

A registry-based analysis of incidence, stage at presentation and treatment of cancers in Accra, Ghana

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Abstract

Background

Cancer incidence is increasing more rapidly in low- and middle-income countries including Ghana. Country estimates of incidence is based on extrapolation of data from limited number of sites with population-based registries. We established a population-based cancer registry to determine the incidence of various cancers in a Ghanaian subsite to facilitate inclusion of such data in the country profile for cancer. Treatment received and stage of cancer at presentation were determined.

Methods

The jurisdiction to capture data from and its population pyramid were defined using existing boundaries according to districts in the Greater Accra Region of Ghana. New cases of cancer presenting between September 2016 and August 2017 were manually derived from all hospitals that managed cancer, death registry, pathology laboratories, and postmortem records with related epidemiological data. Patients must have lived in the Region for at least six months. The information was captured on an abstraction form which included stage and treatment received and was analyzed using Canreg5 software. Known risk factor profile of the common cancers identified were examined. Comparison was made with available cancer statistics in the country.

Results

One thousand and thirty-nine cases were analyzed. The Age Standardized Rates per 100,000 were determined to be 28.4, 24.6, 7.0, 6.9, 6.0, 3.8, 3.2, 3.2, 2.5 and 2.5 for breast, prostate, colorectal, cervical, uterine, stomach, lymphomas, liver, and mouth and pharynx cancers respectively. Forty percent of all cancers presented with stage three disease. Among breast cancer patients only 5% presented with stage I disease, whilst 8% presented with metastatic disease. Twenty-one patients received at least two treatment modalities of Surgery, Radiotherapy and Systemic treatment in different combinations.

Conclusions

Age Standardized Rates vary across the country. A high proportion of patients present with advanced disease. Almost all breast cancer patients present with symptomatic disease. Mutidisciplinary oncological care requires intensification in the Region.

BACKGROUND

Cancer incidence is rising across the world by virtue of population increase, and the rate of increase is more pronounced in countries with low and medium human developing index¹. There is a changing pattern of disease in these countries with an increase in the burden of non-communicable disease like cancer in addition to already existing infectious disease. These countries are experiencing a rapid improvement in life expectancy but are also increasingly acquiring lifestyle-dependent diseases.

For a particular jurisdiction, the greater the number of sites used in determining incidence and mortality, the more representative the estimates would be. This would enable evidence-based decision making on the burden of the disease and by extension, its relationship with modifiable risk factors to guide public health interventions.

Ghana like most developing countries, largely depends on figures produced by the World Health Organization (WHO) through its International Agency for Research (IARC) on Cancer for the burden of its cancers. IARC in turn uses statistical estimation and inference from data collected from Registries for specific countries. The level of accuracy of the incidence figures reported depends on the authenticity of the primary data. In the last series on Ghana, the IARC relied mainly on data produced by the Registry in Kumasi in the Ashanti Region. Whilst this enabled reporting for Ghana, the accuracy of reporting can be further improved with the inclusion of data from a wider geographical distribution, and multiple sources, considering that there may be variation in risk factors and hence the incidence of cancers across the country.

We previously reported on cancer incidence and prevalence in Korle Bu Teaching Hospital², the largest hospital in Ghana, but the data was hospital based, the data required for country estimation ought to be population-based. As a prelude to this paper, we undertook to establish a Population Based Cancer Registry and published the basis for such classification³. We now present the outcome of the paper in which our intentions and methodology regarding establishment of a population-based cancer registry in a low resource setting was discussed.

METHODS

The purpose of this article is to publish the results of the Population Based Cancer Registry with respect to the types and incidence of cancers seen, stage at presentation and treatment received. In addition, we make comparisons between our previously published hospital-based data in 2013 and data from Komfo Anokye Teaching Hospital located in the mid- zone of the country that was collected in 2015.

This is a descriptive observational study.

The data source is well described in a previous publication, but we take the liberty to give a summary description as follows. Active manual case search was done in Records Department, Wards and Units in Korle Bu Teaching Hospital comprising Oncology, Haematology, Gynaecology, Internal Medicine, General Surgery, Ear Nose and Throat, Child Health, Orthopaedics, Maxillofacial, and Plastics. We also collected data from Pathology reporting services, death registries, postmortem records, and other Tertiary Hospitals in the jurisdiction that manage cancers. The hospital has a bed capacity of over 2000 and is located along the mid-coast.

