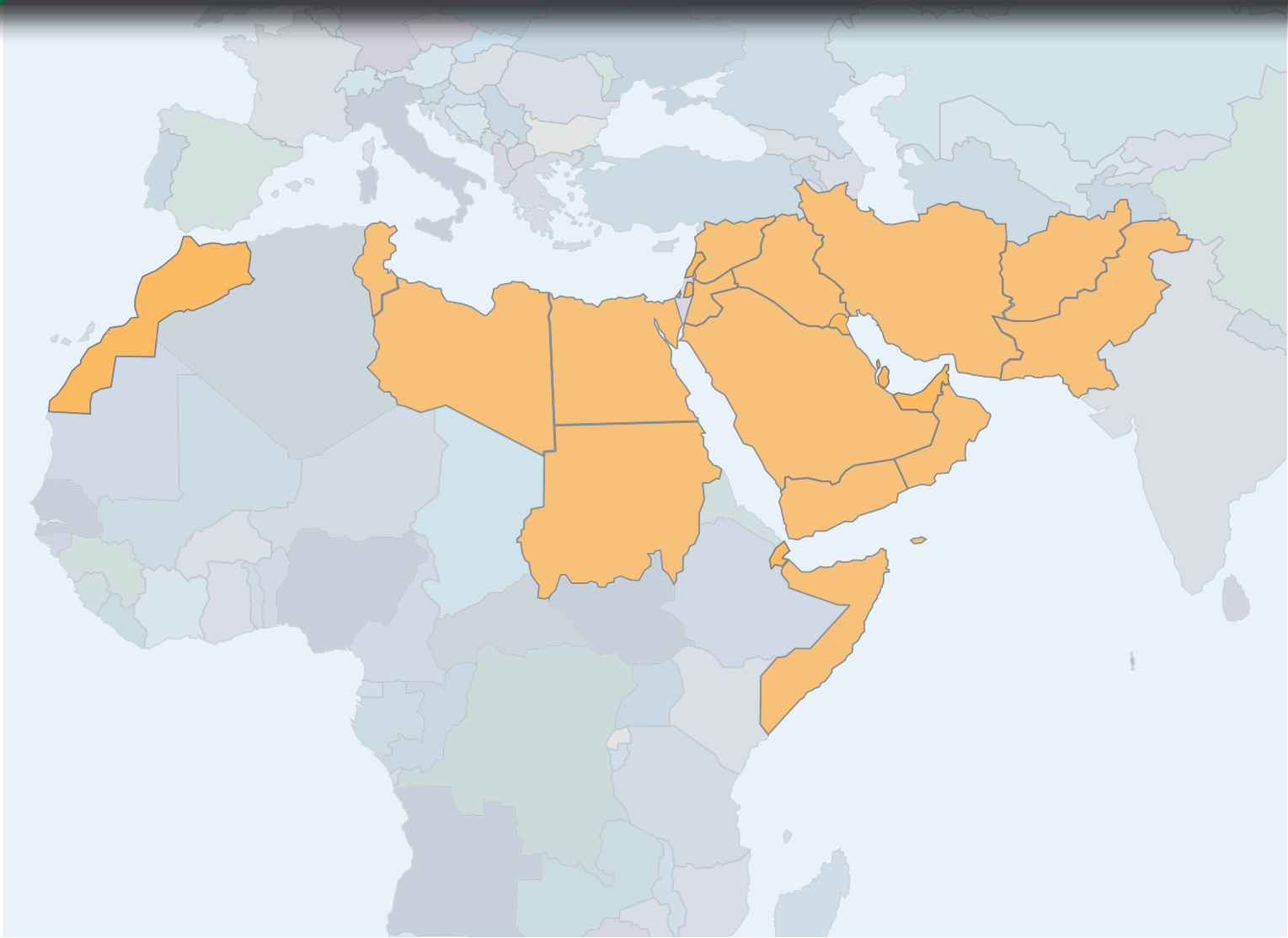


# CANCER CONTROL

## EASTERN MEDITERRANEAN REGION SPECIAL REPORT



FOREWORD BY DR AHMED AL-MANDHARI, WORLD HEALTH ORGANIZATION  
REGIONAL DIRECTOR, EASTERN MEDITERRANEAN REGION

PROJECT LEAD: DR IBTIHAL FADHIL, CHAIR, EASTERN MEDITERRANEAN NCD ALLIANCE



PUBLISHED IN OFFICIAL ASSOCIATION WITH THE EASTERN MEDITERRANEAN NCD ALLIANCE

# CANCER CONTROL

## EASTERN MEDITERRANEAN REGION SPECIAL REPORT



PROJECT LEAD: DR IBTIHAL FADHIL  
CHAIR, EASTERN MEDITERRANEAN NCD ALLIANCE



[www.cancercontrol.info](http://www.cancercontrol.info)

#### PROJECT LEAD

IBTIHAL FADHIL

#### PUBLISHER

TIM PROBART

Contact details: [tprobart@globalhealthdynamics.co.uk](mailto:tprobart@globalhealthdynamics.co.uk)

#### DESIGN

Marriott Graphics

[www.smarriott.co.uk](http://www.smarriott.co.uk)

#### COPY EDITOR

MADELINE PEARSON

#### CANCER CONTROL EASTERN MEDITERRANEAN REGION SPECIAL REPORT

is published by Global Health Dynamics Limited

in official association with the Eastern Mediterranean NCD Alliance

#### GLOBAL HEALTH DYNAMICS

20 Quayside, Woodbridge, Suffolk

IP12 1BH, UK

P: +44 1394 446023

[www.globalhealthdynamics.co.uk](http://www.globalhealthdynamics.co.uk)

[cancercontrol@globalhealthdynamics.co.uk](mailto:cancercontrol@globalhealthdynamics.co.uk)

#### EASTERN MEDITERRANEAN NCD ALLIANCE

Al Safat

Kuwait City 12128

Kuwait

[www.emrnca.org](http://www.emrnca.org)

All rights are reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the permission of the Publisher.

The information contained in this publication is believed to be accurate at the time of manufacture. Whilst every care has been taken to ensure that the information is accurate, the Publisher and the Eastern Mediterranean NCD Alliance and Research can accept no responsibility, legal or otherwise, for any errors or omissions or for changes to details given to the text or sponsored material. The views expressed in this publication are not necessarily those of the Publisher or of the Eastern Mediterranean NCD Alliance.

Application for reproduction should be made in writing to the Publisher.

Copyright © Global Health Dynamics 2022

ISBN 978-1-9160216-7-9

FIRST PUBLISHED 2022



# Contents

## 05 Foreword

Ahmed Al-Mandhari

## 06 Introduction

Ibtihal Fadhil

## 07 Editorial:

Cancer control in the Eastern Mediterranean Region

Asmus Hammerich, Nasim Pourghazian, Heba Fouad, Mark Lodge, Rana Hajjeh and Ibtihal Fadhil

## 10 Chapter 1:

National cancer control planning in the Eastern Mediterranean Region

Eman Alkalawi, Ali Al Zahrani, André Ilbawi, Rolando Camacho, Salim M Adib and Ibtihal Fadhil

## 19 Chapter 2:

Cancer prevention: Modifiable risk factors

Randah Hamadeh, Ayoub Al-Jawaldeh, Fatina Altahan, Fatimah El-Awa, Khalid Saeed, Mark Lodge, Maya Charafeddine and Ibtihal Fadhil

## 34 Chapter 3:

Cancer prevention: Infection and environment as risk factors

Ali Al Zahrani, Ali Shamseddine, Partha Basu, Randah Hamadeh, Hikmat Abdel-Razeq, Maya Charafeddine and Fatina Altahan

## 45 Chapter 4:

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

Kazem Zendehelel, Partha Basu, Ophira Ginsburg, Samar Al Homoud, Slim Slama, Rola Shaheen, Deborah Mukherji, Ali Al Zahrani and Ibtihal Fadhil

## 55 Chapter 5:

Access to cancer treatment and diagnosis in the Eastern Mediterranean Region

Mojtaba Vand Rajabpour, Rolando Camacho, Ibtihal Fadhil, Bassim J Al-Bahrani, Nagi S El Saghir, Hikmat Abdel-Razeq, Ahmed Elhaj, Gulin Gedik and Kazem Zendehelel

## 68 Chapter 6:

Cancer care in humanitarian crises

Raya Saab, Slim Slama, Asem Mansour, Zahi Abdul Sater, Rola El Sayed and Deborah Mukherji

