

Comparative Analysis of National Cancer Control Programs: Insights from Iran, USA, UK, Turkey, and Finland

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Abstract

Background: National cancer control programs (NCCPs) are pivotal in addressing the global burden of cancer through prevention, detection, treatment, and supportive care strategies. Comparing the effectiveness of these programs is crucial for optimizing cancer care practices worldwide.

Objectives: This study evaluates NCCPs in Iran, the USA, the UK, Turkey, and Finland to provide insights into enhancing global cancer care practices.

Methods: We compared Iran's NCCP with those of selected countries, focusing on key components including prevention, screening, diagnosis, treatment, supportive care, research, and registration. A systematic literature search identified relevant articles discussing NCCPs of Iran and comparison countries. Peer-reviewed journals and reputable databases were utilized for article retrieval. Inclusion criteria comprised English articles offering comprehensive information on NCCP components, while exclusion criteria involved articles not directly comparing NCCPs or lacking relevant data. Qualitative analysis of selected articles identified similarities and differences in program implementation and effectiveness. Grey literature and official government documents supplemented findings.

Results: Five studies on NCCPs from America, England, Finland, Turkey, and Iran were identified, revealing diverse approaches and shared objectives in global cancer treatment management. While comprehensive program components were similar across nations, nuanced differences emerged. More developed nations exhibited detailed strategies, while challenges such as treatment access and palliative care integration persisted elsewhere. Variations in prevention initiatives, screening methods, treatment accessibility, and research funding mechanisms underscored the complexity of global cancer control efforts.

Conclusions: This study compares NCCPs in Iran, the USA, the UK, Turkey, and Finland. While all programs share common objectives, differences in strategies and resources exist. More developed nations often have detailed plans, while challenges like treatment access persist elsewhere. Variations in prevention, screening, treatment, and research underscore the complexity of global cancer care. By understanding these nuances, policymakers can better tailor NCCPs to address diverse population needs and improve cancer care outcomes worldwide.

Keywords: National Cancer Control Program (NCCP); Cancer Control; Program Evaluation; Healthcare Disparities

1. Background

Cancer is one of the major health challenges worldwide, characterized as a non-communicable disease resulting from deviations in the growth and division of cells (1). This disease induces abnormal changes in the structure and function of cells and may spread irregularly and scattered throughout the body. Given the increasing prevalence of this disease, the development and implementation of cancer management programs are of paramount importance (2-4). Cancer management programs encompass strategies, processes, and policies employed

to diagnose cancer, treat it, and, in cases of incurability, improve the quality of life for patients. These programs include comprehensive data collection about the disease, accurate diagnosis, therapeutic justifications, and psychological and social support (5-7).

In recent years, remarkable advancements in medical science and information technology have facilitated the creation of more intelligent and personalized cancer management programs. From advanced imaging and genetics to the use of artificial intelligence and the Internet



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of Things, these programs are built on precise data and advanced methods to enhance efficiency in cancer diagnosis and treatment (8, 9).

2. Objectives

The main objective of this study is to identify and examine the national cancer control and management programs in the studied countries, including Iran, the USA, the UK, Turkey, and Finland, by reviewing multiple scientific articles related to the control and treatment programs.

3. Methods

Selected countries such as Iran, the US, the UK, Turkey, and Finland were chosen for comparison due to their geographical locations, diverse economic developments, and healthcare systems. Acting as a bridge between Europe and Asia, Iran offers insights into cancer management in a region with unique cultural healthcare characteristics. Conversely, Finland represents a Nordic country with an advanced healthcare system and remarkable progress in cancer prevention. By comparing Iran with these diverse countries, our goal was to offer a comprehensive understanding of the strengths, weaknesses, and opportunities for reforming Iran's National Cancer Control Program (NCCP) on a global scale.

This review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and rigor in the review process (10). The protocol was submitted to the Islamic Azad University Semnan unit by [code: 31150-163-02-96].

3.1. Study Identification

Two researchers independently conducted a simultaneous electronic database search using keywords related to cancer management programs. The search included major databases such as PubMed, Cochrane Library, Web of Science, ClinicalTrials.gov, and Scopus, with the search concluding at the end of June 2022. Conference abstracts were also considered during the database search process. In instances where information was incomplete or required clarification, direct communication with authors was initiated. A consistent search strategy was applied across various databases, and comprehensive searches were conducted in key journals and the reference lists of included papers.

