

## Cancer Prevention Strategies: Evidence-based Interventions in Kenya

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### Abstract

Cancer has become one of the leading public health problems in Kenya, as it is the third leading cause of death accounting for about 7 percent of national mortality. These high rates underscore the need to develop evidence-based interventions that can effectively handle this volatile epidemic. This study aimed to assess the status and strategies for enhancing cancer preventive measures in Kenya by focusing on a) cancer screening, capacity, and access; b) cancer early detection and prevention; and c) respective mitigation strategies. A study of 1,048 cancer patients' records and 12 healthcare facilities in Kenya documented demographic distribution of cancer cases in ten selected counties, determined the specific types and nature of cancers, established the capacity of cancer diagnosis and treatment, and identified institutions dealing with cancer. Age was found to be a major risk factor for cancer. Breast and cervical cancers were most common among women between 40 and 55 years old. By gender, breast and cervical cancers were the most prevalent cancers for women, while esophagus and prostate cancers for men [1]. In Kenya, there is a need for improving patient access concerning cost management, the proximity of facilities to patients, and availability of screening and treatment services on the supply side, as well as issues of awareness in terms of symptoms and lifestyle practices on the demand side. Integration of prevention, screening and early detection strategies are likely to give optimal public health benefits, with minimal cost implications and long-term cancer control benefits.

**Keywords:** *Cancer detection; Cancer screening; Cancer prevention; Africa, Evidence-based interventions*

### 1. Introduction

The 2018 global estimates for new cancer cases were 18.1 million with cancer deaths at 9.6 million, representing the second leading cause of death globally [2]. At the global level, cancer has been identified as one of the leading causes of morbidity

and mortality in the developed world. This realization notwithstanding, in the developing countries, determination of the burden and pattern has not reached the same level as the more developed nations. There is an expected yearly incidence of 15 to 20 million new cases worldwide with a staggering 50% to 60% occurring in the developing world [3]. Kenya has limited national data to provide an accurate view of the cancer situation. Irrespective of this fact, cancer is the third highest cause of morbidity in the country. There has been an increasing number of cancer cases being reported in Kenya within the past 10 years. This trend is partly attributable to physical inactivity, unhealthy diets, overweight/obesity, HIV/AIDS, harmful alcohol use, drugs, and environmental changes [4].

The cancer registry system was developed to use the active case finding approach from hospital records, pathology reports, and death certificates to identify and register cancer cases. This type of information provides insights into the burden and pattern of cancer [3]. However, knowledge of cancers in Kenya is scanty. At the same time, cancer as a disease has not been given adequate attention. In the light of this concern that this study seeks to generate credible data that is critical in designing evidence-based interventions. The study retrospectively collates population-based data on cancer in Kenya captured in various cancer registries nationwide to supplement primary data. This framework is used to elicit the classification, frequency, and pattern of distribution of the cases of cancer. The typology includes various types of hematological and non-hematological malignancies. The study takes cognizance of access for the poor and therefore ensures that such vulnerable populations were included in the sampling frame to enhance representativeness in the data collection.

## **2. Scope and Limitations**

This study covered three groups of data, i.e., patient data from records, interviews with volunteer patients, and survey data from hospital medical officers. As a pilot project, it targeted larger facilities such as district or national referral hospitals since they would typically be the ones receiving cancer patients as the majority of lower-level facilities were not likely to have the expertise to diagnose and treat cancer, and most had also been affected by the health workers strikes. Future larger-scale research efforts, such as sites to consider, research organization, and other pertinent activities would improve the research process, findings, and analysis.

## **3. Significance of the Study**

There is a need for documentation of the demographic distribution of cancer cases to determine the specific types and nature of cancers in Kenya. While the Nairobi Cancer Registry has attempted to collect data for the prevalence of types of cancer based on participating facilities in Nairobi, there is still a large gap for such coordinated data at the national level. Hence, the study sought to fill the gap, which helps establish the capacity of cancer diagnostics and treatment in the country, including identifying existing capacities for institutions dealing with cancer. This makes the research significant for promoting cancer care policies and capacity enhancement.

