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Cancer research priorities for early diagnosis in Iran: Analyses based on Multiple-Attribute Decision Making Model

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ABSTRACT

Introduction: National comprehensive cancer control programs combat cancer through different measures, including primary prevention, early detection, treatment, and palliative and supportive care. Among the others, early detection programs seem to be a promising intervention and lead to lower cancer mortality. We define research priorities for the early detection of cancers in Iran.

Methods:
We applied the multiple criteria decision-making (MCDM) tools using three key attributes, including “5-year prevalence”, “mortality to incidence ration as severity of disease,” and “economic burden,” to rank different cancers for research priorities. The priorities were ranked based on four scenarios based on the weighting of the attributes. We also used the differences in the 5-year survival between localized and advanced tumors as the effect of early detection and incorporated it as the decision rule into the priority-setting model.

Results:
Gastric cancer and cancers of the brain and nervous system ranked first in all the proposed scenarios. The most and least 5-year survival differences between localized and advanced cancers were observed for the kidney (80.5%) and the brain (3.3%) cancers. The top 10 priorities for early cancer detection in Iran were gastric, prostate, breast, lung, colorectal, ovarian, kidney, bladder, and cervical cancers.

Conclusion:
We used a quantitative method and demonstrated the priority areas for research in the early detection of cancer in Iran. Researchers and government may use these results to optimize their research strategies for cancer prevention in Iran

Keywords: cancer, early diagnosis, research, priority setting

INTRODUCTION:

World health organization (WHO), in the Seventieth World Health Assembly for "Cancer prevention and control in the context of an integrated approach," in 2017, clarified 22 goals to eliminate cancer. The 14th goal was to promote cancer research to improve evidence for cancer prevention and control, including research on health outcomes, quality of life, and cost-effectiveness (1). One of the most critical challenges in meeting these goals is the lack of data and empirical evidence. Research is one of the most components of the cancer control program and prepares evidence for decision-makers. Research is needed in many areas, including epidemiology, prevention, diagnosis, and treatment. A strong cancer control planning needs governance, data, budget, and surveillance (2). Early detection programs seem to be a promising intervention and lead to lower cancer mortality. With timely diagnosis and treatment, one-third of the cancer burden is reduced (3).

Priority setting for research topics leads to efficient use of limited resources, especially in low- and middle-income (LMIC) countries where the resource is minimal (4). In recent years, several studies have been conducted in high-income countries to determine research priorities in cancer. Their main results were categorized into disease control and management, patient-related issues, professional dimensions, economic evaluation of cancer tests and interventions, cultural and behavioral issues regarding cancer control, health system coordination for cancer control, life cycle approach for cancer control (5,6,7). The use of such approaches by researchers and research executives has become less operational in LMICs, partly because the applied methods used in this regard have been hardly disseminated on a wide scale (4).

The approach pf research priority setting can be divided into five main categories: subjective methods, valuing the burden of disease, valuing the impact on clinical practice, valuing information, and payback (4). In the subjective methods, the assessment of the importance of the research and the ranking are based on the subjective judgments of experts. For valuing the burden of disease, the assumption was: "the higher the burden of the disease, the greater the need for research (4). In valuing the impact on clinical practice, the value of research was measured as the impact of changes in clinical practice. In the valuing of information, decision to perform research is mainly related on the principle that information provided by research. Finally, in the payback, the costs and benefits of conducting research are assessed. The application of subjective methods, the burden of disease methods, and clinical variations and payback methods can't meet the objectives of the health system namely "providing the most health benefits to the population with considering of budget constraint and equity implications". This issue is mainly related to the fact that the valuing process of the impacts of conducting research in these three methods (subjective methods, the burden of disease methods, and clinical variations and payback methods) has serious shortcomings, but as it seems the value of information priority setting approach has been able to solve this problem (4).

So far, cancer research priorities have used qualitative methods, including "The James Lind Alliance" (8), the Council on Health Research for Development (COHRED) (9), Expert consensus and the Delphi technique to prioritize oncology research. As the examples, by using expert consensus methods, prioritization of research related to prostate cancer was performed in Canada, and for the first time, the questions that were in the minds of patients and clinician was considered (10). For the research priority setting regards to preventing occupational cancer in Canada, expert panels and also reviewing data registries were used (11).

