NOVEMBER 2024

WOMEN'S CANCERS IN THE EASTERN MEDITERRANEAN REGION

A CASE FOR INVESTMENT

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EXECUTIVE SUMMARY

Breast cancer is the most common cancer among women in the World Health Organization (WHO) Eastern Mediterranean Region (EMR), with around 130,000 new cases and 53,000 deaths in 2022. Cervical cancer also poses a significant challenge, with nearly 17,000 new cases and 11,000 deaths within the same year. The societal and economic burden of these cancers is dramatically high, due to resource limitations, low awareness, sociocultural barriers, and health system disruptions due to conflict and instability in many EMR countries and territories. Breast cancer also has the highest age-standardized incidence rate of all cancers in both sexes combined, which results in women dying prematurely (that is, before the age of 70 years), with their lives and livelihoods being disproportionally affected compared to men.

Breast and cervical cancers represent substantial public health and health equity issues, yet they are largely preventable. Governments across the globe have showed increasing interest and commitment to countering this trend, and have demanded tailored economic evaluation to guide decisions and prioritize the most cost-effective interventions. As a response, the WHO Regional Office for the Eastern Mediterranean (EMRO) developed a regional investment case on women's cancers, quantifying their significant socioeconomic burden, as well as the economic return from investing in evidence-based cost-effective interventions.

According to the investment case, the economic burden of both cancers was $15 billion in 2020, and is expected to accrue to $379 billion by 2040, with premature mortality accounting for 96.4 percent of this burden. However, the investment case also displayed significant health and economic benefits from scaling up cost-effective interventions, generating an 82 percent decrease in incidence and high return on investment (ROI) as a result of human papillomavirus (HPV) vaccination – between $2 and $6 gained for each dollar invested. Comprehensive treatment interventions for breast cancer are projected to reduce mortality by 26 percent and to yield almost $8 for each dollar invested.

The study highlighted key recommendations, including:

- Significantly increase investments in scaling up cost-effective interventions – especially HPV vaccination, early detection programs, and comprehensive treatment of breast and cervical cancer – and design programs according to country context.
- Address bottlenecks across the continuum of care and maximize efficiency using and strengthening existing women's service delivery platforms.
- Invest in data systems to better plan and regularly monitor progress and evaluate program performance.

The time to act is now. There is a critical need for a co-ordinated, well-resourced approach to tackle the growing burden of cervical and breast cancers in the EMR, emphasizing the economic and health benefits of early intervention and integrated healthcare strategies. By investing in proven, cost-effective measures now, we can create a future where fewer women in the EMR suffer from these preventable cancers, ultimately transforming the landscape of women's health in the region for generations to come.

INTRODUCTION

More than two million women receive diagnoses of breast or cervical cancer every year. However, the likelihood of a woman developing these 'women's cancers',* accessing timely diagnosis and treatments, and surviving, is significantly influenced by where she lives.[1] This is particularly striking in the case of cervical cancer, where about 85 percent of women who are diagnosed, and 88 percent of women who ultimately die from the disease, live in low- and middle-income countries (LMICs).[2] Premature death and disability caused by cancer are preventable tragedies affecting hundreds of thousands of women and their families annually. In regions with limited resources and fragile health systems, cancer further exacerbates the cycle of poverty. At macroeconomic and societal levels, cancer has a large impact on the economy, particularly through increased health expenditure and loss of productivity.[3] Cost-effective and efficient methods exist to reduce these disparities, yet many women lack access to life-saving interventions such as human papillomavirus (HPV) vaccination, and timely screening and treatment for cervical cancer precursors. There is an urgent, critical need for substantial and sustainable investments in comprehensive cancer control.

In 2020, the World Health Assembly adopted the WHO Global Strategy for Cervical Cancer Elimination,[4] which aims to end cervical cancer as a public health issue. A Regional Cervical Cancer Elimination Strategy[5] was later developed in 2022 in the EMR. In 2021, WHO introduced the Global Breast Cancer Initiative[6] to reduce breast cancer mortality by 2.5 percent annually, potentially saving 2.5 million lives over 20 years. WHO's focus on these two cancers is primarily motivated by their significant contribution to global mortality and morbidity. These diseases also act as tracers for other health priorities, offering a way to evaluate health system effectiveness in equity and outreach. Scaling up interventions on breast and cervical cancer responds to recent political commitments to universal healthcare and the overall noncommunicable disease (NCD) response, including World Health Assembly resolutions on primary healthcare, social determinants of health, quality of care, medicines and technologies, and research and innovation.

Cancer is a growing public health challenge in the EMR** accounting for considerable burdens of disease and death. The increase can be partially explained by an aging population, improved diagnostics and better reporting of cancer cases. The region has some of the highest lifestyle-related risk factors for cancer, such as physical inactivity, a high calorie diet and obesity, and tobacco smoking, all of which have shown a steady increase since 2000. The burden of common cancers is variable across EMR countries and territories, reflecting the heterogeneity of the region in terms of population characteristics, human development index, prevalence of risk factors for different cancers, and health system maturity. Cancer survival rates in the EMR are lower

* The term 'women's cancers' refers to cancers that exclusively affect women or affect them at a higher rate. However, for the purpose of this paper, it is used to refer to breast and cervical cancers that are included in the investment case modeling.

** WHO Eastern Mediterranean Region (EMR): Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, occupied Palestinian territory, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates and Yemen.

compared to other WHO regions such as the Americas and Europe. This discrepancy might be explained by typically late diagnosis and delayed access to adequate cancer treatment, resulting in preventable premature deaths and disability.

Breast cancer is the most frequent cancer among women in the EMR, with 130,062 new cases and 52,836 deaths in 2022. Cervical cancer also poses a significant health challenge, with about 16,833 new cases and 10,704 deaths in 2022. It represents the second most common cancer in Afghanistan, Morocco, Somalia and Sudan.[7] In this policy paper, women's cancers refer specifically to cervical and breast cancers, two of the primary women's cancers in the region. Eliminating these cancers also aligns with WHO key priorities. The number of women diagnosed yearly with either cancer is increasing, with late diagnoses exacerbating morbidity and mortality. Most EMR countries and territories face challenges with limited resources, often intensified by conflict, emergencies and political instability, leading to partial or complete health system disruptions. In addition, low awareness and sociocultural barriers – such as stigma linked to HPV being a sexually transmitted infection and fear of discrimination following a cancer diagnosis – are likely drivers of low take-up of preventive services and screening.

