



## Trend in Cancer Cases Diagnosed at Kiambu and Gatundu Level 5 Hospitals, Kiambu County Kenya between 2013 and 2017

Linet W. Warui<sup>1\*</sup>, Mbaruk A. Suleman<sup>2</sup>, Francis W. Makokha<sup>3</sup>  
and Moses Kamita<sup>3</sup>

<sup>1</sup>Department of Epidemiology and Biostatistics, Mount Kenya University, Thika, Kenya.

<sup>2</sup>Department of Research and Development, Mount Kenya University, Thika, Kenya.

<sup>3</sup>Department of Medical Laboratory Science, Mount Kenya University, Thika, Kenya.

### Authors' contributions

This work was carried out in collaboration among all authors. Author LWW designed the study performed statistical analysis, wrote the first draft of the manuscript. Author MAS edited the first manuscript. Author FWM wrote the protocol. All authors read and author MMK approved the final manuscript.

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### ABSTRACT

**Aims:** This study sought to estimate the Trend in Cancer cases diagnosed at Kiambu and Gatundu Level 5 Hospitals, Kiambu County Kenya between 2013 and 2017.

**Study Design:** Descriptive cross-sectional design.

**Place and Duration of Study:** Kiambu and Gatundu level 5 health facilities between 2013 and 2017 (Kenya).

**Methodology:** The study utilized standardized abstract forms were used to collect data. Data from abstract forms was filled with information from Kiambu Level Five Hospital and Gatundu Level Five Hospital record department in the five-year period 2013-2017. The records guided in retrieving of patient's files in order to collect personal data of each patient as well as the status of cancer during the first contact with the health providers in selected health facilities.

**Results:** From the two hospitals, Gatundu level 5 and Kiambu level 5, 180 cancer patients

\*Corresponding author: E-mail: [linetwambui@gmail.com](mailto:linetwambui@gmail.com);

registered as 66.7% (120) and 33.3% (60). In terms of distribution of cancer cases by sex 123 were females while 57 were males. Cervical cancer and breast cancer were the most common forms of cancers among women accounting for 33.4% and 11.7%. Esophageal and Stomach were the most common forms of cancers among males. There were more cancer cases between the age of 41-60(47 in Gatundu and 29 in Kiambu level 5 hospitals).

**Conclusion:** In terms of gender female's cervical cancer was the leading cancer while stomach cancer was more common among males.

**Recommendations:** More cancer awareness programs should be adopted to the public in order to reduce preventable cancer cases and eventually eradicated cancer.

*Keywords: Cancer cases; trends, descriptive cross-sectional; Kiambu county.*

## 1. INTRODUCTION

Global cancer mortality and morbidity rates estimated at 18 million new cases in 2018 (GOK, 2019). This reflects the true picture of the increasing mortality and morbidity caused by cancer over the years if the trend continues. 13% of the 14 million that is 7.6 million of these deaths occurred in the year 2008 [1,2]. Globally cancer is the second most common disease-causing mortality with 8.8 million accounted for in 2015,70% of this mortality occurs mostly in the low and the middle-income countries like our country Kenya [3]. About all Cancer deaths as a resulting from Lung cancer is leading mutually in sexes (18.4% of all cancer deaths) as well as the leading incidence accounting for (11.6% of all cancer cases), breast cancer is the second most occurring cancer (11.6%), colorectal is third with (10.2%), and prostate is fourth (7.1%). The second cause of cancer mortality is Colorectal cancer with a percentage of 9.2, stomach cancer is third with (8.2%) and liver cancer fourth with (8.2%) [1].

In the U.S.A 14.9 per 100000 children under the age of 15 years have cancer and 16.4 per 100000 children below 20 years have cancer. In industrialized countries, cancer in children is listed to be the fourth leading mortality in children less than 15 years. Leukemia is the leading cancer among children [4].

In Asia, breast cancer incidence is lower than in western countries; however, the incidence is rising at a more rapid rate than in western countries. Breast cancer is the leading cancer among Asian women at 31.3% and its diagnosis is generally at late stages compared to western countries [5].

