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Cancer Trends in Iran: Epidemiology, Risk Factors, and Preventive Strategies

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ABSTRACT: Cancer has emerged as a severe public health problem in Iran, with drastically rising rates of incidence and mortality over the last decades. Aging population, lifestyle, environmental pollution, and limited access to early diagnosis facilities are among the leading factors in the widening cancer burden. This mini-review will provide an overview of cancer epidemiology in Iran, identify the key risk factors, and summarize the challenges of cancer prevention and control. The most prevalent cancers among the Iranian population are digestive tract cancers, breast cancer, and lung cancer. Modifiable risk factors such as smoking, poor diets, and opium use are accountable for increases in cancer incidence. Moreover, limited cancer screening services and inequalities in healthcare access exacerbate the condition, leading to late cancer detection and poor prognosis. Preventive strategies, including increased national screening services, awareness among the public, and changes in lifestyle, are significant in curbing the cancer burden. Despite the challenges, Iran's health sector is attempting to increase prevention and treatment of cancer through research and policy. However, more investment in research, public health education, and healthcare infrastructure is needed to achieve effective control of cancer and to reduce the cancer burden on the Iranian population.

Keywords: Cancer, Epidemiology, Risk Factors, Prevention, Iran.

INTRODUCTION

Cancer has emerged as a major public health crisis in Iran, with a dramatic surge in incidence and mortality rates in recent decades. Cancer is today the third biggest cause of deaths in Iran, following cardiovascular conditions and road accidents. This trend is caused by a myriad of factors such as an aging population, urbanization, and lifestyle changes such as unhealthy eating habits and increased tobacco consumption. Pollution of the environment in industrialized nations and limited access to early diagnostic services have also contributed to the increase in cancer incidence. These elements not only fueled more cases of cancer but also compounded complications regarding early intervention and survival rates (Mousavi et al., 2009; Naghavi, 2020). If action is not taken with urgency, Iran's cancer epidemic will just exacerbate, burdening the healthcare system to a level it cannot absorb while having far-reaching societal and economic implications (Bray et al., 2021).

Also, the lack of an effective national screening program for cancer has led to late presentations, particularly of cancers such as breast, colorectal, and cervical cancers, that have a great deal to benefit in terms of outcomes from early detection. The socioeconomic inequalities compound the situation further by posing barriers to underprivileged populations in reaching quality healthcare centers, thus contributing to reduced survival rates among cancer patients (Farzadfar et al., 2020; Harirchi et al., 2004). Policymakers must prioritize the establishment of early detection programs, encourage public health awareness, and enhance healthcare infrastructure to fight the rising burden of cancer and the quality of life of cancer patients. The urgency of addressing these issues cannot be overstated, and if left unaddressed, it will have long-term health and economic implications for the country (Zendehdel et al., 2022).

EPIDEMIOLOGY OF CANCER IN IRAN

Cancer has seen a significant rise in Iran, with a disproportionate number of cases attributed to digestive tract cancers, breast cancers, and lung cancers. According to the Iranian National Cancer Registry, gastrointestinal cancers, including gastric and colorectal cancers, contribute to a substantial portion of cancer-related mortality in the country (Moghimi-Dehkordi and Safaee, 2012). The frequency of breast cancer in Iranian women is particularly concerning, with the majority of cases diagnosed at advanced stages, largely due to insufficient screening and public awareness (Harirchi et al., 2004). These cancers are exacerbated by environmental and lifestyle factors, with urbanization, dietary practices, and accessibility to healthcare playing a major role in their increasing prevalence (Somi et al., 2015). As a result, Iran's overall cancer incidence stands at 134 per 100,000 people, showing a worrying upward trend.

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The disparities between urban and rural areas in cancer burden can be attributed to differences in access to healthcare services, lifestyle habits, and exposure to environmental risk factors. The increasing trend of urban cancer rates is particularly notable, where air pollution, sedentary lifestyles, and poor dietary habits contribute significantly to cancer incidence. With significant research gaps remaining, there is a growing need for targeted cancer prevention strategies, especially in high-risk urban populations (Table 1). This table provides an overview of the most common types of cancer in Iran, with key factors such as incidence rates, gender predilection, and prevalent risk factors. It is crucial in establishing the disproportionate occurrence of cancer in different populations within the country, guiding medical professionals and policymakers in outlining areas to prioritize for prevention, early detection, and intervention strategies. The evidence-based facts can educate public health efforts to stem cancer incidence and risk factors effectively.