BREAST CANCER

Facts and statistics

- A disease in which abnormal breast cells grow out of control and form tumors.
- It is the most common cancer in women.
- Caused ~670,000 deaths globally in 2022.
- 0.5–1% of breast cancers occur in men.

Causes/risk factors

- Being of female sex is the strongest breast cancer risk factor.
- Other risk factors include:
  - Age
  - Obesity
  - Alcohol use
  - Family history
  - History of radiation exposure
  - Reproductive history
  - Tobacco use
  - Postmenopausal hormone therapy

Symptoms

- A breast lump or thickening, often without pain.
- Change in size, shape or appearance of the breast.
- Dimpling, redness, pitting or other changes in the skin.
- Change in appearance of the nipple or areola.
- Abnormal or bloody fluid from the nipple.

CERVICAL CANCER

Facts and statistics

- Cervical cancer is the growth of abnormal cells in the lining of the cervix.
- It is the fourth most common cancer in women.
- There were ~660,000 new cases and ~350,000 deaths in 2022.
- The highest rates of cervical cancer incidence and mortality are in LMICs.
- Being vaccinated at age 9–14 is a highly effective way to prevent HPV infection, cervical cancer and other HPV-related cancers.

Causes/risk factors

- Persistent HPV infection of the cervix, if left untreated, causes 95% of cervical cancers.
- Typically, it takes 15–20 years for abnormal cells to become cancer, but in women with weakened immune systems, such as untreated HIV, this process can be faster and take 5–10 years.

Symptoms

- Vaginal bleeding after sexual intercourse.
- Vaginal bleeding after menopause.
- Vaginal bleeding between periods or periods that are heavier or longer than normal.
- Vaginal discharge that is watery and has a strong odor or that contains blood.

THE CASE FOR CHANGE

Despite the challenges faced by the EMR, there are evidence-based cost-effective preventable and curative solutions to avoid premature deaths from women's cancers.[8] These include vaccination against HPV for girls aged 9 to 14 years, early diagnosis and screening programs for cervical cancer linked with timely diagnosis and comprehensive treatment, as well as early diagnosis interventions and comprehensive diagnosis and treatment for breast cancer.

Despite the challenges faced, there are evidence-based cost-effective preventable and curative solutions to avoid premature deaths from women's cancers.

While these interventions have been demonstrated to be cost-effective in all settings, including in LMICS,[9] WHO Member States have demanded tailored economic evaluations grounded in context-specific data around the cancer burden, to guide policymaking and encourage a whole-of-government and whole-of-society response to women's cancers.

In one response, WHO EMRO developed a regional investment case, to provide Ministries of Health with economic arguments that respect and promote human rights, and with a policy landscape analysis to implement and scale up the relevant cost-effective interventions. The findings of the investment case encourage a holistic approach to women's cancers, highlighting opportunities for integrating interventions at the primary healthcare (PHC) level. Investment cases have a proven track record of success in catalyzing stronger NCD and cancer responses through improved governance, financing, and health service access and delivery, and by framing NCD action as an investment rather than a cost.[10] While several national investment case studies on NCD-related interventions have been conducted in the EMR, not much attention has been paid to cancer, including women's cancers.

This policy paper summarizes the findings of the investment case on women's cancers and provides policy recommendations for improving the approach to addressing women's cancers in the EMR, and enhancing the take-up and scale-up of WHO global initiatives.

METHODOLOGY FOR THE EASTERN MEDITERRANEAN REGION INVESTMENT CASE ON WOMEN'S CANCERS

The 22 WHO EMR countries and territories are categorized into three income groups: high-, middle-, and low-income, based on World Bank classification of income levels.[11] Group 1 (high-income): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates; Group 2 (middle-income): Egypt, Iran (Islamic Republic of), Iraq, Jordan, Lebanon, Libya, Morocco, occupied Palestinian territory, Syrian Arab Republic and Tunisia; and Group 3 (low-income): Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen. Following a literature review, a questionnaire was sent to EMR Ministries of Health via WHO country offices, covering: (i) existing programs, policies and strategies for control of women's cancers; (ii) the capacity and availability of human and financial resources, equipment and supplies; and (iii) available health services and access to care. Of the 22 EMR Member States, 16* responded between August and October 2023.

Four countries and territories (occupied Palestinian territory, Pakistan, Somalia and United Arab Emirates) responded to a request for in-depth interviews to document successes and challenges in implemented programs, explore views on the cancer burden and investment needs, and map relevant stakeholders. The selection was based on the objective of including one country/territory from each income group and from countries affected by fragility, conflict and violence.

An in-person consultation of EMR experts was held in November 2023 to gather inputs on interventions and needs for addressing women's cancers, and to develop a Strengths, Weaknesses, Opportunities and Threats analysis. The invited experts, policymakers and service providers contributed insights from EMR countries and territories and were nominated by their respective Ministries of Health. Civil society, academic institutions, and other United Nations (UN) agencies involved in women's health were also involved. The final drafts of the analyses were sent to country focal points and experts for validation.

ECONOMIC ANALYSIS

The economic study, conducted across all 22 EMR countries and territories, aimed to investigate two main areas: (i) the current and future economic burden of cervical and breast cancers from 2020 to 2040;** and (ii) the health benefits and ROI of scaling up four major interventions recommended by WHO.

* Afghanistan, Bahrain, Egypt, Iraq, Jordan, Lebanon, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, the United Arab Emirates, and the occupied Palestinian Territory.