The data was collected using an abstraction form between September 2016 and August 2017, the completed abstraction forms were then imputed into the Can Reg 5 software which uses ICD-O for

coding. We allocated unique identification numbers to the entries and removed duplicate and unrealistic entries.

The whole process ensured anonymity of patients by ensuring no linkage with patient identifiers. Locations were described in terms of Districts per local government designations. Patients who had spent less than 6 months in the jurisdiction were removed. CanReg 5 software was used to generate summary statistics.

A comprehensive description of how the data was acquired can be found in a previous publication on the subject which recorded 1039 cases³. Epidemiological variables of age, and sex, were determined in addition to the basis for diagnosis, stage of cancer and treatment received. Staging of cancers was done by clinical examination and imaging including plain X-rays, CT scans, MRI and bone scintigraphy. World Age Standardized Rates were derived for our data which is based on the population pyramid as obtained from Ghana Statistical Service for the jurisdiction of coverage of the Registry.

RESULTS

A bar chart of the top 10 cancers with the corresponding ASR is shown in Fig. 1.

Table 1

Prevalence and incidence of most common cancers seen at KBTH in 2012 From: Profile of cancer patients' seen at Korle Bu teaching hospital in Ghana (A cancer registry review)²

Site	Total cases	*New cases	**Prevalence/100,000	**Incidence/100,000/year
Breast	333	198	80.5	47.9
Cervix	194	154	46.9	37.2
Prostate	90	54	21.8	13.1
Colorectal	57	48	13.8	11.6
Uterus	36	31	8.7	7.5
Ovary	34	29	8.2	7.0
Pharynx	33	25	8.0	6.0
Bones	32	24	7.7	5.8
Skin	26	19	6.3	4.6
Stomach	25	19	6.0	4.6

1. * New cases imply those first diagnosed between January and December 2012.

2. **The denominator for the calculation is 413,514.

DISCUSSION

Increasing life expectancy, changing lifestyle including alcohol consumption and smoking, obesity, sedentary lifestyle, low intake of fruits and vegetables, in an environment that still harbors infectious diseases linked to cancers has led to a predictable increase in the burden of non-communicable disease like cardiovascular diseases and cancers in developing countries like Ghana.

It is important to generate local data in a format similar to that produced by the World Health Organization to facilitate inclusion of such data in future publications of cancer incidence. This is more relevant, recognizing that for Ghana IARC categorizes the quality of our data as coming from local data on relative frequency of different cancer types, scoring it 8 out of 10 with zero representing best and 10, worst, and makes use of only one site in the country. There could be wide variation within any country dependent on risk factor exposure, socioeconomic status variation and less so, constitutional variation. Such knowledge proves useful in the design and implementation of preventive strategies.

Our data emanates from Accra the capital of Ghana, which is in the southern zone of the country, more cosmopolitan and with higher literacy level, whilst the other data source, Kumasi is in the middle belt with different cultural practices and occupation compared to Accra. There are therefore bound to be differences in the burden and types of cancers seen. For instance, the number of agricultural households is 10.9% in Greater Accra Region but 47.9% in Ashanti Region⁴. This statistic alone can have a tremendous impact on sociodemographic dynamics and risk factor exposure.

Incidence and Ranking, ASR based

Ranking of the ten most common cancers from our data is shown in Fig. 1 in decreasing order of incidence: breast, prostate, colorectal, cervical, uterus, stomach, lymphoma, liver, bladder and mouth and pharynx. The order for the Kumasi Registry in decreasing order of ASR values is Breast (16.1), Cervix (13.7), Liver (10.8), Prostate (10.5), Non-Hodgkins Lymphoma (4.5), Stomach (3.6), Ovary (3.3), Colorectal (2.8), bladder (1.9), Connective tissue (1.4)⁵. There isn't much variation between the ranking of cancers in Accra compared to Kumasi. The magnitude of the ASRs, however, vary considerably: Breast is 28.4 and 16.1 respectively for, Accra in 2016–2017 and Kumasi (2015) respectively. For prostate it is, 24.6 and 10.5.