## 72 Chapter 7:

Childhood cancer in the Eastern Mediterranean Region

Raya Saab, Ranin Soliman, Asim Belgaumi, Leila Hessissen, Tezer Kutluk, Lydia Konig, Sawsan Jaffar Sawan Al Madhi, Iyad Sultan, Mhamed Harif and Nasim Pourghazian

## 82 Chapter 8:

Palliative care in the Eastern Mediterranean Region: An overview

Hibah Osman, Sami Alshammary, Maryam Rassouli, Iman Al-Diri, Ibtihal Fadhil, Azza Hassan, Omar Shamieh, Samy Alsirafy, Ghadeer Alarjeh, Nasim Pourghazian and Khalid Al Saleh

## 90 Chapter 9:

Cancer surveillance in the Eastern Mediterranean Region

Saleh A Alessy, Ariana Znaor, Ze Shen, Ali Al Zahrani, Ali Shamseddine, Heba Fouad, Kazem Zendehelel, Sultan Eser, Zahi Abdul-Sater, Jawad Al-Lawati and Ibtihal Fadhil

## 95 Chapter 10:

Role of regional civil society organizations in cancer control in the Eastern Mediterranean Region

Fatemeh Toorang, Kazem Zendehelel, Ibtihal Fadhil, Hana Chaar, Nisreen Qatamish, Sawsan Al Madhi and Hadi Abu Rasheed



# Foreword



**Dr Ahmed Al-Mandhari,**

World Health Organization Regional Director  
for the Eastern Mediterranean Region

Cancer is a major public health issue in the region causing considerable morbidity and mortality. In Eastern Mediterranean Region (EMR) countries, cancer ranks as the second to fourth most common cause of death. Each year, thousands of people are diagnosed with cancer in the region and more than half of the patients eventually die. The impact of cancer on individuals, families, communities, and health systems is well documented globally.

While many countries in the EMR have shown an increase in life expectancy, reduced maternal and child mortality coupled with health system development, they are also challenged with an increasing incidence of cancer burden and mortality. Evidence has shown that our region can expect a doubling of cancer incidence by 2040 due to ageing and growth in the population alone, without even taking into consideration the high regional prevalence of risk factors such as smoking, unhealthy diets and air pollution. Therefore, the pertinent question that remains is how ready are we to face the increasing incidence of cancer?

Planning for cancer prevention and control is now more critical than ever before. Well informed and country-tailored national cancer control plans (NCCPs) are essential to mitigating the growing burden and cost of cancer and to help cope with the increasing demand on national health systems, while ensuring that core cancer prevention and control interventions are made available to the population. Considering the significance of cancer for premature noncommunicable disease (NCD) mortality, well-implemented NCCPs will also contribute to the realization of the Sustainable Development Goal Target 3.4 to

reduce premature deaths from NCDs by 30% by 2030.

The ongoing COVID-19 pandemic exposed health system weaknesses, yet it gives us the opportunity to strengthen and build back better. The World Health Organization (WHO) continues to support countries to ensure effective and equitable cancer care, and we remain focused on reducing cancer morbidity and mortality, investing in cancer control and paving the road towards achieving universal health coverage in its member states. WHO's global initiatives (Global Initiative on Childhood Cancer, Cervical Cancer Elimination Initiative and the Global Breast Cancer Initiative) provide strategy and technical support to national level strengthening of these cancer programmes as part of overall national cancer control plans and as an integrated part of the regional commitment in line with the regional framework for action on cancer prevention and control.

Controlling cancer will require strong collaboration among various sectors, including civil society organizations, academia, and other partners to implement cancer control policies and address community needs and priorities. In our efforts to achieve this, it is encouraging that we can lean on a high-level commitment to universal health coverage in the region.

My hope and expectations are that by highlighting the region's needs and priorities in the *Cancer Control: Eastern Mediterranean Region Special Report* there will be an opportunity for cancer communities to advocate more widely for advancing the cancer control agenda in the EMR. Together, we can reverse the tide of cancer, avoiding millions of unnecessary deaths and cancer-related suffering in the region. ■

# Introduction



**Dr Ibtihal Fadhil, Project Lead**

Founder and Chair, Eastern Mediterranean NCD Alliance ([www.emncda.org](http://www.emncda.org))

The Eastern Mediterranean Region (EMR) comprises of 22 member states in the Middle East, North Africa and West Asia, with a total population of around 712 million (1). Many of these states share similarities in language, religion and culture, yet vary widely in terms of their economic situation, healthcare system development, and the corresponding health challenges faced. In 2020, over 700,000 people were diagnosed with cancer in the EMR and, unfortunately, approximately 500,000 lost their lives to cancer in the same year (2). These figures are predicted to double by 2040 (2).

Whilst the EMR demonstrates many challenges in cancer care, understanding these is often obscured by issues of conflict, resources and inequality. The *Cancer Control: Eastern Mediterranean Region Special Report*, draws on the expertise and knowledge of more than 60 contributors, most from within the region, to analyze cancer issues at first hand, what is being done to overcome them, and future directions. This is the first time such information has been documented in one report and provides an opportunity for more in-depth study of cancer control across the EMR and the interaction between countries, as well as providing a basis for shared information and ongoing cooperation.

*Cancer Control: Eastern Mediterranean Region Special Report* is the first in a new series of region-specific reports from Global Health Dynamics, the publishers of the *Cancer Control* series ([www.cancercontrol.info](http://www.cancercontrol.info)).

Work on this special report started in early 2019 and draws on my previous experience of the region through the World Health Organization (WHO). It was obvious that EMR countries needed to describe the variability in cancer resources across the 22 countries of the region, as well as explaining particular regional cancer issues, including the impact of the rising incidence of cancer, the current state of cancer control and prevention strategies. There was also a need to take stock of new global cancer initiatives and the scale-up to achieve the

Sustainable Development Goal target 3.4 to reduce premature NCD mortality by 2030.

Discussions were initiated with more than 60 colleagues, cancer experts from across the Eastern Mediterranean, as well as from global institutions involved in the region. Authors from the WHO, International Agency for Research on Cancer and International Atomic Energy Agency, have also welcomed the idea and contributed greatly to the special report.

The special report consists of ten chapters covering the whole cancer care continuum, including planning, prevention, early detection, access to care, treatment, palliative care, and cancer surveillance and research. Besides covering the unique regional situation, and the new WHO initiatives, the regional experts have added three further chapters on cancer care in humanitarian settings, paediatric oncology to assist with the scale-up of the global childhood cancer initiatives (GICC), and the role of civil society organizations in advancing cancer care in the EMR.

Each chapter outlines the current status in EMR countries, the challenges and progress with a set of recommendations targeting cancer managers and policy-makers. I hope this will make the special report a valuable resource for healthcare practitioners, researchers, academics and policy-makers who are interested in cancer control programmes from the region and globally.

Finally, I would like to thank the chapter leads for their hard work in coordinating activities, Eman Alkhalawi, Ali Al Zahrani, Andre Ilbawi, Mark Lodge, Saleh Alessy, Asmus Hammerich, Heba Fouad, Ariana Znaor, Slim Slama, Deborah Mukharji, Raya Saab, Kazem Zendeheh, Sami Ayed, Nasim Pourghazian, Fatemeh Toorang, and all the authors who contributed their knowledge and time to the project.

I hope you find the special report use in your work and if you have any comments or suggestions please feel do not hesitate to contact me. ■

## References

1. WHO. Health and well-being profile of the Eastern Mediterranean Region: an overview of the health situation in the Region and its countries in 2019. Cairo: WHO Regional Office for the Eastern Mediterranean; 2020 (<https://applications.emro.who.int/docs/9789290223399-eng.pdf?ua=1>).

2. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021; 71: 209–49.

# Editorial: Cancer control in the Eastern Mediterranean Region

**Asmus Hammerich**, Director, Eastern Mediterranean Regional Office, Cairo, Egypt; **Nasim Pourghazian**, Technical Officer, World Health Organization Eastern Mediterranean Regional Office, Cairo, Egypt; **Heba Fouad**, Medical, Noncommunicable Diseases and Mental Health Department, World Health Organization Eastern Mediterranean Regional Office, Cairo, Egypt; **Mark Lodge**, Executive Director, International Network for Cancer Treatment and Research, UK Office; **Rana Hajjeh**, Director, Programme Management (DPM), World Health Organization Eastern Mediterranean Regional Office, Cairo, Egypt and **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait



ASMUS HAMMERICH

NASIM POURGHAZIAN

HEBA FOUAD

MARK LODGE

RANA HAJJEH

IBTIHAL FADHIL

The World Health Organization's (WHO) Eastern Mediterranean Region (EMR) comprises 22 countries with a population of over 700 million people (1). Although, most of these countries share a language, religion and culture, they vary widely in their socioeconomic status, health system development and health challenges. Moreover, several countries in the region have been heavily affected by protracted armed conflict and political instability resulting in a generalized state of insecurity and dysfunctional health systems (2). Cancer is a growing public health challenge in the EMR accounting for considerable burdens of disease and death (3). Based on WHO's International Agency for Research on Cancer (IARC) data, approximately 734,000 new cancer cases and over 458,600 deaths were documented in the EMR in 2020. These numbers are projected to double by 2040, challenging this region with the highest estimated increase in cancer burden out of all of the six WHO regions worldwide (4).