Although MCDM has been used for priority setting and resource allocation of health interventions, but it seems that it has the great capacity for research priority setting, especially for cancer research. We could not find studies based on quantitative methods including MCDM models as the valuing information model for research priority setting.

In this study we aimed to use MCDM and defined priorities for early detection of cancer in Iran.

Methods:

MCDA techniques have wide applications in the public and private sectors. MCDA is classified into two general categories: multi-objective models (MODM) and multi-attribute models (MADM), with the former models being used in designing issues and the latter models used in selecting the best choice (12). In MODM, a set of objective functions are optimized considering the defined restrictions. In MADM, the number of alternatives is prioritized by comparing various alternatives concerning each attribute (12).

Model attribute

The existing systematic reviews in health care priority setting criteria were reviewed to identify related attributes (13, 14). These criteria were divided into five main categories, including health outcomes, population, alternative interventions, economic aspects, and the evidence level. We considered the mortality-to-incidence ratio of cancers as an indicator of the severity of cancers for the health outcome category. 5-year prevalence for the population category, and the economic burden for the economic aspect of the MCDA model. We did not consider alternative interventions and evidence level in this analysis due to the nature of priority setting in research.

Next, we applied one of the main MCDM methods, namely VIKOR (The VIKOR " a Serbian term for multi-criteria optimization and compromise solution" method is an MCDM technique that focuses on ranking and can lead the decision-maker to the final answer. This technique is the best option when faced with a conflicting attribute for determining and selecting the best alternatives (15). This research has been faced with this challenge; three key attributes, including "5-year prevalence", "severity of disease," and "economic burden," had conflicting measurement units, namely "numbers or proportion" versus "price (currency)", hence, the use of this method can give better answers than routine methods (like AHP and TOPSIS).

If the AHP method was used, considering the number of paired–wise comparison tables used, where there are 24 alternatives against three attributes, it could lead to biased results (the limitation of AHP for the number of alternatives: at least five and at most 9). Also, we could use TOPSIS methods. But due to the fact that it is mentioned in the literature that if there are attributes with different and conflicting units (In this research, "numbers versus price"), VIKOR methods should be preferred. Also, due to the use of the V coefficient and collective agreement, VIKOR has better optimization in decision-making, which is the superiority of this method over other multi-criteria decision-making methods.

We used the global cancer observatory (GCO) website (2018) (16) to obtain a 5-year prevalence and the mortality-to-incidence ratio. For the economic burden of cancer, we calculated the cost of each type of cancer by multiplying the number of cancer prevalence in Iran by the average cost per prevalent case. Regarding some cancers, including breast, colorectal, and lung cancer, the average cost per prevalent case was extracted from previous studies conducted in Iran (17-20). However, no study had been conducted in Iran regarding other cancers. To estimate the average cost of these cancers in Iran, we assumed that the ratio of the average cost of each cancer to the average cost of breast cancer in Iran is the same as in other countries. Thus, we used the result of the study conducted by Lee et al. in Korea to estimate the average cost of cancers that we did not have data in Iran (21). For this purpose, we first calculated the ratio of the average cost of each cancer to breast cancer in Korea. Then we multiplied the calculated ratio by the average cost of breast cancer in Iran. We chose the Lee et al. study in Korea because it provided valuable information on the average cost of various cancers. (Table 1).

After the collection of data for the MCDA attributes, we considered four different scenarios based on the different weights considered for each attribute as follows:

Scenario 1: 5-year prevalence: 33%, disease severity: 33%, economic burden: 33%

Scenario 2: 5-year prevalence: 50%, disease severity: 25%, economic burden: 25%

Scenario 3: 5-year prevalence: 25%, disease severity: 50%, economic burden: 25%

Scenario 4: 5-year prevalence: 50%, disease severity: 25%,

Table 1. Estimation of Economic Burden of Cancer in Iran

Cancers Type	Cost per prevalence case ($) (8)	Number of prevalence cases in Iran	Relative frequency
Bladder	8,242.44	17284	179.26
Brain	14,520.57	12345	437.60
Breast	10,718.92	40825	270.47
Colorectum	11,109.79	24345	61.28
Esophagus	14,589.77	4200	14.04
Gallbladder	14,366.48	977	57.87
HL	13,808.53	4191	49.41
Kidney	9,704.71	5091	51.96
Larynx	9,189.27	5654	425.59
Leukemia	27,350.05	15561	43.28
Liver	16,204.28	2671	99.35
Lung	15,377.65	6461	73.58
Multiple Myeloma	21,072.33	3492	44.64
Mouth	12,285.32	3634	138.07
Non-Hodgkin Lymphoma	16,449.22	8394	57.98
Ovary	11,764.54	4928	22.79
Pancreas	15,611.90	1460	100.65
Prostate	7,271.85	13841	11.35
Skin	7,608.85	1492	163.59
Stomach	10,378.81	15762	22.69
Testis	11,058.96	2052	119.97
Thyroid	Thyroid	13812	22.14
Uterine	8,473.64	2613 (Cervix uteri)	179.26 (Cervix uteri)
Uterus	8,549.40		

economic burden: 25%

This sensitivity analysis was performed because changing the weight of each attribute can completely affect the final ranking. We were uncertain how to weigh different attributes. Therefore, based on the consensus among the research team, we defined these scenarios for analysis. We reported the scenario with equal weights as the main scenario (The base case). Therefore, to take into account the effects of all the attributes on the obtained ranking, each of the attributes in each scenario was allocated by half of the importance weight (compared to other attributes), and the rest of the importance weight in other attributes was divided equally. We then ranked the cancers according to the MCDA model using the VIKOR method. In each scenario, the cancers were first ranked based on the points obtained and then divided into three groups: high, medium, and less priority for intervention and research in Iran.

Priority setting

We used a combination of MCDA and decision rules (22) to prioritize cancer research for early detection. We assumed that the difference between the 5-year survival rate in the localized (stage 1) and advanced stage (stage IV) is associated with early detection measures. In other words, we assumed that if the stage IV cancer patients had been diagnosed earlier (stage I), they would experience higher survival. For example, if the difference in the survival of stage IV and stage I cancer is 50%, early detection would save an additional 50% more patients from death. Given that the data on the 5-year survival rate of localized and advanced tumors were not available in Iran, we used stage-based survival rates from SEER data in the United States (23) and calculated the percentage of the 5-year survival between stage IV and stage I for each cancer site.

The cancers were divided into five groups based on the quartiles cut-point of the estimated difference between stages IV and I, including 1) <= 3.3 %, 2) 3.3%-34.5%, 3) 35.5-52.2%, 4):52.2%-69.5%, 5) 69.5-80.5%.

In this research, some attributes in the priority setting have the nature of trade-off, which is used in the VIKOR model. Still, one of them was considered as a sufficient condition due to their high importance in the decision-making process. For instance, cancer type remained in the rank obtained from the trade-off stage if it met the sufficient condition's cut-off point; otherwise, the closest rank that met the cut-off point was considered for them. Accordingly, in the previous step, cancers in the high-importance group remained in their group, provided that diagnosis in the early stage will make a significant difference in survival compared to the advanced diagnosis. If otherwise, they did not satisfy this condition (determined cut-off point: survival group: 4 or 5) and were moved from the higher priority group to the lower group. If the early diagnosis made a significant survival benefit for cancers in the lower group, they moved to the higher priority group.

Results:

ARanking based on four weighting scenarios showed that gastric cancer and cancers of the brain and nervous system ranked 1 in all the studies scenarios. (Table 2). However, the ranks varied between scenarios for other cancer types. For instance, while prostate cancer ranked three in the first scenario, breast cancer ranked three in all other scenarios.

The difference between the 5-year survival rate of early-stage (localized) and advanced stages is presented in Table 3. The most considerable differences were observed for kidney (80.5%), corpus uteri (78.2%), breast (71.4%), colorectal (75.7%), and cervix uteri (74.9%) cancer indicating the importance of early detection in these cancer sites. In contrast, the difference was very low in the brain and nervous system (3.3%), Hodgkin lymphoma (8.7%), non-Hodgkin lymphoma (12.5%), Multiple myeloma (22.8%), indicating that the early detection will not change the outcome of these cancer types and priority will be the proper treatment (Table 3).

Table 4 presents the results for optimized priorities for the first scenario. For instance, stomach cancer which was in rank one and had a high survival difference between early and advanced stages (63%), remained in the high-priority group. However, brain and nervous system cancer dropped from the high-priority list due to the small survival benefit by early detection measures. On the other hand, kidney cancer, ranked 14 and grouped in the medium priority group, moved to a higher priority category because of significant survival benefits through early detection.