A conspicuous difference between the two data sets is the ranking and magnitude of the age standardized rate for cervical cancer, 13.7 for Kumasi and 6.9 for the Accra Registry. Given the historical absence of immunization and screening for cervical cancer countrywide until recently, the only plausible explanation to the wide difference between the two populations would be certain cultural practices, considering risk factor exposure specific to cervical cancer that these practices bring. The relationship between vaginal douching and HPV infection is well documented⁶. A study in Kumasi revealed that close to 70% of women engaged in douching which has been linked to several conditions including cervical cancer. There is also variation in the substances used for douching including herbs and water with

varying effect⁷. This is believed to be attributable to alteration in vaginal pH and vaginal flora thus setting the stage for inflammation and sexually transmitted disease including colonization by HPV⁷. The other difference between the two sites is socioeconomic development which is related to cervical cancer. We have mentioned the differences in subsistence agricultural households between the two sites, in addition, literacy level is 87.9% in Greater Accra Region and 78.0% in Ashanti Region⁸.

The other glaring difference between the Accra and Kumasi data sets is the proportion and ranking of liver cancer, they are in 8th and 3rd position respectively. Whilst appearance in the list of top ten cancers in Ghana underscores its importance, the figures from the Accra Cancer Registry are comparatively low. Liver cancer comprises hepatocellular cancer and intrahepatic cholangiocarcinoma with attribution of cause in Africa stated as Hepatitis B infections in 60% (40–90), Hepatitis C infections in 20% (9–56), alcohol 11–41%, with aflatoxin exposure stated as “important”⁹. There seems to be a global decline (including Ghana) in the age adjusted incidence of liver cancer even though absolute figures continue to rise due to population increase, furthermore, the proportion attributed to infection is declining probably due to immunization but with metabolic causes increasingly assuming more importance and alcohol related liver cancer remaining stable¹⁰.

About 15% of maize and 9% of nuts in Ghana are contaminated with aflatoxin, this could represent an important association with liver cancer causation even though hepatitis B represents the major cause of the disease¹¹. It also appears there is geographical variation in aflatoxin infestation related to climate, post-harvest processing and storage with the coastal regions where Accra resides having less infestation relative to Kumasi¹². The prevalence of HBV as determined by HBsAg seropositivity declined from 17.3% to 10.2% between 1995 and 2015 countrywide, with Accra and Kumasi recording 10.6 and 13.1% respectively¹³. The national prevalence of HBsAg seropositivity has been updated to 9.1%¹⁴ and continues to decline albeit still high.

Lung cancer fails to make the top ten cancer list in the Accra Registry. A recent STEPS survey, which is cross-sectional, put the proportion of Ghanaians aged between 18 and 69 years who smoke at 4.8% in females and 9.3% in males¹⁵. This figure is very low compared to rates in countries with high human development index. However, an alarming observation is the increasing smoking trend for countries with a low human developing index when the same statistic is dwindling in countries with high HDI albeit with very high estimates^{16,17}. This is represented graphically in Fig. 6, demonstrating increasing peaks for developing countries and declining peaks for high income countries¹⁸. Another difference in the epidemiology of lung cancer in the Accra registry is the relatively high proportion of females compared to other jurisdictions (Institutional data). This picture is seen in areas with low smoking history such as ours.

In comparison to our earlier publication details of which are shown in Table 1, the difference is that because it was wholly hospital based, the denominator for calculation of rates is the number of patients who attended our out-patients department rather than population of the jurisdiction covered². We also

applied strictly the definition of a case as an individual who must have lived in the jurisdiction for at least 6 months. This definition excludes all those who came to the region only to seek treatment. Additionally, because we used population figures this time, we were able to calculate the age-standardized rates to allow for comparison between different populations. There is variation in the ranking of cancers seen in the purely hospital-based data and the population-based data.

Stage distribution

Out of the patients who had data on stage, the majority are seen to present with stage 3 disease. Almost a quarter of cancer patients (23%) from the Registry data had denovo metastases. Specific to breast cancer, 55.5% had information on stage, the proportion presenting with distant metastases was 8%, this falls within the range (5.6–30.6%) reported for sub-Saharan Africa, the same statistic is 0–6% for the United States of America. The difference between the figures from the two regions is explained based on effective policy intervention¹⁹. There is population-based screening in high income countries which leads to diagnosis of asymptomatic cases with a higher chance of cure relative to unscreened populations. Mammography reduces chances of death by 15% in females aged 39–69 years of age. In our data close to 90% (38% for stage II and 49% for stage III) presented with palpable disease thus reducing the survival advantage conferred by screening²⁰. Larger tumours at the time of diagnosis were found among women with limited education, divorced, separated or widowed, and use of herbal and alternative medicine²¹.