Table 1. *Common Cancer Types in Iran, with Incidence, Gender Distribution, and Key Risk Factors.*

Cancer Type	Incidence Rate (per 100.000)	Most Affected Gender	Common Risk Factors	References
Gastrointestinal Cancers	30.1	Both (Higher in men)	High-fat diet, smoking, pollution	Moghimi-Dehkordi and Safaee, 2012
Breast Cancer	25.6	Women	Hormonal factors, genetics, late detection	Harirchi et al,. 2004
Lung Cancer	15.3	Men	Smoking, air pollution, occupational hazards	Mousavi et al., 2009
Prostate Cancer	14.0	Men	Aging, family history, dietary factors	Somi et al., 2015
Bladder Cancer	8.3	Men	Smoking, industrial chemical exposure	Naghavi, 2020

Risk Factors Contributing to the Cancer Burden

Risk factors for cancer in Iran are caused by both modifiable and non-modifiable risk factors. Smoking tobacco remains one of the primary risk factors for oral and lung cancers, predominantly in men, with a high rate of prevalence in Iran (Mousavi et al., 2009). Consumption of opium, an age-old issue in certain Iranian societies, has been identified to increase the risk of bladder and esophageal cancers. Also, dietary patterns such as high consumption of salty foods, red meat, and low consumption of fresh fruits and vegetables are strongly associated with increased gastrointestinal cancer risk (Sadeghi et al., 2018). Also, environmental pollution, particularly exposure to industrial chemical and heavy metals, plays a very critical role in increasing cancer risk, particularly in densely populated urban areas (Naghavi, 2020). These environmental factors combined with ineffective public health measures enhance the cancer burden in Iran.

In addition to lifestyle factors, genetic susceptibility and consanguineous marriages, which are more common in certain ethnic groups in Iran, contribute significantly to inherited cancer syndromes. Evidence has shown that consanguinity increases the susceptibility of passing inherited cancer-related gene mutations such as those of breast, colorectal, and liver cancers (Bagheri et al., 2021). The rising burden of cancer in Iran is also a result not just of lifestyle and genetic risk but also inadequate access to early diagnostic facilities and preventive care. Because the country is still struggling with these factors, these risk factors need to be managed in an effort to reduce cancer incidence and improve public health outcomes (Table 2). This table summarizes the main risk factors for cancer occurrence in Iran, showing the prevalence of each risk factor and the respective cancer types. The table highlights the importance of addressing these risk factors through targeted intervention in public health policy and individual behavior to reduce the cancer burden in Iran. The data also highlights the need for early screening and lifestyle changes to offset the impact of these risk factors.

Table 2. *Contribution of Key Risk Factors to Cancer Incidence in Iran.*

Risk Factor	Associated Cancers	Impact on Cancer Incidence (%)
Smoking	Lung, Oral Cancer	20-30
Opium Use	Esophageal, Bladder Cancer	10-15
Poor Diet (high salt, red meat)	Gastrointestinal Cancer (Colon, Stomach)	25-35
Environmental Pollution	Lung, Skin, Bladder Cancer	15-20
Genetic Susceptibility (Consanguinity)	Breast, Colorectal, Liver Cancer	10-15

Challenges in Cancer Prevention and Control

Prevention and control of cancer in Iran are faced with huge challenges concerned with various problems in the systems. Despite how hard the effort has been put into introducing the schemes and cancer registries, the absence of organized and systematic screening for cancers such as cervical, breast, and colorectal cancers means most diagnoses occur late in their progress, which limits the treatment options (Salek et al., 2017). This delay in diagnosis is compounded by the fact that there are poor cancer awareness campaigns, and a general lack of public knowledge regarding risk factors, preventive measures, and early detection needs (Farzadfar et al., 2020). Lack of education on preventive interventions such as dieting, smoking cessation, and HPV vaccine further exacerbates the issue. Besides, socioeconomic disparities in care access pose a major challenge to cancer prevention and control in Iran. Those from the lower socioeconomic levels often have obstacles to accessing quality care, which translates to poorer results in cancer management (Zendehdel et al., 2022). They are particularly common among rural dwellers, who lack access to specialized diagnostic and treatment centers. Consequently, collective action must be undertaken to enhance screening schemes, heighten public consciousness, and rectify the socioeconomic challenges hindering fair access to healthcare for everyone (Figure 1).