The expected rising burden of cancer cases in the region varies from doubling (e.g. Kuwait and Oman) to tripling (e.g. Saudi Arabia). Moreover, the expected increase in burden of cancer mortality across the region is estimated to double by 2040 (4).

The expected increase can be partially explained by an ageing 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 caloric diet and obesity, and tobacco smoking, all of which have shown a steady increase since 2000 (5). The prevalence of obesity in the EMR remains high, particularly among adolescents with a high body mass index (BMI) (5). This phenomenon is expected to lead to a future increase in

incidence of colorectal, liver and gastric carcinoma particularly among males, and breast cancer incidence among females (6).

This increasing burden is also critical for future health planning, as it will inevitably lead to the need to upscale infrastructure, doubling the number of hospital beds, the number of providers and other resources allocated to cancer. The implementation of existing national cancer plans and programmes in most EMR countries already face challenges such as weak commitment to cancer control, fragmentation of services, scarcity of human and technological resources, limited funding, lack of access to cancer services and medicines, and the weakness of public health systems, particularly in low- and middle-income countries (7). Moreover, political instability in many countries, associated with population displacement and the destruction of health services, has negatively impacted on cancer services in almost half of the EMR countries (8).

Cancer prevention is a priority health need in the EMR. According to GLOBOCAN, the three most frequently diagnosed cancers in the region amongst women are cancers of the breast, colorectum and cervix. For men, they are lung, liver and prostate cancer (4). Most of these common cancers in the region are easily preventable by feasible and cost-effective public health interventions, including implementation of the Framework Convention on Tobacco Control (FCTC), increasing coverage human papillomavirus (HPV) vaccination and reducing exposure to occupational carcinogens through more stringent industrial safety standards (7).

Evidence has shown that the increasing trends in cancer incidence are driven by the rising incidence of common risk factors, especially tobacco use. For instance, smoking is

estimated to have the second-highest population attributable fraction (14.9%) for cancer just below infections (15.3%) (9). Unfortunately, tobacco use in the EMR is one of the highest compared to other WHO regions, with around 19% of adults in this region tobacco users, mostly men. Only one country (Iran) is on track to reach the tobacco reduction target by 2025 and four out of the six countries who are predicted to experience a rise in tobacco use are in the EMR (Egypt, Jordan, Lebanon and Oman) (10, 11, 12).

Despite all the challenges and setbacks, the region has experienced some promising developments. Population-based cancer registration (PBCR) coverage has increased in the last two decades (7) in the EMR region. Moreover, considerable efforts over the last two decades by both civil society organizations (CSOs) and governments, focusing on improving public awareness have shown a positive impact on trends for cancer downstaging of breast cancer in several EMR countries (13), especially where cancer cases present at late stages. The recent campaign to eliminate Hepatitis C in Egypt and Pakistan will have major impact on the incidence of liver cancer in Egypt, and possibly in Pakistan.

For early detection of common cancers, which is critical for cancer control programmes in the region, there are two complementary approaches: cancer screening and early diagnosis. Implementation of these, varies substantially across the region. For instance, almost half of the EMR countries reported having organized population-based screening programmes for breast cancer, 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 and the majority lack most of the components of an organized screening programmes (14, 15).

By contrast, the early diagnosis approach remains an effective key intervention in all countries in the EMR, considering the late presentation of most cancers. Therefore, early diagnosis measures need to be enhanced as a foundation and feasible approach to improving cancer curability and survival even in low-resources settings in the EMR (15).

Whilst almost two thirds of the 22 countries in the EMR (68%) have PBCR for cancer registration, a considerable variation prevails across the region, both in cancer registry coverage and the quality of cancer data. There are still limitations for cancer registration in the region due to a shortage of funding, poor quality of data, population mobility and political instability that currently affect several EMR countries (16).

Paediatric oncology diagnostics and treatment interventions remain poorly reflected in national cancer control programmes

and benefit packages. The lack of accurate and accessible data regarding childhood cancer incidence and outcomes is one of the significant challenges in identifying and implementing needed changes to improve care (17). Within the context of the WHO Global Initiative for Childhood Cancer, in addition to the regional focus country, Morocco, six more countries in the region have recently been involved in accelerating their national childhood cancer programmes through a variety of childhood cancer projects engaging both CSOs and ministries of health. Significant efforts by civil society actors in the region have also contributed to the overall regional childhood cancer agenda.

As for cancer palliative care services, several initiatives have been developed in the region. Most EMR countries have not yet considered palliative care as a public health need and have not included it in their national health plans. The EMR has a vast variation in national laws, religious affiliations, and access to healthcare. As a result, there is great variability in palliative care policies and access to controlled medications, especially intravenous medications such as morphine or fentanyl. Most countries in the EMR have much lower consumption levels of opioids than the steadily rising global consumption levels. There are many reasons for this, the most significant reason being the lack of access to opioids for both patients and healthcare professionals (18), but also other factors such as limiting prescription laws and misconceptions about the use of opioids for pain relief.

The availability of skilled healthcare workers to address all types of cancer care is a critical element for cancer management. More than half of countries in the region do not meet the minimum threshold of doctors, nurses and midwives per 10,000 population (4). Problems are exacerbated by the migration of specialists to high-income countries and those who sometimes stay in these countries after completion of their training courses. Considering the increasing incidence of cancers in developing countries, the brain drain of specialists will shortly lead to serious challenges and shortcomings in the region (19).

The COVID-19 pandemic has further complicated the situation of cancer prevention and control in the region. It has adversely affected all cancer services, from planning to palliative care, in the low-income countries. According to a WHO survey in 2020, cancer services were reportedly disrupted in more than 40% of countries in EMR (20). These disruptions of cancer services, including the suspension of screening programmes, delays in diagnosis and treatment (including palliative care), are likely to exacerbate the current situation with an increase in advanced-stage diagnoses and, as a result, an increase of potentially preventable cancer mortality. Whilst countries continue to mitigate the service

disruptions, the extent of the effects of the pandemic has yet to be thoroughly evaluated.

In the context of achieving the health-related SDG targets, and in particular SDG 3.4 to reduce the premature mortality of NCDs, most EMR countries will struggle to achieve the SDGs by 2030 (21). It is therefore imperative to intensify efforts to fight cancer and support accelerated progress in cancer prevention and control measures to further reduce mortality and develop actions beyond “business as usual”.

Many supportive tools and measures have been developed to address gaps in a comprehensive approach for cancer control, including, but not limited to, the *WHO EMRO Regional Framework for Action on Cancer Prevention and Control*, which lists strategic interventions along with the six areas of cancer prevention and control along with indicators for better evaluation of the existing cancer-related programmes (22).

