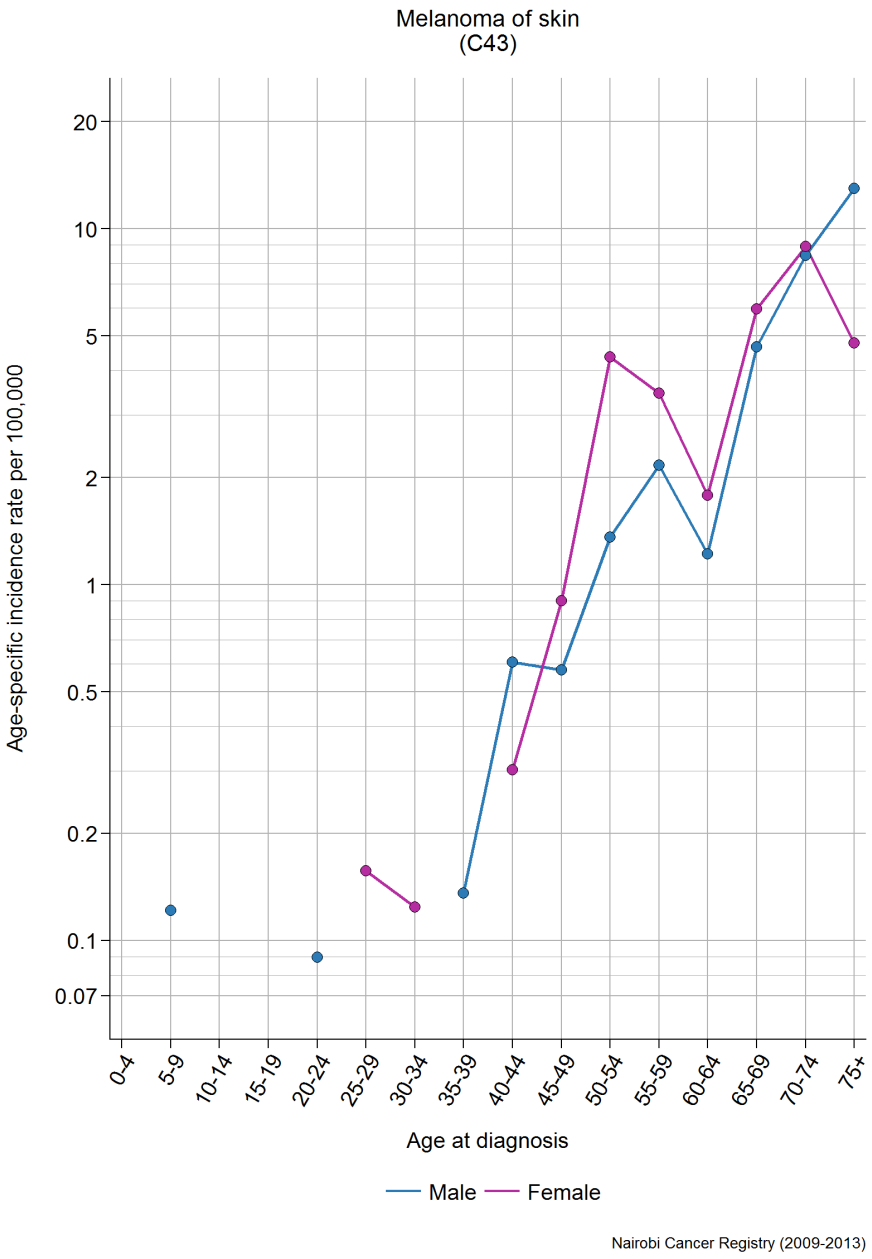

Appendix fig 6. Pancreas: Age-specific incidence rate per 100,000



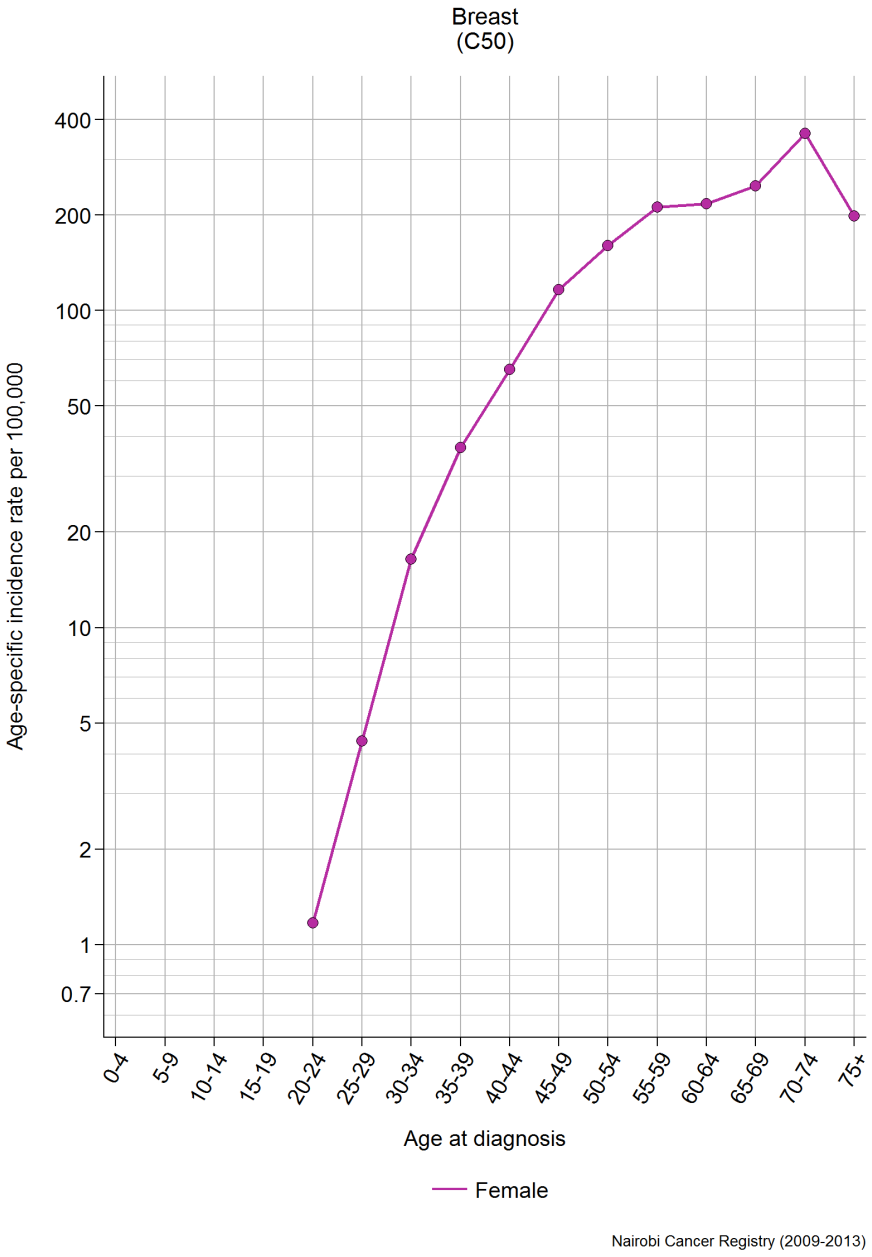

Appendix fig 7. Larynx: Age-specific incidence rate per 100,000



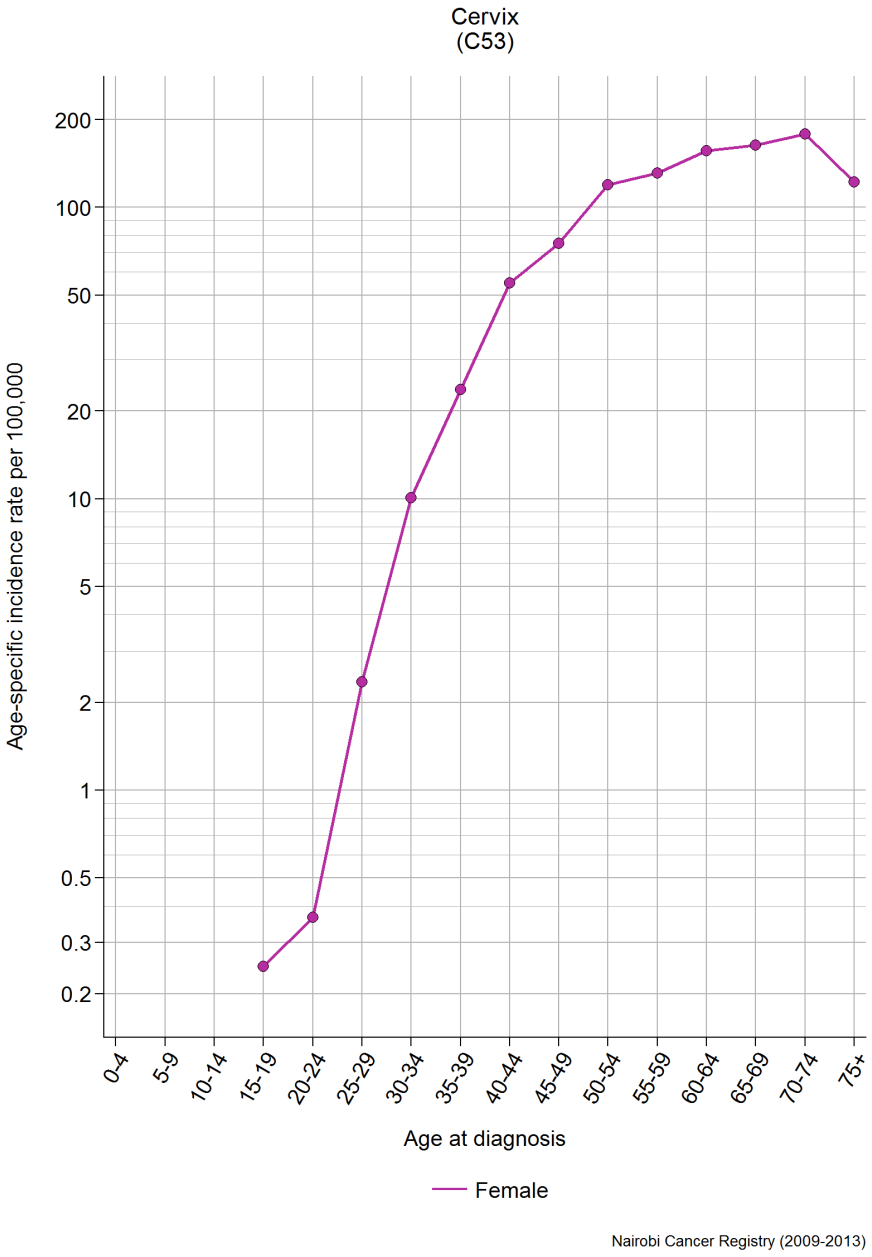

Appendix fig 8. Lung, trachea, bronchus: Age-specific incidence rate per 100,000