This study will be of significance to policymakers who will need to understand the magnitude and implications of the cancer problem and hopefully come up with effective mitigation measures. Medical practitioners will also find this study important in their development of respective capacities to screen, diagnose and treat cancer. Other stakeholders include funding partners

and other health experts, researchers, and ultimately, current and potential cancer patients who will find the study informative in their respective interests.

#### **4. Methods and Patients**

The study triangulated different research designs. First, the study adopted a descriptive research design. Descriptive design is appropriate in providing information on the demographic distribution of cancer cases in ten selected counties; the specific types and nature of cancers in ten selected counties; and the capacity of cancer diagnosis and treatment in the selected counties, including identifying existing institutions dealing with cancer. The study also adopted a case study design to document the biography of at least one cancer patient per selected county; and benchmarked best practices that will help in formulating recommendations for earlier detection, prevention, and treatment of cancer. The population for this study comprised of health facilities, cancer patient records, and cancer survivors in 10 counties. The 10 counties were identified based on Africa Cancer Foundation's criteria in such a manner as to try and capture at least one county from each part of Kenya.

The sampling procedure was convenience sampling with a sample size of 11 facilities and 1,048 records from 12 facilities across 9 counties of Kenya during the period from November 2013 to February 2014. Data collection relied on index card records, medical officials' surveys, and interviews with patients. Normality tests were used to portray the trends in the data distribution. Quantitative data was modeled for cancer prevalence by typology and also geographically as well as for best practices.

To document the demographic distribution of cancer cases in ten selected counties, the team used the cancer registry to generate information from hospital records, pathology reports, and death certificates. This information was simulated into an analytical data set. This data was analyzed using SPSS version 20. To determine the specific types and nature of cancers in ten selected counties, the cancer registry system was coded appropriately to develop classification, frequency, and pattern of distribution of the cases of cancer. The classification included all types of hematological and non-hematological malignancies. To establish the capacity of cancer diagnosis and treatment in the selected counties, including identifying existing institutions dealing with cancer, the team used different sets of questionnaires with the health facility personnel to assess the capacity of health care providers in responding to cancer cases. This was benchmarked with the international standards. To make recommendations for earlier detection, prevention, and treatment, the team documented what works well and areas for improvement from the perspectives of health providers and patients. A case study that encapsulates the high note for best practices and areas for improvement has been developed from the survey to enhance sharing and learning from experience.

#### **5. Results**

For diagnosis, the most prevalent type of cancer recorded was breast cancer at 26.7%. As depicted in TABLE 1, in Marigat Hospital, breast cancer was leading among women at 40%, followed by thorax and leukemia, both at 20%.

TABLE 1. Marigat Hospitals Patient Final Diagnosis.

| Gender of patient |               | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------------------|---------------|-----------|---------|---------------|--------------------|
| Female Valid      | ca breast     | 4         | 40      | 40            | 40                 |
|                   | ca cervix     | 1         | 10      | 10            | 50                 |
|                   | ca oesophagus | 1         | 10      | 10            | 60                 |
|                   | ca thorax     | 2         | 20      | 20            | 80                 |
|                   | Leukaemia     | 2         | 20      | 20            | 100                |
|                   | Total         | 10        | 100     | 100           |                    |
| Male Valid        | ca lung       | 1         | 20      | 20            | 20                 |
|                   | ca oesophagus | 1         | 20      | 20            | 40                 |
|                   | ca prostate   | 3         | 60      | 60            | 100                |
|                   | Total         | 5         | 100     | 100           |                    |

Most of the patients in Nakuru Rift Valley General Hospital were seen for cervix at almost 19%, “cervix uteri” at 17%, and esophagus at 7%. Other frequent types of cancer included neoplasm of the breast at 6% and neoplasm of the stomach and leukemia, each at 4%. As depicted in FIG. 1, most of the female patients in Moi Teaching and Referral Hospital were suffering from breast cancer at about 9%, cancer of the colon at 8%, leukemia at 8%, the bone at 6%, and rectum, appendix, digestive, head/face, and liver each at about 4%.

