# Early detection of cancer: An evolving necessity in the Eastern Mediterranean Region

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Early detection of common cancers is one of the vital cancer control programmes and includes two different complementary approaches: cancer screening and early diagnosis.

While the cancer burden varies across the 22 countries in the Eastern Mediterranean Region (EMR), some similarities have been observed in the most commonly diagnosed cancers. The five most common cancers among men in the region are lung, prostate, liver, colorectum, and bladder. In Women the most common cancers are breast, colorectum, liver, thyroid, and ovarian. Late-stage diagnosis and limited access to cancer screening programmes are significant factors negatively affecting cancer survival in the EMR. Many of these common cancers can be prevented and detected early if evidence-based, cost-effective public health interventions are implemented.

Data obtained from various oncology centres show that the proportion of breast cancer patients diagnosed at an advanced stage (stage III or IV) ranged from 46% in Pakistan to 78% in the Sudan. A recent meta-analysis of nearly 80 studies from 12 countries in EMR reported a 5-year average survival rate of 71% for breast cancer, with a range varying widely from less than 30% to almost 90% across the studies.

While several strategies were adopted by the EMR countries in recent times to improve cancer early detection, a considerable inequity exists between and within the countries in implementation. Moreover, most countries face multiple challenges that hinder the effective performance of cancer early detection programmes.

Recent data show that almost half of the EMR countries reported having organized population-based screening programmes for breast cancer. In addition, approximately one-third and one-fifth of the countries reported having population-based organized cervical and colorectal cancer screening. Nevertheless, none of the screening programmes in the EMR have met the criteria to be considered as population-based programmes (defined as programmes systematically inviting the eligible populations) and the majority of them lack most of the components of organized screening programmes. For instance, high-resourced countries provided opportunistic cancer screening for breast and colorectal cancers. However, the uptake of screening is relatively low in each country despite the existing cancer awareness campaigns.

To advance cancer screening, EMR countries need to identify priority cancers for screening, the set of interventions that can be included in the health insurance or universal health coverage package and to ensure sustainable financing, and increase the accessibility of cancer screening interventions.

More importantly, all countries need to invest in developing

**Figure 1:** Cancer early diagnosis and screening , Adapted from WHO Guide on cancer early diagnosis, available from  http://apps.who.int/iris/bitstre am/10665/254500/1/9789241511940-eng.pdf?ua=1 *(4)*
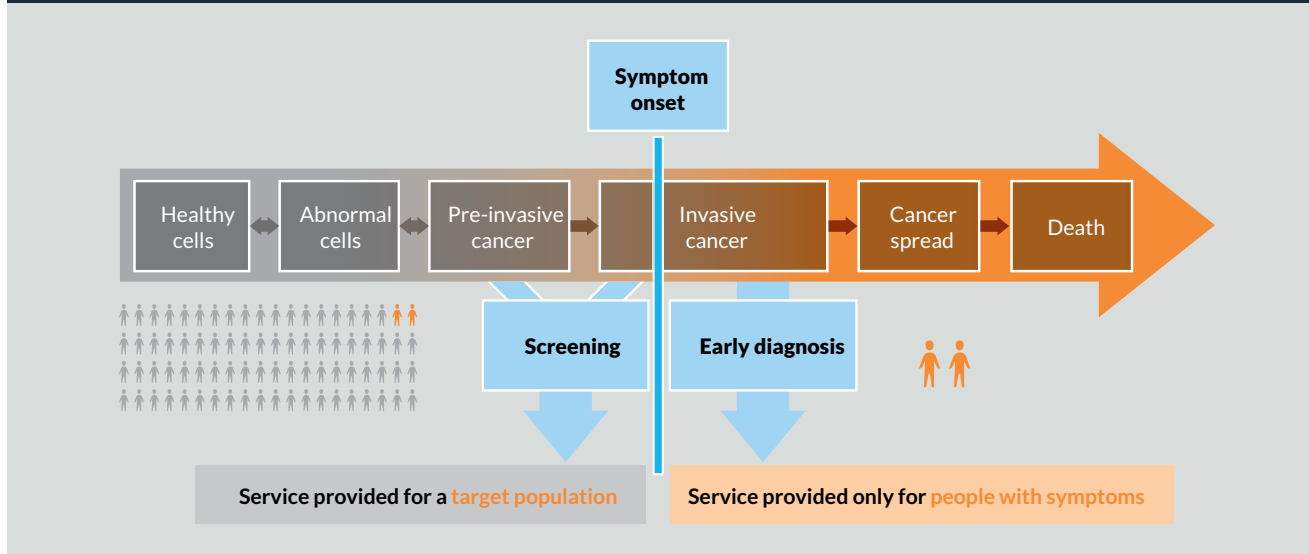


adequate facilities for early diagnosis interventions, to develop facilities for early diagnosis, referral, diagnostic investigations, including imaging, biomarkers, fine needle aspiration cytology and histopathology in their public health services to support early detection. They should also ensure adequate healthcare financing mechanisms and access for early diagnosis and treatment of early-stage cancers detected by screening or early diagnosis.