Table 5 demonstrates the final list of the top 10 cancer types for research priorities in Iran. It shows that stomach cancer is the most important cancer based on all four scenarios for early detection in Iran. It also shows that prostate, breast, lung, colorectal, ovary, and bladder cancers are among the most important cancers to be prioritized for the early detection of cancer in Iran.

Discussion:

For the first time, we used the "MCDA with decision rules"(22) to define research priorities for the early detection of cancer. We found that the top 10 high-priority cancers for research on early detection include gastric, prostate, breast, lung, colorectal, ovarian, kidney, bladder, and cervical cancers. We applied different scenarios for ranking and found that gastric, prostate, breast, and lung cancers are the most important cancer for early detection research in Iran.

Few studies have mentioned applied mathematics models for the priority setting in cancer research. In this respect, this study can provide a new model for resource allocation in this field. One study by Adunlin et al. (2015) entitled "Multi-Criteria Decision Analysis in Oncology" used such models. Given the increasing use of multiple-criteria decision-making methods in healthcare de-

Table 2. General ranking of cancer sites for intervention and research according to the four scenarios

Cancers Type	Rank in 1st scenario	Rank in 2nd scenario	Rank in 3rd scenario	Rank in 4th scenario
Stomach	1	1	1	1
Brain, nervous system	1	1	1	1
Prostate	3	4	4	4
Non-Hodgkin lymphoma	3	4	5	4
Breast	5	3	3	3
Lung	6	10	10	10
Colorectum	7	6	6	6
Larynx	8	11	11	11
Multiple myeloma	8	11	11	11
Leukemia	10	7	6	7
Esophagus	11	13	14	14
Ovary	11	13	15	14
Lip, oral cavity	13	13	13	13
Kidney	14	16	16	16
Hodgkin lymphoma	14	16	17	16
Pancreas	16	20	20	20
Bladder	17	8	8	8
Thyroid	17	8	8	9
Liver	19	21	21	21
Gallbladder	20	22	21	22
Testis	21	22	23	22
Cervix uteri	22	18	17	18
Corpus uteri	22	18	19	19
Melanoma of skin	24	24	23	24

Weights in scenario 1: 5-year prevalence: 0.33, disease severity: 0.33, economic burden: 0.33
Weights in scenario 2: 5-year prevalence: 50%, disease severity: 25%, economic burden: 25%
Weights in scenario 3: 5-year prevalence: 25%, disease severity: 50%, economic burden: 25%
Weights in scenario 4: 5-year prevalence: 50%, disease severity: 25%, economic burden: 25

cisions, it is better to use these methods in cancer (24). MCDA seems to be a good tool that can be used for clinical decision-making regarding cancer policy.

According to our results, gastric cancer was ranked first for early detection of cancer in Iran. There are some opportunistic and sporadic prevention programs for breast, colorectal and cervical cancer but we do not have a global consensus on screening of gastric cancer. Gastric cancer is the most common cancer among Iranian men, gastric cancer is usually diagnosed at a very late stage, and the prognosis of gastric cancer is very poor (25-26). Detection of gastric cancer in a localized stage will improve the prognosis (23). Asia was known as a high incidence gastric cancer continent in the world. Asian countries like Japan and Korea worked on the early detection of gastric cancer. Screening with endoscopy is more effective than other screening methods. The new updated version of Japanese guideline, a country with high incidence gastric cancer, recommended for both population-based and opportunistic screening by imaging and endoscopy. Due to the lack of evidence, H. Pylori antibody and serum pepsinogen tests were not recommended as screening methods to identify the high-risk groups for screening (27). Howev-

Table 3. The difference between 5-year survival at different stages according to the type of cancer (source: SEER program)