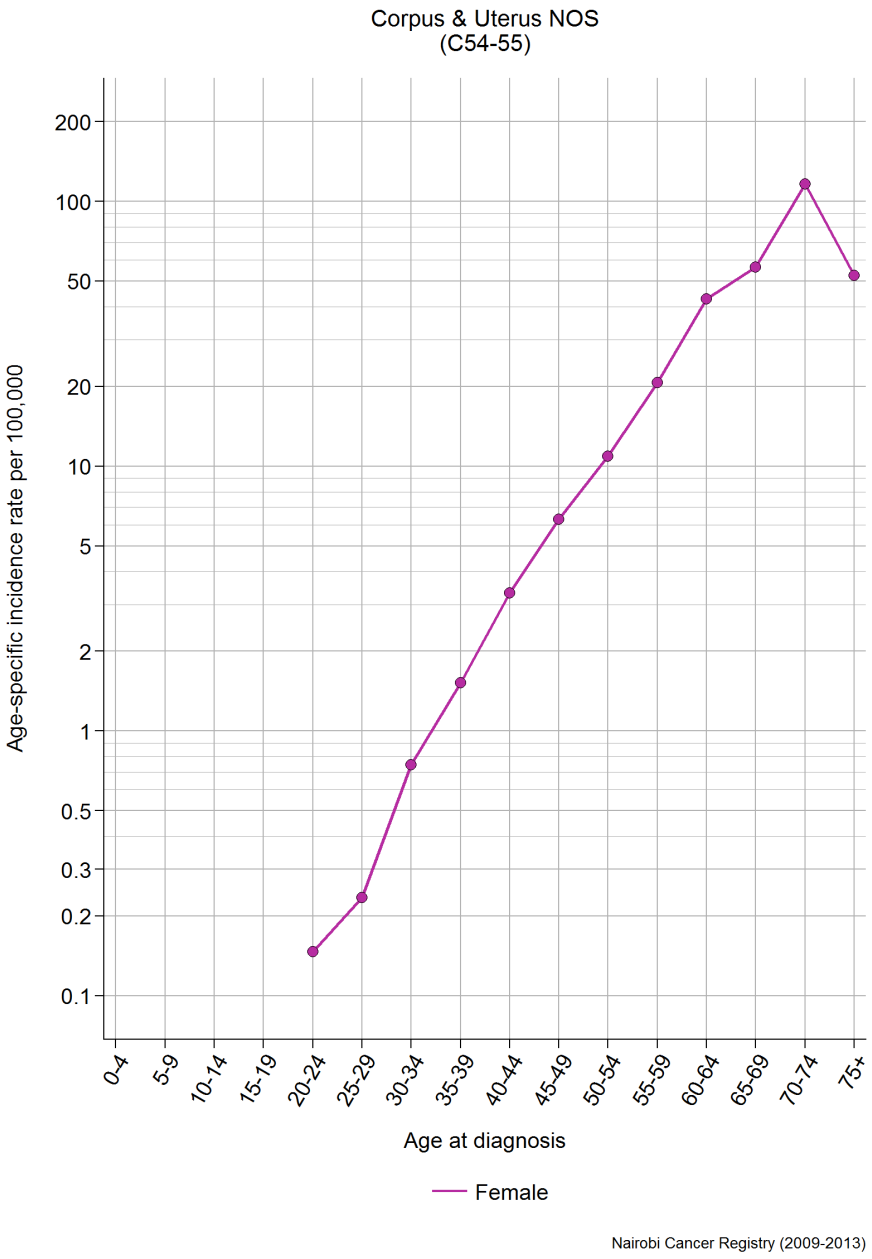

Appendix fig 9. Melanoma of skin: Age-specific incidence rate per 100,000



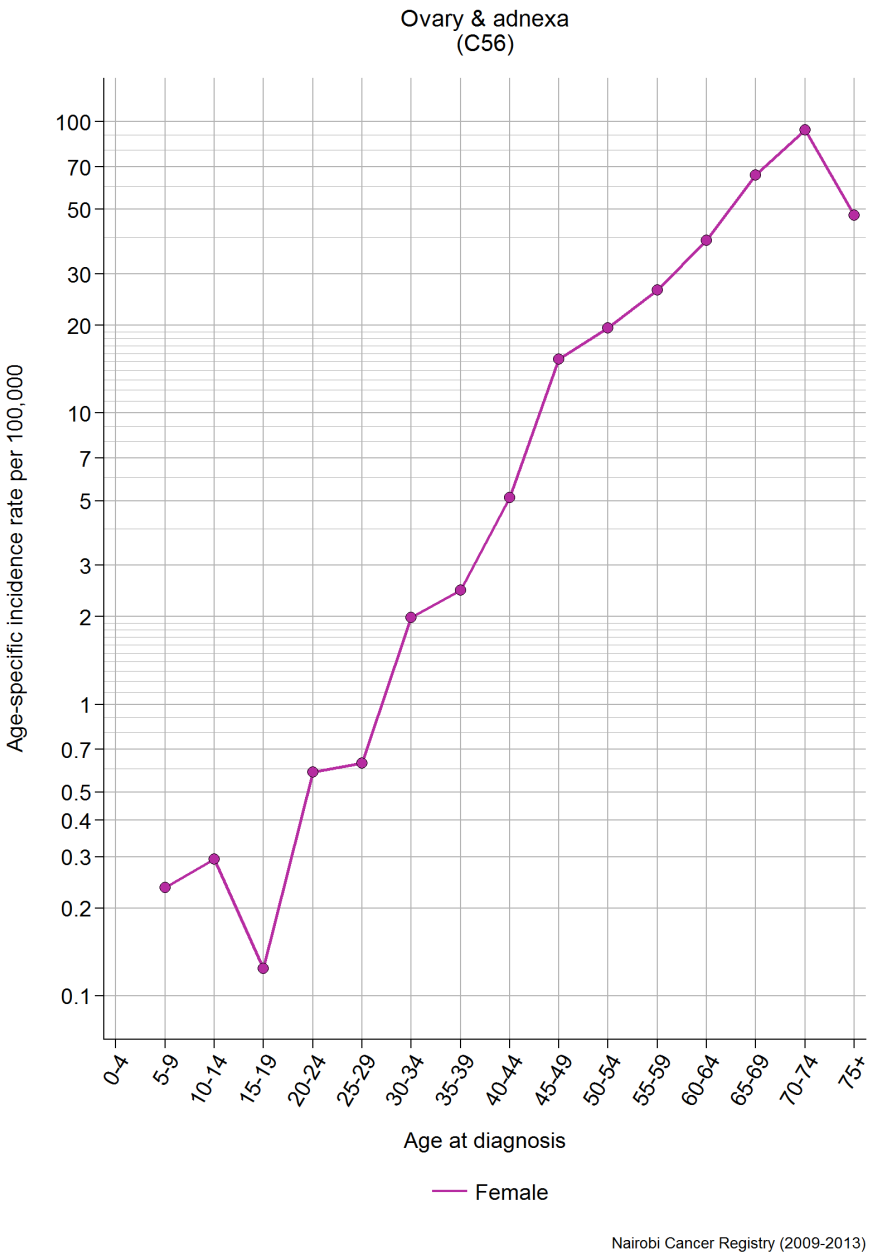

Appendix fig 10. Breast: Age-specific incidence rate per 100,000



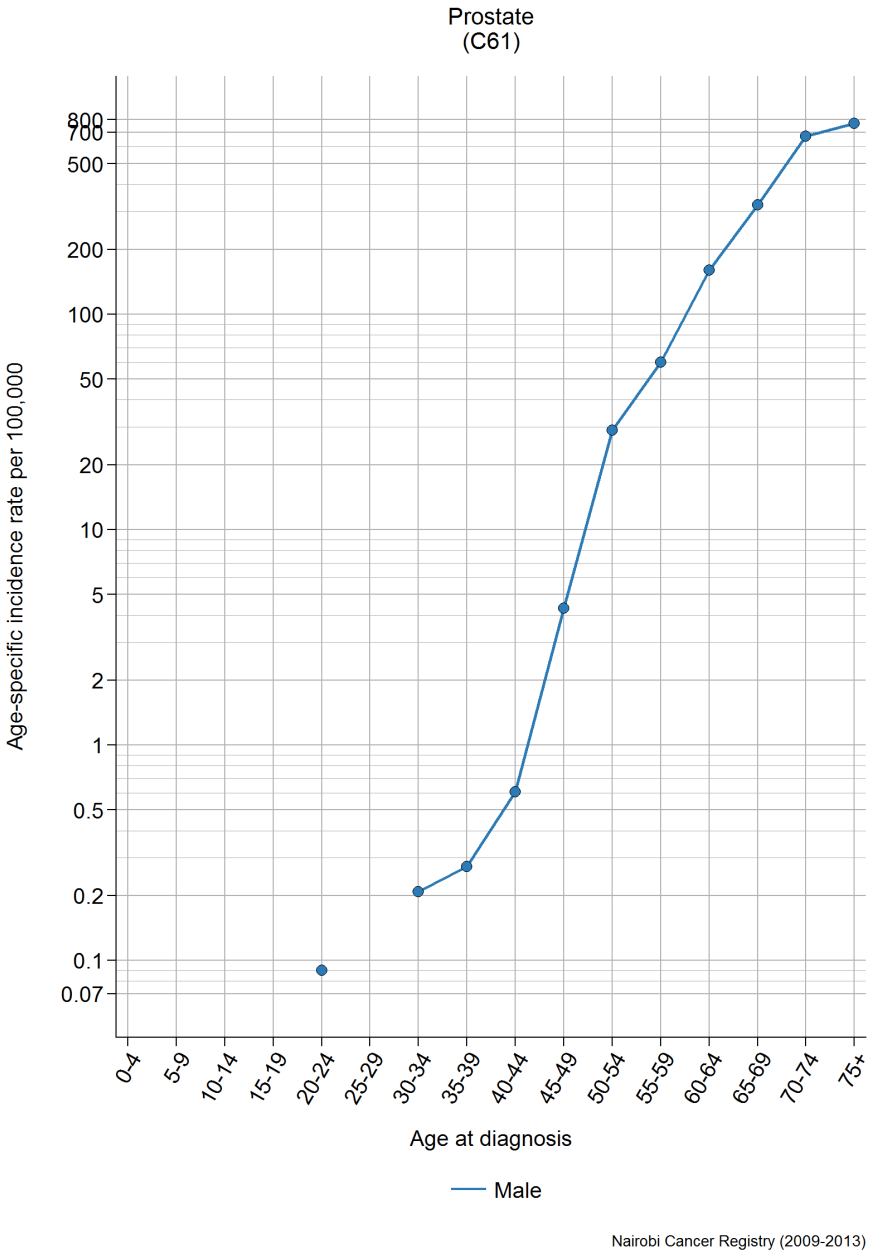