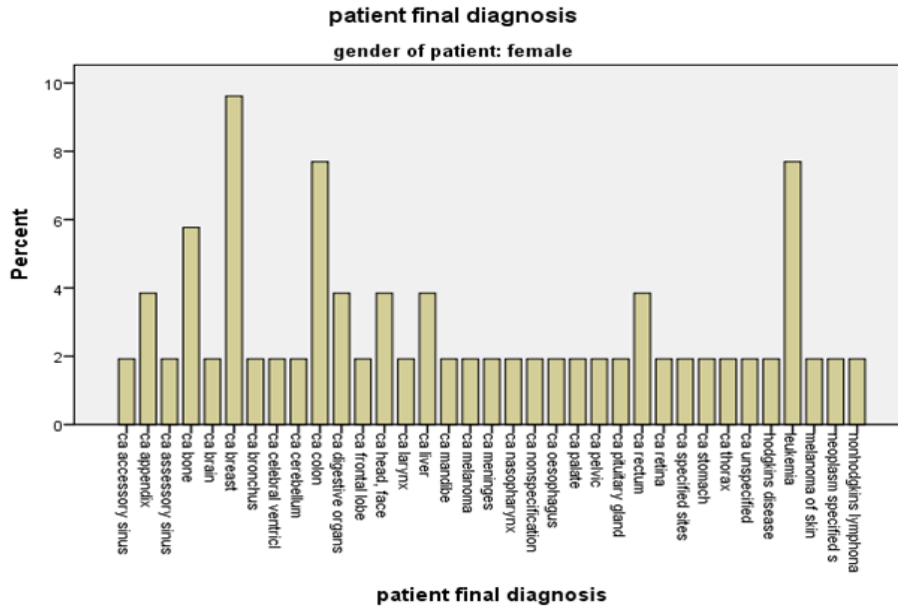


FIG. 1. Prevalent Cancer Types among Females in Moi Teaching and Referral Hospital.

For female patients at the Jaramogi Oginga Odinga Teaching & Referral Hospital (JOOTRH), cervical cancer is the most overwhelming at 20%, followed by cancer of the lymphoma at 9%, cancer of the ovary at 8%, esophagus at 6%, dermoid cyst at 5% as well as liver cancer at 4%, and Hodgkin’s Lymphoma at 3%, as can be seen in FIG. 2.

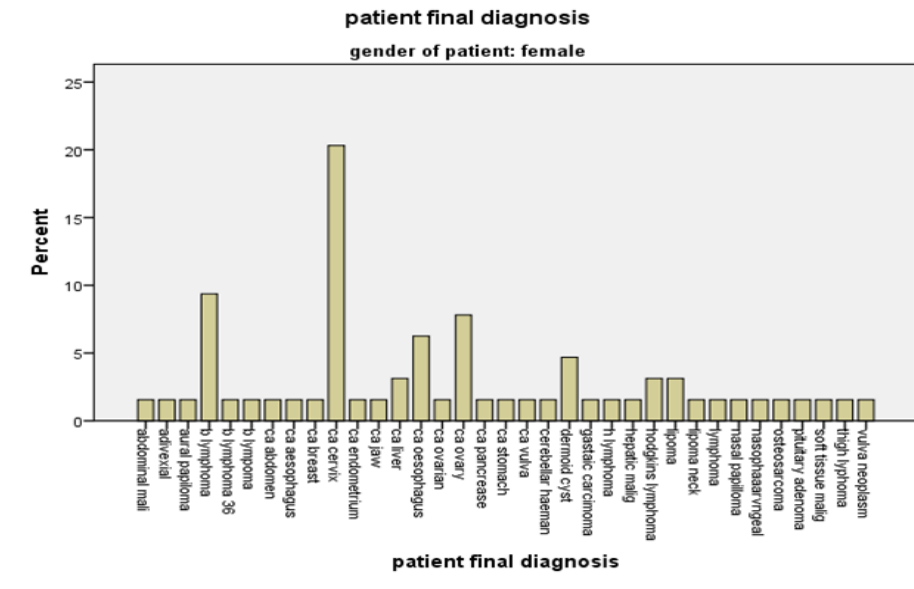


FIG. 2. Prevalent Cancer Types among Females in Jaramogi Oginga Odinga Teaching & Referral Hospital.