** Based on the availability of projected cancer burden data from the WHO Global Cancer Observatory.

Economic burden analysis

The economic burden was calculated for the years 2020 to 2040 using an epidemiological projection model. This model incorporated a combined human capital (HC) approach and the value of a statistical life (VSL) to comprehensively assess the economic burden. The HC method calculates the economic impact by estimating the loss of productivity due to illness. The VSL approach estimates the economic value of a statistical life, in order to quantify the benefit of reducing mortality risk. It represents the amount society is willing to pay for small reductions in mortality risk.[12–16]

The following components were included in the economic burden analysis:

1. Economic and social value lost due to premature mortality (VSL).
2. Foregone productivity due to absenteeism, or time taken off work (HC).
3. Foregone productivity due to presenteeism, or reduced productivity while at work (HC).
4. Direct healthcare costs, including medical treatments, hospital stays, and other healthcare services.

ROI AND COST-BENEFIT ANALYSIS

A cohort simulation model was used to estimate the health and economic benefits over the lifetime (90 years) of a cohort consisting of all girls born in 2020 in EMR countries and territories (nearly 9 million). This analysis focused on a sub-set of four WHO-recommended interventions[17] (see table on page 8) aimed at reducing the disease burden and associated costs. The evaluation included:

- Estimating the health and economic benefits of the interventions over the cohort's lifetime.
- Calculating the economic and social gains from reduced mortality rates.
- Estimating the direct healthcare costs saved due to the interventions.
- Quantifying the economic returns of the interventions relative to their costs.

The limitations of the methodology used in this study are outlined in the Appendix.

Modeled intervention scenarios, target population, and coverage rates

Modeled intervention scenarios	Target population modeled	Coverage rate
Cervical cancer		
Vaccination with one dose against human papillomavirus (HPV)	12-year-old girls	90%
Early diagnosis programs to identify symptomatic presentations linked with timely diagnosis and comprehensive cancer treatment for stages 1 to 4	Women and girls with invasive cancer	90%
Cervical cancer HPV-DNA screening	Women aged 35 and 45 years	70%
Breast cancer		
Early diagnosis programs to identify symptomatic presentations linked with timely diagnosis and comprehensive cancer treatment for stages 1 to 4	Women and girls with invasive cancer	90%

WHO recommends mammographic screening for asymptomatic women aged 50 to 69 every two years, linked to timely referral and comprehensive treatment, in settings where mammographic screening is recommended. The population-based mammographic screening program employs call-recall strategies, followed by referral for comprehensive treatment. Diagnosis involves imaging to stage the disease and histopathology for confirmation. This is followed by stage-specific multimodal therapy, which includes palliative and supportive care. However, this specific intervention was not modeled in the current study due to the complexity and resource intensity required to accurately simulate the entire spectrum of diagnostic, treatment, and follow-up processes.

RESULTS OVERVIEW

SITUATION ANALYSIS

Findings from the situation analysis were divided into: (i) governance; (ii) prevention and management programs; and (iii) views and perceptions on women's cancer interventions.

Governance

In 2023, 15 of the 22 EMR countries and territories reported having cancer care integrated into national policies, strategies or action plans, including cervical and breast cancers.[18] Six of the 16 countries/territories that participated in the survey have a department for cancers, and 10 have policies, strategies or action plans for breast cancer early diagnosis and screening, including key performance indicators and up-to-date timeframes. Only five have policies, strategies or action plans for cervical cancer early diagnosis and screening.

In 2023, 15 of the 22 EMR countries and territories reported having cancer care integrated into national policies, strategies or action plans, including cervical and breast cancers.

Prevention and management programs

At the time of data collection, six countries had HPV vaccination programs (see table on page 10). Libya's program, introduced in 2013, was discontinued. HPV vaccination programs are planned in Tunisia, Oman and Lebanon. Introduction in Pakistan is underway from age 15 under the Expanded Program on Immunization, with support from Gavi, the Vaccine Alliance (GAVI). GAVI's subsidies are also being considered for the introduction of HPV vaccination in Djibouti.*

* EMR countries eligible for GAVI support: Afghanistan, Somalia, Sudan, Syrian Arab Republic, Yemen, Pakistan and Djibouti.

EMR countries that have HPV vaccination programs

Country	Type of program	Year started	Platform	Target	Doses	Coverage (one dose, 2022)
Bahrain	Systematic	October 2023	Schools	Girls and boys: 12 to 13 years	2	Not available
Kuwait	Systematic	2023	Schools	Girls and boys: 11 to 12 years	2	Not available
				Catch-up: 15 to 45 years	3	
Morocco	Opportunistic	October 2022	Primary healthcare (PHC) and pediatricians	Girls: 11 years	2	21%
Qatar	Pilot-opportunistic	May 2023	PHC, pediatricians and gynecologists	Girls: 9 to 15 years	2	Not available
				Catch-up: 15 to 45 years	3	
Saudi Arabia	Systematic	November 2018	PHC, pediatricians, schools	Girls and boys: 9 to 13 years	2	55%
				Catch-up: 15 to 26 years	3	
United Arab Emirates	Systematic	2008 (Abu Dhabi)	Mainly schools (grade 8)	Girls: 9 to 14 years	2	87%
		2018 (roll-out)	Other: PHC, pediatricians and gynecologists	Catch-up: 15 to 26 years	3	

Early detection of common cancers is critical for cancer control programs and includes two complementary approaches: cancer early diagnosis; and screening. In contrast to screening, 'early diagnosis' targets individuals with symptoms suggestive of cancer. This approach improves cancer outcomes by providing care at the earliest possible stage, and is therefore an important public health strategy in all settings, logistically simpler to implement than screening. It is founded on core principles in delivering clinical services, including community empowerment and engagement, improving health literacy, and access to primary care, and requires diagnostic capacity, including pathology, strong referral mechanisms, co-ordination and availability of timely treatment.

Screening for early precancerous lesions in the cervix, using a high-performing HPV DNA test is recommended in all countries, and early diagnosis remains the foundation of any cancer early detection strategy. However, the appropriate early detection strategy for breast cancer needs to consider the latest available evidence of what works in different contexts – for example, the efficacy of organized screening depends on all patients having access to care, and more than 70 percent of the population being screened, which is out of reach for many EMR countries/territories.[19]

The situation analysis found that cervical cancer screening and early detection services are widely lacking in EMR countries and territories and mostly available in an opportunistic manner.