3.2. Study Selection and Data Extraction

The eligibility criteria for articles included English-language articles published in peer-reviewed journals. Additionally, articles should focus on national cancer control and management programs in the studied countries. They should cover aspects such as prevention, screening, diagnosis, treatment, supportive care, research, and registration of cancer, providing comprehensive informa-

tion on the strategies, processes, and policies employed. Articles with insufficient information or data regarding the NCCPs, as well as those published in languages other than English, were excluded. Furthermore, articles lacking relevance to the objectives of the study or published before the specified timeframe were not considered for inclusion.

Two authors independently compiled a list of included studies, with a third author available for mediation in case of discrepancies. Data extraction was carried out independently by two authors, who recorded the information from selected studies in a standard Microsoft Excel spreadsheet. In the event of disagreements, consensus was sought, and if needed, a discussion with the third author was initiated. For each study, the following information was extracted: (1) Study characteristics, such as sample size, demographics, and the country where the study was conducted; (2) study environment; (3) summary of the national program for the control and management of cancer treatment in the studied countries.

4. Results

4.1. Findings, Search Results, and Recommendation of Studies

A total of 286 articles were initially identified, with 46 articles being excluded due to duplication. After reviewing the abstracts, 198 articles were further excluded from the study for reasons such as lack of relevance to the topic, focusing on specific cancers, absence of full text, or concentrating solely on surgical costs. Subsequently, the researcher examined the full text of 42 articles, resulting in the exclusion of 20 articles that did not address a comprehensive national program for controlling and managing non-surgical costs of cancer. These excluded articles either referred to subsets of the program or focused on the control program of specific cancers. The final selection comprised 22 articles.

To enhance the comprehensiveness of the search, the researchers manually reviewed the reference lists of all related articles found in the initial search. In the qualitative review, 17 articles were further excluded, leaving a final selection of five articles for inclusion. To mitigate bias, all steps of source extraction and review were independently conducted by two researchers.

The study encompassed an examination of the national cancer treatment control and management programs of America, Finland, England, Iran, and Turkey. Table 1 presents the characteristics of these studies, based on the four selected studies from the five articles mentioned. The rationale for choosing and presenting these specific studies as a sample was their comprehensive nature, high scientific precision, inclusivity, and adherence to other scientific standards within their respective works for each of the countries under study.

Table 1. National Cancer Treatment Control and Management Program of the Studied Countries

Source	Study Country	Summary of Findings
Jalali and Khodabakhshi Kolayi, 2018	Iran	In 2012, representatives of the IAEA and the WHO evaluated the status of Iran's NCCP. Recommendations to improve this program in Iran were proposed in six categories, including planning, cancer registration and information, prevention, early diagnosis, diagnosis and treatment, and palliative care. The recommendations emphasize strengthening continuous activities in the field of tobacco control, obesity, and HBV vaccination to prevent cancer. According to the recommendations, Iran should create a national strategy for early cancer detection and prepare evidence-based guidelines for the early detection of cancers that can be identified through screening. Palliative care services, both hospital-based and home-based, are limited in Iran, with few centers run by charitable organizations.
Dams, 2020	America	The components of the third American cancer control program from 2014 to 2020 included research and innovation, prevention, screening, and improving the quality of life for cancer patients. The tobacco control law is one of America's cancer prevention programs. Two national breast cancer screening programs and colon cancer screening programs are conducted in the United States. For cancer treatment, it is mandatory to organize coordinated multidisciplinary meetings in each institution to provide the best treatment. Cancer treatment institutions must renew their treatment licenses.
Micheli et al., 2019	Finland	Finland's cancer control program is 10 years old and includes prevention, screening, treatment, palliative services, and cancer registration. Anti-smoking activities and HBV vaccination are part of the cancer prevention programs. Screening is conducted for stomach, breast, cervix, liver, and colon cancers. The government implements a national model of home-based hospice care for terminally ill patients as part of palliative care services. The National Cancer Registry of Finland annually records detailed information on cancer cases from over 150 teaching hospitals across the country. The National Cancer Information Center provides evidence-based cancer information to the public and cancer professionals through its call center, website, and publications. Regional cancer centers have been established in Finland to address inequalities in service delivery.
Sayani, 2019	England	In the 2016 British Cancer Control Program, the three priority areas of the cancer control program include: Clinical services, research and collection and management of cancer data/information. The components of this program include: Cancer control coordination, cancer prevention and early diagnosis, providing cancer services along the cancer path, cancer education, cancer workforce, cancer research, and fundraising and quality assessment and accreditation. Cancer prevention strategies in England include: Implementation of the SunSmart campaign to prevent skin cancer, special prevention strategies related to tobacco, free telephone answering by trained nurses for breast cancer 5 days a week. There are many comprehensive cancer centers in England. Non-governmental organizations are focused on funding cancer research, cancer prevention, patient support, and educational services. All Englishmen are covered by insurance. Even non-governmental organizations offer free or fully subsidized support services to cancer patients and their families.
Goltkin et al., 2019	Turkey	Turkey's comprehensive cancer control program includes six components: Epidemiology and research, public information and health education, prevention, early diagnosis, treatment, and pain relief. Among the preventive programs, the tobacco control law and infant vaccination are highlighted. Screening programs include breast examination and annual clinical examinations by a doctor. Although mammography is not easily accessible, there has been a shift in health policy from pap smear to visual acetic acid as the preferred method for cervical cancer screening nationwide. Bowel cancer screening involves the FOBT test. The program also outlines the establishment of a cancer care network aimed at developing self-sufficient communities responsible for cancer care and control throughout the country.

