

# Cancer Prevention and Control in Pakistan: Review of Cancer Epidemiology and Challenges

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## ABSTRACT

With current situation of increasing burden of cancer in Pakistan, this report reviews studies related to cancer burden and cancer prevention and control in Pakistan.

Electronic databases used were PubMed, Medline, EMBASE, the University of Adelaide library & Aga Khan University (AKU) library database, to search for relevant articles on the topic of cancer prevalence and prevention in Pakistan published in English. We conducted a literature search of published epidemiological and clinical studies relating to this topic up to March 1, 2020. It showed that there is a dearth of epidemiological studies in cancer risk factors, prevention and control in our population. Most studies are hospital based with small sample sizes and underpowered.

Epidemiological integrated transdisciplinary research is needed to find the actual burden, etiology and feasible prevention strategies of cancer unique to our population with focus on low cost screening methods for early detection of cancers and premalignant lesions in our population. There is an urgent need for a centralized national cancer registry to have combined results of cancer registry from Pakistan Atomic Energy Commission, Karachi Cancer Registry, Punjab Cancer Registry and cancer registries from the rest of Pakistan. To have the data of cancer incidence in Pakistan, policy is needed to make cancer incidence as notifiable disease and mandatory. Collaboration is also needed to work with diverse groups like the National Cancer Society of Pakistan (NCSP), National Cancer Control Plan, and Society of Medical Oncology Pakistan to draft and implement plans and strategies for national cancer control programs. It will help mobilize Ministry of Health and policy makers to address the alarming high incidence of different types of cancers in Pakistan.

**Keywords:** Cancer prevalence, cancer epidemiology, risk factors, cancer prevention and screening, palliative care, cancer registry, Pakistan.

## BACKGROUND

The global burden of cancer is increasing and there was approximately 8.1 million new cases with 9.6 million deaths in 2018 [1]. According to an estimate the risk of developing cancer is one in 5 among men and one in 6 among women during their lifetime [2]. Globally, the most common cancers are cancers of lung, female breast, and colorectum. In Asia, it is observed that there has been one of the most rapid increases in breast cancer occurring over the last two decades [3]. With current situation of increasing burden of cancer in Pakistan, this report reviews studies related to cancer burden and cancer prevention and control in Pakistan.

## METHODS

Electronic databases used were PubMed, Medline, EMBASE, the University of Adelaide library & AKU library database, to search for relevant articles on the topic of cancer prevalence in Pakistan published in English. We conducted a literature search of published epidemiological and clinical studies relating to this topic up to March 1, 2020. Following key terms were used: cancer prevalence, cancer epidemiology, risk factors, cancer prevention and screening, palliative care, Punjab

cancer registry, Karachi cancer registry combined with Pakistan. EndNote (X8.1) was used to create a reference database and finally 49 articles were included after excluding 45 articles.

## CANCER IN PAKISTAN

In Pakistan, approximately 150, 000 new cases of cancer are diagnosed annually, with high mortality of 60%–80% [4]. Data from the Karachi Cancer Registry (KCR) reported that most common cancer was lung cancer among males, associated with cigarette smoking followed by carcinoma of the oral cavity, again associated with high tobacco smoking and smokeless tobacco [5] in spite of smoking ban in Pakistan since 2002 [6]. Breast cancer was the most common malignancy in females with a peak at the age of around 45 years. The second and the third most common malignancies amongst the females were of the oral cavity (observed in the second and third decades of life) and the ovary [7]. Like other lower and middle-income countries (LMICs), breast cancer incidence is rising rapidly in Pakistan too [8, 9]. Hospital based studies of breast cancer are constantly reporting breast cancer at a younger age in their 40s and with locally advanced disease among Pakistani women, imposing a bigger public health concern in future for Pakistan [10-12]. Results from a pathology laboratory based cancer registry for the period of 2010-2015 among people from all districts of Karachi showed that Karachi has the highest number of cancers of breast, head &

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neck and esophagus in females and cancer of lip and oral cavity and larynx in males (associated with all forms of tobacco) compared to any of the Asian populations [13]. Stomach cancer has also been reported mostly in young Pakistani males [14].