Therefore, taking into consideration that recommended interventions need to be tailored to EMR countries'/territories' income and health system maturation, and distinguishing between the recommended interventions for early detection of breast cancer versus cervical cancer, the situation analysis found that cervical cancer screening and early detection services are widely lacking and mostly available in an opportunistic manner. Awareness and early detection programs for breast cancer exist in nearly all countries/territories. Six countries have national organized breast cancer screening programs, and eight have opportunistic programs, often including mammograms for all women from age 40. The reach of these programs and take-up of screening is unknown and may vary widely. Further details are available in the table on page 12.

Population-based cancer registries (PBCRs) are the cornerstone for effective planning, establishing, monitoring and evaluating of cancer programs. PBCRs describe a population's cancer incidence, broken down by age, sex, stage and cancer type. However, data collection is challenging in several EMR countries and territories due to fragmented health systems and lack of electronic information. Only 12 countries have PBCRs, 10 with national coverage, and six providing high-quality data for international publication.

Early diagnosis programs in countries that took part in the survey

Country	National standards for early diagnosis	Program	Method	Criteria	Coverage
Breast cancer					
Afghanistan	Various/no specific guidelines are followed	No	Clinical examination (followed by mammography or other radiology of positive findings) Ultrasound	–	–
Pakistan	No, but other international guidelines are followed	Opportunistic	Mammography	–	–
Somalia	Various/no specific guidelines are followed	No	–	–	–
Sudan	Yes, but not endorsed or disseminated	No	Clinical examination (followed by mammography or other radiology of positive findings)	Age ≥35 years High-risk group	–
Egypt	Yes	Organized	Clinical examination (followed by mammography or other radiology of positive findings)	–	–
Iraq	Yes	Opportunistic	Primary healthcare: clinical breast examination Secondary level: triple assessment	Age 40 to 69 years	3 to 4% (2022)
Jordan	Yes	Opportunistic	Clinical examination (followed by mammography or other radiology of positive findings)	Age 40 to 59 years	–
Lebanon	Yes (screening only)	Opportunistic	Mammography	Average-risk women starting at age 40, annually for as long as the woman is in good health	–

Country	National standards for early diagnosis	Program	Method	Criteria	Coverage
Morocco	Yes	Organized, national	Clinical examination (followed by mammography or other radiology of positive findings)	Age 40 to 69 years	22% (2022)
occupied Palestinian territory	Various/no specific guidelines are followed (national protocol under development)	Opportunistic	Mammography	Women aged 40 years and older Any woman with higher-than-average risk before 40 years	2.8% (women aged 40 to 65, 2022)
Syrian Arab Republic	Yes	Organized, national (five provinces and rolling out to others according to National Cancer Control Plan)	Mammography, ultrasound	Women over 45 years of age, any age with high-risk group	5 to 10% of women aged >45 in each province
Bahrain	Yes	Opportunistic at primary healthcare	Clinical examination Mammography	Age <40 years Age ⩾40 years	–
Oman	Yes	Organized, national coverage	Clinical examination (followed by mammography or other radiology of positive findings)	Women aged 40 to 69 years not diagnosed or on treatment for breast cancer and asymptomatic	14% (2022)
Qatar	Yes	Organized, national coverage	Mammography	Asymptomatic nationals and residents from 45 to 69 years old/ no previous mammogram or when the last mammogram was older than three years with negative result	51% during the first round (2016–2018) 21% during the second round (2019–2021)
Saudi Arabia	Yes	Opportunistic	Mammography, ultrasound/ magnetic resonance imaging (MRI) for selected cases	Women aged 40 years and older	–
United Arab Emirates	Yes	Organized, national	Annual clinical examination (followed by mammography or other radiology of positive findings) plus mammogram every two years	Women aged 40 to 69 years	–

Country	National standards for early diagnosis	Program	Method	Criteria	Coverage
Cervical cancer					
Afghanistan	Various/no specific guidelines are followed	Not done	–	–	–
Pakistan	Yes	Opportunistic	Visual inspection with acetic acid (VIA) followed with cytology if positive	–	–
Somalia	No specific guidelines are followed	No (in essential package of health services but rarely performed)	VIA with a test-and-treat approach	–	–
Sudan	Yes, but not endorsed or disseminated	Not done	–	–	–
Egypt	Yes	Opportunistic	Primary human papillomavirus (HPV) testing (by healthcare provider)	Above 18 years with high risk	–
Iraq	No, but other international guidelines are followed (under development)	Opportunistic	Cervical cytology/VIA	Aged 25 to 50 years	–
Jordan	Various/no specific guidelines are followed	Opportunistic	–	–	–
Lebanon	No, but other international guidelines are followed (depending on resource availability)	Opportunistic	Cervical cytology	–	–
occupied Palestinian territory	Various/no specific guidelines are followed	No (currently only in private sector)	Cervical cytology	Older than 40 years	–

Country	National standards for early diagnosis	Program	Method	Criteria	Coverage
Syrian Arab Republic	Yes	No	–	–	–
Bahrain	Yes	Opportunistic at primary healthcare	Liquid base cytology every three years and high risk (hrHPV) alone every five years for high risk	Aged 30 to 65 years after three consecutive negative screens in the past 10 years	–
Morocco	Yes	Organized, subnational (11 of 12 regions) since 2010	VIA (test-triage-and treat approach)	Aged 30 to 49 years	11% (2022)
Oman	Yes	Opportunistic/pilot	Both cervical cytology (liquid-based cytology and HPV tests) are used	Women 25 to 49 years married or previously married Not diagnosed or on treatment for cervical cancer Not pregnant or in the postpartum period ≥4 months post-delivery No history of total hysterectomy	–
Qatar	Yes (screening)	Opportunistic	Cervical cytology	Sexually active women aged 21 to 49 years every three years Aged 50 to 64 years every five years	4% (2019)
Saudi Arabia	No, but other international guidelines are followed	Opportunistic	Cervical cytology VIA with a test-and-treat approach	–	–
United Arab Emirates	Yes	Organized	Cervical cytology HPV test, as co-testing	Every three years for women aged 25 to 29, every five years for women aged 30 to 65, annually for women who are immunocompromised.	–