Appendix fig 11. Cervix: Age-specific incidence rate per 100,000



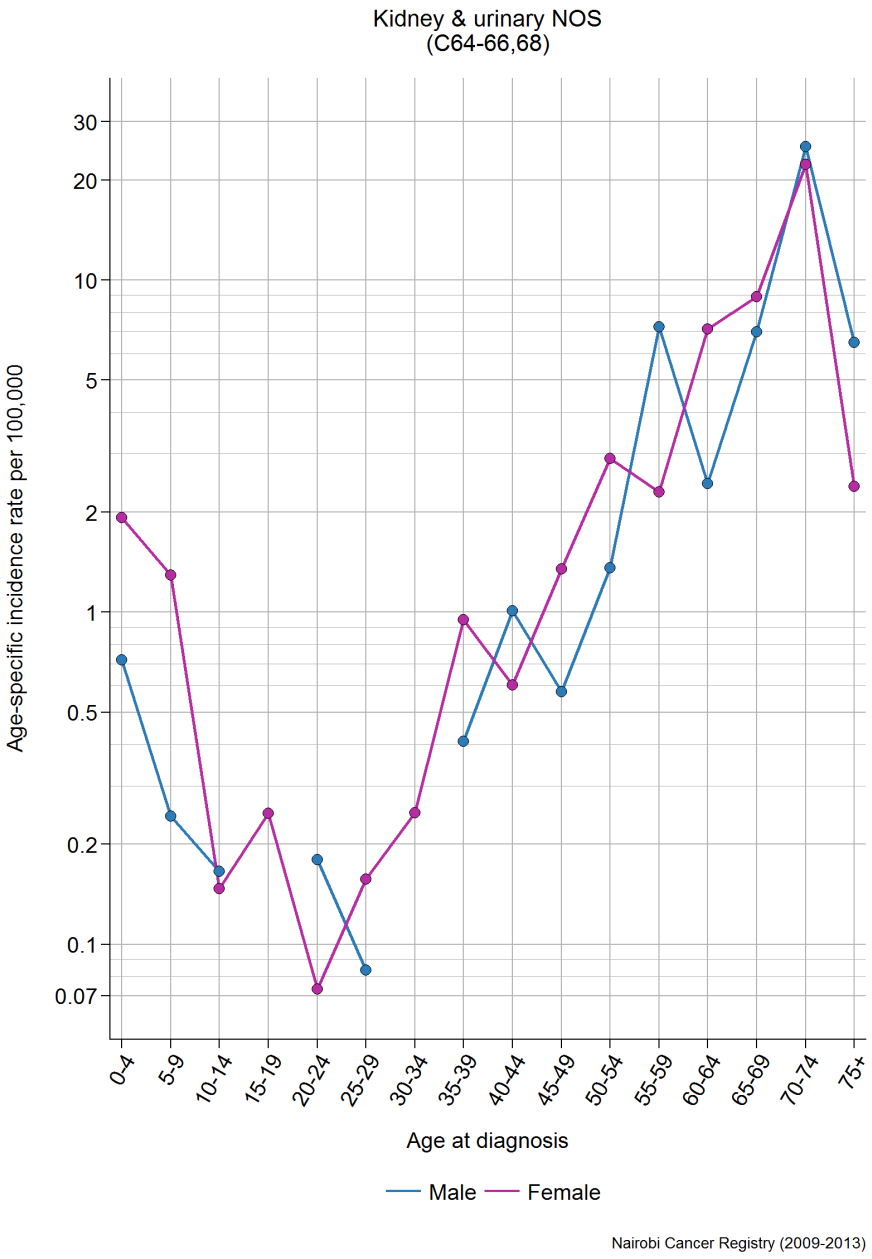

Appendix fig 12. Corpus & Uterus NOS: Age-specific incidence rate per 100,000



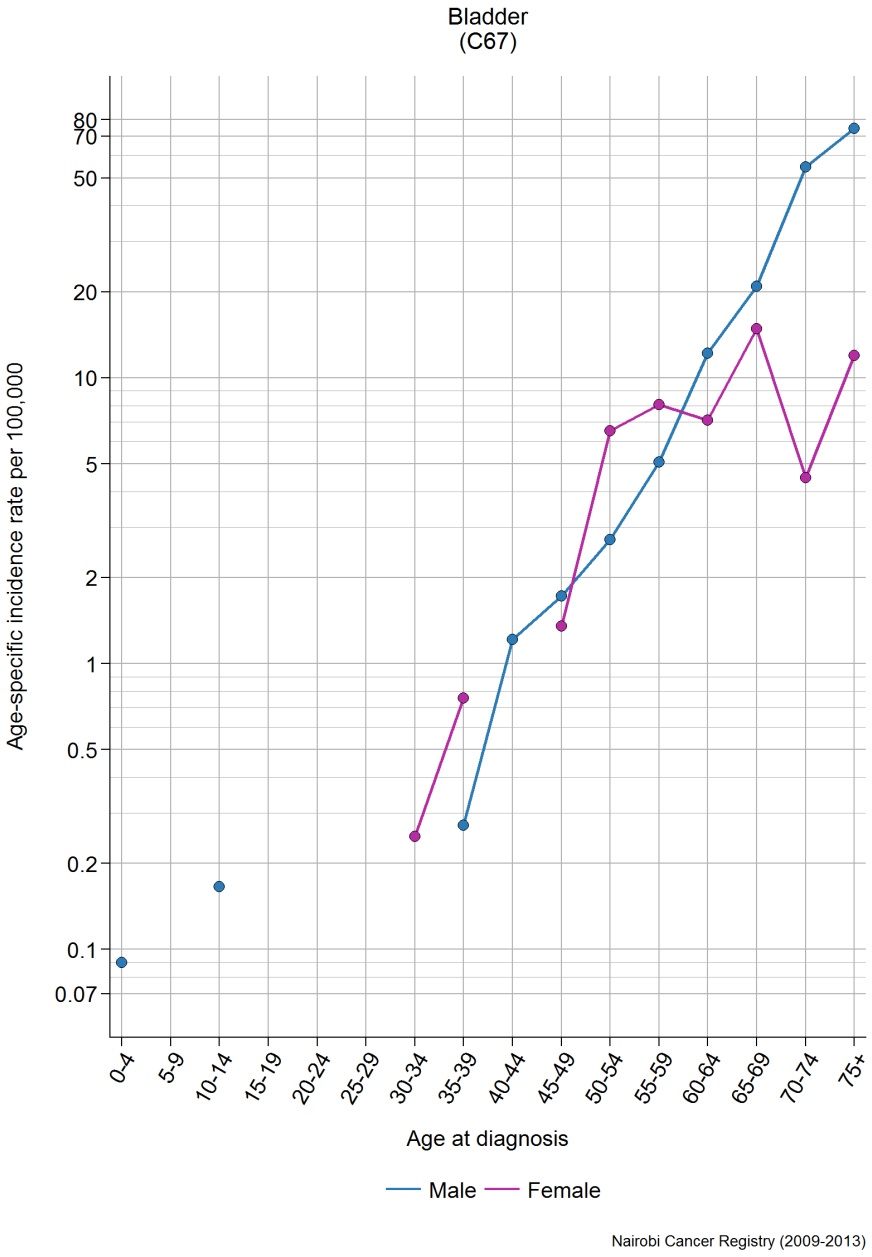

Appendix fig 13. Ovary & adnexa: Age-specific incidence rate per 100,000