Examination of the diagnosis at the Kakamega General Hospital based on the most recent 100 cases reveals that the most common type of cancer is cancer of the cervix at 19%, followed by cancer of the esophagus at 12%. Other types worth mentioning include leukemia at 4%, cancer of lymphoma, cancer of the uterus, and ovarian cancer each at 3%, as presented in FIG. 3 below.

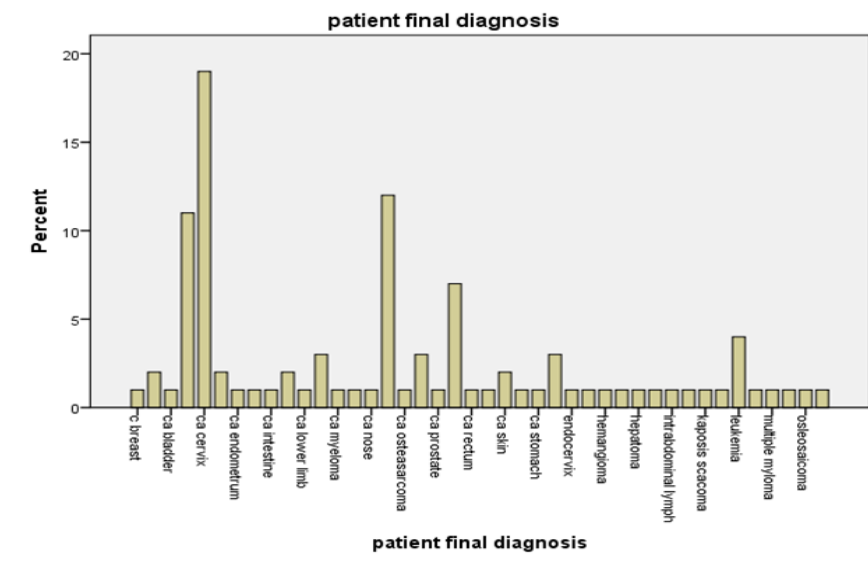


FIG. 3. Prevalent Cancer Types in Kakamega General Hospital.

Based on the most recent 100 cases and from the gender perspective, the most common types of cancer among women at the Kenyatta National Hospital were cancers of the cervix and ovary at 13% each, breast cancer at 11%, and leukemia at 10%. Other minor ones included rectal and myeloma cancer at 3.3% as depicted in FIG. 4 below.

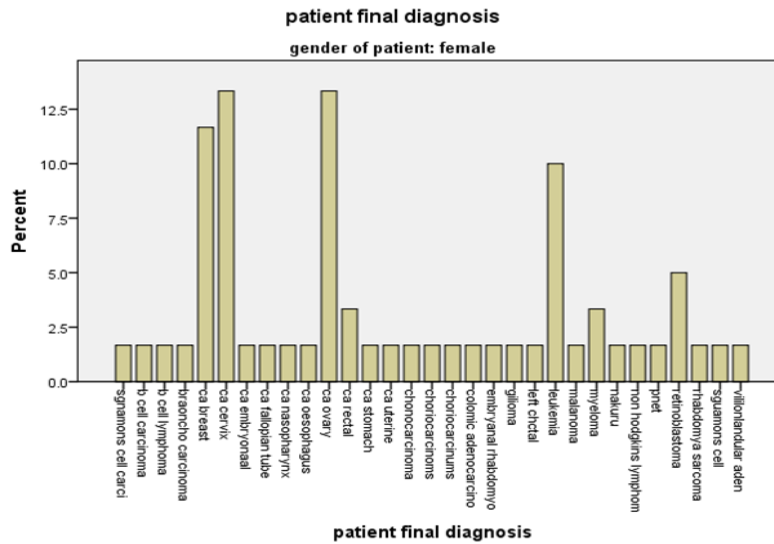


FIG. 4. Prevalent Cancer Types among Females in Kenyatta National Hospital.

In Coptic Hospital, the most prevalent type for women was overwhelmingly breast cancer at 30%, followed by cervical cancer and cancer of the colon at 7%, and cancer of the stomach at 5.4%. There was a clear heavy prevalence of breast cancer at 35%, followed by ovarian cancer at about 15%, then colon cancer, lung cancer, and cancer of the stomach in descending order in Pandya Hospital. In Nyeri General Hospital, the majority of female patients were suffering from breast cancer followed by cancer of the cervix and cancer of the esophagus.