In Africa, the cancer burden estimates in 2008 were 618,000 new cases with 512,000 resulting in death. If this trend continues the estimates by

the year 2030 will be at 1.27 million of new cancer cases in the continent of Africa with 970,000 resulting in death (Maina, 2014). Yearly there are about 600,000 cancer mortality cases in Africa [6]. An estimated 752,000 new cancer cases (4% of the global total) and 506,000 cancer deaths occurred in sub-Saharan Africa in 2018. Although the overall cancer burden in the region is dominated by breast, cervical, and prostate cancers, the cancer profile in sub-Saharan Africa is quite diverse [7]. Incidence rates have been increasing for several major cancer sites. For example, cervical cancer rates increased by 80% in Zimbabwe in 2018 and 36% in South Africa [7].

In Kenya third principal cause of mortality is cancer with infectious diseases and related cardiovascular conditions being first and second respectively [3]. There are almost 47,000 new number of cases due to cancer every year in our country Kenya with an estimation of 32,000 and more of these cases dying every year [8]. There were 41,000 cancer cases in 2012 with 28,453 resulting in death [9]. The incidence rate of cancer for men was 167.2 for every 100,000 men and 196.6 for every 100,000 women [10].

Among men, the leading diagnosed cause of cancer is prostate cancer with 606 cancer cases reported in 2004-2008 followed by oesophageal cancer with 333 cases. In women, the most common diagnosed cancer was breast cancer with 1154 cases reported in 2004 -2008 followed by cervical cancer with 1053 cases. Both breast and cervical cancer represented 44% of all female cancers [10].

This study is necessitated by the increased cancer cases globally and in Kenya which have narrowed down to Kiambu county. This is according to the data collected from the GLOBOCAN organization hence the need to establish the trend of cancer cases in Kiambu

County, which will help in establishing the global trend.

## 2. METHODS

The study employed a descriptive cross-sectional study. The study adopted the WHO Abstract forms which were modified and structured to abstract the data from each of the patient's records from Kiambu Level Five Hospital and Gatundu Level Five Hospital record department in the five-year period 2013-2017. This was to determine if the primary diagnosis of whatever cancer was made at these health facilities or it was a referral or provision of palliative services with the diagnosis already made elsewhere. The number of cancer cases abstracted from hospital files was used to calculate incidence within the five years. Cancer patient ages recorded from the patient's data was analyzed to determine age distribution per cancer type. Recorded lifestyle factors were used to calculate the relative risk/odds of getting a specific cancer. All the collected data was thereafter checked if complete, it was coded and then entered into the "Statistical Package for Social Sciences (SPSS)

software version 23" for complete data analysis. All descriptive statistics was analyzed and presented in tables, graphs and charts.

## 3. RESULTS

### 3.1 Social Demographic Characteristics

The study population comprised of all patients who sought cancer treatment in Kiambu and Gatundu level five hospital from the year 2013-2017. A total of 180 data abstract forms were used for the study. Data analysis was done on all the 180 patients. From the sample size 123 were males while 57 were females. There were relatively more patients in the age group 41-60 years (76), followed by 61-80 (40) years. The age group with the least number of patients was between 0-20 years (5), however age was missing from 25 abstract forms. Majority of the patients were married 49.4%, 20% were windowed, 3% were children. While the marital of 8% of the respondents was unknown.

**Table 1. Characteristics of study respondents**

Variable		N=180	%
Gender	Male	57	68.3%
	Female	123	31.7%
Age group	0-20	5	2.8%
	21-40	26	14.4%
	41-60	76	42.2%
	61-80	40	22.2%
	Above 81years	8	4.4%
	Unknown	25	13.9%
	Total	180	100%
Marital Status	Child	3	1.7%%
	Divorced	1	0.6%
	Married	89	49.4%
	Separated	7	3.9%
	Single	6	3.3%
	Unknown	8	4.4%
	Windowed	20	11.1%
	Total	180	100%

**Table 2. Distribution of cancer cases by facility**

Facility	Frequency	Percent
Gatundu	120	66.7
Kiambu	60	33.3
Total	180	100.0

### 3.2 Cancer Incidence

During the period of five years 2013-2017 a total of 180 cancer patients were registered in two level 5 hospitals. Gatundu level 5 had 66.7% (120) and 33.3% (60) in Kiambu level 5 hospital.