Cancers Type	Localized (%)	Regional (%)	Distant (%)	5-year survival difference (%)
Bladder	69.5	36.3	4.6	64.9
Breast	98.8	85.5	27.4	71.4
Colorectum	89.9	71.3	14.2	75.7
Kidney	92.5	69.6	12	80.5
Lungs	57.4	30.8	5.2	52.2
Melanoma of skin	98.7	64.7	24.8	73.9
Stomach	68.8	31	5.3	63.5
Pancreas	37.4	12.4	2.9	34.5
Prostate	100	100	30.5	69.5
Thyroid	99.9	98.2	56.2	43.7
Corpus uteri	95	69	16.8	78.2
Brain and nervous system	35.7	20.2	32.4	3.3
Liver	32.6	10.8	2.4	30.2
Testis	99.2	96.4	72.8	26.4
Larynx	77.4	44.7	33.3	44.1
Ovary	92.4	75.2	29.2	63.2
Esophagus	46.7	25.1	4.8	41.9
bone marrow	73.9	0	51.1	22.8
Cervix uteri	91.8	56.3	16.9	74.9
Lip, oral cavity	84.4	66	39.1	45.3
Multiple myeloma	73.9	NA	51/1	22.8
Hodgkin lymphoma	91.6	93.5	82.9	8.7
Non-Hodgkin lymphoma	82.6	75.2	70.1	12.5

er, Sugano et al in Korea declared that in the future gastric cancer should be a compound of “screen to treat” of H. Pylori in the young population and then followed by endoscopy intervention for high risk groups (28). Kim et al emphasized that endoscopic screening for immigrants from Asia and other high incidence countries should be performed (28). Guideline Committee of the Korean Gastric Cancer Association (KGCA) in 2019 recommended population screening for high-incidence areas of gastric cancer and high-risk group screening in low-incidence areas (29). National population screening was implemented for biannual endoscopic screening for all individuals older than 40 years in Korea and 50 years in Japan (29). In a meta-analysis, 40% relative risk reduction in gastric cancer mortality occurred in Asian countries based on endoscopy screening (30). Although endoscopic screening is performed in Japan and North Korea (31), there are no valid and reliable methods for screening gastric cancer worldwide. Research to identify reliable and valid methods and technology for screening of gastric cancer is a national and international priority.

Breast and colorectal cancers were also among Iran’s top priorities for early cancer detection. Although mammography screening, fecal immunochemical test (FIT test), and colonoscopy are promising methods for screening breast and colorectal cancers, respectively, it is not feasible and cost-effective to introduce population-based and organized screening programs in Iran and several low and middle-income countries (32, 33). In addition, cervical cancer has been a priority for the early detection of cancer in Iran. Although HPV testing

Table 4. Comparison between the 5-year survival difference code and the obtained rank for each cancer based on the first scenario

General Cancer Research Group	Cancer Type	Rank	Survival group	Final Situation
Cancers that are within 50% of the upper limit: Highly important for cancer research	Stomach	1	4	Stay in this group
	Brain, nervous system	1	1	Moved to lower group
	Prostate	3	5	Stay in this group
	Non-Hodgkin lymphoma	3	2	Moved to lower group
	Breast	5	5	Stay in this group
	Lung	4	4	Stay in this group
	Colorectum	7	5	Stay in this group
	Larynx	8	3	Moved to lower group
	Multiple myeloma	8	2	Moved to lower group
	Leukemia	10	NA	Moved to lower group
	Esophagus	11	3	Moved to lower group
	Ovary	11	4	Stay in this group
Cancers that are within 25% of the median limit: Somewhat important for cancer research	Lip, oral cavity	13	3	Moved to lower group
	Kidney	14	5	Moved to group of high importance
	Hodgkin lymphoma	14	2	Moved to lower group
	Pancreas	16	3	Moved to lower group
	Bladder	17	4	Moved to a group of high importance
	Thyroid	17	3	Moved to lower group
Cancers that are within 25% of the lower limit: Less important for cancer research	Liver	19	2	Moved to lower group
	Gallbladder	20	NA	Moved to lower group
	Testis	21	2	Moved to lower group
	Cervix uteri	22	5	Moved to a group of high importance
	Corpus uteri	22	5	Moved to a group of high importance
	Melanoma of skin	24	5	Moved to a group of high importance

*Survival differences between early and advanced stages were categorized into 5 groups including group 1: <= 3.3 %, group 2: 3.3%-34.5%, group 3: 35.5-52.2%, group 4:52.2%-69.5%, group 5: 69.5-80.5%

is a cost-effective method for screening Iranian women, it is still expensive to provide screening for all at-risk women in Iran (34), and the implementation of cervical cancer is challenging. Early detection programs are not available for most cancer types. Research is needed to establish new methods and implement them in the public health system. There is no appropriate biomarker for several cancers to detect cancer patients in the early stage. For some cancers like prostate cancer, PSA screening has been introduced as a screening Although PSA screening may reduce the risk of prostate cancer mortality, it is associated with false-positive results, biopsy complications, and over diagnosis. Therefore, its application for the prevention of prostate cancer is not recommended yet (35). Research is needed to find new technology or optimize the methods for the early detection of cancers.