^z Abbreviations: IAEA, International Atomic Energy Agency; WHO, World Health Organization; NCCP, National Cancer Control Program; HBV, hepatitis B virus.

4.2. Review of Studies

During this phase of the research, the focus was on examining the national cancer control and management programs. Articles were conducted in the United States of America, Finland, England, Turkey, and Iran. We aimed to provide a comprehensive understanding of how cancer is controlled, fought, and treated in the studied countries. More detailed findings related to Iran and the four countries under comparison will be discussed.

4.2.1. Iran

In 2012, representatives from the International Atomic Energy Agency (IAEA) and the World Health Organization (WHO) examined the status of Iran's national cancer prevention program. Recommendations have been proposed to improve the program in Iran in six categories: Policy, cancer records and information, prevention, early detection, diagnosis and treatment, and palliative care. The recommendations emphasize the need to increase sustained efforts in tobacco control, obesity, and hepatitis B virus (HBV) cancer prevention. According to the proposal, Iran should develop a national system for the early detection of cancer, and those who can be screened (such as breast and colorectal cancer) or diagnosed early (such as colorectal, prostate, constipation, and stomach).

4.2.2. UK

The Cancer Control UK Program (2016) includes three priority areas: Clinical services, research, and collection and data/information management. The components of this program include cancer control coordination, cancer prevention and early diagnosis, providing cancer services along the cancer path, cancer education, cancer workforce, cancer research, fundraising, and quality assessment and accreditation. Cancer prevention strategies in England include the SunSmart campaign to prevent skin cancer, special prevention strategies related to tobacco, and a free telephone answering service by trained nurses for breast cancer, available five days a week. Non-governmental organizations have been very active in public education about cancer, especially cancer prevention. National cancer screening programs are largely implemented by state and territory governments using Commonwealth funds. Cancer treatment is managed by multidisciplinary teams and is increasingly done through the implementation of clinical guidelines. There are many comprehensive cancer centers in England. Non-governmental organizations focus on funding cancer research, cancer prevention, patient support, and educational services. The Commonwealth and state governments spend a large part of their budgets on cancer funding, cancer treatment, and palliation. In England, socio-economic status is not an obstacle to accessing high-quality cancer control because all English people are covered by insurance. Even non-governmental

organizations offer free or fully subsidized support services to cancer patients and their families.

4.2.3. America

The first American NCCP, from 2003 to 2008, included prevention, screening, care, social support, staff training, and research. This program was created as a result of the establishment of the American National Cancer Institute (NCI) and became the foundation for the second cancer control program. From 2009 to 2013, the second program in America focused on research and innovation, prevention, screening, and improving the quality of life for cancer patients. One of America's cancer prevention programs is the tobacco control law. The United States carries out two national breast cancer screening programs and colon cancer screening programs. For cancer treatment, it is mandatory for each institution to organize a coordinated multidisciplinary meeting to provide the best treatment. Cancer treatment institutions must also renew their treatment licenses. The US NCCP emphasizes the integration of research units and the formation of large research organizations with increased funding.