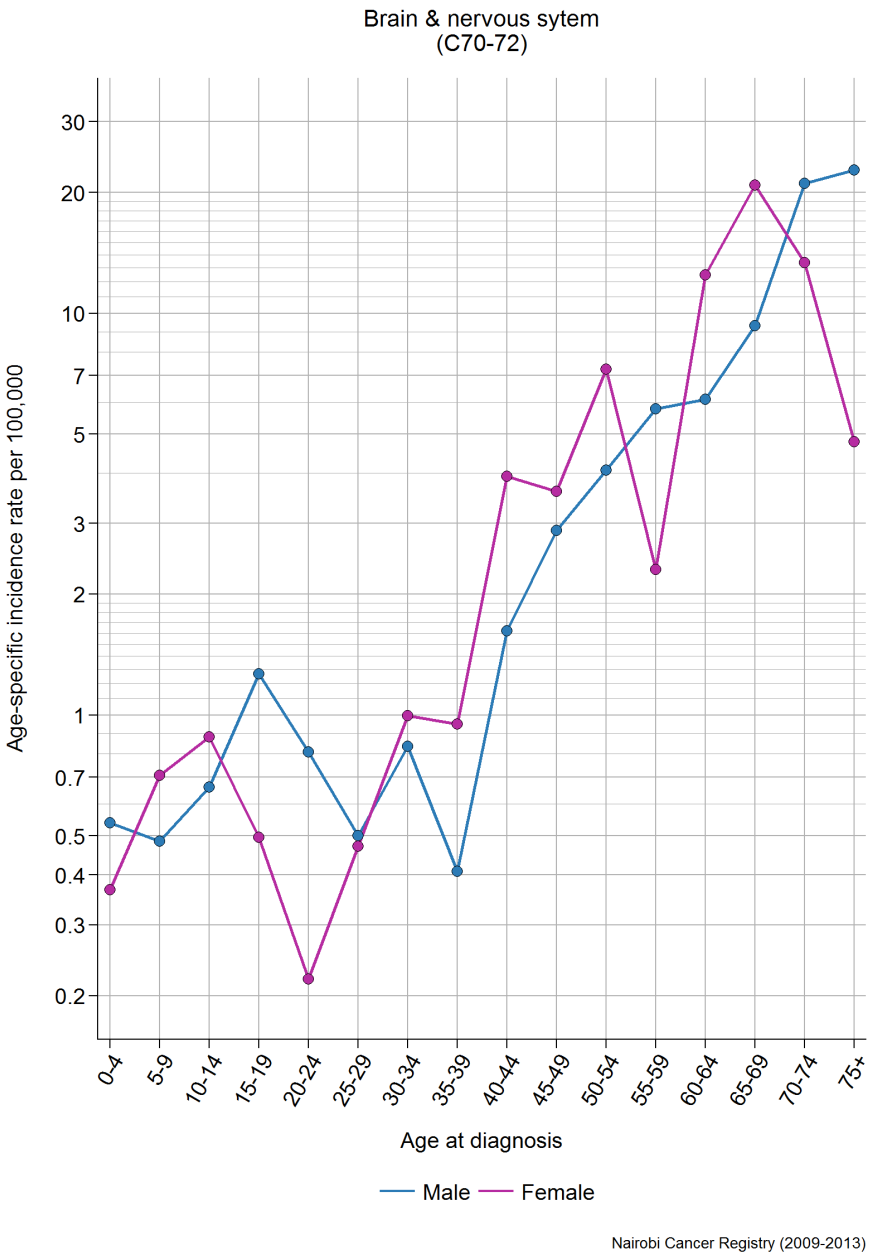

Appendix fig 14. Prostate: Age-specific incidence rate per 100,000



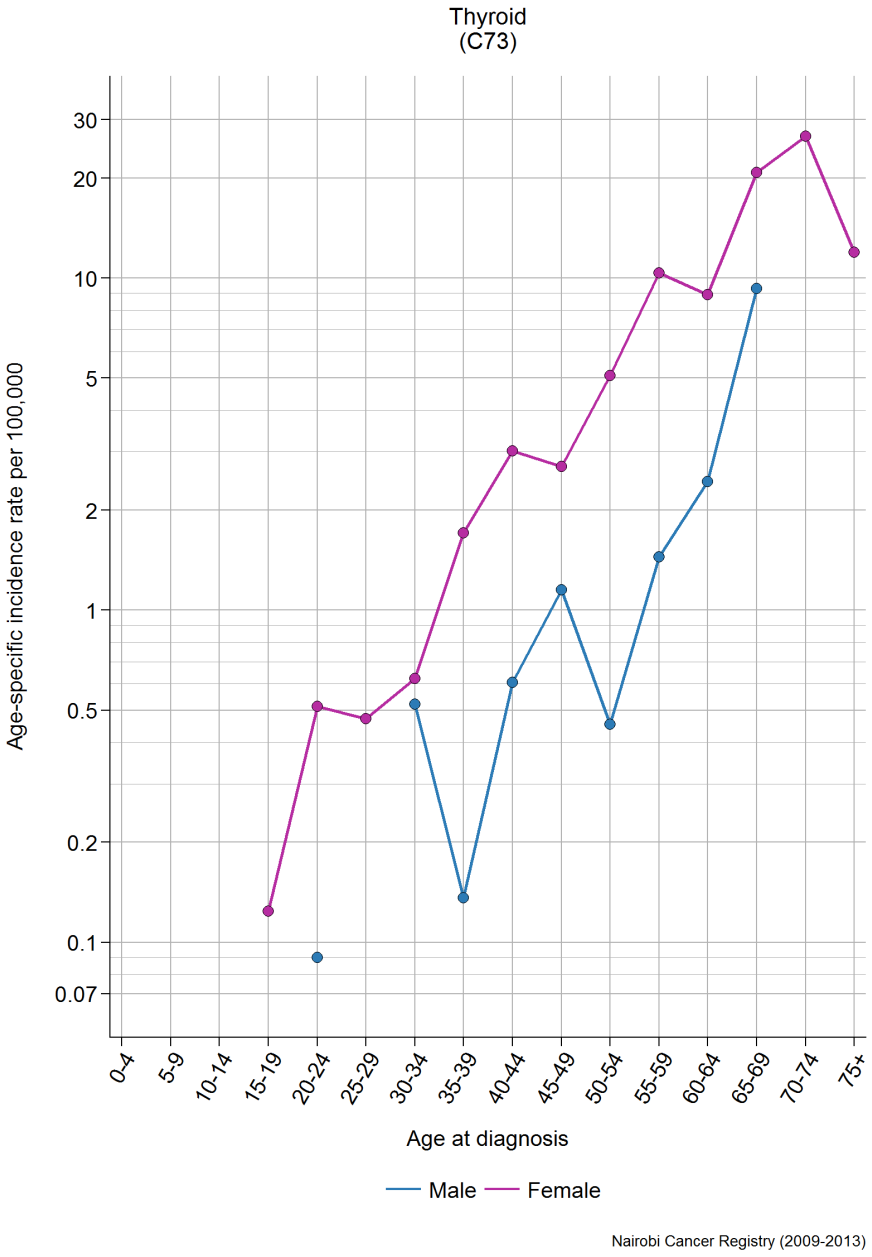

Appendix fig 15. Kidney & urinary NOS: Age-specific incidence rate per 100,000



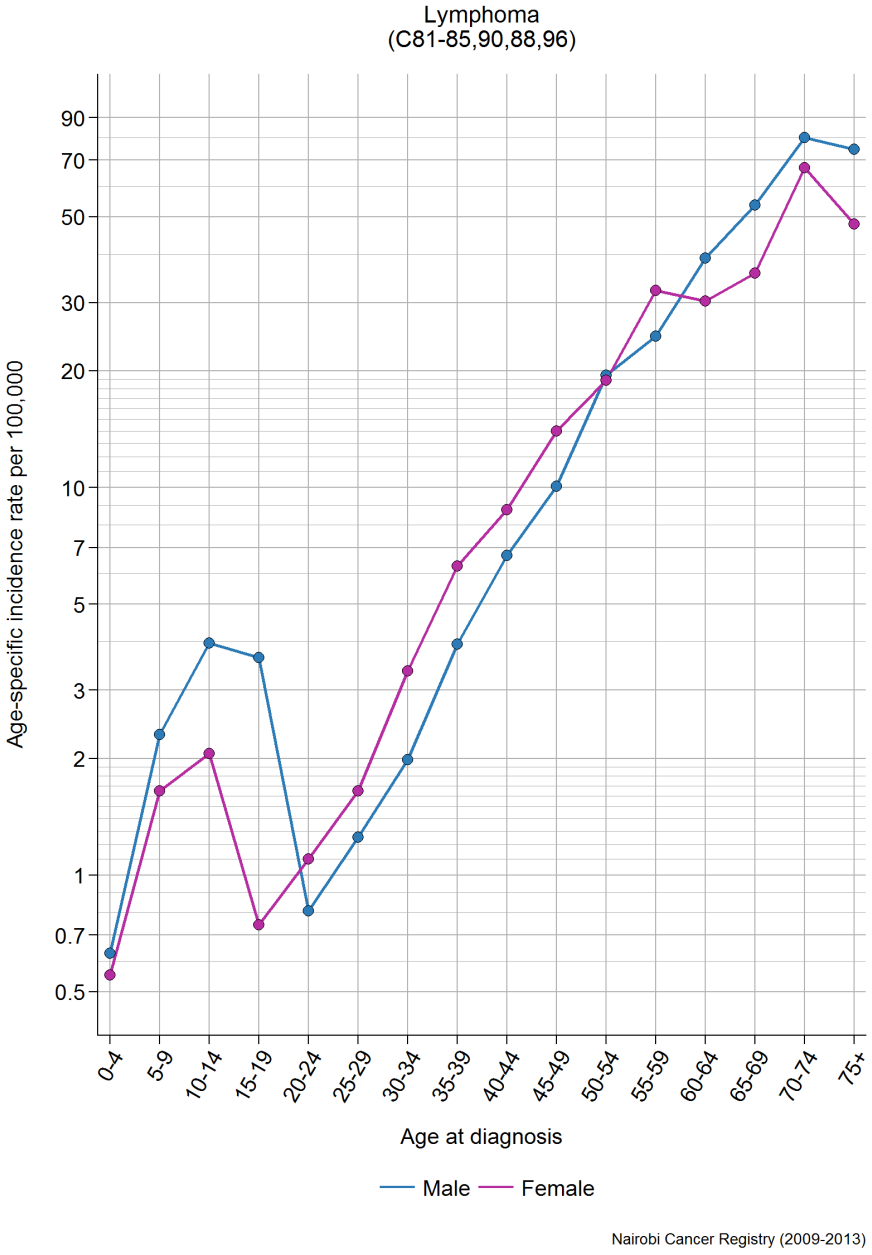

Appendix fig 16. Bladder: Age-specific incidence rate per 100,000