By developing effective programmes to diagnose and treat cancer early, we can reduce cancer mortality, and personal, societal, and economic costs as a consequence of the disease.

## Introduction

The countries included in the Eastern Mediterranean Region (EMR) of the World Health Organization (WHO) are highly heterogeneous in terms of their population characteristics, human development index (HDI), and prevalence of risk factors for different cancers. As a result, the cancer burden

**Table 1: Top three  cancers among males and females combined in the EMR countries**

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| **Group 1** | **1st** | **2nd** | **3rd** | **1st** | **2nd** | **3rd** |
| Bahrain | Lung | Colorectum | Prostate | Breast | Colorectum | Thyroid |
| Kuwait | Prostate | Colorectum | Lung | Breast | Colorectum | Ovary |
| Oman | Prostate | Colorectum | Stomach | Breast | Colorectum | Thyroid |
| Qatar | Prostate | Colorectum | Lung | Breast | Colorectum | Ovary |
| Saudi Arabia | Colorectum | Prostate | Liver | Breast | Thyroid | Colorectum |
| United Arab Emirates | Prostate | Colorectum | Bladder | Breast | Colorectum | Thyroid |
| **Group 2** | | | | | | |
| Egypt | Liver | Bladder | Prostate | Breast | Liver | NHL |
| Iran | Stomach | Prostate | Lung | Breast | Stomach | Colorectum |
| Iraq | Lung | Prostate | Colorectum | Breast | Thyroid | NHL |
| Jordan | Lung | Colorectum | Bladder | Breast | Colorectum | Thyroid |
| Lebanon | Prostate | Lung | Colorectum | Breast | Lung | Colorectum |
| Libya | Lung | Prostate | Colorectum | Breast | Colorectum | cervix uteri |
| Morocco | Lung | Prostate | Colorectum | Breast | Cervix Uteri | Colorectum |
| Palestine | Lung | Colorectum | Prostate | Breast | Colorectum | Lung |
| Syrian Arab Republic | Lung | Prostate | Colorectum | Breast | Colorectum | Thyroid |
| Tunisia | Lung | Bladder | Prostate | Breast | Colorectum | Thyroid |
| **Group 3** | | | | | | |
| Afghanistan | Stomach | Lung | Oesophagus | Breast | Cervix Uteri | Stomach |
| Djibouti | Prostate | Colorectum | NHL | Breast | Cervix Uteri | Ovary |
| Pakistan | lip, oral cavity | Lung | Oesophagus | Breast | Lip, Oral Cavity | Oesophagus |
| Somalia | Prostate | Colorectum | NHL | Breast | Cervix Uteri | Colorectum |
| Sudan | Prostate | NHL | Colorectum | Breast | Cervix Uteri | Ovary |
| Yemen | Colorectum | Stomach | Liver | Breast | Colorectum | Oesophagus |

*NHL: non-Hodgkin lymphoma*

varies across the countries, with some similarities observed among countries with a more or less similar HDI *(1)*. (Table 1). According to GLOBOCAN 2020, the five most common cancers among men in the region are lung, prostate, liver, colorectum and bladder in that order. On the other hand, breast, colorectum, liver, thyroid and ovaries are the most common cancers in women *(2)*. (Table 2).

The burden of common cancers is also variable across EMR countries. While Breast cancer is the most common cancer among women in all EMR countries, cancer of the lip and oral cavity is the number one cancer among males in Pakistan. Cervical cancer is among the top five cancers in Libya, Morocco, Djibouti and Somalia *(1)*.

The second most common cancer is cervical cancer in Afghanistan, Morocco, Somalia and Sudan; thyroid cancer in Saudi Arabia; and colorectal cancer in Bahrain, Iran, Jordan and others. The most common cancer among males is highly variable – lung cancer in Jordan, Libya and Morocco, colorectal cancer in Bahrain and Saudi Arabia and Yemen, prostate cancer in the Sudan, Somalia, stomach cancer in Afghanistan and Iran and cancer of the lip and oral cavity in Pakistan *(1)*.

The World Health Organization estimates that 30–50% of cancers are preventable (WHO World Cancer Report; IARC 2020 report). Many of the common cancers in the EMR can be prevented by cost-effective public health interventions, such as implementing the Framework Convention on Tobacco Control recommendations to reduce lung, lip and oral cavity cancer; meeting the WHO targets for population coverage of hepatitis B vaccination to reduce liver cancer; prevention of cervical cancer through vaccination against HPV and screening, reducing exposures to occupational carcinogens through stringent industrial safety norms to reduce bladder cancer, as well as by encouraging healthy lifestyles and enacting policies to enable equitable opportunities for adults and children to increase physical acitivity, maintain a healthy body weight (or body mass index), and consume a healthy diet. These interventions, if effectively implemented would prevent many thousands of new cases of cancer and cancer-related premature deaths in the region.