4.2.4. Finland

The government has comprehensive 10-year plans for cancer control. The Finnish cancer control program includes prevention, screening, treatment, palliative services, and cancer registration. Anti-smoking activities and HBV vaccination are cancer prevention programs. Cancer screening is performed for stomach, breast, cervix, liver, and colon cancers. The national model of home-based hospice care for palliative care of terminally ill patients is carried out by the government. Cancer patient management programs provide various medical care services for low-income cancer patients, such as counseling and pain control, as well as a care plan for terminally ill cancer patients, which includes improving the quality of palliative care units. The National Cancer Registry of Finland annually records detailed information on cancer cases from more than 150 teaching hospitals across the country. The National Cancer Information Center provides evidence-based cancer information to the public and cancer professionals through its call center, website, and publications. In Finland, regional cancer centers have been established to strengthen cancer care infrastructures and address inequality in receiving services.

4.2.5. Turkey

Turkey's comprehensive cancer control program includes six components: Epidemiology and research, public information and health education, prevention, early diagnosis, treatment, and pain relief. The prevention programs include the tobacco control law and in-

fant vaccination. The causes and prevention of six cancers (lung, breast, liver, cervix, oral cavity, colon, and rectum) are discussed. The screening programs mentioned are BSE breast examination and annual clinical examinations by a doctor. It is noted that mammography is not easily accessible, and the health policy has been changed from Pap smear to visual acetic acid as the chosen method of cervical cancer screening throughout the country. The FOBT test is included in the bowel cancer screening program. The program also mentions the cancer care network, which aims to develop a network of self-sufficient communities responsible for cancer care and control in the country.

4.3. Results of Comparing the National Cancer Control Programs

Comparison of the results showed that more developed countries such as America, England, and Finland have more detailed and documented programs for managing cancer treatment. The research findings in the comparison of cancer treatment control and management programs in the studied countries showed that, despite some general similarities in their programs and goals, there are also significant minor differences. Based on the findings of the comparative study, all the studied countries had formulated and implemented a national and comprehensive cancer control program. In the NCCP of all countries, the aspects of prevention, screening and early diagnosis, treatment, supportive and palliative care, cancer research, and cancer registration were considered as the main components of cancer control. Of course, in the NCCP of some countries, there were other dimensions, such as the dimension of “cancer justice” in the UK program, which were other dimensions of the cancer control program of the studied countries.

In the prevention dimension, programs to fight against tobacco and reduce alcohol consumption are implemented in the cancer management program of all the studied countries. Programs to raise awareness and educate the community and children, as well as the HPV vaccination program, are carried out in the United Kingdom and the United States. In Iran, campaigns to control smoking and reduce salt consumption are held every year in February and at the same time as the National Cancer Week (1st to 7th of Bahman).

In terms of screening, screening for breast, colorectal, and cervical cancers is performed in NCCP in all the studied countries and Iran, although the methods of implementation, the target population, and the frequency of screening differ.

In terms of treatment, there are different strategies in countries in this regard. In some countries, treatment is free, and in some countries, such as America, cancer treatment is completely covered by insurance. In Iran, cancer is diagnosed late and usually in the 3rd and 4th stages of the disease, so the consumption of chemotherapy drugs increases, and chemotherapy and radiotherapy services are provided free of charge to these patients in government centers.

In terms of palliative care, the NCCP of the United States and England provide high-level palliative care in almost all medical centers in the country. In England, remote palliative care and free palliative supportive care consultations are conducted over the phone. However, in Iran, palliative care for cancer patients is not provided in an integrated manner.

Regarding cancer registration, population-based cancer registration is carried out in many cancer registration centers in all the countries studied. The confidentiality of patient information is taken into consideration in the cancer registry of all countries. In England, there is a national cancer screening registry for colon and cervical cancers. America has one of the largest cancer databases in the world, which aims to provide a reliable database to support cancer research. In Iran, the “Integrated Cancer Information Management System” (Simai Cancer) has been designed and implemented. This system is a web-based and integrated software at the national level that records cancer diagnosis and treatment information.

On the side of cancer research, in England, most non-governmental and charitable organizations cover the costs associated with cancer research. Clinical trials are conducted in American cancer research. Cancer research is one of the most prosperous and active scientific fields in the United States, and one day a month is designated as “Cancer Research Day” to increase educational opportunities about cancer clinical trials. In Iran, it is difficult to obtain government support for cancer research, but around 200 active researchers in the country have received support in the field of cancer research.