Among those were 41 females and 19 males in Kiambu level 5 Hospital while 82 females and 38 males were in Gatundu level 5 hospital.

Cumulatively a total of 37 cancer types were identified. Cervical cancer was leading among the top cancer cases in both facilities with 33.3% (60) followed by breast cancer 11.7% (21), oesophagus 10.6% (19), stomach 8.3% (15) while prostate and lung cancer accounted for 3.9% (7) each.

### 3.3 Distribution of Cancer by Sex

Cervical cancer and breast cancer were the most common forms of cancers among women accounting for 33.4% and 11.7% of total cancers between both sexes, this was closely followed by Esophageal cancer accounting for 10.6%,

stomach cancer 8.35% while lung cancer came in fifth with 3.9%.

Gatundu level 5 Hospital had more cancer cases between the two facilities. The results demonstrate that cervical cancer was leading among females accounting for 45 cases, this was closely followed by breast cancer with 10 cases. Stomach cancer was more common among Males with 10 cases, this was followed by Prostate and Oesophagus cancer which had 7 cases each.

Cancer cases by sex and health facility revealed a similar trend. In Kiambu Level 5 hospital Cervical was the leading cancer among females, breast cancer came in second. Oesophagus cancer the most common form of cancer among Males, this was followed by Cancer of the Bladder, stomach cancer and prostate cancer who had 2 cases each.

Fig. 2 illustrates the top 5 cancer cases among men and women in both Gatundu and Kiambu level 5 hospitals as documented during the 5-year period.