### CANCER PREVALENCE RATES VARIATIONS

A recent meta-analysis of 13 studies done in Pakistani population showed a significant variation in the reported prevalence rates of different cancers (breast cancer, oral cancer, prostate cancer, gastric cancer and colorectal cancer). The prevalence rates of these cancers differed in different studies according to the different places and populations [15]. Even commonest cancers in males and females also varied in different hospital-based data. Oral cancer varied from 2% to as high as 19%: prostate cancer ranged from 2.2% to as high as 8.8% with overall pooled prevalence of 5%, breast cancer from 20-50% with pooled prevalence of 31% and prevalence of stomach cancer varied from 1.4% -22%. Finally, the prevalence of colorectal cancer CRC ranged from as 4.3%-7.1%. According to the report by GLOBOCON 2012, lung cancer was the 3rd most common cancer in Pakistan while Pakistan Health Research Council (PHRC) 2016 has estimated it as the 10th most common cancer over the past one decade [16]. Cancer data from Lahore in 1984-2014 showed lymphomas and breast cancer as the most common neoplasm in males and females, respectively, and high incidence of head and neck, brain, and lung cancers, and leukemia among males, and ovarian, cervix, head and neck and lymphomas among females [17]. Another study by KCR showed that the incidence of cancer ovary, involved younger age group with a positive family history of ovarian cancer and advanced stage at presentation [18].

In another retrospective, observational study in the Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH & RC), Lahore, during 18 years' time period (1994 to 2012) the most common malignancies among adults, were those of breast, lip and oral cavity, and liver and intrahepatic bile ducts [19].

The Pakistan Atomic Energy Commission Cancer Registry (PAECCR) database for the last 30 years (1984-2014) confirmed that head and neck and breast cancers in males and in females respectively were the most common cancers in Punjab province in Pakistan, highest in Asia. Moreover, the incidence of cancers of brain, prostate and non-Hodgkin's Lymphoma NHL among males and ovarian and cervix cancers among females were observed to be increasing rapidly [20]. According to it, head and neck cancer was 13.41%, brain tumor was 10.90%, and non-Hodgkin lymphoma NHL was 9.70% among males, whereas breast cancer was 45%, ovary tumors was 6.6%, and head and neck was 6.21% in females. Leukemia was reported as the most common cancer for the age group of 1-12 years [21]. PAECCR report of 2015-2017 of more than 100,000

cancer patients in 18 hospitals of Pakistan again confirmed head and neck cancer and breast cancer as most common cancers. Median age of breast cancer (49 years) among Pakistani women is much younger age compared with other populations' median age at breast cancer diagnosis [22]. According to this report, oral cavity, lung and CRC among males and Breast, oral cavity and CRC among females were the major cancers.

The Shaukat Khanum Memorial Cancer Hospital & Research Centre (SKMH&RC) reviewed cancer among patients 0-19 years of age, from 2011 to 2012 and reported 669 new cases of common childhood malignancies like leukemia, myeloproliferative/dysplastic disorders, lymphoma, reticuloendothelial neoplasms, central nervous system CNS and miscellaneous intracranial/intraspinal tumors and malignant bone tumors [23].

### RISK FACTORS

Regarding the etiology of cancers, there is interaction of both genetic and environmental factors like poor lifestyle behaviors in the development of specific cancers in our population. There are changing trends in cancer incidence due to changing demographic and lifestyle factors as it is reported that there has been a reduction in incidence of esophageal and gastric cancers due to better diet and better SES in certain high-risk areas, whereas in countries like the United States, Australia, and France, the decreased incidence is attributed to declines in cigarette smoking [24]. According to Institute of Nuclear Medicine and Oncology, Lahore, Pakistan, the main risk factors of head and neck cancer (18.74%) recorded during 2004 -2014 were related to smoking, drinking and smokeless tobacco ("paan", "gutka"), age, low socioeconomic status, family history of cancer, occupation in chemical factories [25]. There are 16000 new cases annually of oral cancer, with strong relationship between oral cancer and "naswar" (powdered tobacco) usage in Pakistan [26]. A review of 11 years (2005-2015) concluded that infections associated with human papillomavirus was the greatest risk of carcinoma cervix and high mortality rate [27]. In twin cities of Pakistan, a study was conducted to screen cervical cancer patients for HPV infection in a small sample of 67 cervical cancer biopsies. It showed a strong association between HPV infection and cervical cancer and it is an evidence for the need of prophylactic HPV vaccines and PAP smear screening [28].