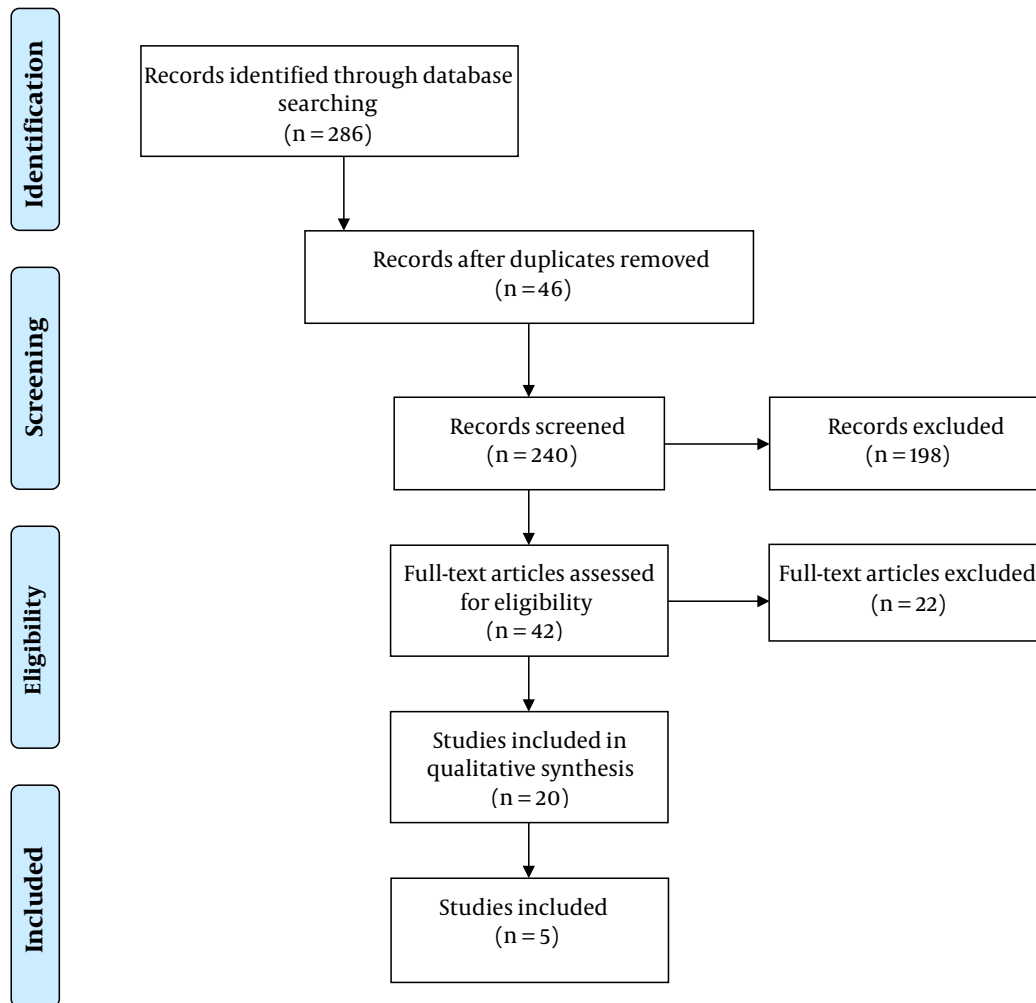


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram for clinical trials

5. Discussion

In the discussion of NCCPs, a nuanced examination of the approaches adopted by America, Finland, England, Turkey, and Iran reveals both shared objectives and distinctive strategies. These countries, each with its unique socio-economic and healthcare landscape, have developed comprehensive initiatives to combat the multifaceted challenges posed by cancer. While common goals such as prevention, early detection, treatment, and palliative care are evident across all nations, variations in implementation and emphasis highlight the importance of context-specific approaches. This discussion delves into the key findings of the comparative analysis, shedding light on the strengths, weaknesses, and opportunities for improvement within each country's cancer control efforts.

All the countries under examination had formulated and implemented comprehensive NCCPs (11, 12). The main components across all NCCPs included prevention,

screening and early diagnosis, treatment, supportive and palliative care, cancer research, and cancer registration. Additionally, some countries incorporated unique dimensions, such as the "cancer justice" dimension in the UK program.

In terms of prevention, all countries have implemented robust initiatives aimed at combating tobacco use and reducing alcohol consumption, recognizing these as significant risk factors for cancer development (13). Specifically, the UK and the US have undertaken extensive awareness and education campaigns to promote healthier lifestyle choices, alongside implementing an HPV vaccination program to prevent certain types of cancer. In contrast, Iran has prioritized controlling smoking and reducing salt consumption during its National Cancer Week, aligning with its efforts to address modifiable risk factors within its population.