Despite tremendous regional challenges and instability, there is a growing momentum towards an “All-of-Society, All-

of-Lifetime” approach and there are many opportunities to advance the cancer agenda. The ongoing global WHO initiatives related to childhood cancer, cervical and breast cancer will provide the EMR countries with a unique opportunity to elevate the priority of cancer control programmes while creating a regional platform to improve advocacy and clinical practice by joining forces with existing regional collaborative efforts. The potential decrease in cancer mortality represents a substantial contribution to the achievement of SDG Target 3.4 to reduce premature NCD mortality by 2030. Civil society organizations should be encouraged to play a bigger role in educating the public and supporting cancer prevention and screening initiatives. However, the primary responsibility for the health of the populations in the region and for the achievement of SDG target 3.4 rests with governments and can only be fulfilled by the provision of adequate health and social measures guaranteed by the implementation of universal health coverage. ■

## References

1. Al-Mandhari A, Brennan R, AbuBakar A, Hajjeh R. Tackling COVID-19 in the eastern Mediterranean Region. [https://doi.org/10.1016/S0140-6736\(20\)32349-7](https://doi.org/10.1016/S0140-6736(20)32349-7).
2. (UNOCHA), Global Humanitarian Overview 2020. Available at (<https://www.unocha.org/global-humanitarian-overview-2021>).
3. International Agency for Research on Cancer (IARC) and World Health Organization. *GLOBOCAN 2012: estimated cancer incidence, mortality and prevalence worldwide in 2012*. Geneva: World Health Organization; 2012. ([http://globocan.iarc.fr/Pages/fact\\_sheets\\_population.aspx](http://globocan.iarc.fr/Pages/fact_sheets_population.aspx)).
4. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021; 71: 209–49.
5. WHO Regional Office for the Eastern Mediterranean. Health and well-being profile of the Eastern Mediterranean Region: an overview of the health situation in the region and its countries in 2019. Cairo: World Health Organization Regional Office for the Eastern Mediterranean, 2020. (<https://applications.emro.who.int/docs/9789290223399-eng.pdf?ua=1>).
6. Charafeddine MA, Olson SH, Mukherji D, Temraz SN, Abou-Alfa GK, Shamseddine AI. Proportion of cancer in a middle eastern country attributable to established risk factors. *BMC Cancer* 2017; 17: 337.
7. WHO Cancer Country Profile 2020. Geneva: World Health Organization, 2020.
8. El Saghir NS, Soto Pérez de Celis E, Fares JE, et al: Cancer care for refugees and displaced populations: Middle East conflicts and global natural disasters. *Am Soc Clin Oncol Ed Book* 38:433–440, 2018.
9. Kulhanova I, Znaor A, Shield KD, Arnold M, Vignat J, Charafeddine M, et al. Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region. *Int J Cancer*. 2020;146(3):646–56.
10. Fouad H, Commar A, Hamadeh RR, El-Awa F, Shen Z, Fraser CP. Smoking prevalence in the Eastern Mediterranean Region. *East Mediterr Health J*. 2020;26(1):94–101.
11. WHO global report on trends in prevalence of tobacco use 2000–2025, third edition 2019.
12. WHO global report on trends in prevalence of tobacco use 2000–2025, fourth edition 2021. available from : <https://www.who.int/publications/i/item/9789240039322>.
13. El Saghir NS, Assi HA, Jaber SM, Khoury KE, Nachez Z, Mikdashi HF, et al. Outcome of breast cancer patients treated outside of clinical trials. *Journal of Cancer*. 2014;5(6):491.
14. World Health Organization *Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2017 global survey* 2018.
15. World Health Organization. *Guide to cancer early diagnosis*. World Health Organization. 2017. Available from: <https://apps.who.int/iris/handle/10665/254500>.
16. Znaor A, Eser S, Anton-Culver H, et al: Cancer surveillance in northern Africa, and central and western Asia: Challenges and strategies in support of developing cancer registries. *Lancet Oncol* 19: e85–e92, 2018
17. WHO Global initiatives for childhood cancer: <https://siop-online.org/who-global-initiative-for-childhood-cancer>.
18. Fadhil I, Lyons G, Payne S. Barriers to, and opportunities for, palliative care development in the Eastern Mediterranean Region. *Lancet Oncol*. 2017 Mar;3(18): e84–176. [https://doi.org/10.1016/S1473-3099\(17\)30451-4](https://doi.org/10.1016/S1473-3099(17)30451-4) PMID:28271872.
19. El Saghir NS, Anderson BO, Gralow J, Lopes G, Shulman LN, Moukadem HA, et al. Impact of merit-based immigration policies on brain drain from low- and middle-income countries. *JCO global oncology*. 2020;6:185–9.
20. Rapid assessment of service delivery for NCDs during the COVID-19 pandemic: (<https://www.who.int/publications/m/item/rapid-assessment-of-service-delivery-for-ncds-during-the-covid-19-pandemic>).
21. United Nations. Transforming our world: the 2030 agenda for sustainable development. <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf> (accessed November 24, 2021).
22. WHO Regional Office for the Eastern Mediterranean: Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region. Cairo: World Health Organization Regional Office for the Eastern Mediterranean, 2019.



# National cancer control planning in the Eastern Mediterranean Region

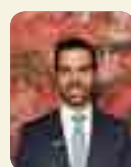
**Eman Alkalawi**, Assistant Professor, Department of Family and Community Medicine, King Abdulaziz University, Jeddah, Saudi Arabia; **Ali Al Zahrani**, Gulf Centre for Cancer Control and Prevention, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia; **André Ilbawi**, Technical Officer, Cancer Control, World Health Organization, Geneva, Switzerland; **Rolando Camacho**, Global Technical Lead, City Cancer Challenge Foundation, Geneva, Switzerland; **Salim M Adib**, Professor of Public Health Practice, American University of Beirut, Lebanon and **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait



EMAN ALKALAWI



ALI AL ZAHIRANI



ANDRÉ ILBAWI



ROLANDO CAMACHO



SALIM ADIB



IBTIHAL FADHIL

The Eastern Mediterranean Region (EMR) is expected to witness substantial population growth and ageing in the coming decades. This, along with changing risk factors, will lead to an increasing burden of cancer. National cancer control plans (NCCPs) are essential to mitigate the growing human and financial cost of cancer and to help cope with the increasing demand on health systems. Furthermore, well-implemented NCCPs will help realize the Sustainable Development Goal to reduce deaths from noncommunicable diseases by 30% by 2030.

Over half of the EMR countries do not yet have operational NCCPs. Many of them face challenges including political instability, competing priorities and fragmented healthcare systems. In order to reach the highest achievable level of cancer control, countries will need to develop a national plan focusing on strong governance, engagement of all stakeholders, including non-health sectors, and will need to set priorities and targets with proper budgeting. Monitoring and evaluation should be an integral part of the plan.

Priority cancer control areas in the EMR include strengthening primary healthcare which provides preventive and early diagnosis activities, scaling up multidisciplinary cancer care, tobacco control, and human resources, strengthening and increasing access to supportive and palliative care, and supporting surveillance and high-quality policy-relevant research. Regional collaboration in the areas of research, training and clinical care as well as exchange of technical expertise can help build capacity and better utilize existing resources.

## Background

The Eastern Mediterranean Region (EMR) comprises 22 member states in the Middle East and North Africa, with a total population of around 712 million (1). Many of these states share elements of language, religion and culture. However, EMR states vary widely in terms of their economic situations and their levels of health service development. The World Health Organization (WHO) categorizes EMR countries into three health system groups based on population health outcomes, health system performance and their level of healthcare expenditure (2).

**Group 1:** High-income countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates).

**Group 2:** Middle-income countries (Egypt, Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Palestine, Syrian Arab Republic and Tunisia).

**Group 3:** Low-income countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen).

This is reflected in large differences in health system and work-force capacity between EMR countries. For example, per 100,000 cancer patients, the number of mammographs ranged from 1 to 186, the number of external beam radiotherapy units ranged from zero to 24 while the number of surgeons ranged from 15 to 1,918 (3).

The three most frequently diagnosed cancers in the region amongst women are cancers of the breast, colorectum, and cervix. For men they are lung, liver, and prostate cancer (Figure 1). While lung cancer contributes an equal proportion of cancer incidence worldwide as breast cancer and is the leading cause of cancer deaths (followed by colorectum, liver, and stomach cancer), breast cancer carries by far the highest incidence and mortality burden in the EMR (4).

The Global Cancer Observatory estimated that there were nearly 680,000 newly diagnosed cancers and over 400,000 cancer deaths in the EMR in 2018 (4). The region witnessed a 46% increase in cancer incidence between 2005 and 2015 (5).



This was mostly attributed to population growth and ageing, and to better diagnosis and reporting, but changing risk factors have also contributed to the increased incidence. Second to the African Region, the EMR is projected to experience the highest relative increase in the number of cancer deaths in the coming decades (Figure 2).

With increasing life expectancy and the advancement of cancer treatments, we will see more people being diagnosed with cancer and living with it. In recent years, there has been a rise in the number of targeted therapies, most of which are very expensive. With cancer control in the EMR mostly directed towards treatment, healthcare systems cannot cope with the rise in treatment cost. More attention is being directed towards prevention and early detection, but systems remain deficient in early diagnosis, referral, and coordinated management.