Examination of the diagnosis in Machakos District Hospital reveals that the most common type of cancer out of the 100 cases is cancer of the cervix at almost 40%, followed by cancer of the breast at 7%, and cancer of the esophagus as well as cancer of the ovary at 6%. For female patients, the most prevalent type of cancer in Karen Hospital was breast cancer at 26.7%, followed by carcinoma at 20% and cancer of the colon and ovarian cancer each at 13.3%, as presented in FIG. 5 below.

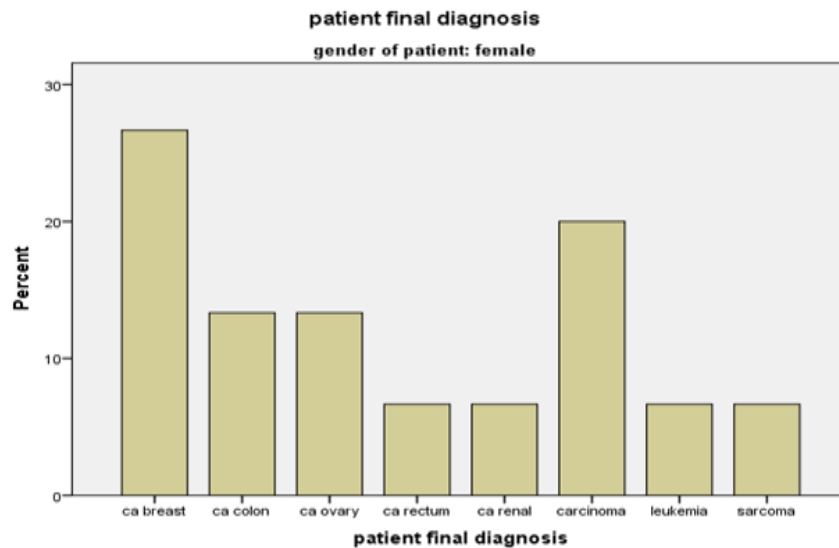


FIG. 5. Prevalent Cancer Types among Females in Karen Hospital.

## 6. Discussion

Our findings exhibited that cancer is of major concern and women are the most affected. There were gender disparities concerning the most frequent age for cancers at 52 years old for females but at 62 years for males. By gender, while esophagus and prostate cancers were the most prevalent cancers for men, breast, and cervical cancer for women, especially among women between 40 and 55 years old. This is similar to results from the Kenya Medical Research Institute (KEMRI) report which also reported that cancers of the breast and cervix uteri comprised a large proportion (43.3%) of all reported cases [5]. The cancer strategy report also pointed out that among women, the most common areas affected are breast, lung, stomach, colorectal, and cervix [6].

It is estimated that 3,000 women in Kenya are diagnosed with cervical cancer and it is projected that by the year 2025 the number of new cervical cancer cases annually in Kenya will reach 4,261 if the proper measure is not put in place to prevent, control, or even create awareness among women in Kenya [7]. While cytological screening has successfully been lowering cervical cancer in North America and Europe [8], cervical cancer has been the first leading cause of death among Kenyan women due to inadequate prevention programs. Cervical cancer screening occurs, but only in a few selected sites and disjointed projects rather than a fully-fledged national-level program. Barriers to Kenyan women's participation in cervical cancer screening include older age, perceived low risk of developing cervical cancer, the subsequent colposcopy, scheduling multiple gynecological appointments, and the lack of awareness of the benefits of early detection measures [9]. Female patients tend to endure long waiting times for the service and find discomfort with male services [10]. Although Pap testing is accurate in detecting cervical lesions, the government should seek other screening alternatives due to the high costs and resource constraints. A cost-effective alternative such as Visual Inspection with Acetic Acid (VIA) is becoming a more popular screening tool for cervical cancer prevention programs in countries with limited resources [9].