In addition to primary prevention strategies, several important cancers in the region, namely breast cancer, colorectal cancer and cervical cancer, are amenable to secondary prevention through early detection strategies, comprising early diagnosis (targeting individuals with cancer-related symptoms or signs), and screening (targeting asymptomatic at-risk individuals in a target population). There is also clear technical guidance for early detection of these common cancers in different resource contexts, with favourable cost-effectiveness data for the screening and management of cervical cancer (a WHO "best buy"; <US$

100/DALY averted in low- and middle-income countries), while breast cancer screening with mammography (albeit only relevant in high resource settings with adequate quality control, monitoring and evaluation), and treatment of early stage colorectal cancer associated with a CEA >US$ 100/DALY averted, "may be considered according to the country's context"*(3)*.

However, as with most low-income and middle-income countries, and many high-income countries globally, the implementation of effective primary and secondary prevention strategies for cancer control in EMR countries, continue to fall far short of the global NCD targets and the Sustainable Development Goal target of "a one third reduction in premature deaths from NCDs by 2030".

Even in EMR countries with more developed and robust health systems and services, many individuals with cancer are diagnosed at an advanced stage of disease, which is more challenging to treat with curative intent. Cancer survival rates in the EMR are generally lower than that in other WHO regions such as the Americas and Europe *(6)*, due to a combination of delayed diagnosis and an inability to access timely and high-quality cancer treatment, resulting in countless preventable premature deaths and disability. Somewhat unique as a region, several countries (i.e. Syria, Libya and Afghanistan) are also facing complex challenges in maintaining or rebuilding fragile health systems due to conflict or post-conflict settings. Hence, cancer control measures need to prioritize early detection interventions and develop high-impact and cost-sensitive interventions.

Early detection of common cancers is critical for cancer control programmes and includes two complementary approaches: cancer screening and early diagnosis. (Annex 1). In contrast to screening, the "early diagnosis'" approach targets individuals with symptoms suggestive of cancer; it can be effective for all common cancers and is logistically simpler to implement. Cancer early diagnosis through improved awareness and the health-seeking behaviour of the population, competent primary healthcare providers, and better access to efficient diagnostic and treatment services should be an integral component of cancer control programmes in all EMR countries *(4)*.

Screening is effective in significantly reducing cancer-specific mortality for breast, cervical, colorectal, oral and lung cancer, only when implemented through a population-based approach with high coverage and robust quality a ssurance. Population-based screening is quite a complex and resource-intensive public health initiative and can be introduced to scale only after careful consideration of disease burden, competing health priorities, health systems capacity, financial resources and sustainability. The selection of target populations for cervical, breast and colorectal cancer screening is based on age – the most commonly targeted ages (or age ranges) being

30–59 years for cervical cancer, 50–69 years for breast cancer and 50–74 years for colorectal cancer screening.

## Stage at diagnosis of cancers in the EMR

The stage at diagnosis is the most critical determinant of the response to treatment and survival. The meta-analysis of breast cancer survival studies in the EMR showed a negative correlation between stage at diagnosis and 5-year survival (stage I: 90%; stage II: 77%; stage III: 57%, and stage IV: 37%) (5). Moreover, early-stage cancer requires less aggressive and organ-preserving treatment that has a vast impact on the patients' quality of life.

There is a lack of good quality data on the stage of cancers at diagnosis from most EMR countries as most of the EMR cancer registries do not collect stage information. However, data obtained from various oncology centres showed that the proportion of breast cancer patients diagnosed at an advanced stage (stage III or IV) ranged from 46% in Pakistan to 78% in Sudan (6). A recently published study reported that among breast cancers registered at the oncology centres in Morocco 43.4% were at an advanced stage; the percentage remaining constant over a decade (2008–17) (7).

This is in sharp contrast to most high-income countries, where the proportion of breast cancers diagnosed at an advanced stage is invariably below 30% (8). The Kuwait Cancer Registry reported the stage distribution for adult Kuwaiti cancer patients diagnosed during 2000–2013 with a higher proportion of cancers diagnosed at a localized or regional stage (breast cancer: 68%; prostate cancer: 40%; colon cancer: 56%). The proportion of cancers at the localized or regional stage was much less for cancers with worse prognosis (lung: 30%; stomach: 39%; liver: 18%) (8).

## Reasons for late diagnosis of cancers in the EMR

Despite several strategies adopted by the EMR countries and supported by WHO/EMRO in recent times to improve early detection of cancer, a huge inequity exists between and within the countries (9, 10). Cancer early diagnosis requires individuals with symptoms that may indicate cancer to be investigated promptly for disease confirmation and those with confirmed cancer to have access to good quality treatment without delay. Systematic reviews of studies have observed that breast cancer patients with delays exceeding three months between symptom onset and treatment have 47% higher chance of death than those treated earlier (11). The same is applicable for most of the other common cancers.

A recently published study reported that the median access delay (interval between onset of symptoms and first medical consultation leading to referral for cancer diagnosis) for the breast cancer patients in Morocco was 6 months (IQR: 3-12 months) (7).