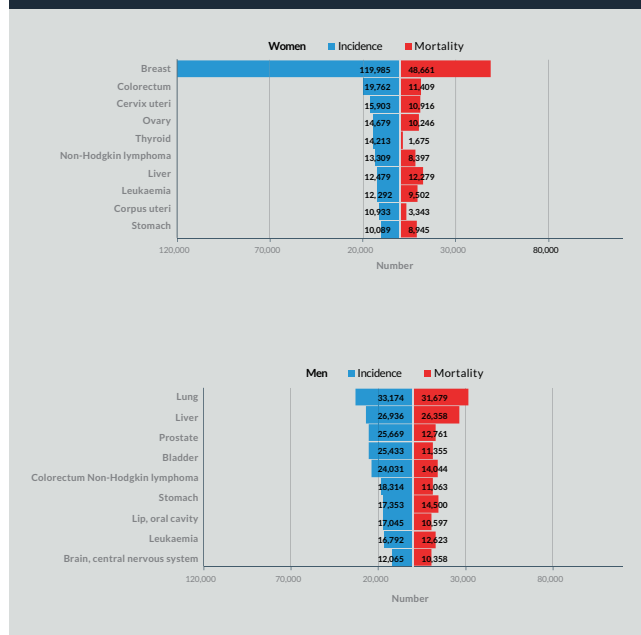
Target 3.4 of the Sustainable Development Goals (SDGs) aims to reduce by one third premature mortality from noncommunicable diseases (NCDs) by 2030 through prevention and treatment (6). Current projections show that the EMR is expected to achieve the least progress towards this target (7). The probability of dying prematurely (between the age of 30 and 70) from an NCD in 2016 ranged from 11% in Bahrain to 30% in Yemen (8). Cancer deaths constitute around 23.5% of premature NCD deaths in the region (9). Having effective cancer control programmes and policies in place can therefore make a significant contribution to lowering premature mortality.

Following the landmark resolution of 2011 where a commitment was made by Heads of State to address cancer and other NCDs (10), many countries started developing National Cancer Control Plans (NCCPs). What came to be known as the “Cancer Resolution” was passed in 2017 by the World Health Assembly (Agenda Item 15.6, WHA70.12), putting cancer high on the global agenda (11). Furthermore, the universal healthcare (UHC) resolution in 2019 highlighted the need to address NCDs including cancer (12). The necessity of UHC is especially highlighted in the context of cancer due to the often prohibitive costs of cancer treatment.

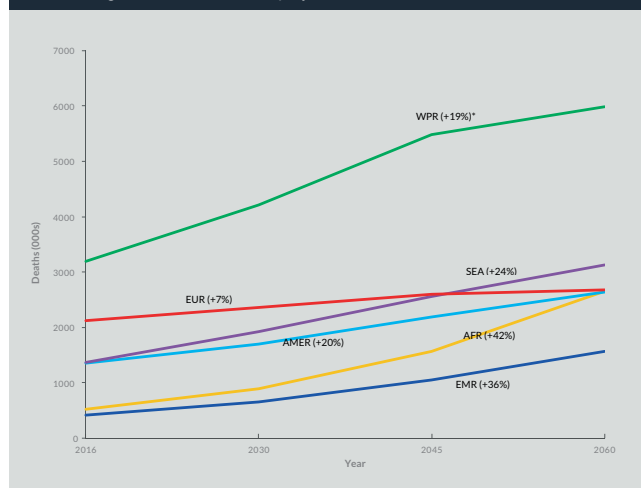
### Cancer risk factors in the EMR

Many of the prevalent cancer risk factors in the region like tobacco use, ambient air pollution, physical inactivity, unhealthy diet, and harmful use of alcohol contribute to the rising incidence of cancer and other major NCDs. For example, estimates of tobacco use prevalence in men range from 18% in Oman to 49% in Lebanon. In women, they range from less than 1% in several EMR countries to 30% in Lebanon (13). The EMR is the only region where an increase in tobacco use is expected in both men and women by 2025, and many of its countries

**Figure 1: Estimated numbers of the top ten cancers diagnosed and their corresponding numbers of deaths in women and men in the WHO Eastern-Mediterranean region, 2018.** Data source: International Agency for Research of Cancer, Global Cancer Observatory (<https://gco.iarc.fr>)



**Figure 2: Cancer mortality projections by WHO region.** WPR (Western Pacific Region), EUR (European Region), SEA (South-East Asia Region), AMER (Region of the Americas), AFR (African region), EMR (Eastern Mediterranean Region). \*Average percent increase per 15-year interval. Data source: WHO Health statistics and information systems: [https://www.who.int/healthinfo/global\\_burden\\_disease/projections/en/](https://www.who.int/healthinfo/global_burden_disease/projections/en/)



are unlikely to achieve the 30% tobacco use reduction target (14). Accurately quantifying tobacco use and its health impacts in this region is challenging due to the widespread use of waterpipes, for which there is no standardized method to measure its consumption. Consequentially, it is difficult to estimate its hazard compared to cigarettes. The prevalence of alcohol consumption in 2016 ranged from less than 1% for women in several countries to 52% for men in Qatar (15). Obesity is very common in the Gulf Cooperation Council (GCC) countries, Jordan and Egypt, especially in women (16). Physical inactivity is also highly prevalent across income levels. All EMR countries have high average red meat consumption

and insufficient fruit and vegetable intake (17). Effective prevention programmes to tackle these risk factors will help to reduce the burden of cancer and other NCDs.

To varying degrees, infection-related cancers still significantly contribute to the cancer burden in the EMR, even in high-income countries. In some instances, this reflects the lead-time following exposure to infectious agents that were highly prevalent in the past, such as *Schistosoma haematobium* causing bladder cancer or the hepatitis B and C viruses, which are major causes of liver cancer in the region. *Epstein-Barr* virus and *Helicobacter pylori* are highly prevalent in the EMR and are associated with some types of lymphoma and stomach cancer. *Human papillomavirus* (HPV) causes virtually all cervical cancer and less commonly, anogenital and oropharyngeal cancers. Hepatitis B virus vaccination is included in the vaccine schedules of all EMR countries and 3-dose coverage in 1-year-olds has rapidly increased, reaching 82% in 2019 for the whole region. About half the EMR countries have achieved over 90% coverage, but it remains low in others, especially Somalia and Afghanistan. Hepatitis B vaccination rates dropped drastically in Syria since the start of the war in 2011 (18).

With the exception of Libya and the emirate of Abu Dhabi (United Arab Emirates), none of the EMR countries routinely vaccinate girls against HPV (19). However, in November 2021, Saudi Arabia has announced the start of routine vaccination against HPV for girls 9-13 years.

The WHO defines national cancer control programmes

as “public health programmes designed to reduce cancer incidence and mortality and to improve quality of life of cancer patients, through the systematic and equitable implementation of evidence-based strategies for prevention, early diagnosis, treatment and palliation, making the best use of available resources”. A national cancer control plan (NCCP) is a government document which lays out the path to achieving the programme’s aims and objectives, answering questions such as who is responsible for a task, when and how they will achieve it within a given timeframe and the available resources. Elements of the plan translate into national policies which are concrete measures specific to the country’s situation and based on relative priority (20). Establishing NCCPs was stated by the WHO as one of five steps towards cancer control (7).

### Current situation of NCCPs in the EMR

Countries across the region vary in terms of the availability and quality of NCCPs. While some states have comprehensive, well-implemented NCD plans which include cancer, others have dedicated cancer plans, though these can be poorly structured and implemented. Some countries like Jordan have plans for specific cancers.

To date, 13 of the 22 EMR countries (60%) have operational NCD plans which include cancer, while ten (45%) have standalone NCCPs. NCCPs are under development in two countries and not in effect in one; while nine countries do not yet have an NCCP. Fifteen (68%) have population-based cancer

**Table 1: The availability of noncommunicable disease (NCD) plans, National Cancer Control Plans (NCCP) and type of cancer registration in each of the WHO Eastern Mediterranean Region countries**

Country	Integrated NCD plan	NCCP	Cancer registration	Cancer unit available in MoH
Afghanistan	Operational	No	PBCR	Yes
Bahrain	Operational	Operational	High quality PBCR	Yes
Djibouti	No	Not in effect	No information	N/A
Egypt	Operational	Operational	Registration activity	Yes
Iran	Operational	Operational	High quality PBCR	Yes
Iraq	Operational	Operational	PBCR	Yes
Jordan	Not in effect	Under development (breast cancer only)	High quality PBCR	Yes
Kuwait	Operational	Operational	High quality PBCR	Yes
Lebanon	Operational	No	PBCR	N/A
Libya	Not in effect	No	Registration activity	Yes
Morocco	Operational	Operational	PBCR	Yes
Oman	Operational	No	PBCR	Yes
Pakistan	No	No	Registration activity	Yes
Palestine*20, 21	Operational	No	Registration activity	Yes
Qatar	Operational	Operational	High quality PBCR	Yes
Saudi Arabia	Operational	Operational	High quality PBCR	Yes
Somalia	No	No	No information	No
Sudan	Operational	Under development	PBCR	Yes
Syrian Arab Republic	No	No	Registration activity	Yes
Tunisia	Operational	Operational	PBCR	Yes
United Arab Emirates	Operational	Operational	PBCR	Yes
Yemen	No	No	Aden Region Cancer Registry	N/A

PBCR: Population-based cancer registry

High quality PBCR: Included in Cancer Incidence In Five Continents, Volume XI

registries (PBCRs) and of those, only six are considered high-quality PBCRs (Table 1).