Treatment

That high proportion of patients submitted to Chemotherapy (58%) and Radiotherapy (40%) represents the stage of the disease at diagnosis and the type of cancers seen. Twenty-seven percent of patients were managed with Surgical intervention. In addition, emerging paradigms emphasize organ preservation with preservation of function in several disease sites including breast, prostate, head and neck, cervical and other cancers. These factors conspire to reduce the number of cases that had surgical intervention outside of biopsy to make a diagnosis.

In a study conducted under the auspices of the International Atomic Energy Agency in Vienna in non-African developing countries, 55.2% received combined modality treatment whilst 44.8% had monotreatment²². In our study, only 4% of patients received all three treatment modalities, 21% submitted to at least two treatments. It is important to note that best outcomes in terms of survival, organ preservation, completeness of resection are obtained with combined modality treatment due to synergistic effect in the mechanism of action. A review in the UK reported use of multimodality treatment in patients who had survived 5 years and over after cancer treatment. The study found that 45% of patients received at least two modalities, underscoring the need for multimodality treatment²³.

This study albeit conducted in all patients registered, irrespective of survival status, portrays a certain pattern of care in which multimodality treatment is practiced. It is however evident that use of

multimodality treatment could be better when our figures are compared to the sites quoted. This is particularly true for jurisdictions where patients present with advanced disease such as ours. Multidisciplinary Tumour Board meetings are therefore encouraged to streamline treatment decision making.

We recognize the one-year difference in the data collection periods between our site and Kumasi but reckon they are close enough not to impact on comparison between the two sites. The study is also limited by the high proportion of missing data on staging and treatment information which reduces its representativeness. In the analysis of staging and treatment received, patients with missing data were excluded. We also believe that this represents an improvement in data collection methods from the southernmost area in the country and could represent an additional source for inclusion in future attempts to determine cancer burden in Ghana. The hospital has since moved to electronic medical record keeping, furthermore, we have laid the background for trend analysis in stage distribution and treatments in addition to incidence that is registry based.

CONCLUSIONS

In conclusion we have determined the incidence and ranking of cancers in Greater Accra region of Ghana, we also aver that there may be in-country variation in the incidence of cancer. Use of multiple sites in estimation of incidence of cancer in Ghana is therefore recommended. We have also demonstrated a high proportion of metastatic disease at presentation: 23% for all cancers. Locally advanced breast cancer constitute majority (87%) of breast cancers (stages 2 and 3). Furthermore, we have identified that the number of patients receiving multimodality treatment is low.

Declarations

Ethical Approval and Consent to Participate

The authors hereby confirm that the study was done according to the principles of Declaration of Helsinki regarding research on human subjects. It is an observational study using routinely collected data with no experimental arm. All data were deanonymized with no linkage to patient identifiers. Ethical approval of the research protocol including informed consent related issues was obtained from Noguchi Memorial Institute for Medical Research IRB with number 010/15-16, FWA 00001824.

Competing Interest

The authors declare no competing interest.

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Consent to Publish

Not applicable: No identifying images or personal or clinical details are published in the manuscript.

Availability of Data and Material

The data that was analysed and presented in this paper is not publicly available but would be made available by the authors on reasonable request. This is because it contains all the epidemiological data on the registry in the interval considered but is yet to be submitted to the African Cancer Registry Network.