Myths and misconceptions, and lack of awareness about the early symptoms of cancer and curability of the disease when detected early are often projected as the primary reasons for the delayed medical consultation (12).

It is increasingly apparent that such delays in diagnosis are more closely related to availability, affordability, and access to early detection services rather than the knowledge and health-seeking attitudes of the patients. The inability of frontline healthcare providers (general practitioners and nurses at primary healthcare facilities) to recognize the common signs and symptoms of cancers and refer the patients promptly can often delay the diagnosis (13). Frontline workers are seldom trained or re-oriented in-service to recognize common cancer symptoms or perform a systematic clinical examination on the symptomatic patients and refer them appropriately (6).

In many high-quality health systems, the primary care physicians are expected to refer the suspected cancer patients immediately to the referral hospital, where the patient should be seen within two weeks (14). No such policies exist or are not explicitly documented in most EMR countries. Strategies for early detection of cancer have only been integrated into primary healthcare in some countries in the region. Countries like Jordan, Morocco, Qatar and Saudi Arabia have recently upgraded their cancer detection facilities to reinforce cancer screening programmes. However, vast inequities in access to such services still exist, especially for rural indigent populations, migrants and expatriates.

Lack of a trained national workforce in the public sector, especially to run the key service facilities for the entire cancer care continuum and reliance on an expatriate workforce to run health services are major problems in many EMR countries.

Health systems in the region are challenged by myriad factors that hinder many countries in effectively integrating cancer early detection programmes. These include a lack of national cancer control plans, insufficiently funded implementation, evaluation and monitoring of programmes, absence of a system of programme evaluation and quality assurance, political and economic instability, armed conflicts and humanitarian crises, and a profoundly limited/inadequate trained national healthcare workforce in the public sector. Compounding these challenges, in some countries cancer patients are often denied their fundamental rights to access diagnostic and therapeutic care due to the geo-political situation (15).

The situation is likely to worsen as financial resources and the workforce from public health programmes are being diverted to mitigate the COVID-19 pandemic and its after effects.

## Survival of cancer patients in the EMR

Survival estimates for the commonly occurring cancers are

**Table 2: Age-standardised 5-year net survival (%) with 95% CI in adults (15–99 years) diagnosed with common malignancies in select EMR countries (2004–2014)** *Data source: CONCORD-3 study*

| Cancer site | Morocco (%) | | | Iran (%) | | | Jordan (%) | | | Kuwait (%) | | | Qatar (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000-04 | 2005-09 | 2010-14 | 2000-04 | 2005-09 | 2010-14 | 2000-04 | 2005-09 | 2010-14 | 2000-04 | 2005-09 | 2010-14 | 2000-04 | 2005-09 | 2010-14 |
| Breast (95%CI) | NA | 86.7 | 99.7 | NA | NA | 68.6 | 87.6 | 86.6 | 84.4 | 68.3 | 71 | 75.2 | 59.2 | 73.3 | 71.9 |
| | NA | 71.7-100 | 95.8-100 | NA | NA | 66.5-70.6 | 83.5-91.7 | 83.2-90.0 | 80.9-88.0 | 58.0-78.7 | 63.8-78.2 | 66.4-83.9 | 48.7-69.7 | 63.0-83.7 | 58.4-85.5 |
| Prostate (95%CI) | NA | NA | NA | NA | NA | 70.2 | 88.5 | 88.6 | 86.1 | 78.8 | 71.9 | 84 | 81.5 | 98.2 | 89.6 |
| | NA | NA | NA | NA | NA | 68.0- 72.3 | 83.7-93.3 | 83.3-93.9 | 81.0-91.0 | 66.7-90.9 | 63.7-80.0 | 74.1-94.0 | 60.7-100 | 87.1-100 | 79.0-100 |
| Childhood ALL (95%CI) | NA | NA | NA | NA | NA | NA | 75.4 | 89.2 | 88 | 76.1 | 74.9 | 88.4 | 67.3 | 82.6 | 88.5 |
| | NA | NA | NA | NA | NA | NA | 69.7-81.2 | 84.8-93.6 | 84.8-93.6 | 65.7-86.5 | 65.6-84.1 | 80.6-96.2 | 44.3-90.3 | 61.2-100 | 73.8-100 |
| Stomach (95%CI) | NA | NA | NA | NA | 5.7 | 15.9 | 76.1 | 64.8 | 55.7 | 15 | 13.4 | 22.4 | 15 | 22 | 17.5 |
| | NA | NA | NA | NA | 3.3-8.6 | 15.0-16.8 | 69.7-82.5 | 58.4-71.3 | 48.7-62.6 | 7.1-22.9 | 7.1-19.7 | 12.6-32.3 | 2.0-28.0 | 12.2-31.7 | 9.7-25.3 |
| Colon (95%CI) | NA | NA | NA | NA | 29.1 | 48.4 | 86 | 80.8 | 76.1 | 64.8 | 50.2 | 58.5 | 62.1 | 64.3 | 63.5 |
| | NA | NA | NA | NA | 20.2-38.6 | 46.8-50.0) | 81.6-90.5 | 77.0-84.7 | 72.1-80.1 | 53.1-76.5 | 42.7-57.7 | 49.4-67.7 | 50.1-74.1 | 47.6-80.9 | 51.7-75.2 |
| Liver (95%CI) | NA | NA | NA | NA | NA | 13.2 | 71.5 | 64.3 | 40 | 11.4 | 12.4 | 18.6 | 7.1 | 10.3 | 27.2 |
| | NA | NA | NA | NA | NA | 11.2-15.3 | 58.1-84.9 | 54.5-74.1 | 28.6-51.3 | 3-5-19.2 | 5.8-19.1 | 9.8-27.3 | 2.6-11.5 | 3.2-17.3 | 12.9-41.5 |
| Lung (95%CI) | NA | NA | NA | NA | NA | 11.8 | 42.9 | 44.1 | 28.3 | 13.3 | 16.3 | 13.4 | 7.4 | 14.3 | 17.2 |
| | NA | NA | NA | NA | NA | 10.7-12.9 | 38.3-47.4 | 39.4-48.7 | 24.9-31.6 | 8.9-17.7 | 11.1-21.5 | 8.8-18.0 | 0.8-14.1 | 7.4-21.2 | 10.3-24.2 |