A genetic epidemiology study done on 370 patients reported PALB2 mutations in early-onset and hereditary breast/ovarian cancer cases and importance of genetic etiology of breast cancer [29]. There is an immense need of Pakistani breast/ovarian cancer cases genetic testing for BRCA1/2 mutations and genetic testing of high-risk Pakistani breast/ovarian cancer [30]. A study in 2002 reported 6.7% of BRCA1 or BRCA2 mutations among breast cancer cases, with higher proportion of premenopausal breast cancer [31].

## LACK OF AWARENESS ABOUT CANCER

Research studies have shown that 30-50% cancer cases can be avoided by eliminating or reducing exposure to known lifestyle and environmental risk factors [32, 33]. Studies show that Pakistani people have little awareness about common cancers like breast, cervix, head and neck cancers, its risk factors, and consumption of substances causing cancer and unrelated causes of cancer like black magic and fate were attributed to cancer [34-36]. Measures are needed for the awareness about breast cancer [37] as increased awareness for recognition of symptoms for breast cancer detection and timely referrals by multiple healthcare providers, especially traditional healers and general practitioners in Pakistan, can decrease the delay in diagnosis [38]. Abandonment of treatment was also found high among patients with childhood malignancies in a study between November 2014 and May 2016, in spite of free treatment in a welfare hospital [39]. Delayed diagnosis of oral cancers was common, frequently due to patient's self-delay and the main reason was lack of awareness about oral cancer risk factors, symptoms, and whom to approach for treatment [40]. Timely referral can decrease the complications and mortality due to oral cancers which is preventable if use of cigarette, "paan", "gutka is banned.

## LEVELS OF SCREENING AND PREVENTION

Up to one-third of cancers in the developing world are curable if recognized early [41]. Pakistan has no national breast cancer screening or awareness programs and it is an important reason that women present at a more advanced stage [42]. Delayed presentation of cancer has a significant economic impact, since it is far less expensive to treat patients with early-stage disease and success rates are significantly increased. To minimize the delay in diagnosis, it is important to implement an organized breast cancer screening program, at primary care level, through providing low-cost mammograms, with a target population of women especially high-risk women and try to outreach into the public sector at community level including both urban and rural areas.

Cervical cancer is the most commonly and easily diagnosed cancer in the developed countries due to effective screening program PAP screening which is lacking in Pakistan. However, the situation can be transformed to accelerated declines in cervical cancer like in high-income countries through implementing resource-dependent programs of Visual Inspection with Acetic Acid (VIA), PAP screening and HPV vaccination for cervical cancer screening and prevention [43].

A study in SKCMH to assess the burden of Ca cervix showed that current HPV vaccine could potentially prevent new cervical cancer cases [44]. Similarly, there exist many barriers to CRC screening at Primary Health Care PHC level in a resource constraint country like Pakistan, with poor health literacy.

A small study conducted among Karachi residents reported 2.6% of CRC screening in eligible individuals (50 years or older) but only 14.9% (n = 58) of study participants showed interest for CRC screening. There was severe lack of awareness about the CRC due to many barriers like poor health literacy [45].

## PALLIATIVE CARE

Given the higher morbidity and highest mortality, cancer is now a major public health burden and challenge. There is dearth of well-equipped cancer hospitals with only 20 cancer hospitals in Pakistan where approximately 320,000 of new cases of cancer are expected every year. Moreover, for advanced and terminal cancer care, there are no palliative care facilities or hospices [46]. A study done in Mayo hospital Lahore showed under treatment of cancer pain in Pakistan is alarming due to inadequate training of health care providers, patients beliefs, lack of availability of opioid medications, and socioeconomic factors [47]. In government hospitals it is observed that there is an overwhelming numbers of advanced cancer patients and an enormous need for opioids, with lack of medication even for agonal breathing of a dying child [48].

## ASSESSING HUMAN AND ECONOMIC BENEFITS OF CANCER PREVENTION

The financial burden of cancer care is also huge and overwhelming due to multiple factors [49]. It is time to focus on cost effective cancer prevention and to have data about the relative costs and outcomes of cancer control and prevention activities as healthcare resources are limited. An increase in the proportion of cancers of breast, colorectum, mouth detected clinically at an early stage in the absence of screening is commonly referred to as downstaging which is cost effective and beneficial in our setting.