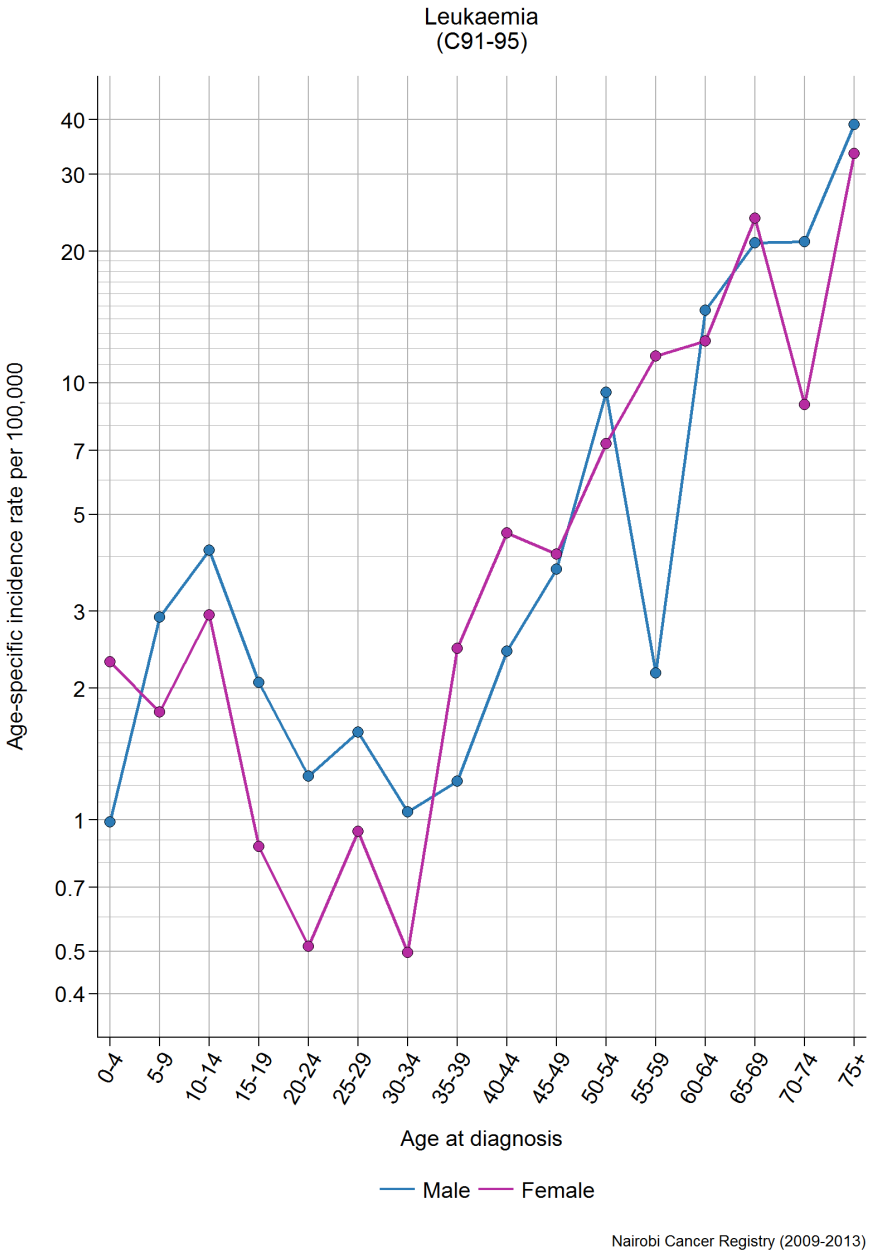

Appendix fig 17. Brain & nervous system: Age-specific incidence rate per 100,000




Appendix fig 18. Thyroid: Age-specific incidence rate per 100,000

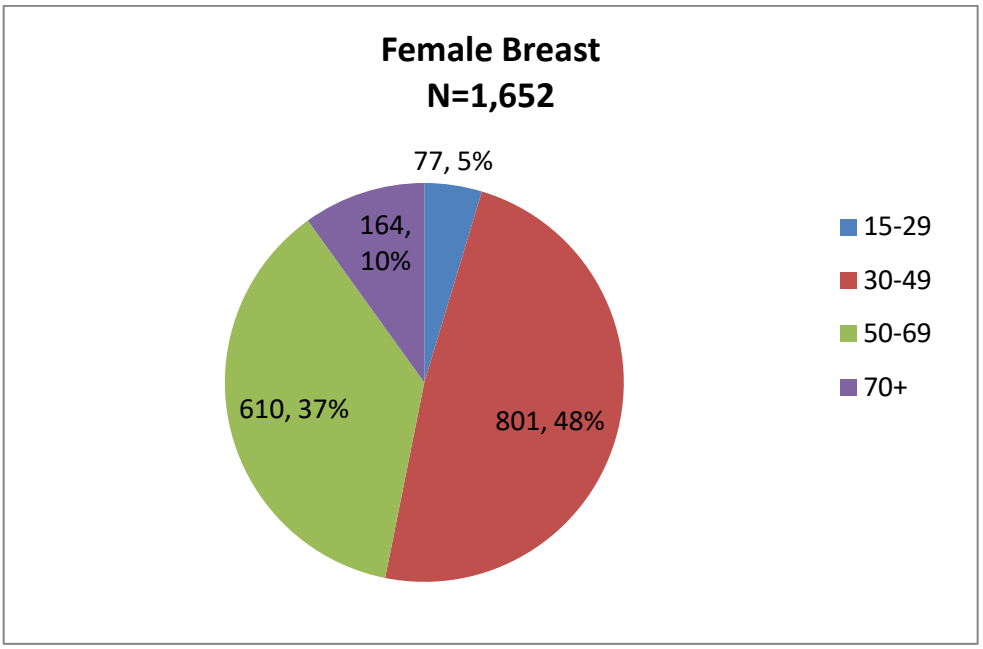



Appendix fig 19. Lymphoma: Age-specific incidence rate per 100,000