directly related to the stage at diagnosis and access to quality-assured cancer treatment. The quality of cancer treatment is a crucial metric of cancer control policies and programmes in a country. It is difficult to find in the EMR countries high-quality cancer survival estimates based on data collected from the population-based cancer registries (PBCRs). In countries where such data are available, the high frequency of lost to follow-up cases often overestimate survival rates leading to imprecise estimates. Incomplete mortality registers, difficulties in accessing health insurance databases, and challenges in linking the databases pose challenges in obtaining follow-up data on vital statistics. The updated report of the CONCORD-3 programme for global surveillance of cancer survival could only include survival statistics from Jordan, Kuwait and Qatar for the common cancers and from Iran and Morocco for a select few sites *(5)* (Table 2).

Even this limited data shows the disparities between the countries, especially in the survival from the more common and treatable cancers like breast, prostate and colon.

A recent meta-analysis of nearly 80 studies from 12 EMR countries reported a 5-year average survival of 71% (95% CI: 68–73%) for breast cancer with a range widely varying from less than 30% to nearly 90% across the studies *(1)*.

Evidence-based guidelines with tailored context-specific protocols for referral and management of common cancers can reduce the delays in the initiation of treatment and ensure stage-appropriate evidence-based and affordable treatment and follow-up care. Only half of the EMR countries have a documented management guideline, and only 40% have a referral guideline *(16)*.

The number of radiation therapy machines is inequitably distributed in the region; the high-income countries in the Middle East have 1.436 machines per million population, while the low-income countries have only 0.172 machines per million *(17)*. Similarly, availability and access to cancer surgery and systemic therapy services are limited in many EMR countries.

## Status of cancer screening in the EMR

Effective implementation of cancer screening requires the inclusion of several key programmatic elements considered as essential for an "organized"' programme, such as a documented policy highlighting the governmental commitment, a pragmatic strategic plan including a strategy to identify and invite the target populations, a well-defined structure of governance, allocation of adequate financial resources, availability of a trained work-force in sufficient numbers, a practical health information system, a strong linkage between screening, diagnostic and treatment services, and robust quality assurance *(10)*. Unfortunately, most of the cancer screening programmes in the EMR do not fulfill many of the requirements of an organized programme.

The major shortcoming of the cancer screening programmes in the EMR is the lack of a comprehensive plan to improve coverage and ensure quality at each service level. In the latest national capacity survey on noncommunicable diseases (NCDs) control by the WHO in 2019, nearly half of the EMR countries claimed to have organized population-based screening programmes for breast cancer *(16)*. Approximately one-third and one-fifth of the countries claimed to have population-based organized cervical and colorectal cancer screening. Such claims are unjustified as none of the screening programmes in the EMR have a mechanism to identify and invite the target population

individually (essential for the programme to be considered population based). The majority of them lack most of the components of organized screening, as described earlier *(17)*.

The status of implementation of cervical, breast and colorectal cancer screening is briefly described below.

## Cervical cancer screening

in August 2020, the World Health Assembly adopted a global strategy to accelerate the elimination of cervical cancer as a public health problem *(18)*. To be on the path to elimination, countries should ensure human papillomavirus (HPV) vaccination of 90% of girls by 15 years of age, twice in a lifetime screening of women by 45 years of age with a high performance test, and appropriate treatment of women detected to have cervical precancer or cancer *(18)*. A test to detect HPV is preferred over VIA or cytology. HPV testing is considered a higher-performance test (the WHO best buys ) *(19)* provided there are enough fiscal and logistical resources to scale and sustain programmes using this modality. Furthermore, self-sampling for HPV testing is a people-centred strategy supported by WHO, that has a greater likelihood of reaching harder-to-reach, at-risk populations *(20)*.