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Figures

Top 10 cancers, both sexes

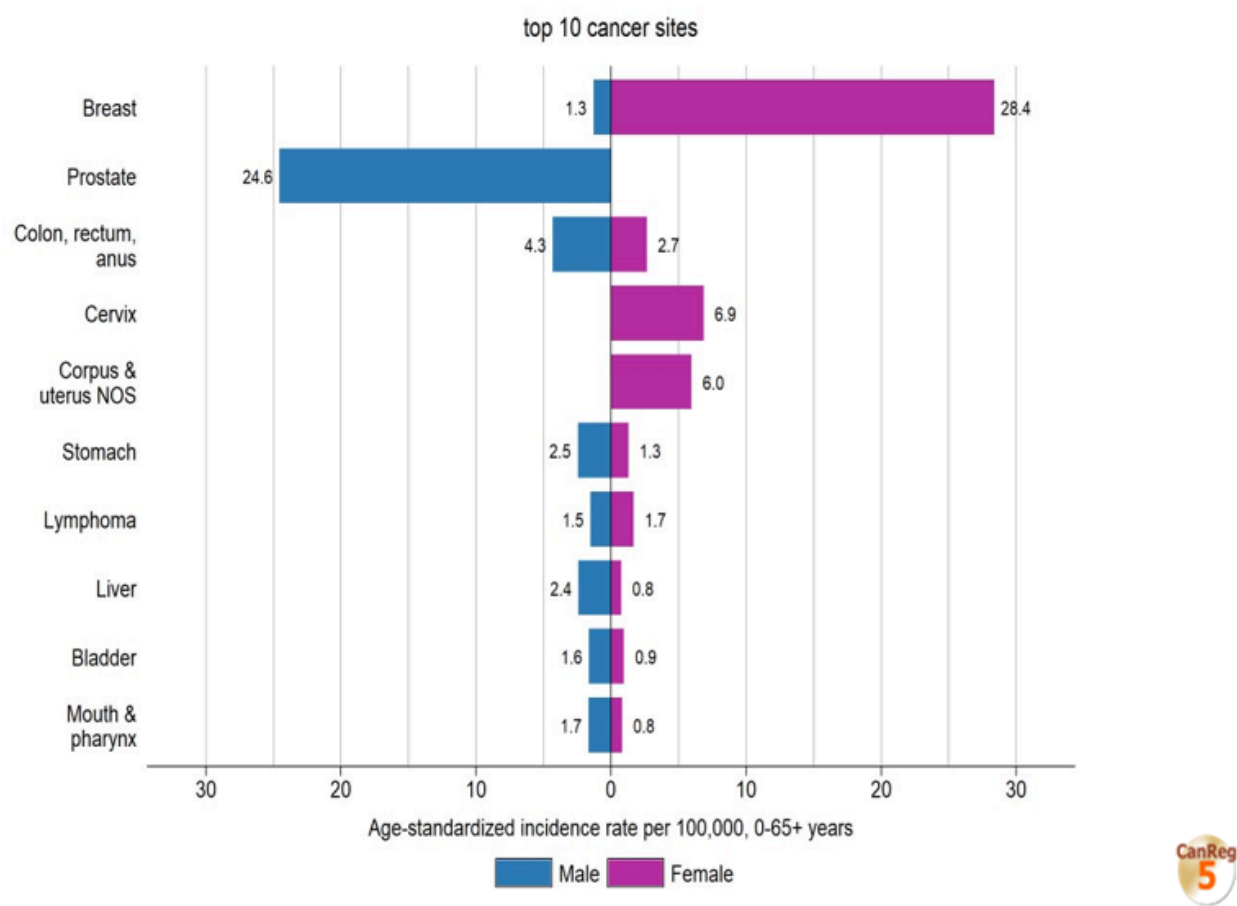


Figure 1

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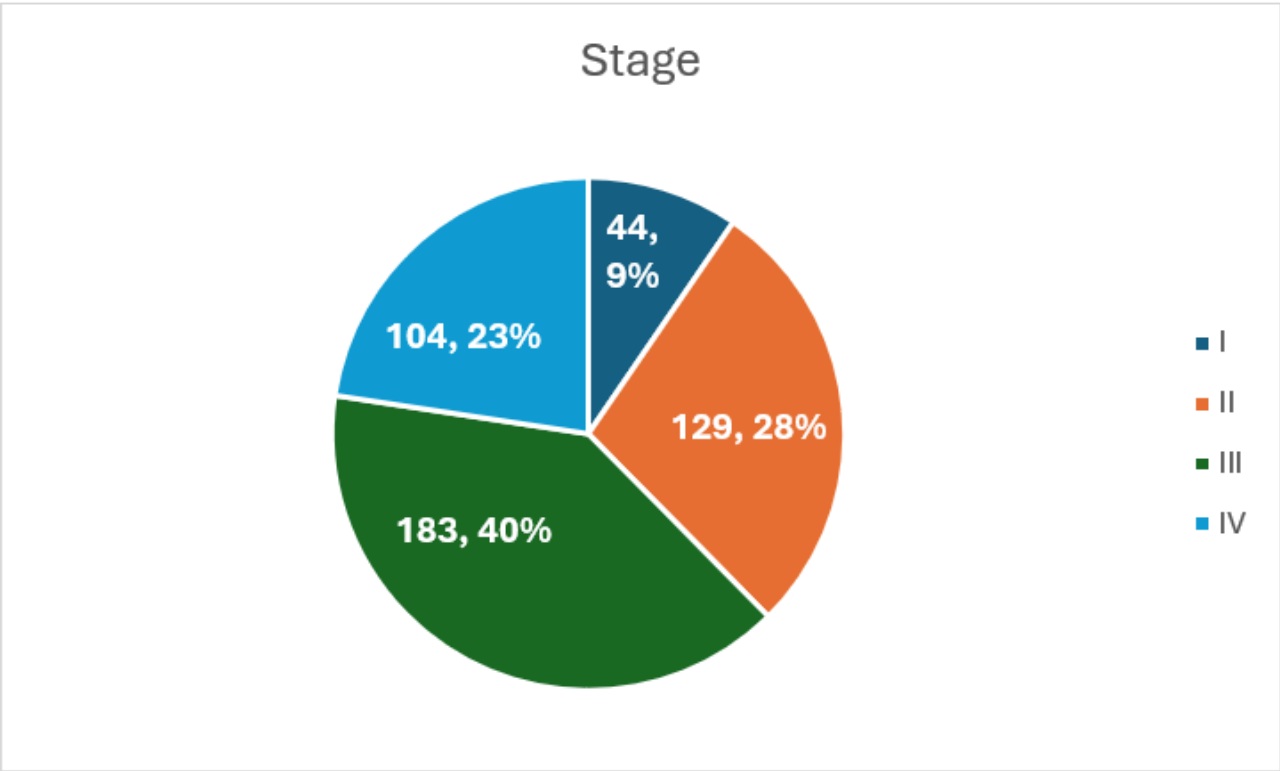


Figure 2
showing Clinical Stage distribution of all eligible cases.