A survey was carried out by the WHO to assess national capacity for the prevention and control of noncommunicable diseases. During the decade from 2010 to 2019, the percentage of participating EMR countries with operational plans, policies, strategies or action plans for cancer had doubled, reaching 70%. However, along with the African Region, this remains the lowest amongst WHO regions. EMR had the lowest proportion of countries with a system for collecting mortality data by cause of death (70%). On the other hand, 70% of EMR countries have population-based cancer registries, the highest after the European Region (22).

In a global analysis of existing NCCPs, only 6% of EMR countries mentioned the cost of the plan with an implementation strategy. All the EMR countries mentioned cancer registries, and 88% mentioned breast cancer screening (23).

### Developing NCCPs

Well-implemented NCCPs offer the most feasible means for cancer control even in low-resource settings (24). From 2000 to 2015, countries which had an NCCP achieved a statistically significant reduction in the prevalence of male smokers and increase in screening uptake of breast cancer compared to countries which did not have one (23). In an analysis by the Organisation for Economic Co-operation and Development (OECD), countries which implemented elements of governance in their NCCPs consistently had better cancer survival outcomes (25).

While NCD plans cover some areas which impact cancer control, like prevention of common NCDs risk factors and palliative care, other areas of cancer control are specific to cancer and not addressed in NCD plans; such as prevention of infection-related cancer, early detection, cancer management, supportive care, and cancer information systems.

A regional framework for action on cancer prevention and control was endorsed by the regional committee for the EMR in 2017 and was updated in June 2019 (Annex Table 1) (26, 27). It provides a roadmap for countries to develop and implement NCCPs and highlights strategic interventions and indicators in the six areas of governance, prevention, early detection, management, palliative care, surveillance and research. It emphasizes the urgency of scaling up prevention policies and programmes, prioritizing early diagnosis, establishing and strengthening monitoring and evaluation systems, and ensuring sustainable financing.

Government commitment is a crucial first step of cancer control. This requires recognition of the cancer burden through national situational analysis and advocacy.

Countries that do not yet have a NCCP should establish a national cancer control committee as an initial step to develop an NCCP in line with the WHO regional strategy and the WHO planning guide for effective cancer control programmes (28, 29). Establishment of this committee under the ministry of health would give it authority and credibility (30). This should take place after identifying and involving relevant government and non-government stakeholders (e.g. academic institutions, civil society, patient advocacy groups and charities). Thereon, relevant stakeholders should be involved in every step of the planning process. A situational analysis should be carried out to evaluate the burden of cancer and its risk factors and assess available resources. While most countries in the EMR have developed a cancer plan, most of them have not gone through this process of engaging stakeholders and situational analyses.

Informed by the knowledge gained, the committee should set objectives and priorities for cancer control, taking into account the feasibility of interventions and the cultural and political context, and focusing on evidence-based, high impact, low cost services. It is useful at this stage to define a set of values (e.g. equity, accessibility, cultural sensitivity, integration into existing healthcare infrastructure) which will guide further decisions and actions (30). The level and source of financing should also be identified and a timeline for implementation should be set.

Cancer control capacity can progress after the first most urgent and cost-effective priorities (usually tobacco control, early diagnosis and palliative care) are initiated and as more resources become available, or when one-off infrastructure has been established, freeing funds for further actions. This involves a stepwise increase in population coverage, geographic coverage, cancer types included and scope of services available in universal healthcare packages. Achievements along every step should be measured and communicated in order to attract political and financial support. WHO “best buys” in cancer control may be helpful as a template to adopt relevant elements in NCCPs (31).

NCCPs should be comprehensive, covering important components along cancer care continuum; coherent, aligning with broader national or regional health related plans and strategies; and consistent with evidence-based best practices and standards.

Monitoring the indicators included in the regional framework will provide data which enable evaluation of the plan's performance and inform the next agenda priorities.

### Challenges

The main limitations identified in cancer control planning are poor governance, leadership and commitment at country

level due to competing priorities, lack of proper costing and budgeting, and lack of monitoring (23). Limited engagement of primary healthcare with no clear path for patient referral, fragmented and weak health systems and lack of resources, including qualified personnel in fields such as paediatric nursing, radiation oncology and palliative care, are also challenges many countries in the region face. Most plans in the EMR lack the element of national targets and goals with a system for monitoring and evaluation.

Many of the current metrics reported for the region are estimates derived from limited data or data of neighbouring countries. Lack of high-quality incidence and mortality data is highlighted by large differences in modelled estimates between GLOBOCAN and the Global Burden of Disease study, which sometimes also differ from nationally reported figures. This poses a challenge in assessing the burden of cancer (5). In some countries, conflict, migration and government instability have also affected the availability of accurate population data and civil registration systems. Data for the occupied Palestinian territories and Somalia are not presented in several international studies.

Poverty and conflict have led to urgent health crises diverting attention from the control of noncommunicable diseases towards competing priorities, while the burden of cancer lurks in the background. Around half of the EMR countries are experiencing acute or long-standing emergencies, which has impacted the availability and stability of services and of programmes for cancer control. These countries not only suffer from lack of treatment and deteriorated infrastructure but also shortage of local healthcare professionals due to a “brain drain”. The long-term nature of many of the preventive strategies to produce outcomes, especially in the form of reduced incidence, makes cancer control seem less attainable. Countries hosting refugees are experiencing overstretched health systems. Besides the need for long-term political solutions, international financial and technical support can provide valuable diagnostics, treatment, palliative care and surveillance in those regions (7, 32).

Additionally, several countries in the region have some of the largest numbers of migrant workers in the world, and some have groups which hold no citizenship. These groups may have some entitlement to healthcare but are hit hardest by cancer as there are often limits to the treatment they would receive due to high cost. They are also frequently unaccounted for in cancer registration systems. Therefore, cancer services should be included in UHC benefits packages for all.

Population-level cancer control cannot be realized without plans which engage both health and non-health sectors (33). Limited inclusion of non-health sectors in planning and implementation challenges the effectiveness of these plans.

## Priorities and special considerations for the EMR

In the EMR, more than half of cancer patients present with advanced tumours, therefore, down-staging through raising awareness of early signs and symptoms, effective early diagnosis and prompt referral to cancer care facilities is a top priority for countries of all income levels. Strengthening primary healthcare which is the basis of prevention and early diagnosis activities should also be a focus of NCCPs. The WHO regional office for the EMR (WHO EMRO) considers five cancers a priority for early diagnosis efforts in the region because they are common or amenable to early diagnosis and treatment: breast, colorectal, prostate, cervical and oral cancer (2); yet, a third, half and two thirds of EMR countries have no guidelines for early diagnosis of breast, cervical and colorectal cancer, respectively, and 90% have none for childhood cancers (22).

Some type of breast, cervical or colorectal cancer screening exists in 40–70% of EMR countries, but target population coverage is quite low (22). This reflects the lack of well-planned and coordinated programmes as the majority of these screening programmes were initiated, run, and maintained by non- or semi-governmental agencies with poorly defined catchment populations and inadequate monitoring and evaluation. While there is momentum for screening for several cancers, introducing screening without adequate human resources and infrastructure for follow-up diagnostic tests and treatment may render the programme ineffective. Reaching the target population could also be a challenge in the absence of a well-operating primary healthcare system through which the target population is identified and invited for screening. Screening programmes should rely on evidence-based situational analyses. Any planned screening programme should be preceded by a pilot programme through the health services before national scale-up. The feasibility of colorectal and breast cancer screening may be considered in high-income countries with available infrastructure for follow-up investigations and treatment. Screening data should be periodically evaluated in order to provide evidence for future decision-making.

The incidence and mortality from cervical, and oral cavity cancer are higher in low-income countries (9, 34), and efforts should focus on primary prevention through vaccination against HPV (35), reducing tobacco use, and on cervical cancer screening and oral health awareness programmes. Currently, only 50% of NCCPs in the region address HPV vaccination (23).