The elimination threshold has been defined by WHO to be an incidence rate below 4/100,000 women. Some of the EMR countries like Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Syria, Saudi Arabia, etc. already have an incidence rate below this threshold. The HPV prevalence in women in west Asia is lower than the global average, likely related to conservative sexual practices with later sexual debut and fewer sexual partners *(21)*. While, It is not surprising that cervical cancer screening has not been prioritized in those EMR countries with a low ASR incidence of cervical cancer (not in the top five among women) , however, after observing a rising prevalence of HPV infection in the country, Iran decided to launch a cervical cancer screening programme in 2017 *(22)*. The programme, piloted in four cities, uses a reverse transcriptase PCR-based HPV test to screen women aged 30–49 years. Among the EMR countries with a relatively higher burden of cervical cancer, Morocco has a nationwide screening programme, in which women aged 30–49 years visiting the primary health centres are offered screening with visual inspection with acetic acid (VIA). However, an external evaluation of the opportunistic programme revealed many shortcomings like low coverage, high variability in performance of VIA across the screening centres and low rates of detection of cancers and precancers *(23)*.

With rapid transition observed in the sociocultural fabric as well as the demographic structure in the region, cervical cancer incidence is likely to increase as has been observed with HIV infection recently *(22)*. Countries without a cervical cancer screening programme need to at least monitor cervical cancer incidence to note any upward trends that might appropriately influence policy-making to introduce screening.

If resources permit, EMR countries with VIA or cytology-based screening programmes need to consider the introduction of HPV detection testing and follow the recently published guidelines from WHO to decide on further management of HPV positive women (WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention, second edition).

Protecting adolescent girls against HPV infection through well-structured vaccination programmes needs to be prioritized in each country to prevent cervical cancer and remain aligned to the WHO cervical cancer elimination targets.

## Breast cancer

Breast cancer is the most common cancer among women in all EMR countries *(1)*. There is a remarkable increase, especially in the estimated numbers of cases, with large variations in breast cancer incidence among countries of EMR and within countries.

Mammography is the only screening test to demonstrate significant reductions in mortality from breast cancer. However, implementing mammography-based screening is logistically more demanding, requires highly-trained radiographers and radiologists and is expensive to sustain. For example, a typical breast cancer screening unit in the United Kingdom screening less than 100,000 women every three years must be equipped with two digital mammography units, ultrasonography, facilities for fine needle aspiration cytology, core biopsy and histopathology services, information systems and adequate number of staff *(10)*.

Almost 60% of countries in EMR have a protocol for breast cancer screening which was developed by the National Committee that recommended mammography screening starting at 40 years or 45 years of age. Women with high risk factors were recommended to be screened at younger age.

Opportunistic mammography screening has been implemented in higher resourced countries in the EMR like Qatar, Bahrain, Saudi Arabia, UAE, Oman, Kuwait and Jordan. In Qatar, women aged 45–69 years can get free yearly mammography at the three designated primary healthcare centres and also at mobile clinics. In Saudi Arabia, the target age for free biennial mammography screening is 40–74 years and women can be screened at designated clinics situated in primary health centres, shopping malls and local civil society organization-led clinics *(24)*. In Jordan, women aged 40 years and above can have annual mammography at any of the accredited centres *(25)*. The national breast cancer screening programme in Kuwait offers yearly mammography to women

between 40 and 69 years of age at the polyclinics, situated in each of the five governorates *(26)*.

In addition, mobile units for breast cancer screening have been implemented in many EMR countries, for example, with mobile vans with mammography facilities to screen women in rural areas or populations with low coverage in Egypt and Jordan. Mobile units also support breast cancer awareness campaigns in most of Gulf States. Additionally, mobile units screening initiatives, like the Pink Caravan in Sharjah, UAE, have strategically integrated their services with collaborative diagnostic centres to ensure timely work up and treatment for the abnormal screening mammograms *(27)*.

In all these countries, the programme is opportunistic and attendance at the screening depends on self-referral, referral by primary health clinics or by private practitioners. The uptake of screening is quite low in each country in spite of the highly visible breast cancer awareness campaigns conducted in the month of October every year. Between 2008 and 2015, only 5,507 women were screened for breast cancer in Qatar out of a yearly target of a few hundred thousand women *(26)*. Only 6,933 women out of a total 164,000 eligible women were screened between April 2014 and March 2016 in Kuwait *(26)*.

The less resourced countries in the EMR primarily depend on clinical breast examination (CBE) as the screening test, for which high-quality evidence for a reduction in breast cancer mortality (particularly for women age 50+) is now emerging, albeit in a tightly controlled randomized clinical trial *(28)*. In Morocco, a national programme to screen 45–75 year old women with CBE every two years was launched in 2010 and was gradually scaled up throughout all regions of the country. Though predominantly opportunistic, the programme is well-coordinated and achieves a high annual coverage of the target population. A formal external evaluation of the programmes reported that nearly 1.1 million women (out of an annual target of 1.75 million) were screened in 2015, with a breast cancer detection rate of 1/1,000 women screened *(26)*.