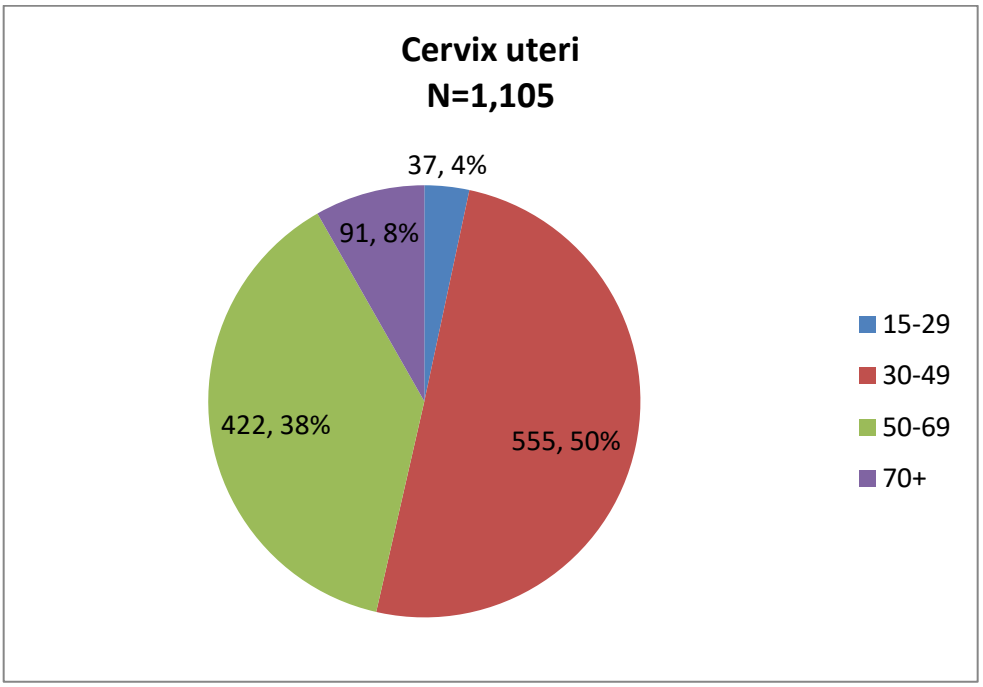



Appendix fig 20. Leukaemia: Age-specific incidence rate per 100,000

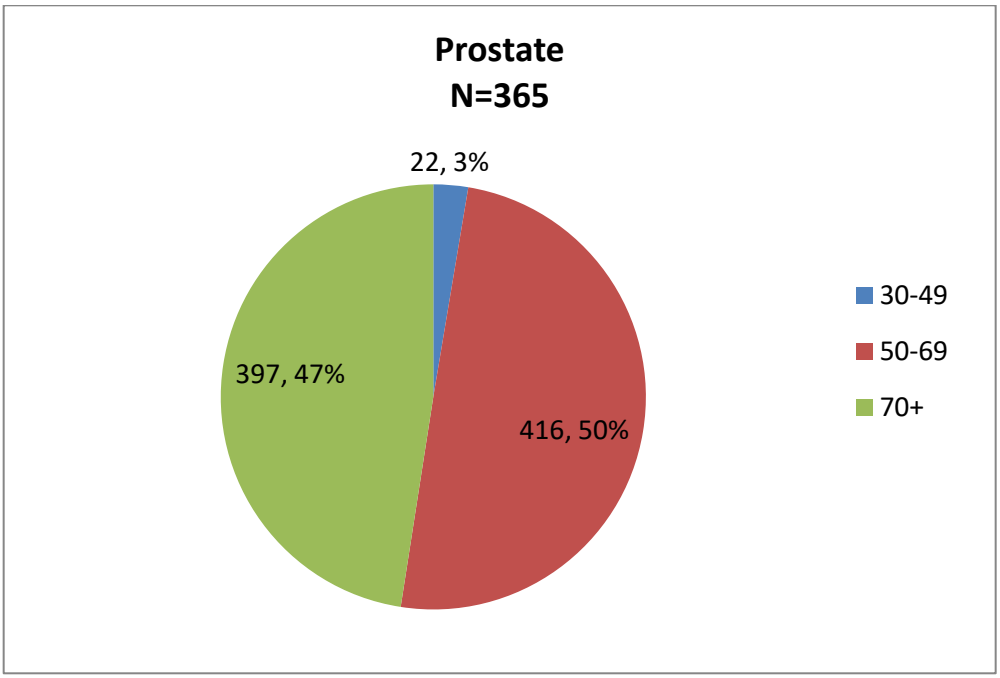
### 4.1.2 Number of cases by age group



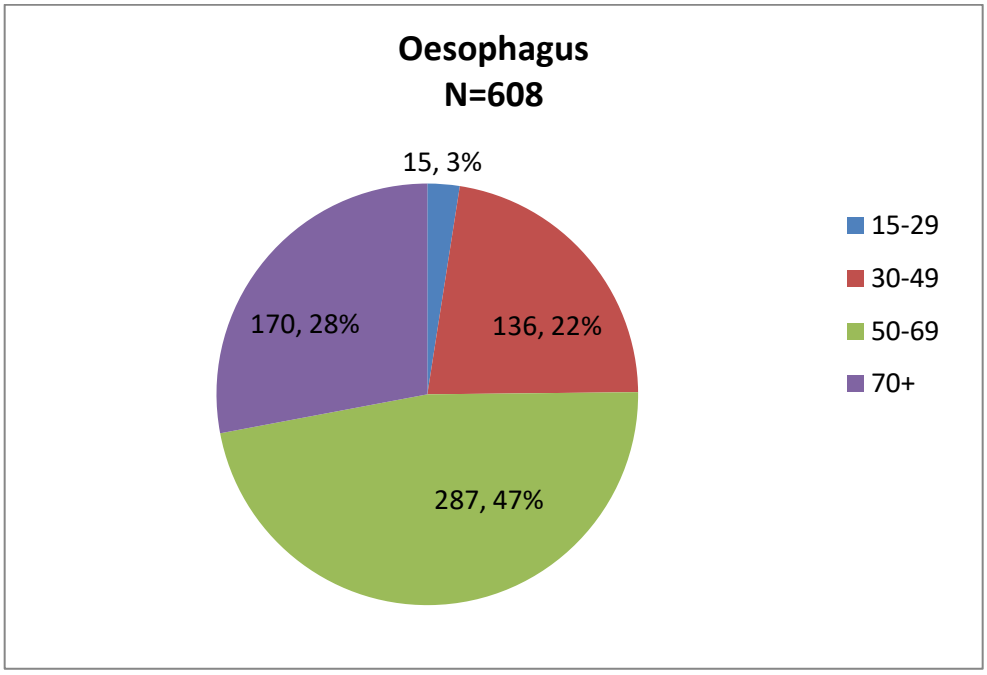

Appendix fig 21. Breast cancer by age (female)