In terms of palliative care services, the region faces enormous challenges in opioid availability. Only 24% of EMR countries provide oral morphine for primary healthcare in the public sector (22). Palliative care requires urgent scaling-up, especially where the majority of patients are diagnosed in advanced stages. This should be provided mainly by home-based care in countries with strong family support and poor

health infrastructure (24).

About a quarter of cancer in the EMR could potentially be prevented through lifestyle changes (17). Tobacco control needs to be a top priority in the region. Trachea, bronchus and lung cancer have the highest age-standardized mortality rates of all cancers in the region (5). To date, Iran, Egypt and Pakistan have implemented four of the six MPOWER tobacco control measures (36).

Two-thirds of NCCPs in the region did not mention obesity or alcohol consumption and a further 13% mentioned them without a plan (23). Cancers related to obesity and low physical activity (breast, colorectal) are common in most high- and middle-income EMR countries (17). Social and practical barriers to physical activity and unhealthy diets should be addressed in NCCPs.

A multidisciplinary approach to cancer management should focus on developing guidelines for the treatment of the most common and most curable invasive cancers. This approach will have the highest impact in terms of survival, quality of life and cost reduction. Expanding population coverage in line with the realization of UHC should be prioritized before incorporating more advanced services (7).

Effective cancer care requires training of primary care providers to elicit relevant history, recognize early signs and symptoms of cancer and to provide community-based palliative care. It also requires establishing specialist training programmes in dedicated areas of expertise including medical, surgical and radiation oncology, pathology, and palliative care; as well as the training of specialist technicians, nurses and physiotherapists.

More policy-relevant research is needed in the EMR and its recommendations integrated into health policy (37). Strengthening research in the region also entails population-based surveillance of key health metrics, the removal of barriers for researchers to access both clinical and population-level data within ethical guidelines, and training researchers and clinicians in research methods. Inclusion of a research component in an NCCP is relatively cheap, enables ongoing evaluation and builds research capacity in the country (38). Population-based cancer registries are essential tools for setting national priorities and later monitoring effectiveness of interventions. They provide a backbone for high-quality research including links with other databases such as vaccine and screening registries, treatment records and national death indices to estimate survival. Monitoring population-based cancer survival is crucial to evaluate the effectiveness of cancer care, reflecting the availability of early diagnosis and effective treatment. Along with incidence, it can provide estimates of cancer prevalence in a country or region. When applied to population projections, incidence data are useful

to forecast the future burden of cancer. These metrics reflect different aspects of the cancer burden to enable cancer control planning.

Countries which do not yet have an NCCP should benefit from the experience of similar countries and learn from their successes and failures. Additionally, technical support may be sought from several regional, and international organizations (WHO, IAEA, UICC, IARC, INCTR, GCCCP).

Media and religious institutions could facilitate large-scale campaigns to spread awareness of cancer risk factors (including smoking cessation campaigns), early symptoms, and the benefits of early detection; and to address misconceptions and tackle fatalistic attitudes. While these would reach a large number of the population, efforts should also be made to address marginalized groups, and minorities, many of whom come from lower-income EMR countries. Migrant workers may be especially vulnerable to occupational and environmental risk factors like asbestos, air pollution, and sun exposure. These may benefit from targeted prevention programmes.

### Opportunities for regional collaboration

Despite differences in income and development levels between countries of the EMR, the geographic proximity, similarities in risk factors, culture and language offer opportunities for collaboration in research, training, exchange of experience and support.

Civil society organizations and patient support groups have shown active engagement and contribution to cancer control agendas at national and regional levels. For example, the King Hussain Cancer Foundation has been a key player in the cancer control agenda in Jordan and contributed to a number of regional training programmes. Many civil society organizations in the region have been actively involved in lobbying for cancer legislation, mobilizing funds for cancer care and research, providing support for refugees and vulnerable groups and working with the media on awareness campaigns. The example and role model demonstrated by some of the civil society organizations in the region could be supported and enhanced.

The travel of experts for training and treatment or the referral of patients to higher resource level countries with larger treatment centres, especially for rare tumours could prove cost-effective. Likewise, collaboration on a regional level could help address research questions involving less-common tumours. National and regional surveys are needed to assess progress and show the gaps in the implementation of cancer control plans. Telemedicine in the areas of pathology and radiology could support the formation of multidisciplinary tumour boards, aiming to optimize patient treatment plans. Countries with small populations could especially benefit from regional collaboration and shared capacity. Sharing



regulatory requirements for medicine and joint negotiation and procurement both across sectors (e.g. private, public, military) and on a regional level could improve efficiency.

An example of such collaboration is the establishment of the Gulf Center for Cancer Registration (GCCR) in 1998 and the Gulf Center for Cancer Control and Prevention in 2011 (39). The latter aims to develop regional cancer control strategies and evidence-based guidelines, disseminate knowledge through conferences and workshops, organize training courses, and coordinate research. This facilitated the formulation of the Gulf Cancer Control Plan (2016–2025) (40, 41). It also won political support to make cancer a notifiable disease, paving the way for developing a high-quality PBCR with national coverage in four of the GCC states (Bahrain, Kuwait, Qatar and Saudi Arabia). The Gulf joint procurement programme was also put in place to harmonize procurement policies, processes, procedures and objectives of the Gulf Health Council. Between-country coordination requires strong governance and a sustainable financing system.

### Conclusion and recommendations

Due to existing regional governance structures, looking at health issues from a regional perspective can support countries to address them effectively. The Regional Committee for the Eastern Mediterranean is the WHO governing body for the region and includes representatives from member countries. Its role is to discuss and endorse regional policies, activities and financial plans. The WHO EMRO also provides various forms of support and advocates for political commitment to cancer control.

Opportunities should be sought for collaboration and support between countries of the EMR. Establishment of a regional cancer network with government representatives of member states, academics and clinical experts could facilitate the sharing of experience in the planning and implementation

of NCCPs and foster communication through annual meetings. Due to the political barriers in the region, the WHO EMRO is the optimal and realistic host for the secretariate of this network. This will require an increase in human resources and the recruitment of officers and consultants for capacity building and coordination of the different aspects of NCCPs. Joint grants for coordinated research is also needed to enhance the effectiveness of this network.

Strong governance is key to the success of NCCPs. Indicators of governance can be assessed by metrics such as presence of an operational budgeted plan for cancer control, existence of a multisectoral national cancer committee to oversee the cancer control plan and its implementation, and involvement of all stakeholders. Country-level surveys to monitor progress in the implementation of NCCPs can help identify and address gaps. Publishing reliable incidence and mortality data and high-quality cancer research are also essential to support cancer control committees in planning and monitoring. NCCPs are more likely to be successfully implemented if they start with a small number of achievable aims covering evidence-based national priorities which can be implemented using existing resources, then gradually increasing coverage, scope and quality.

With political will and proper planning, better cancer control is achievable at every income level, and investing wisely will save lives and resources. ■