CBE is also performed at the primary health centres, though the target age and frequency is varied among EMR countries. Countries with limited resources and weak health systems, where the majority of women with breast cancer are diagnosed in late stages and mammography screening is not cost-effective and feasible, need to follow the WHO recommendation and prioritize early diagnosis of breast cancer over screening. Implementing early diagnosis involves improving the health-seeking behaviours of the population through contextually appropriate communication strategies, reorienting the frontline health providers to recognize early symptoms of breast cancer and creating universal access for women with symptomatic lesions to prompt and effective diagnosis and treatment *(26, 28)*.

Survey results for Gazan women's attitude living in and out of Gaza showed that women are willing to work up a breast complaint including diagnostic mammography, however there is significant less willingness to go for screening mammograms *(26, 28, 29)*.

## Colorectal cancer screening

Considering the growing burden of colorectal cancer (CRC), some of the EMR countries have either introduced screening for CRC or are running demonstration programmes. In 2010, the Ministry of Health of Bahrain launched a pilot programme to screen men and women aged 50 years and above using a faecal immunochemical test (FIT) annually *(30)*. The Ministry of Public Health in Qatar introduced the national bowel cancer screening programme to screen men and women aged 50–74 years using FIT once every year. Demonstration programmes have recently been completed in Iran and Morocco in collaboration with International Agency for Research on Cancer (IARC). The programme in Morocco recruited 9,757 men and women and following FIT 4.6% of them were positive *(31)*. A major challenge was to ensure adherence to care among individuals with positive screening tests, that is, to undergo a (timely) colonoscopy. Only 61.1% of the FIT positives underwent a colonoscopy, and as a result the detection rates of advanced adenoma (3.1/1,000) and CRC (0.7/1,000) were on the lower side. The study also highlighted the necessity of significantly enhancing the capacity of the endoscopy services prior to launching a CRC screening programme. A small pilot project in Iran screened 1,044 asymptomatic average risk men and women aged between 45 and 75 years with the FIT test. The kit return rate was high (96%) and FIT positivity was 9%. The study did not detect any cancer, but found advanced adenomas in 7.1% of those screened *(32)*.

Saudi Arabia successfully implemented a demonstration project in Riyadh and is now scaling up the programme gradually across the Kingdom. The target is to screen 45–69 year old individuals with the FIT test. In Iran, 1,044 asymptomatic average risk individuals (age 54.1 ± SD 7.0 years) recruited in a pilot screening project, from which the up-take of the FIT test was 96%, prevalence of positive result was 9.1% overall; 11.9% for adenoma and 7.1% for advanced adenoma. The positive predictive value (PPV) of the FIT was about 17% for any colonic neoplasms *(33)*. A cross sectional study in Iran among 200 individuals showed that the general public had a very little knowledge about CRC symptoms, risk factors, and screening. Only 9 (4.5%) individuals knew that "blood in the stool is a CRC symptom", 34 (17%) were aware that being 50 years old is a risk factor for CRC, and about 10% had appropriate knowledge about the effectiveness of CRC screening *(34)*.

## Screening and early detection of oral cancer

Oral cancer (lip, oral cavity and pharynx) was ranked the seventh most frequent type of cancer by incidence worldwide. Southern Asia (India and Sri Lanka) as well as the Pacific Islands (Papua New Guinea) reported the highest incidence rates in both sexes *(1)*. Unlike developed countries, almost two thirds of oral cancer patients in the Gulf States presented with advanced tumours (stage III and IV) which required advanced cancer care facilities for diagnoses and management.

Areas with high prevalence of smokeless tobacco consumption such as chewing tobacco or snuff reported the highest incidence of oral cancer in the EMR. Local studies showed that oral cancer was associated with regular consumption of smokeless tobacco products. *Shammah* (chewing tobacco) is commonly used in the Middle East especially in southern part of Saudi Arabia, Yemen and Sudan *(17)* .

Oral cancer control has not received much attention in the EMR. So far, no country has started any form of screening programme.

Public awareness and education on the early signs and symptoms of oral cancers should be planned and undertaken through the healthcare system for efficient downstaging and thus reduction in mortality. The WHO model for oral cancer screening through primary healthcare centres can be introduced for easy access to high risk individuals preferably at their homes or work places. An opportunistic case finding programme through dentists and primary healthcare practitioners can be also established in areas with high prevalence of smokeless tobacco consumption. Routine clinical oral examinations at every visit of a patient seen at primary healthcare center should be performed to detect and report white and red patches (leukoplakia and erythroplakia) which are potentially malignant disorders or persistent ulcers and lumps suspected of cancer *(35)*.