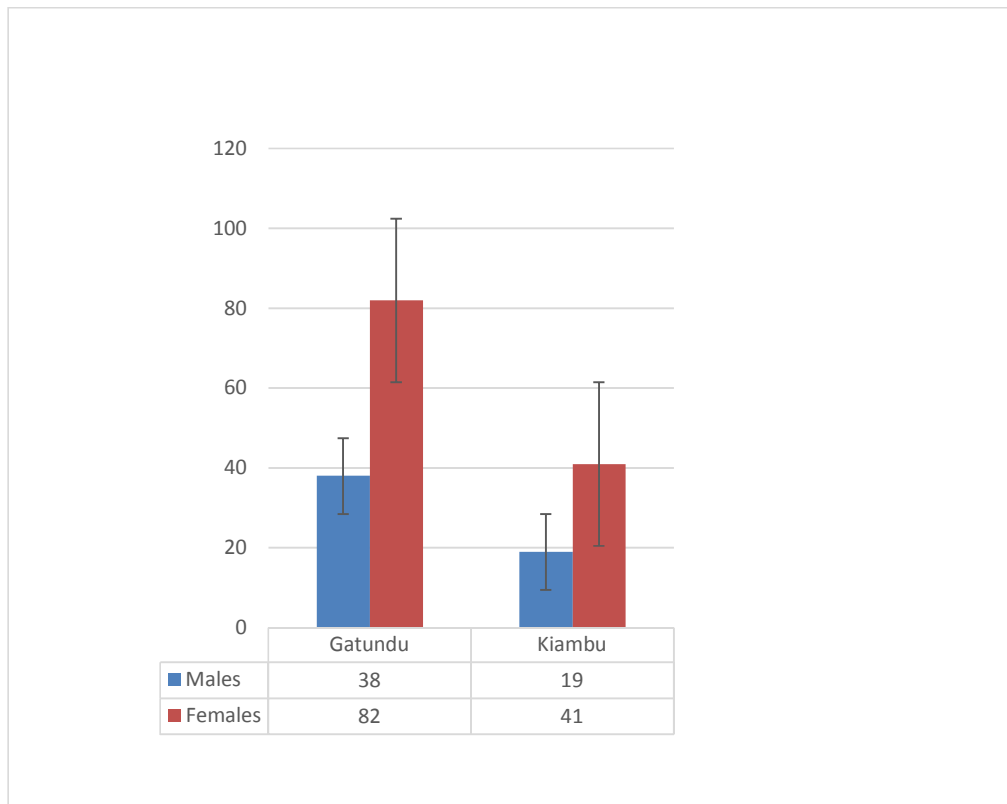


Fig. 1. Distribution of cancer cases by facility and sex

**Table 3. Cancer cases by primary site**

Primary site	Gatundu	Kiambu	Total
Cervix	45	15	60
Breast	10	11	21
Stomach	10	5	15
Esophageal	6	13	19
Prostate	6	1	7
Lung	5	2	7
Endometrium	3	0	3
Gastric	3	0	3
Ovary	3	1	4
Larynx	2	0	2
Liver	2	1	3
Pancreas	2	1	3
Rectum	2	0	2
Tongue	2	3	5
Anorectal	1	0	1
Anus	1	0	1
Blood	1	0	1
Brain	1	0	1
Breast met to brain / liver	1	0	1
Carotid	1	0	1
Cervix met uterus / colon	1	0	1
Colon	1	3	4
Colorectal	1	0	1
Cystic Teratoma	1	0	1
Duet.	1	0	1
Leg	1	0	1
Limb (Bone)	1	0	1
Liver (Gastroesophageal CA with met to liver/ thorax	1	0	1
Non- Hodgkin's lymphoma	1	0	1
Oropharyngeal	1	0	1
Renal	1	0	1
Uterus	1	0	1
Vulva	1	0	1
Bladder	0	2	2
Maxilla	0	1	1
Stomach/Esophageal	0	1	1

Fig. 3 illustrates the top 5 cancer cases among males in both Gatundu and Kiambu level 5 hospitals as documented during the 5-year period.

Fig. 4 illustrates the top 5 cancer cases among males in both Gatundu and Kiambu level 5 hospitals as documented during the 5-year period.

### 3.4 Distribution of Cancer by Age

Our results demonstrated that there were more cancer cases between the ages of 41-60 (39.2% in Gatundu and 48.3% in Kiambu). This was followed by patients aged 61-80 years (21.7% in

Gatundu and 23.3% in Kiambu), then 21-40 years (13.3% in Gatundu and 16.7% in Kiambu), those aged 81 years and above had the least number of Cancer cases (5% in Gatundu and 3.3% in Kiambu), a significant population missed information on age. This information is as demonstrated in Table 7.

A further analysis between Age and cancer cases shows that cervical was more prevalent among women aged of 41-60 years (32) followed those aged 21-40 years (11). Breast cancer was common among women aged of 41-60 years (9) followed by those aged 21-40 years (5). Esophageal cancer was common among patients aged 41-60 and 61-80 Years Old with both age groups having seven cases each. Furthermore,

Esophageal was common among males than females. Stomach cancer was common among patients aged 61-80 years old years (5) and was also common among females than males.

### 3.5 Distribution of Alcohol and Cigarette Smoking Status Among Cancer Patients

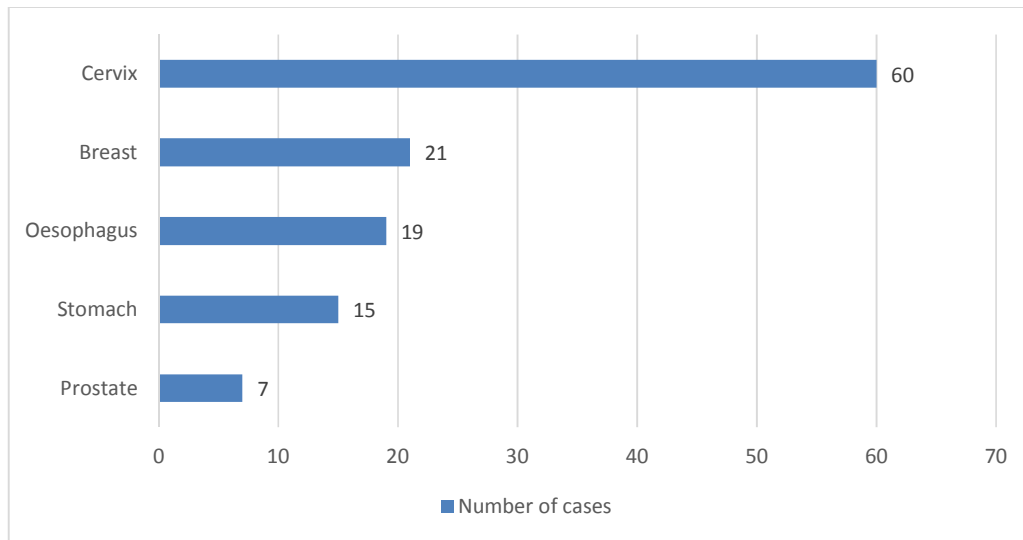
Regarding alcohol use among the cancer patients, the main limitation was the lack of

information on the alcoholism status, 52 respondents reported they have never used alcohol, 17 were ex-smokers while 10 were alcoholics. Notably the alcohol consumption of 101 respondents of the cancer patients is unknown.