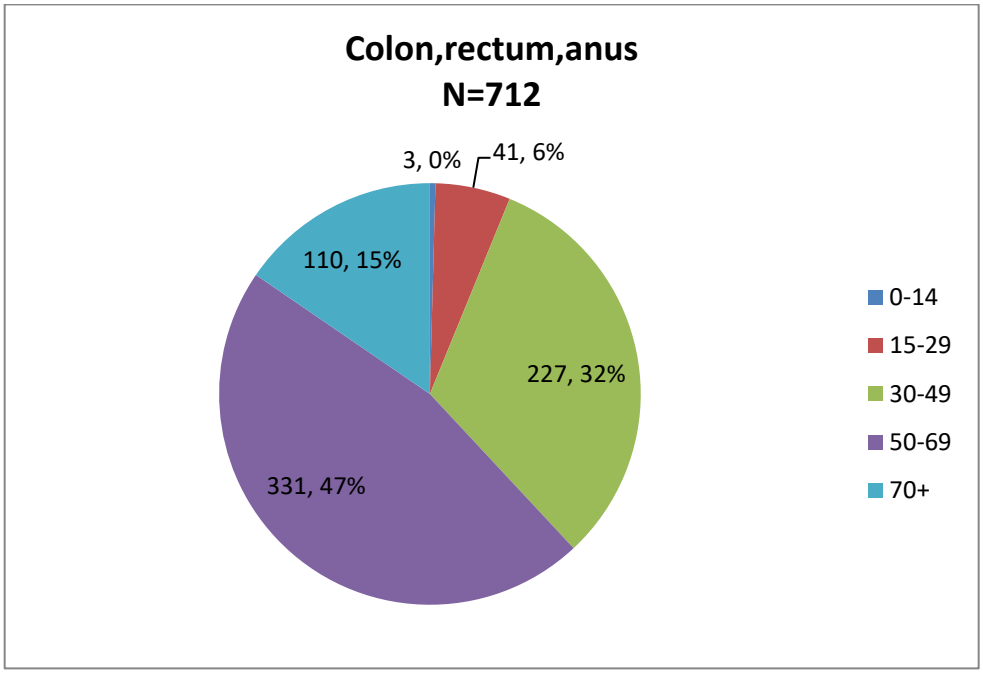

Appendix fig 22. Cervix cancer by age



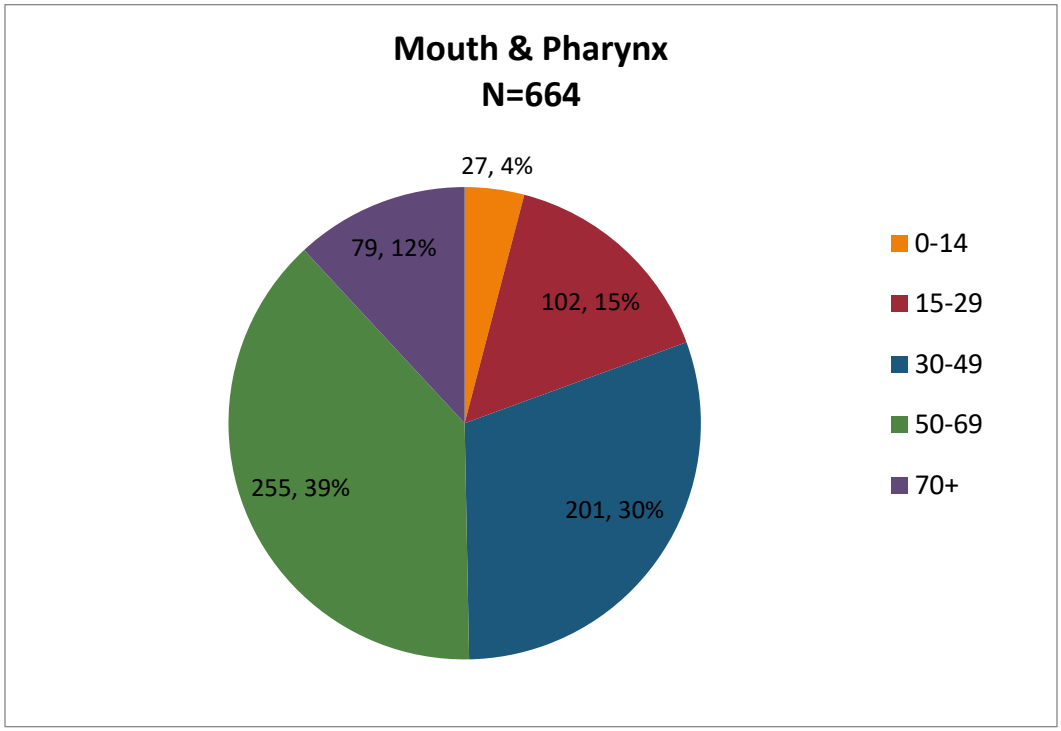

Appendix fig 23. Prostate cancer by age



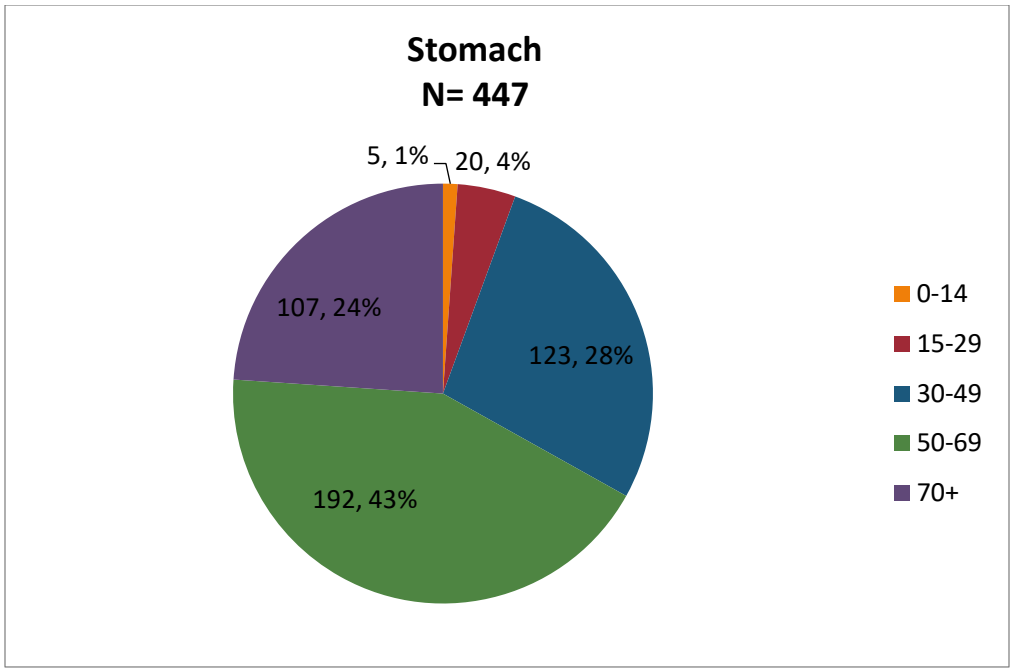
Appendix fig 24. Oesophageal cancer by age



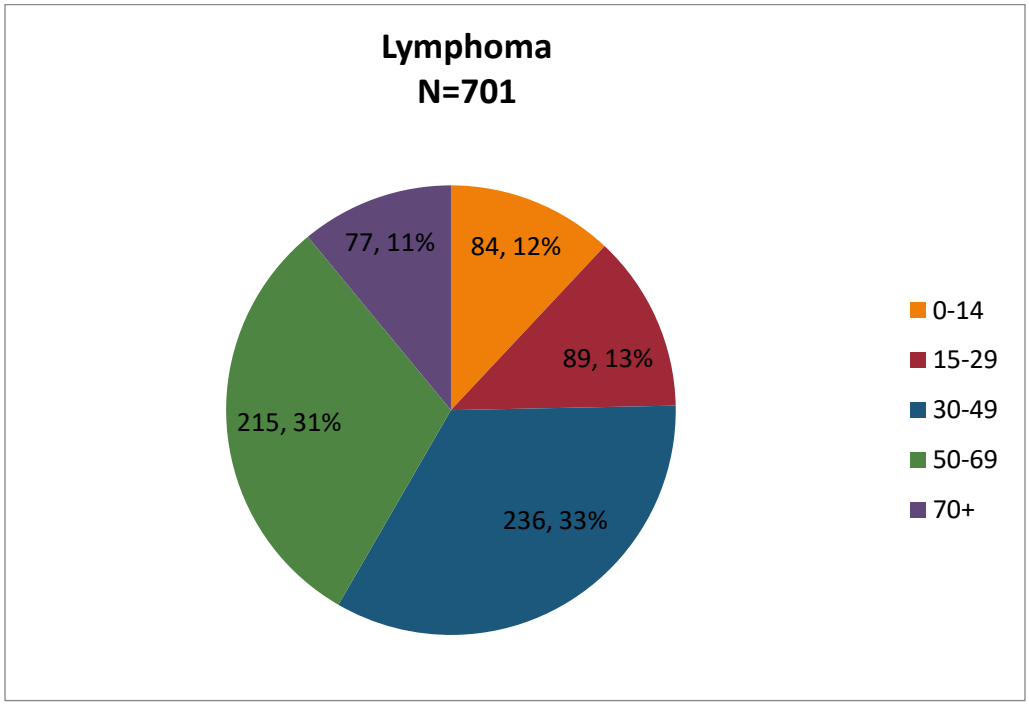

Appendix fig 25. Colorectal cancer by age



Appendix fig 24. Mouth and pharynx cancer by age




Appendix fig 25. Stomach cancer by age




Appendix fig 26. Lymphoma by age

## Cancer Incidence in Five Continents (CI5) Volume XI

Data from Nairobi Cancer Registry was included for the first time in the publication"*Cancer Incidence in Five Continents (CI5) Volume XI".* CI5 is published every five years by the International Agency for Research on Cancer (IARC)and the International Association of Cancer Registries (IACR). It provides comparable high quality statistics on the incidence of cancer from cancer registries around the world.Volume XI contains information from 343 cancer registries in 65 countries for cancers diagnosed from 2008 to 2012. These data can be accessed in the website (http://publications.iarc.fr/). To reference the data use:

Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017) Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: http://ci5.iarc.fr, accessed March 2018.

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Nancy Karanja: Secretary
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Agnes Temba
Alfred Koech
Brenda Ogeto
Janet Chelimo
Edwin Kipchirchir
Lukas Isihao

**Technical and Advisory Team for the KEMRI cancer registry**

The team supports the registry from time to time. They participate in sourcing for grants and collaborations that strengthen the cancer registry.

Dr. Veronicah Manduku
Dr. RobaiGakunga
Dr. Samuel Gathere
Dr. Lydia Kaduka
Dr. Alfred Karagu