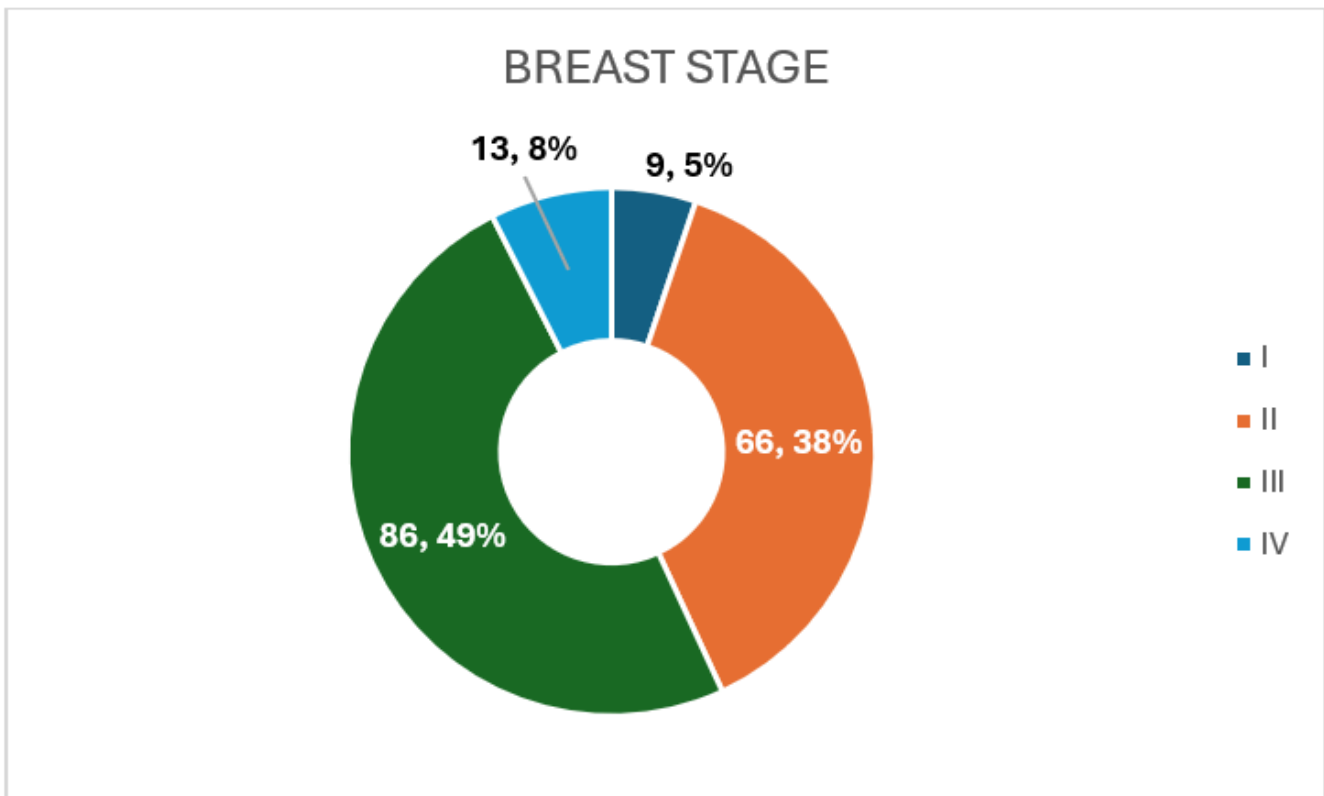


Figure 3
displays the stage distribution of breast cancer at presentation.