The European Union EU aims to develop patient-based

Table 5. An overview of the results of all four scenarios for priority setting of early detection research in Iran

Final Priority Rank	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Stomach	Stomach	Stomach	Stomach
2	Prostate	Breast	Lung	Breast
3	Breast	Prostate	Prostate	Prostate
4	Lung	Colorectum	Ovary	Colorectum
5	Colorectum	Bladder	Breast	Lung
6	Ovary	Lung	Colorectum	Bladder
7	Kidney	Ovary	Kidney	Ovary
8	Bladder	Kidney	Bladder	Kidney
9	Cervix uteri	Cervix uteri	Melanoma of skin	Cervix uteri
10	Corpus uteri	Corpus uteri	Cervix uteri	Corpus uteri

strategies for fighting against cancer. The approach has shifted from prevention to more effective and timely diagnosis and better treatment with minimal side effects. To achieve practical benefits and improve the quality of life of EU citizens, EU-sponsored research focuses on diagnosing the causes and mechanisms of cancer, turning this basic knowledge into clinical programs, and supporting clinical research on new and improving interventions (36). In the United Kingdom, about 500 million pounds is spent on cancer research annually by charities and the government, which has led to the production of important scientific knowledge that can be disseminated worldwide (37).

The list of cancers for research priorities in early detection will differ in each country, as it depends on the incidence, prevalence, and mortality rates of cancer in each country. For instance, gastric cancer, the most important cancer in Iran, may not be important in other countries with a lower incidence and prevalence rate. For instance, gastric cancer is ranked one among Iranian men, while it has become less common in the USA (38, 39). Therefore, the priority area of research would be different in different cancers. However, some cancers like breast and colorectal, and prostate and lung cancers that are common in most countries will remain on the list of top cancers for early detection. However, it will be useful to use this method and define priorities for research on the early detection of cancers at the global, regional, and country levels. In this study, we only defined a list of priorities for the early detection of cancer. It would be useful to develop methods for other aspects of cancer control, including primary prevention, treatment, and palliative care.

Our study has some limitations, especially regarding the data used in the model. Data related to the cost of some cancers in Iran were not available. To estimate the average cost of these cancers in Iran, we assumed that the ratio of the average cost of each cancer to the average cost of breast cancer in Iran is the same as in other countries. Although the access of cancer patients to medical interventions and the cost of treatment varies in different countries, we can assume that within a country, the access of different cancer patients to treatments and the prices of treatments are generally the same. In other words, the ratio of the average cost of cancer (for example, breast cancer) to other cancers is almost similar in different countries. Therefore, although the method used in our study may have some bias, we think this bias will not significantly impact our study results.

In this study, we have used the difference between the survival rates of stage I and IV cancers in our model as the benefit of early detection. We did not have access to the survival data of different cancers by stage in Iran. We assumed that the difference between the survival rates of stages I and IV of cancers in Iran is similar to that of the United States. However, we believe that this assumption is reasonable and will not have a significant impact on the results of our study.

Generally, the use of such quantitative methods in the field of health policy can make the way clearer, but we know that many factors affecting the health sector, including cancer policy making, cannot be quantified, such as equity, moral issues, etc., which should look for methods that can strengthen this tool in these topics. Also, this research has used only one type of multi-criteria decision-making method, but similar methods, such as TOPSIS, can be used in this framework in future studies. Also, in future studies, pairwise comparisons can be used to extract the weights of each attribute, considering that in this method, all the stakeholders of a research topic should be involved, and the extracted weights are closer to reality.

In conclusion, the results of this study can be used for resource allocation by grant agencies, establishing research networks, and conducting research projects to improve early detection methods and strategies in Iran. This approach can be used to define the list of cancers that can be prioritized for early detection research at the global, regional, and country levels. We also suggest extending this method to identify the list of cancers that have higher priority for other aspects of cancer control programs, including primary prevention, treatment, and palliative care.

Declarations:

Ethics approval and consent to participate: Regional Research Ethics Committee of Tehran University of Medical Sciences approved the Study (Code: IR.TUMS.REC.1395.2729).

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