Views and perceptions on women's cancer interventions

Knowledge about cervical cancer risk factors, including HPV, is generally very low,[20–25] especially among women and girls with lower socioeconomic status.[26–28] Moderate knowledge about breast cancer symptoms and benefits of screening was reported, but knowledge about cervical cancer symptoms was lower.[29–35] Low lifetime mammography take-up and adherence to screening intervals were noted, with reasons including 'not being recommended by healthcare provider', 'not knowing where to go', 'fear of results and treatment', and 'low perceived risk'. Concerns included the lack of female physicians, language barriers, risks related to mammography, and lack of family support.[36–40]

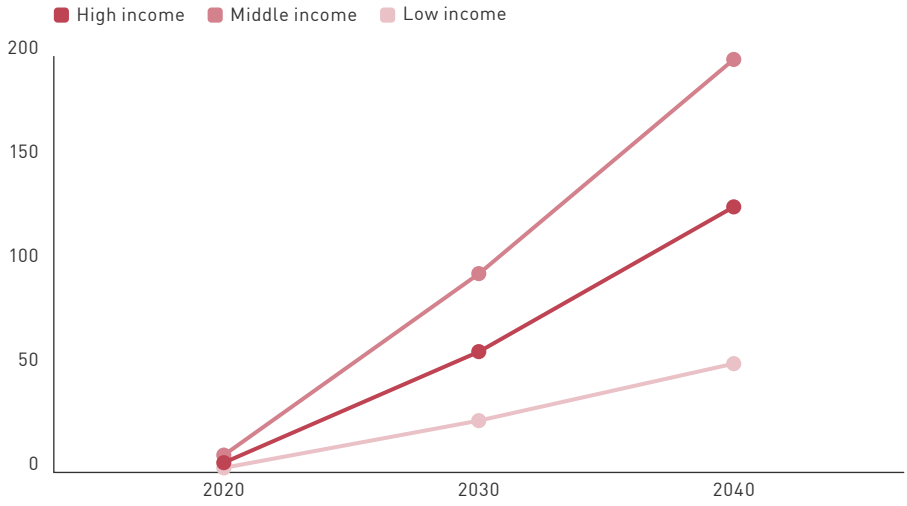
Breast cancer prevention and early diagnosis information was accessible in all but two countries, mainly through media, social media, and awareness campaigns by non-governmental organizations (NGOs). Information dissemination channels included primary healthcare (reported by 12 countries and territories), and specialists, such as gynecologists (reported by 11 countries and territories). Information on cervical cancer mainly comes from gynecologists who provide opportunistic screening, as well as more sporadic campaigns through PHC, media, NGOs, schools and universities.

ECONOMIC ANALYSIS

Our analysis reveals a significant future burden of cancer. Considering the anticipated population growth and current trends, by 2040, cumulative annual prevalent cases of these two cancers will surpass 3 million, and cumulative premature deaths will exceed 2 million.

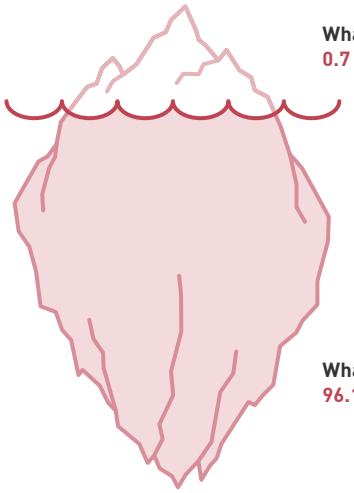
As per the results of the investment case, the economic burden of cervical and breast cancers in the EMR was estimated at a total of $15 billion in 2020: $2 billion for cervical and $13 billion for breast cancer, averaging 0.44 percent of the combined gross domestic product (GDP) of the 22 countries and territories for 2020–2022. This is expected to accrue to a total of $379 billion by 2040.

Cumulated economic burden of cervical and breast cancer in the EMR 2020–2040 (US$, billion)



Direct healthcare costs (that is, the expenses incurred to manage women's cancer cases), generally evident to policymakers in the health sector, account for only 3.0 percent of this burden. However, indirect costs (the socioeconomic output lost due to the diseases) seem significantly higher, with premature mortality accounting for 96.4 percent of this burden, and absenteeism and presenteeism for 0.2 percent and 0.4 percent respectively. This highlights that the true impact of women's cancers on EMR societies might be much higher than is generally perceived.

The economic burden of cervical and breast cancer in 2020 followed an iceberg distribution.

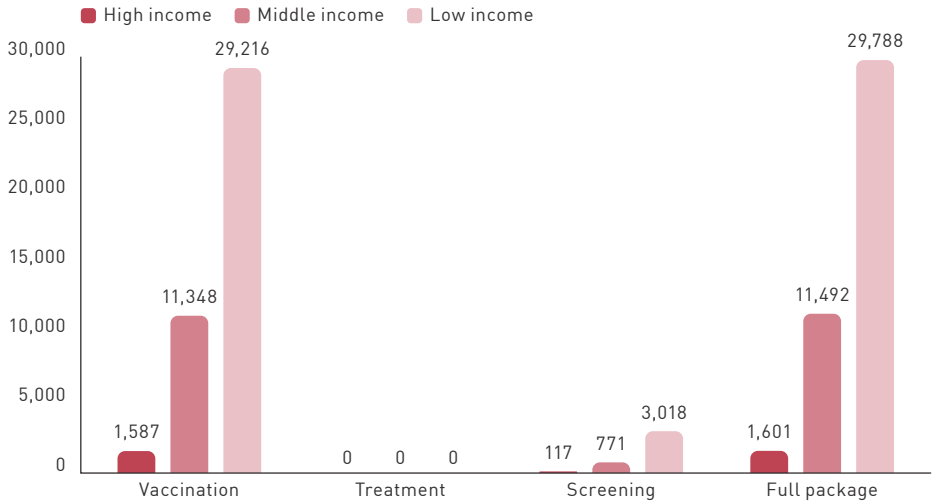


What governments see: direct healthcare costs 0.7 to 3.9% of the total economic burden