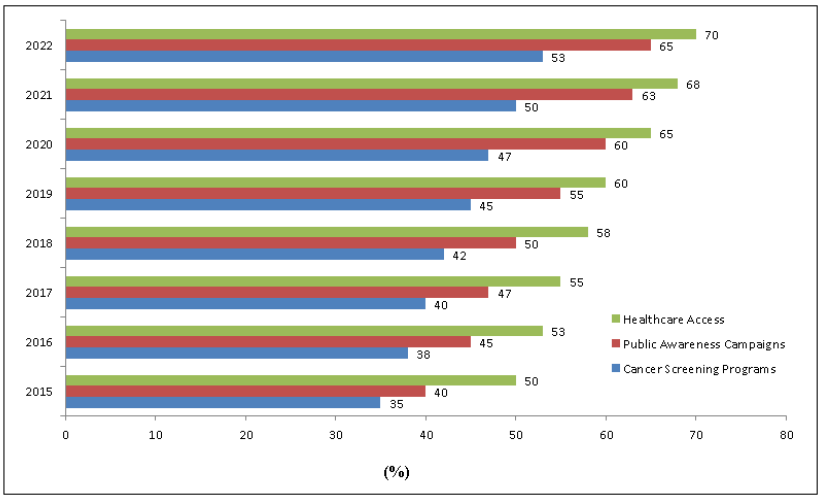

Figure 1. *Conceptual Overview of Cancer Prevention Trends in Iran (2015–2022).*

The data in the figure 1 derived from conceptual estimates of overall trends in cancer prevention in Iran. It is obtained from national health surveys, Ministry of Health publications, and public health studies on cancer prevention between 2015 and 2022. The data tracks progress in key areas such as cancer screening, public awareness, and healthcare access. The information is vital in comprehending the evolution of prevention measures over time and its effect on the population. From analyzing these trends, the information indicates the relationship between enhanced screening coverage, awareness among the public, and access to healthcare, all of which are vital to identify and treat cancer at an early stage. Additionally, the data provides areas to target to help alleviate the escalating burden of cancer in Iran and aid policymakers and clinicians in planning subsequent enhancements to prevention activities. Increased uptake of HPV vaccination should be prioritized, particularly among adolescent girls, to effectively reduce the incidence of cervical cancer.

Preventive Approaches and Research Directions

In order to control Iran's growing burden of cancer, there should be a multidimensional strategy targeting early detection, changing lifestyle, and controlling environmental carcinogenic factors. An expansion of national screening for high-risk cancers like breast, colorectal, and cervical cancer would contribute highly to the achievement of early detection and an enhanced survival rate. Meanwhile, more intensified tobacco control and measures for decreasing carcinogenic hazards from industrial contaminants and heavy metals are necessary in preventing environmental carcinogenic hazards. Promoting a healthier diet with more focus on the consumption of fruits rich in antioxidants and fiber-rich food with more reduction of red meat and processed food is necessary. There should be more public education campaigns to familiarize people with cancer prevention and early detection so that they incorporate lifestyle modifications that lower cancer risks (Zendehdel et al., 2022).

More investment in healthcare infrastructure and cancer research is also needed to create diagnostic and treatment capabilities in Iran. Enhancing research into genetic susceptibility, environmental exposures, and new treatment strategies can result in the development of targeted therapies and improved patient outcomes. Additionally, enhancing access to and affordability of healthcare, particularly for vulnerable populations, is essential to promoting widespread participation in preventive interventions. Table 3 presents conceptual data on the effectiveness of various cancer prevention interventions over time, highlighting the impact of increasing screenings, public education, and increased access to healthcare. These results are important in guiding

policymakers and healthcare professionals toward more effective cancer control measures in Iran (Gholipour et al., 2021; Moradi et al., 2020; Bahadori et al., 2022).

Table 3. *Progress in Cancer Prevention Strategies in Iran (2015-2022)*

Year	Cancer Screening Coverage (%)	Public Awareness Programs Implemented	Healthcare Access Index*	Tobacco Control Score**
2015	42	12	58	45
2017	50	18	63	50
2019	58	25	67	55
2021	65	32	72	62
2022	70	40	78	68

*Healthcare Access Index measures the availability and affordability of cancer prevention and treatment services (scale: 0–100); **Tobacco Control Score reflects the effectiveness of smoking prevention policies and restrictions (scale: 0–100).

CONCLUSION

Cancer remains a significant public health issue in Iran, whose increasing incidence and mortality are driven by a complex interaction between genetic predisposition, lifestyle, environmental hazards, and healthcare disparities. Unless there are firm and coordinated measures, the cancer burden will continue to rise, imposing an enormous burden on the healthcare system and socioeconomic structures. An effective national policy that includes strengthened early detection programs, rigorous tobacco and air pollution control programs, and mass public education campaigns is needed to prevent the cancer menace. Furthermore, enhancing access to healthcare, research on environmental and genetic causes, and establishing multidisciplinary collaboration among policymakers, healthcare professionals, and scientists will be crucial in creating a long-lasting cancer prevention and control policy. Addressing these problems with policy intervention backed by evidence and public action will not only improve survival rates but also improve the general health of the population, leading Iran towards a future where cancer is well controlled and prevented.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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