Breast screening was being done by each of the facilities in the study. Findings indicate that knowledge of breast cancer and early detection measures vary with women's locations in Kenya. [9]. The less educated, poorer, and uninsured rural women are having a low chance to get breast cancer screening than the more educated, richer, and insured urban women [11]. Subspecialty hospitals in Kenya were conducting diagnostic core biopsy for breast cancer. Sayed et al. [12] observed that the Ministry of Health should look into these screening constraints and the standardization of processing and reporting of biopsy tissue. Unfortunately, available preventive services in Kenya are very limited with only preventive vaccinations, breast self-examination, and Pap smear [1]. This leads to dragonizing most cancer patients in the late stage of cancer [13].

The study assessed the available capacity to diagnose and treat cancer. It was evident that most of the facilities dealt with cervical, breast, esophagus, and prostate cancer and in most cases, did more of the screening compared to the treatment. The most common services provided were Pap smears and x rays. Most of these services were being provided or outsourced by Coptic, Texas, Pandya, and Karen hospitals with a score of 15 out of the possible score of 34, all of which are private. Next in line were Kenyatta in Nairobi and Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) in Kisumu with a score of 13 out of the possible 34, which are public. This has implications on access issues concerning both cost and proximity.

A review of data based on the administrator's self-assessment indicated that the available services were very limited with only preventive vaccinations, breast self-examination, and Pap smear reaching the score of a small extent. Some of the very essential drugs for pain management were rare in most public hospitals. The mean on a scale of 1-4 was 1.9 which implied very limited capacity due to the inadequate cancer treatment infrastructure in Kenya, thus forcing some Kenyans to seek cancer treatment abroad [14]. While not captured in the data, it was also clear from discussions with medical practitioners that they were receiving patients with cancer when they are towards the final stages. Kenya has few cancer specialists concentrated in a few health facilities in Nairobi resulting in long waiting times and thus causing some previously curable tumors to progress to incurable stages [10]. Having most cancer care services concentrated in the capital and the largest city of Kenya imposes a significant barrier to services for most patients living in rural areas, resulting in a very late diagnosis. In response, the Ministry of Health of Kenya revised its National Cancer Control Strategy (NCCS) 2017-2022 to address the decentralization of cancer services, prioritization of cancer surveillance, and affordable cancer treatment drugs [15].

## 7. Conclusions

The status of some of the screening services as to whether they were available, or not, and if not available, whether they were outsourced was analyzed. Based on the feedback from participating administrators, a quick analysis showed that only one-third of the services were provided. The issue of accessibility in terms of cost, proximity, and availability of services is of major concern. Concerning cost, it has been evident that private hospitals seem to be the ones offering most of the screening or treatment services both through acquisition and outsourcing. Typically, these tend to be expensive since they are not subsidized. In terms of proximity, most of the services seem to be in Nairobi which is far from most of the sites in the country. And for the availability of services, including screening and treatments which are also influenced by the availability of equipment and drugs, there are problems because they seem to be mostly available through private hospitals in Nairobi.

Furthermore, there is a record-keeping issue that has implications for surveillance efforts. It was clear that most of the hospitals could collect and keep data, except in the following areas: health information systems used for cancer, data processing software used in the analysis, disease surveillance, and patient master index. The hospitals that had most of these services included JOOTRH in Kisumu, Kenyatta National Hospital in Nairobi, and Pandya in Mombasa. Not surprisingly, according to the national cancer strategy, cancer research in Kenya is not commensurate with the magnitude of the problem [6]. This is due to inadequate funding and training facilities in cancer research. There is also no comprehensive cancer surveillance system in Kenya, and its population-based cancer registry does not capture most of the population [16].

The evidence entails the collection and collation of adequate information on the burden and pattern of cancer to promote effective decision-making. The study recommends public health campaigns to increase awareness in terms of symptoms and preventive lifestyle practices [17]. Funding for such programs can be channeled through a cancer foundation that would target risk sites and vulnerable populations. Other recommended strategies include continuous updating of the Cancer Treatment Guidelines, support for the Cervical Cancer Pilot Study, intensification of efforts towards the resource mobilization plan to develop cancer centers, and finally, support for the Kenya Demographic Health Survey to include questions about the incidence of cancer.



## 8. Conflict of Interests

The authors declare that they have no conflicts of interest.

## 9. Funding

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