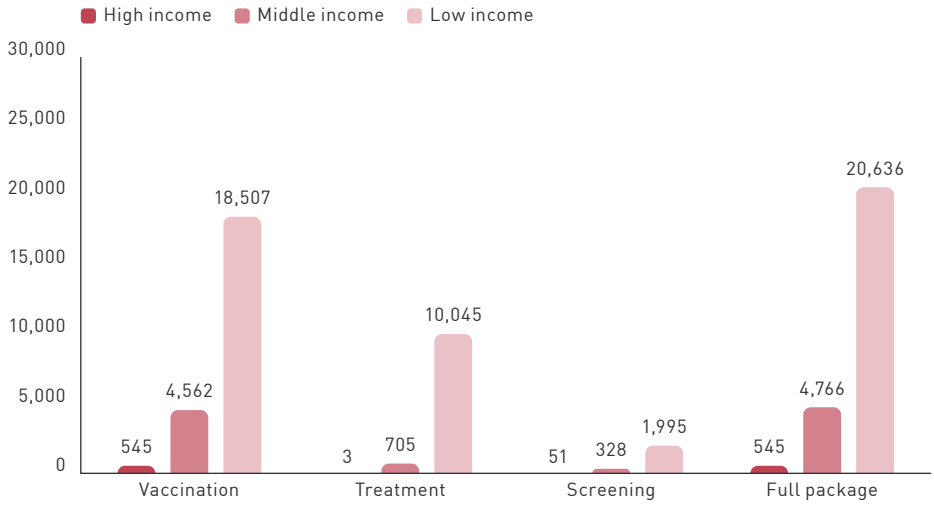
What governments do not see: indirect healthcare costs 96.1 to 99.3% of the total economic burden

The following figures illustrate the number of cervical cancer cases and deaths prevented over the cohort's lifetime, indicating an 82 percent decrease in incidence and an 87 percent decrease in mortality compared to the 'status quo' scenario.

Estimated cervical cancer cases prevented over the cohort's lifetime because of the selected cervical cancer interventions

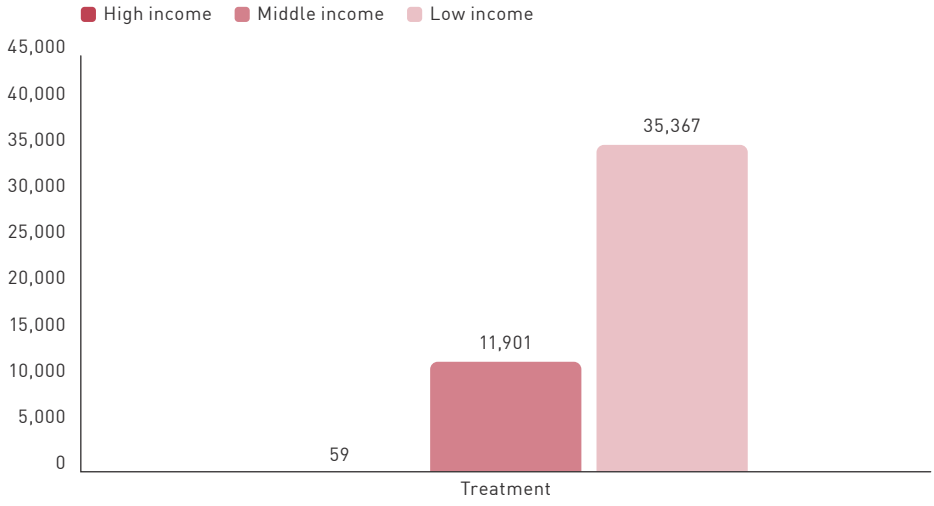


Estimated cervical cancer-related deaths prevented over the cohort's lifetime as a result of the selected cervical cancer interventions



Due to the complexity of modeling breast cancer screening, the economic analysis for breast cancer focused solely on the benefits of providing comprehensive treatment,* an intervention that only contributes to mortality reduction (see figure below). Compared to the 'status quo' scenario, this represents a 26 percent decrease in mortality.

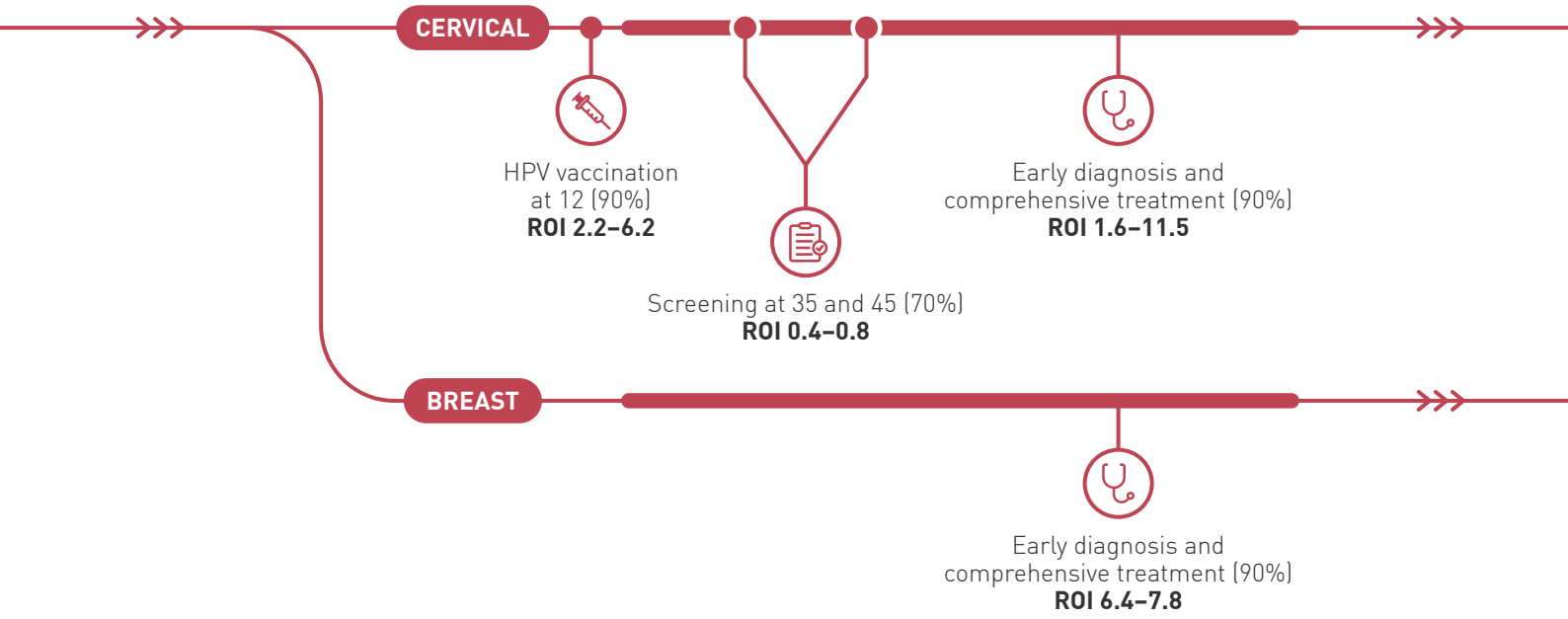
Estimated breast cancer-related deaths prevented over the cohort's lifetime because of the comprehensive treatment for breast cancer