The smoking status of 100 participants was unknown. 55 reported to have smoked, 15 reported to be ex-smokers while 10 were smokers.

**Table 4. Cancer cases by Sex**

Primary site	Female	Male	Total
Cervical	60	0	60
Breast	21	0	21
Esophageal	7	12	19
Stomach	6	9	15
Ovary	4	0	4
Colon	3	1	4
Endometrium	3	0	3
Anorectal	1	0	1
Anus	1	0	1
Blood	1	0	1
Breast met to brain / liver	1	0	1
Cervix met uterus / colon	1	0	1
Cystic Teratoma	1	0	1
Duet.	1	0	1
Gastric	1	2	3
Leg	1	0	1
Liver	1	2	3
Liver (Gastroesophageal CA with met to liver/ thorax	1	0	1
Lung	1	4	5
Lungs	1	1	2
Oropharyngeal	1	0	1
Pancreas	1	2	3
Rectum	1	1	2
Tongue	1	4	5
Uterus	1	0	1
Vulva	1	0	1
Bladder	0	2	2
Brain	0	1	1
Carotid	0	1	1
Colorectal	0	1	1
Larynx	0	2	2
Limb (Bone)	0	1	1
Maxilla	0	1	1
Non- Hodgkin's lymphoma	0	1	1
Prostate	0	7	7
Renal	0	1	1
Stomach/Esophageal	0	1	1



**Fig. 2. Top 5 cancer cases in Gatundu and Kiambu level 5 hospitals**

**Table 5. Gatundu level 5 distribution of cancer by sex**

Primary Site	Female	Male	Total
Cervix	45	0	45
Breast	10	0	10
Endometrium	3	0	3
Ovary	3	0	3
Stomach	3	7	10
Anorectal	1	0	1
Anus	1	0	1
Blood	1	0	1
Breast met to brain / liver	1	0	1
Cervix met uterus / colon	1	0	1
Colon	1	0	1
Cystic Teratoma	1	0	1
Duet.	1	0	1
Gastric	1	2	3
Leg	1	0	1
Liver	1	1	2
Liver (Gastroesophageal CA with met to liver/ thorax	1	0	1
Lung	1	4	5
Oropharyngeal	1	0	1
Pancreas	1	1	2
Rectum	1	1	2
Uterus	1	0	1
Vulva	1	0	1
Brain	0	1	1
Carotid	0	1	1
Colorectal	0	1	1
Larynx	0	2	2
Limb (Bone)	0	1	1
Non- Hodgkin's lymphoma	0	1	1
Esophageal	0	6	6
Prostate	0	6	6
Renal	0	1	1
Tongue	0	2	2