## CANCER SURVEILLANCE, CANCER REGISTRY AND OTHER DATA SOURCES OF CANCER

There is no data of cancer incidence in Pakistan till date as the notification of cancer is not yet mandatory. The incidence, prevalence, survival and mortality data of cancer available is mostly from hospital and laboratory. For the past 71 years there is no national centralized cancer registry in Pakistan to effectively unify and coordinate data from across the country. Few population-based studies have been conducted so far and most studies are done from discreet hospital based data sources [34].

KCR which was the first population-based registry of Pakistan, by the Government of Sindh in collaboration with the International Agency for Research on Cancer (IARC), WHO in 1995 and covered Southern Karachi in Pakistan. It contributed important publications of population based studies on different types of cancer. Punjab Cancer Registry (PCR) was set up in February



2005 and is being run and sponsored by Shaukat Khanum Memorial Cancer Hospital & Research Center, a private cancer treatment hospital. It has been successful in collecting data on cancer cases (though still 60%) from various centers of the Province. The underreporting is due to a lack of priority to cancer disease surveillance, hesitation for data sharing by some hospitals, lack of funds and infrastructure. Before these registries, Cancer Registry of the Jinnah Postgraduate Medical Centre (JPMC) and the Pakistan Medical and Research Council (PMRC) was the first and closest representative of the data of Karachi, as it was the only cancer institute in Karachi.

Hospital-based results obtained from various oncology hospital and departments can be considered as an effective way forward in assessing some cancer burden in the region but the results can't be extrapolated to the whole population of the country and devise appropriate screening and therapeutic strategies according to cancer burden in the country [48].

### NEED FOR CANCER PREVENTION RESEARCH AND EDUCATION

Epidemiological integrated transdisciplinary research is needed to find the actual burden, etiology and feasible prevention strategies of cancer unique to our population. There is need to conduct more research on cancer prevention identify risk factors, low cost screening methods and early detection of cancers and premalignant lesions in our population. With research using local data, we can expect improvement in cancer mortality. Evidence based data is needed in cancer epidemiology in collaboration with non-government organizations NGOs and Ministry of Health for implementation of cancer screening programs at PHC level. It will help mobilize Ministry of Health and policy makers to address the alarming high incidence of different types of cancers in Pakistan. There is also a greater need to emphasize cancer prevention education at both in under-graduation and graduation level, with introduction of cancer epidemiology and cancer prevention courses.

### USE OF TELEMEDICINE IN CANCER PREVENTION

There is immense scope to use telecommunications technology to provide health care services to patients and in both primary and secondary cancer prevention like smoking prevention, nutritional counselling, exercise education, genetic counselling, psychosocial support, screening for breast cancer, cervical cancer, oral cancer, and CRC. It is cost-effective, accessible and clinically efficient with better compliance and satisfaction among patients especially those with limited access to health care.

### INTEGRATING CANCER PREVENTION AT PRIMARY HEALTH CARE LEVEL

At PHC level, there is an urgent need for intensive and comprehensive education campaigns about cancer awareness, its risk factors, screening and prevention of common cancers. It is important to include health care providers, clinicians, nurses, community health workers, and lady health visitors in these educations. There is immense potential for public health professionals at primary health care (PHC) level to play their role in cancer control. It is important to promote awareness about oral, colorectal cancer and breast cancer among GCPs, and nurses at PHC by conducting training program for detection of precancerous and early-stage cancers and timely referral to oncologist/surgeon without delay and encouraging cancer screening activities especially for people with high risk profile. GCPs should be encouraged to do clinical breast examination (CBE) for breast cancer and oral examination regularly for any precancerous lesions. Lady health workers' training for breast cancer awareness education, breast self-examination (BSE), clinical breast examination (CBE) and through them educate women about breast self-examination is also cost-effective way to control cancer in our resource constraint population. Collaboration is also needed to work with diverse groups like the National Cancer Society of Pakistan (NCSP), National Cancer Control Plan, and Society of Medical Oncology Pakistan as they have plans for national cancer control programs.

### CONFLICT OF INTEREST

The author declares no conflict of interest.

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