The following figures present the ROI for cervical cancer interventions and for breast cancer treatment respectively. The ROI for the full package of cervical cancer interventions range from 1.4 (Groups 1 and 2) to 2.6 (Group 3). The table on page 19 shows the cost per death prevented by the four interventions.

* Comprehensive cancer treatment for stages 1 to 4 indicates stage-appropriate, multimodal therapies, aiming for a treatment coverage of 90 percent.

ROI of cervical and breast cancer interventions



Cost per death prevented

Intervention	Cost per death prevented
Cervical cancer (HPV) vaccination	$6,109
Cervical cancer treatment	$1,202
Cervical cancer screening	$57,076
Breast cancer treatment	$2,036

MOVING FORWARD: INSIGHTS AND STRATEGIC RECOMMENDATIONS

Women's cancers are a major and overlooked public health and human rights issue in the EMR, significantly impacting socioeconomic growth. The regional investment case emphasized the most cost-effective interventions to prioritize to recover the lost economic output and to generate monetary gains. The following recommendations take stock of the situation and economic analyses to provide a foundation for addressing women's cancers in the specific contexts and cultures of the EMR Member States.

The evidence is clear: it's time to act. By ensuring accessible preventive and treatment services, boosting health literacy and leveraging existing platforms for delivery, we can make significant progress in universal healthcare and achieving the Sustainable Development Goals (SDGs) and targets for women's health.

PRIORITIZE INVESTMENTS IN THE MOST COST-EFFECTIVE INTERVENTIONS, AND DESIGN PROGRAMS ACCORDING TO COUNTRY CONTEXT

Countries and territories should prioritize HPV vaccination, which offers high ROI and low cost per death prevented in all countries and territories. Global HPV vaccine supplies have been improving, with more affordable options available, such as a single-dose schedule that reduces program costs and enhances coverage. LMICs can access subsidized vaccines through GAVI, and leverage their strong vaccination infrastructures widely available at PHC level.

Breast cancer prevention entails addressing risk factors in common with other NCDs, such as excess body weight, tobacco and alcohol consumption, and insufficient physical activity, while promoting breastfeeding. Relevant interventions are cost effective and have shown high ROI in a number of settings.[41] These measures should be supported by policies ensuring women's safety, paid maternity leave, and workplace support for breastfeeding mothers, through multisectoral action plans targeting NCD risk factors.

Although cervical cancer screening has a lower-than-one ROI, possibly due to the reported low incidence of this cancer in most EMR countries and territories, governments can still recover between 40 and 80 percent of the original investment. Policymaking should consider different dimensions of the issue, including the projected economic burden of cervical cancer in Group 1 and likely changes in risk factor prevalence due to migration and increased tourism. On the other hand, LMICs (Groups 2 and 3) might first consider early diagnosis interventions, which are cost-effective for all settings, then expand to full-fledged screening programs, which require a systematic approach and design, and have high implementation costs. Therefore, it is recommended that countries and territories contextualize, prioritize and design women's cancer early detection programs by taking full stock of their respective cancer burden and current capacities, considering the increasing availability and cost-effectiveness of HPV-DNA testing.[42] In low-risk settings, HPV-DNA testing could reduce the number of cytological examinations, allowing

them to be analyzed centrally by more experienced pathologists, and improving cytology performance.[43] COVID-19 Polymerase Chain Reaction test facilities could be repurposed for HPV testing. Also, self-collection methods are emerging, potentially increasing convenience for women and healthcare providers.

Breast and cervical cancer treatment is cost-effective with a positive ROI across all groups, underscoring the importance of prioritizing and expanding treatment initiatives. For breast cancer, the focus should be on ensuring the accessible, high-quality treatment facilities at low or no cost to all women within a maximum of 60 days from initial presentation.[44] National essential medicine lists should include efficient and cost-effective cancer medicines, and treatment guidelines for middle- and low-income settings should emphasize interventions with the highest benefit within realistic costs. Scaling up comprehensive treatment for breast cancer in Group 1 countries apparently leads to a marginal impact in terms of breast cancer-related deaths prevented. Therefore, high-income countries in the EMR might consider prioritizing enhancing coverage and performance of existing screening programmes, focusing on service take-up, affordability and data systems to monitor and periodically report on progress, to achieve the WHO Global Breast Cancer Initiative's goal to reduce mortality by 2.5 percent per year.

FACILITATE ACCESS BY REMOVING BARRIERS TO TIMELY AND EFFECTIVE CANCER CARE

Delays in seeking and receiving adequate care at pre-diagnostic, diagnostic and treatment intervals often lead to negative cancer outcomes. Delayed detection (pre-diagnostic interval) may result from barriers, such as lack of awareness, social obstacles and financial constraints. Customized health literacy programs are needed, taking into account sex, culture, language, age and education level. Community health workers/midwives could help overcome cultural barriers, especially in rural areas with workforce shortages. Including people with lived experience and religious leaders as advocates is also beneficial. It is also crucial to train nurses, general practitioners, community healthcare workers and gynecologists to recognize early signs and symptoms, perform clinical examinations, and communicate appropriately with women about referral for further investigation.