Regarding cancer screening, breast, colorectal, and cervical cancer screenings are widely available and promot-

ed across all studied countries as well as in Iran. However, there are notable differences in the methods employed, target populations identified, and screening frequencies implemented. These variations reflect the unique healthcare infrastructures and cultural contexts of each country, highlighting the importance of tailoring screening programs to meet the specific needs and challenges of diverse populations.

Treatment strategies varied significantly among the countries examined. While some countries provided free cancer treatment, others, such as the US, relied on insurance coverage for cancer care. In Iran, late-stage cancer diagnoses contributed to a higher consumption of chemotherapy, with government centers offering free chemotherapy and radiotherapy services to patients. However, the availability and accessibility of treatment differed across regions and healthcare facilities.

Regarding palliative care, there were notable disparities among the countries. The US and the UK were found to offer high-level palliative care services in medical centers, with additional options for remote consultations to enhance accessibility. In contrast, Iran lacked an integrated palliative care system for cancer patients, highlighting a gap in supportive care services. This disparity underscores the importance of addressing the holistic needs of cancer patients, including pain management and psychosocial support, to ensure a comprehensive approach to cancer care across all settings.

Cancer registration was a common practice in all studied countries, with confidentiality of patient information emphasized (14-16). Notably, England had a national cancer screening registry for colon and cervical cancers, while America maintained one of the world's largest cancer databases. Iran implemented the "Integrated Cancer Information Management System" to record cancer diagnosis and treatment information (17-19).

In the aspect of cancer research, notable disparities emerged among the examined countries. England's reliance on non-governmental and charitable organizations for funding highlighted a collaborative approach to research financing. In contrast, America's robust scientific field was characterized by an active pursuit of clinical trials and innovative research initiatives, showcasing its leadership in oncology research. Iran faced challenges in securing government support for cancer research, yet approximately 200 researchers received backing, underscoring grassroots efforts within the country's scientific community. These varied approaches underscore the diverse landscapes of cancer research funding and highlight the resilience of researchers in contributing to advancements in cancer care globally.

Overall, the comparative study highlights the need for continuous improvement and collaboration in cancer control programs worldwide, with a focus on addressing specific challenges and tailoring strategies to each country's unique healthcare landscape. Our findings highlight the constraints in Iran's NCCP. Addressing these bottle-

necks will require concerted efforts from policymakers, healthcare professionals, and stakeholders in Iran to allocate resources effectively, improve data collection and surveillance systems, enhance access to treatment and palliative care services, and strengthen collaboration with international partners to advance cancer research and innovation.

5.1. Conclusions

In summary, the discussion of NCCPs across America, Finland, England, Turkey, and Iran underscores both shared objectives and distinctive strategies shaped by each country's socio-economic and healthcare landscape. While all nations prioritize prevention, early detection, treatment, and palliative care, nuances in implementation highlight the importance of tailored approaches. Key findings reveal comprehensive program components across all countries, with unique dimensions reflecting cultural contexts. Variations in screening methods, treatment accessibility, palliative care integration, and research funding underscore the complexity of global cancer control efforts.

Addressing constraints within Iran's NCCP will require concerted efforts to allocate resources effectively, improve data collection and surveillance systems, enhance access to treatment and palliative care services, and strengthen collaboration with international partners to advance cancer research and innovation. Despite limitations such as variability in data reporting and diversity in healthcare systems, this study emphasizes the need for continuous improvement and collaboration in cancer control programs worldwide. By leveraging country-specific strengths and addressing specific challenges, policymakers, healthcare professionals, and stakeholders can work towards enhancing cancer care outcomes globally. Efforts to standardize data reporting methods, consider healthcare system diversity, and tailor strategies to local contexts are essential for effective global cancer control and improved patient outcomes.

5.2. Limitations

Firstly, variability in data reporting: The study highlighted significant minor differences in the cancer control programs among the studied countries. The variability in data reporting methods and standards could potentially hinder direct comparisons and comprehensive assessments of the effectiveness of certain strategies across nations.

Secondly, diversity in healthcare systems: The diverse healthcare systems and structures of the studied countries may limit the applicability of certain strategies. What works effectively in one system may not seamlessly translate to another, necessitating a careful consideration of contextual factors.

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