Dr Shahin Sayed
Prof. Chite Asirwa

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Africa Cancer Registry Network (AFCRN)
Union for International Cancer Control (UICC)
International Association of Cancer Registries (IACR)
RTI International

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Data Collection is carried out from several institutions. We acknowledge their great contribution towards cancer control in Kenya. We also thank individual clinicians, oncologists and entire staff of these facilities for their support.

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2. Cancer Care Kenya (CCK)
3. Aga Khan University Hospital
4. Nairobi Hospital Cancer Centre
5. Texas Cancer Centre
6. St. Mary's Hospital
7. Nairobi Hospice
8. Nairobi Women's Hospital
9. The Mater Hospital
10. Armed Forces Memorial Hospital
11. Nairobi West Hospital
12. Metropolitan Hospital
13. Hurlingham Oncology
14. Gertrude's Garden hospital
15. PCEA Kikuyu Hospital
16. Karen Hospital
17. MP Shah Hospital
18. UoN Dental School
19. Jamaa Hospital
20. Gurunanak Hospital
21. Zambezi Hospital
22. KEMRI Histopathology lab
23. Nazareth Hospital
24. Civil Registration of Deaths office
25. Mariakani Cottage Hospital
26. Lion's Eye Unit
27. Mbagathi District Hospital
28. Coptic hospital

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Dr. GladwelKiarie, Medical Oncologist, Cancer Care International doctor's plaza
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Dr. Jesse Opakas, Clinical Oncologist, Nairobi Hospital Cancer Centre
Dr. Rohit Radia, Medical Oncologist, Nairobi Hospital Lab Building
Dr. S. MainaKanyi, Urologist and General surgeon, Nairobi hospital Doctor's plaza
Prof. Mungai Ngugi, Urologist, Nairobi Radiotherapy Centre
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# NOTES

# NOTES