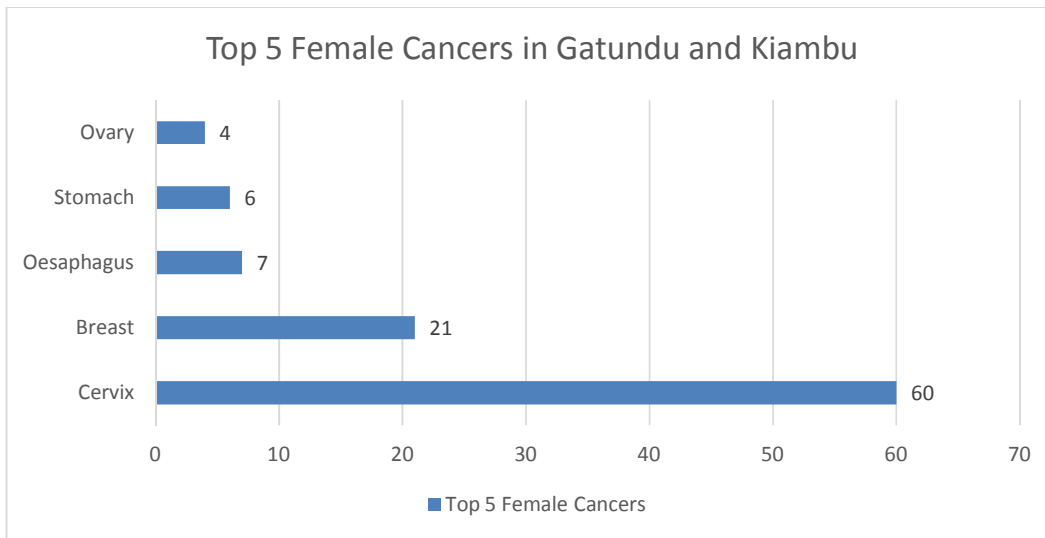


Fig. 3. Top 5 female cancers in Gatundu and Kiambu level 5 hospitals

Table 6. Kiambu level 5 distribution of cancer by sex

Primary Site	Female	Male	Total
Cervix	15	0	15
Breast	11	0	11
Esophageal	7	6	13
Stomach	3	2	5
Colon	2	1	3
Lung	1	1	2
Ovary	1	0	1
Tongue	1	2	3
Bladder	0	2	2
Liver	0	1	1
Maxilla	0	1	1
Pancreas	0	1	1
Prostate	0	1	1
Stomach/Esophageal	0	1	1

Table 7. Distribution of cancer cases by age and facility

Facility	Age	Frequency	Percent (%)
Gatundu	0-20 Years Old	5	4.2
	21-40 Years Old	16	13.3
	41-60 Years Old	47	39.2
	61-80 Years Old	26	21.7
	Above 81 Years Old	6	5.0
	Unknown	20	16.7
	<b>Total</b>	120	100
Kiambu	21-40 Years Old	10	16.7
	41-60 Years Old	29	48.3
	61-80 Years Old	14	23.3
	Above 81 Years Old	2	3.3
	Unknown	5	8.3
	<b>Total</b>	60	100
		180	100%



**Table 8. Distribution of cancer cases by age and primary site**

<b>Patients Age</b>	<b>Primary Site</b>	<b>Gatundu</b>	<b>Kiambu</b>	<b>Total</b>	
0-20 Years Old	Blood	1		1	
	Breast	2		2	
	Limb (Bone)	1		1	
	Vulva	1		1	
	Total	5		5	
21-40 Years Old	Breast	1	4	5	
	Breast met to brain / liver	1	0	1	
	Cervix	8	3	11	
	Cystic Teratoma	1	0	1	
	Endometrium	1	0	1	
	Liver	0	1	1	
	Lung	1	0	1	
	Prostate	1	0	1	
	Rectum	1	0	1	
	Stomach	0	1	1	
	Tongue	1	1	2	
	Total	16	10	26	
	41-60 Years Old	Anus	1	0	1
		Bladder	0	1	1
Brain		1	0	1	
Breast		3	6	9	
Cervix		24	8	32	
Colon		0	1	1	
Colorectal		1	0	1	
Gastric		2	0	2	
Liver		1	0	1	
Liver (Gastroesophageal CA with met to liver/ thorax)		1	0	1	
Lung		1	0	1	
Maxilla		0	1	1	
Non- Hodgkin's lymphoma		1	0	1	
Esophageal		2	5	7	
Oropharyngeal		1	0	1	
Ovary		1	1	2	
Pancreas		1	1	2	
Prostate		1	0	1	
Rectum		1	0	1	
Stomach		3	2	5	
Stomach/Esophageal		0	1	1	
Tongue		1	2	3	
Total		47	29	76	
61-80 Years Old		Anorectal	1	0	1
		Bladder	0	1	1
		Breast	3	1	4
		Carotid	1	0	1
	Cervix	4	2	6	
	Cervix met uterus / colon	1	0	1	
	Colon	0	2	2	
	Endometrium	2	0	2	