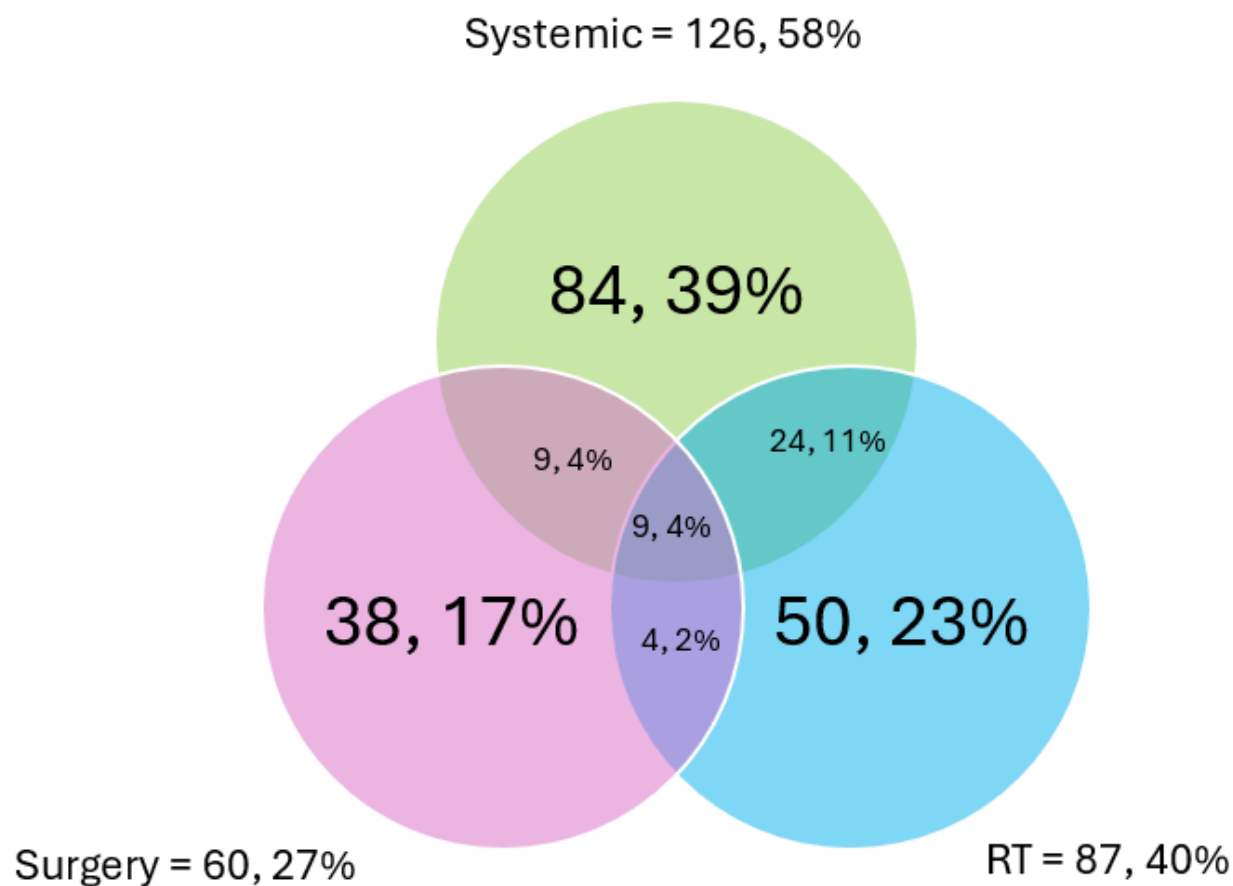


Figure 4

Venn diagram of treatments received.