## Conclusions and the way forward

It is evident that several high- and middle-income countries have made some progress on early detection. Yet, implementation of cancer early detection programmes varies substantially across the region, and that the EMR countries face multiple challenges that hinder the effective performance of cancer early detection programmes. Deficiencies in screening up-take, are leading to a significant proportion of cancer cases being discovered at a late stage when the treatment is less effective. Organized cancer screening services are not feasible in most EMR countries, given the existing health system constraints. Yet in most countries, screening remains opportunistic and non-systematic with low participation rates and impact.

- Early diagnosis approaches need to be enhanced as a solid foundation and made feasible for all countries in the EMR,

irrespective of their income level. All EMR countries should develop adequate facilities for early diagnosis, referral, diagnostic investigations, including imaging, biomarkers, fine needle aspiration cytology/biopsy, and histopathology in their public health services to support early detection.

- They should also ensure adequate healthcare financing mechanisms and access for early diagnosis and treatment of early-stage cancers detected by screening or early diagnosis.
- Similarly, public health literacy is one area that needs to be prioritized in the region. Increasing community awareness and strengthening the capacity of healthcare professionals for early diagnosis, timely referral, and treatment is crucial for the region. Integration of early diagnosis programmes in primary healthcare will need to for scale-up across high-, middle-, and low-income level countries in the region to improve cancer early detection and eventually reduce cancer mortality.
- Given the existing low up-take of cancer screening programmes in most countries, it is important to identify priority cancers and key interventions that can be included in health insurance packages whenever applicable or the universal health coverage priority benefits to ensure sustainable financing and increase the accessibility of cancer screening interventions in limited resources settings.
- Early detection of cancer and, in some cases, prevention of cancer through screening is the most effective strategy to achieve treatment and cure of cancer. Although significant efforts have been invested in the cancer awareness campaign on breast cancer in most countries around October, it has had limited linkages with the rest of the health system.
- Poor documentation and understanding of the number of screen-positive women from the breast cancer awareness campaign receiving the necessary follow-up care. Early detection does not make an impact unless there is a system of ensuring ready access to affordable treatment by the early detected cancer patients.
- The current screening activities should consider the health system requirements needed to meet the diagnostic and treatment demands that arise from positive mammography results to ensure the availability of adequate detection and follow-up interventions for screen-positive women. The bottlenecks faced by the cancer patients, especially those belonging to vulnerable populations (low socioeconomic class, the uninsured, immigrants, etc.).
- Effective programmes for cancer early detection require robust, high-quality cancer data, which is critical for planning, monitoring and evaluation of the programmes.

Unfortunately, insufficient data constitutes a significant concern in most countries in the EMR and demand considerable improvement in cancer registration in the region. Existing efforts to develop cancer registry programmes aim to address these concerns.

➤ Fostering collaboration and national dialogue with various stakeholders, including civil society organizations, the private sector, and patient groups is necessary to harmonize all efforts and ensure coverage of the vulnerable populations.

➤ All countries, irrespective of their socioeconomic progress, can take steps to improve early diagnosis of cancer by ensuring that People are sensitized enough to consult health professionals promptly as soon as symptoms appear, without being delayed by any financial, logistical or psycho-cultural barriers. Moreover, the health staff consulted should react appropriately and rapidly, thanks to adequate training and clear referral guidelines with diagnostic and treatment services that are accessible rapidly and deliver optimal quality at an affordable cost.

The COVID19 pandemic has a negative impact on cancer early detection. Most activities have been suspended and put on hold to reduce the spread of coronavirus, leading to a significant decline in cancer screening. The delay will likely lead to late presentation of cancer, poor outcomes, and overall poor survival rates. However, advice on re-starting cancer screening in line with COVID 19 will require a well-coordinated effort to proactively reach out to the community and to regain public trust using safe practice to ensure the public is protected against COVID19 much as possible. ■

**Annex 1: Definition of early detection of cancer**

➤ **Early diagnosis aims to detect cancer in its early stages in people with symptoms, when treatment is simple and affordable, resulting in higher cure rates. Early diagnosis is based on improved public and professional awareness of signs and symptoms of cancer. It entails recognizing possible warning signs and taking prompt action, and requires education of the public to improve cancer awareness, training of healthcare professionals to improve their professional awareness and skills in recognizing early signs and symptoms of common cancers, availability, affordability and good access to diagnostic and staging investigations, treatment services and follow-up care in public health services.**

➤ **Screening is the process of identifying apparently healthy, asymptomatic people who are at high risk of having clinically undetectable early disease. It involves routine application of a screening test at specified intervals and referring those with "abnormal" (positive) screening tests for further diagnostic investigation and treatment. A screening test may be offered to a large number of asymptomatic people in the population, when it is called population-based screening, or it may be offered by a provider to asymptomatic individuals during routine healthcare interactions, when it is called opportunistic or spontaneous screening.**

*Disclaimer*

*Where authors are identified as personnel of the International Agency for Research on Cancer/World Health Organization, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy, or views of the International Agency for Research on Cancer/World Health Organization.*

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