	Larynx	1	0	1
	Leg	1	0	1
	Liver	1	0	1
	Lung	0	1	1
	Esophageal	2	5	7
	Ovary	1	0	1
	Prostate	3	1	4
	Stomach	4	1	5
	Uterus	1	0	1
	Total	26	14	40
Above 81 Years Old	Breast	1	0	1
	Duet.	1	0	1
	Gastric	1	0	1
	Larynx	1	0	1
	Lung	1	0	1
	Esophageal	1	1	2
	Stomach	0	1	1
	Total	6	2	8
Unknown Age	Cervix	9	2	11
	Colon	1	0	1
	Lung	2	1	3
	Esophageal	1	2	3
	Ovary	1	0	1
	Pancreas	1	0	1
	Prostate	1	0	1
	Renal	1	0	1
	Stomach	3	0	3
	Total	20	5	25
Total		120	60	180

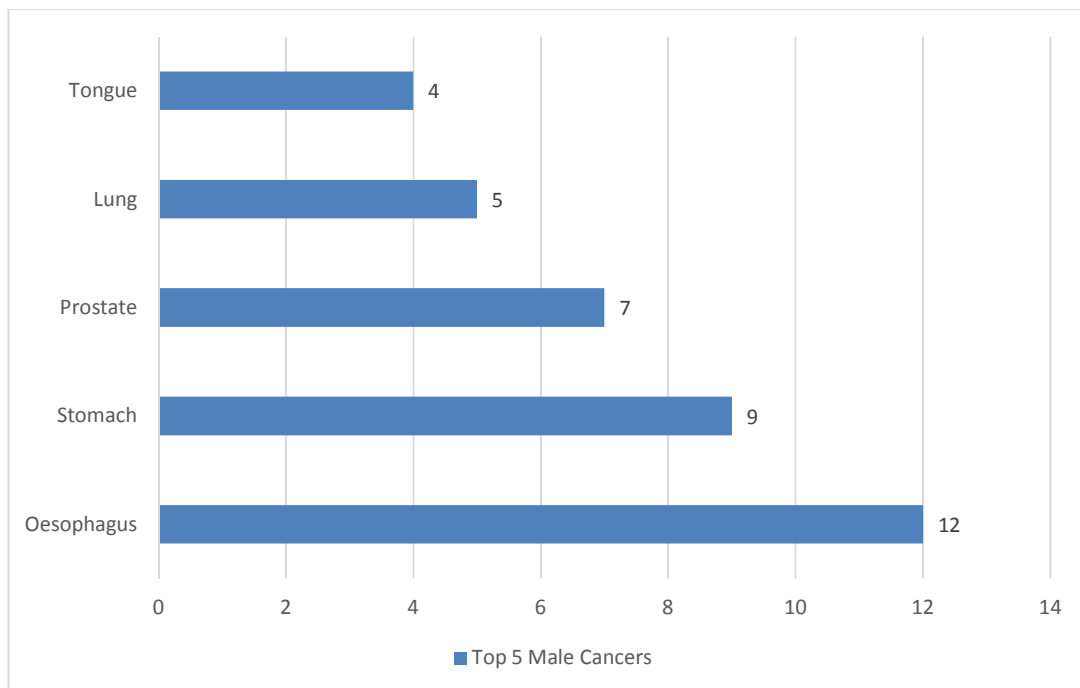


Fig. 4. Top 5 male cancers in Gatundu and Kiambu level 5 hospitals.

**Table 9. Distribution of alcohol among cancer patients**

Takes Alcohol	Frequency	Percent
Alcoholic	10	5.6
Ex-smokers	17	9.4
Never	52	28.9
Unknown	101	56.1
Total	180	100.0

**Table 10. Distribution of alcohol among cancer patients**

Smokes Cigarettes	Frequency	Percent
Ex-Smoker	15	8.3
Never	55	30.6
Smoker	10	5.6
Unknown	100	55.6
Total	180	100.0

#### 4. DISCUSSION

In the five-year period a total number of 180 cancer patients were treated in the two hospitals with Gatundu level five hospital accounting for 120 (66.7%) of these cases and Kiambu Level five accounting for the other 60 (33.3%) cases.