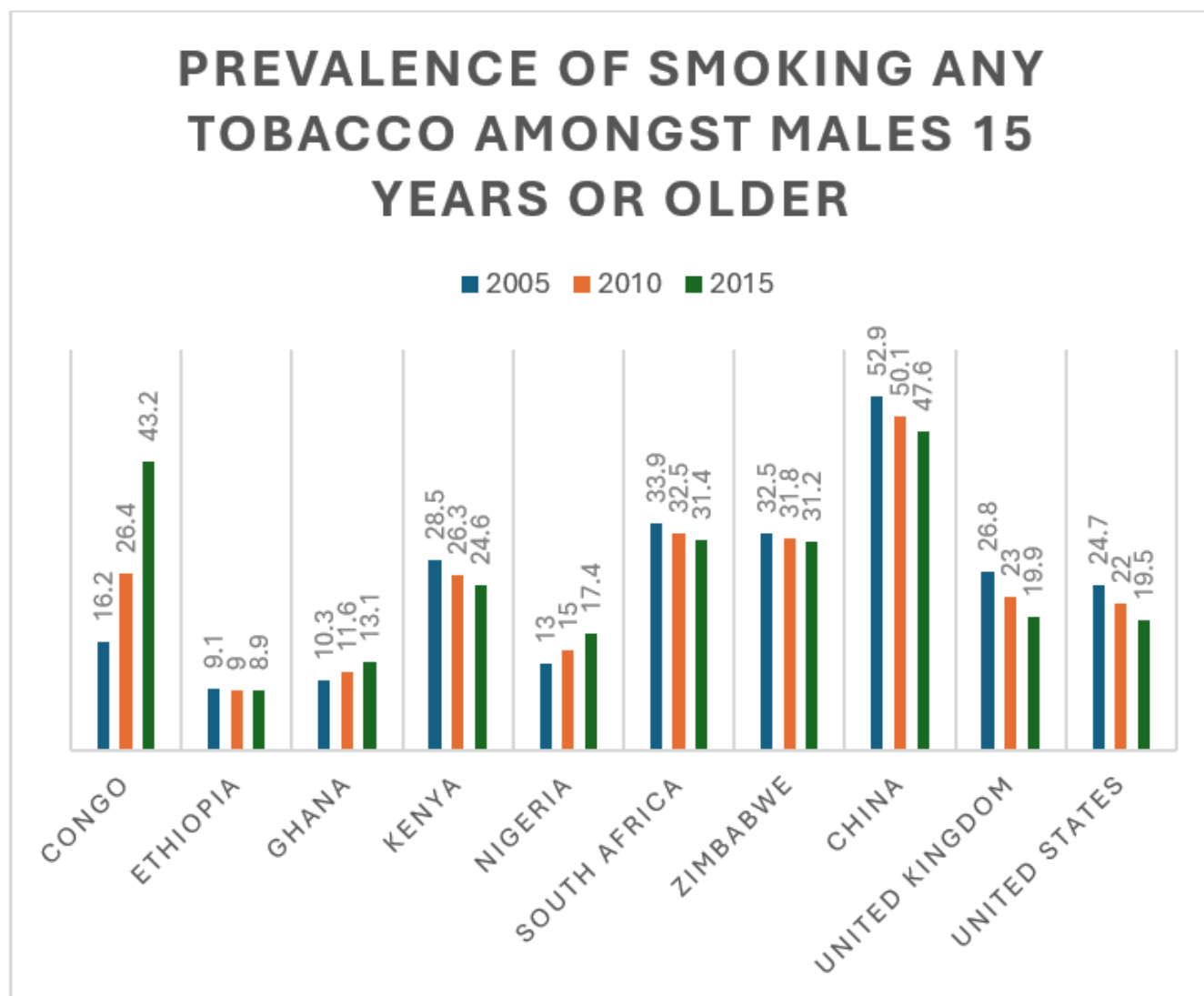


Figure 6¹⁸

Figure 5

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