An *integrated approach* to women's cancer is recommended, incorporating services into existing delivery platforms, and ensuring a clear patient pathway through the cancer care continuum.

To address the diagnostic and treatment delays, maximizing resource allocation is important to ensure coverage and take-up. An *integrated approach* to women's cancer is recommended, incorporating services into existing delivery platforms (for example, maternal and child health programs), and ensuring a clear patient pathway through the cancer care continuum. This integrated approach can enhance broader health outcomes through effective governance, streamlined care continuity, and comprehensive coverage from prevention to palliative care. These interventions align with the best approaches to NCDs and the UN Global Strategy for Women's, Children's and Adolescents' Health 2016–2030,[45] helping countries achieve universal health coverage and SDG targets.

INVEST IN DATA SYSTEMS TO BETTER PLAN AND REGULARLY MONITOR PROGRESS AND EVALUATE PROGRAM PERFORMANCE

Population-based cancer registration has increased in the EMR, but barriers remain due to shortage of funding, poor-quality data, population mobility and political instability. Cancer registries are the foundation of meaningful research that can improve cancer outcomes. Registry information should be integrated into broader information systems to support policy formulation, program management, quality assurance and monitoring.

EMR countries and territories should mobilize political commitment to enact legislation that lists cancer as a reportable disease and ensure regulatory frameworks for information sharing. Cancer information systems should be built progressively, starting with existing hospital-based cancer registries, working towards population-based registries, coupled with annual vital statistics. Building and sustaining capacity is a fundamental component of cancer surveillance – collecting, compiling, analyzing and synthesizing data to inform decision-making. Cancer registration training curricula should thus be created and disseminated, including with support from the Global Initiative for Cancer Registry Development developed by WHO and the International Agency for Research on Cancer.

APPENDIX. LIMITATIONS TO THE ECONOMIC ANALYSIS METHODOLOGY

This study is the first attempt to estimate the health and economic burden of women's cancers, and the return on investment (ROI) for World Health Organization recommended interventions for cervical and breast cancers in the Eastern Mediterranean Region (EMR). It also examines governance, financing and health service delivery, providing a comprehensive basis for region-specific recommendations. However, the methods illustrated in this study have some limitations.

First, data on the costs of treating cervical and breast cancers, stage distribution, and treatment coverage across the 22 EMR countries and territories was limited, potentially affecting the accuracy of direct healthcare costs. The value of a statistical life year (VSLY) approach used for the societal impact of cancer-related deaths, though comprehensive, influences the total economic burden and its distribution when used alongside other methodologies. A human capital approach might have yielded a lower economic burden but would overlook contributions from women who are not formally engaged in the economy.

Second, the ROI analysis completed at the group level relied on aggregated data, which restricts the ability to capture individual countries'/territories' nuances and variations. Also, estimating the benefits of cervical cancer screening may not fully account for the long-term cancer progression and the varied impacts of screening, and so may underestimate the ROI for screening.

Third, the cost estimates for scaling up intervention coverage to 90 percent were based on current costs and did not include additional investments for infrastructure, equipment or technologies. This could lead to an overestimation of economic returns. The assessment of breast cancer was limited to one intervention, as screening would have required advanced modeling techniques not feasible for integration in this study.

Finally, the authors did not conduct a sensitivity analysis to account for uncertainties in key parameters – such as the rates of future cancer incidences, healthcare cost inflation and variations in the VSLY across different countries and territories. This is because our study primarily aimed to establish a baseline model. The focus was on developing a foundational understanding of the intervention's potential impact rather than exploring the full range of possible scenarios. Conducting a sensitivity analysis would have required extensive additional resources and data, which were beyond the scope of this initial study.

ABBREVIATIONS

EMR	Eastern Mediterranean Region
EMRO	WHO's Regional Office for the Eastern Mediterranean
GAVI	Gavi, the Vaccine Alliance
GDP	gross domestic product
HC	human capital
HPV	human papillomavirus
hrHPV	high risk human papillomavirus
LMICs	low- and middle-income countries
MRI	magnetic resonance imaging
NCD	noncommunicable disease
NGOs	non-governmental organizations
PBCRs	population-based cancer registries
PHC	primary healthcare
ROI	return on investment
SDGs	Sustainable Development Goals
UN	United Nations
VIA	visual inspection with acetic acid
VSL	value of a statistical life
VSLY	value of a statistical life year
WHO	World Health Organization

ACKNOWLEDGMENTS

This paper was written by **Mohammed Afifi**, **Giuseppe Troisi**, **Matilda Bystrom**, **Lamia Mahmoud** (WHO Eastern Mediterranean Regional Office), **Khalifa Elmusharaf** (University of Birmingham in Dubai), **Eman Alkhalawi** (King Abdul Aziz University), **Maha El Akoum** and **Slim Slama** (WISH).

Sincere thanks are extended to the members of the WISH 2024 Advisory Group on women's cancers in the EMR region, who contributed their unique insights to this paper:

- **Hadi Mohamad Abu Rasheed**, Head of the Cancer Awareness and Professional Development Department, Qatar Cancer Society
- **Salha Bujassoum**, Chairperson of Medical Oncology and Palliative Care Medicine, National Center for Cancer Care and Research, Qatar
- **Noreen Zafar**, Consultant Obstetrician and Gynecologist, Mid City Hospital, Lahore, Pakistan

We would like to thank the members of the WHO working group for sharing their expertise for this report:

- **Asmus Hammerich**
- **Maha El-Adawy**
- **Jihan Azar**
- **Zaynab Mahdi**
- **Deena Alasfoor**
- **Filip Meheus**
- **Nashwa Skaik**
- **Mary Nyangasi**
- **Maribel Almonte Pacheco**

Finally, we would like to thank **Sultana Afdhal** and **Didi Thompson** from the WISH team for their support and editorial guidance in preparing this report.

Any errors or omissions remain the responsibility of the authors.

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WISH RESEARCH PARTNERS

WISH gratefully acknowledges the support of the Ministry of Public Health

ISBN 978-1-913991-42-5

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