In terms of gender Distribution of these cancer patients' females were more with a record of 123 cases while that of males was 57 cases in both facilities. Gatundu level five hospital had registered 82 females and 38 males while Kiambu level five hospital had a record of 41 females and 19 males. The higher cases of cancer among females in the two hospitals were Contrary to the findings of [11] which recorded more male cancer cases than those of females. This was contrary to a study conducted by GLOBOCCAN in Hungary the International Agency for Research on Cancer where lung cancer was the most common type of cancer in regard to new cases and mortality followed by breast cancer which was also the number five cause of cancer mortality, colorectal cancer was the third most common type of cancer followed by prostate and the fifth was stomach cancer [12]. Another study conducted in Hungary revealed that lung cancer was the most prevalent type of cancer and also caused the most deaths followed by breast cancer both in prevalence and death rates [13,14].

The most common forms of cancers among women in both health facilities accounted for 33.4% and 11.7% of total cancers between both sexes, these were cervical and breast cancer respectively. Stomach cancer was more common among Males; this was followed by Prostate and

Esophageal cancer which had same cases. The study findings were aligned to cancer cases in Nairobi and Eldoret where it is recorded that cervical cancer has the highest cases in the two areas. However, the records in Nairobi stated that Prostate Cancer has the highest cases in men as compared to Eldoret where Esophageal cancer has the highest number of cases. This didn't replicate previous studies which previously reported that among males the number one cancer type was lung cancer while breast cancer was number one type of cancer among females [14].

In both health facilities results demonstrated that there were more cancer cases between the age of 41-60 years. This was followed by patients aged 61-80 years, then 21-40 years, those aged 81 years and above had the least number of Cancer cases, a significant population missed information on age. Breast cancer was common among women aged 41-60 years followed by those aged 21-40 years. Esophageal cancer was common among patients aged 41-60- and 61-80- Years Old years with both age groups having seven cases each. A further novel finding is that Esophageal was common among males than females. Stomach cancer was common among patients aged 61-80 Years Old years and was also common among females than males. Lack of information on the alcoholism status among the cancer patients which was a huge limitation when carrying out the study, 28.9% reported they had never used alcohol, 9.4% were ex-smokers while 5.6% were alcoholics. Notably the alcoholism status of 56.1% of the cancer patients was Unknown while 55.6%. Data on smoking status of these patients was unknown.30.6%

reported to have never smoked. 8.3% were ex-smokers while 5.6% were smokers.

## 5. CONCLUSIONS

The study concludes that cervical and breast cancers are the most common forms among females. Stomach, Prostate, oesophagus were more common among males. There were more cancer cases between the ages of 41-60 years. Finally, the study concludes that available cancer data is wanting and scanty and more research needs to be done to fill this gap.

## 6. RECOMMENDATIONS

From the study findings the following recommendations were reached.

- i. The Government should ensure; Cancer treatment and screening machines should be available in all level five hospitals to ensure patients are treated wholesomely in one health facility and to ensure it's easy to track patient's data and also to enable a lot more patients are able to access the services.
- ii. The community should be sensitized on the importance of constant cancer screening which will help in early cancer detection and translate to lower mortality rate.
- iii. Researchers should be encouraged to carry out more research on cancer that will aid in making informed decisions, better health polices and frameworks.
- iv. There should be a collaboration of public and private facilities to ensure there is linkage of cancer data.
- v. More cancer awareness programs should be adapted to the public in order to reduce preventable cancer cases and eventually eradicated cancer.
- vi. All Patients admission files and forms should be filled wholesomely so they contain all the necessary information for easier future reference.
- vii. Hospitals should adopt a computer-based program to key in patients records to ensure data is accurate and collected at the right time for purposes of quality data and provision of timely care services for cancer patients.
- viii. All hospitals should have a standard way of reporting and staging cancer cases to ensure data uniformity used to create

cancer registries for better future planning of care services to cancer patients.

## ETHICAL APPROVAL

Ethical approval was being acquired from Mount Kenya University Ethical and Research Committee (MKU/ERC/1640). An introduction letter was obtained from Mount Kenya postgraduate school, a research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) and Kiambu ministry of health. Authorization to access health record department and code data was sought from medical superintendents of both Kiambu and Gatundu level five hospitals. Confidentiality was being highly observed, and data was password protected.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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