### 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.*



## References

1. WHO EMRO. About us. <http://www.emro.who.int/entity/about-us/index.html>
2. WHO EMRO. *Summary report on the consultative meeting on early detection and screening of priority cancers in the Eastern Mediterranean Region*. 2016. WHO-EM/NCD/123/E.
3. World Health Organization. WHO Cancer Regional Profile 2020, EMRO.
4. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018;0(0):3-31.
5. Global Burden of Disease Eastern Mediterranean Region Cancer Collaborators. Burden of cancer in the Eastern Mediterranean Region, 2005–2015: findings from the Global Burden of Disease 2015 Study. *International journal of public health*. 2018/5/3 2018;63(Suppl 1):151-164. doi:10.1007/s00038-017-0999-9
6. World Health Organization. *World health statistics 2019: monitoring health for the SDGs, sustainable development goals*. 2020. 2020/4/30. <https://apps.who.int/iris/bitstream/handle/10665/324835/9789241565707-eng.pdf>
7. World Health Organization. WHO report on cancer: setting priorities, investing wisely and providing care for all. 2020.
8. World Health Organization. Global Health Observatory data repository.
9. World Health Organization. Cancer country profiles 2020.
10. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. A/RES/66/2. 2011. 2011/9/19. [https://www.who.int/nmh/events/un\\_ncd\\_summit2011/political\\_declaration\\_en.pdf](https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf)
11. *Cancer prevention and control in the context of an integrated approach*. World Health Assembly resolution WHA70.12. 2017. 2017/5/31. <https://apps.who.int/medicinedocs/documents/s23233en/s23233en.pdf>
12. United Nations General Assembly. Political declaration of the high-level meeting on universal health coverage. A/RES/74/2. 2019/10/10 2019;
13. World Health Organization. *WHO report on the global tobacco epidemic. Age-standardized prevalence estimates for tobacco use, 2017*. 2019. <https://www.who.int/teams/health-promotion/tobacco-control/who-report-on-the-global-tobacco-epidemic-2019-appendix-10>
14. Bilano V, Gilmour S, Moffet T, et al. Global trends and projections for tobacco use, 1990–2025: an analysis of smoking indicators from the WHO Comprehensive Information Systems for Tobacco Control. *The Lancet*. 2015/3/14 2015;385(9972):966-976. doi:10.1016/S0140-6736(15)60264-1
15. World Health Organization. Global Information System on Alcohol and Health.
16. NCD Risk Factor Collaboration. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet*. Dec 16 2017;390(10113):2627-2642. doi:10.1016/S0140-6736(17)32129-3
17. Kulháňová I, Znaor A, Shield KD, et al. Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region. *Int J Cancer*. 2019/3/18 2019;doi:10.1002/ijc.32284
18. World Health Organization. World Health Data Platform-Hepatitis B (HepB3) immunization coverage among 1-year-olds (%). 2020// 2020;
19. World Health Organization. WHO/UNICEF Human papillomavirus (HPV) vaccine coverage estimates. 2020 2020;
20. International Cancer Control Partnership (ICCP) Portal. <https://www.iccp-portal.org/map>
21. World Health Organization. *Assessing national capacity for the prevention and control of noncommunicable diseases: Report of the 2015 country capacity survey in the Eastern Mediterranean Region*. 2016. [http://applications.emro.who.int/dsaf/EMROPUB\\_2016\\_EN\\_19168.pdf?ua=1&ua=1](http://applications.emro.who.int/dsaf/EMROPUB_2016_EN_19168.pdf?ua=1&ua=1)
22. World Health Organization. *Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2019 global survey*. 2019. 978-92-4-000231-9. 2019//. <https://www.who.int/publications-detail/ncd-ccs-2019>
23. Romero Y, Trapani D, Johnson S, et al. National cancer control plans: a global analysis. *The Lancet Oncology*. 2018/10/26 2018;19(10):e546-e555. doi:10.1016/S1470-2045(18)30681-8
24. World Health Organization. National cancer control programmes: Policies and managerial guidelines. 2002/4/5 2002;
25. Organization for Economic Co-operation and Development. Cancer care: Assuring quality to improve survival. 2013.
26. World Health Organization, Regional Office for the Eastern Mediterranean. Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region, based on resolution EM/RC64/R.2. 2019/6/1 2019;
27. World Health Organization, *Regional Committee for the Eastern Mediterranean. Regional framework for action on cancer prevention and control*. EM/RC64/R.2. 2017. 2017/10/1.
28. World Health Organization. Technical paper strategy for cancer prevention and control in the Eastern Mediterranean Region. EM/RC56/4. 2009// 2009;
29. World Health Organization. Cancer Control : Knowledge into Action : WHO Guide for Effective Programmes; Planning, 2006.
30. Cancer control planning. In: Kerr DJ, Haller DG, Cornelis JH, Baumann M, eds. *Oxford Textbook of Oncology*. Third ed. Oxford University Press; 2016.
31. World Health Organization. Tackling NCDs: 'Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases.
32. World Health Organization Regional Office for the Eastern Mediterranean. WHO responds to the cancer care crisis in Yemen. 2020.
33. Kostecky B, Stevens L. Cancer control planning by international cancer control partnerships: an exploration of planning practices and resources in diverse settings. *The Lancet Global Health*. 2018/3/1 2018;6doi:10.1016/S2214-109X(18)30096-2
34. Kulhanova I, Bray F, Fadhill I, Al-Zahrani, A. S.; El-Basmy, A.; Anwar, W. A.; Al-Omari, A.; Shamseddine, A.; Znaor, A.; Soerjomataram, I. Profile of cancer in the Eastern Mediterranean region: The need for action. Article. *Cancer Epidemiol*. 2017;47:125-132. doi:10.1016/j.canep.2017.01.009
35. Dr Tedros Adhanom Ghebreyesus, WHO Director-General. Cervical cancer: an NCD we can overcome. 2018.
36. World Health Organization. WHO report on the global tobacco epidemic. 2019. 2019//.
37. El-Jardali F, Lavis JN, Jamal D, Ataya N, Dimassi H. Evidence-informed health policies in Eastern Mediterranean countries: comparing views of policy makers and researchers. *Evidence & Policy: A Journal of Research, Debate and Practice*. 2014/8/1 2014;10(3) doi:10.1332/174426514X672380
38. Wild CP. Cancer control: a reminder of the need for a balanced approach between prevention and treatment. *Eastern Mediterranean health journal*. 2014/6/18 2014;20(6):360-362. doi:10.26719/2014.20.6.360
39. Gulf Center for Cancer Control and Prevention (GCCCP). Draft Proposal. 2010/6/1 2010;
40. Gulf Center for Cancer Control and Prevention, Gulf Health Council. *The Gulf Cooperation Council cancer control plan 2016-2025*.
41. Al-Othman SH, A.; Alhomoud, S.; Alkhenizan, A.; Khoja, T.; Al-Zahrani, A. Tackling cancer control in the Gulf Cooperation Council Countries. Review. *The Lancet Oncology*. 2015;16(5):e246-e257. doi:10.1016/S1470-2045(15)70034-3

## Annex 1

## Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region

Updated June 2019, based on resolution EM/RC64/R.2



	Strategic interventions	Indicators
<b>In the area of governance</b>	<ul style="list-style-type: none"> <li>» Develop a multisectoral strategy and action plan for cancer prevention and control, as part of national noncommunicable disease response</li> <li>» Establish a national multisectoral committee for cancer prevention and control</li> <li>» Ensure a sufficient national budget for cancer prevention and control efforts</li> <li>» Define an essential cancer care package<sup>1</sup> and identify financing mechanisms to reduce out-of-pocket expenditure</li> <li>» Appoint a national cancer control programme manager</li> </ul>	<ul style="list-style-type: none"> <li>» An operational, funded national multisectoral strategy/action plan encompassing all areas of cancer prevention and control</li> </ul>
<b>In the area of prevention</b>	<ul style="list-style-type: none"> <li>» Implement healthy lifestyle interventions in the areas of tobacco control, physical activity, healthy diet and alcohol, in line with the regional framework for action on noncommunicable diseases</li> <li>» Vaccinate against hepatitis B in infancy</li> <li>» Vaccinate girls between the ages of 9 and 14 by administering two doses of human papillomavirus (HPV) vaccine</li> <li>» Eliminate or reduce exposure to occupational and environmental carcinogens, such as asbestos</li> </ul>	<ul style="list-style-type: none"> <li>» Five demand-reduction measures of the WHO FCTC<sup>2</sup> implemented</li> <li>» Four measures to reduce unhealthy diet<sup>3</sup> implemented</li> <li>» At least one national public awareness campaign on diet/physical activity conducted every 5 years</li> <li>» Percentage of infants receiving three doses of Hep-B vaccine (HepB3)<sup>4</sup></li> <li>» Percentage of girls between the ages of 9 and 14 receiving two doses of HPV vaccine</li> </ul>
<b>In the area of early detection</b>	<ul style="list-style-type: none"> <li>» Develop, implement and update evidence-based, nationally approved guidelines/protocols/standards for the early detection of priority cancers, with a focus on early diagnosis</li> <li>» Raise community awareness of the early symptoms of priority cancers<sup>5</sup></li> <li>» Build health professionals' capacity to recognize the early signs and symptoms of common cancers for prompt referral of symptomatic patients to diagnostic and treatment services</li> <li>» Ensure availability, affordability and accessibility of diagnostic tests for suspected cases</li> <li>» Periodically assess effectiveness of early diagnosis and screening programmes</li> </ul>	<ul style="list-style-type: none"> <li>» Availability of evidence-based, nationally approved guidelines for early detection of priority cancers<sup>5</sup></li> <li>» Proportion of cancer patients diagnosed in early stages</li> <li>» Reduction in cancer mortality rates for which early detection programmes have been introduced</li> <li>» Proportion of cancer patients who receive timely diagnosis within one month of symptomatic presentation at primary health care services</li> <li>» Proportion of women between the ages of 30 and 49 years screened for cervical cancer at least once, or more often, and for lower or higher age groups according to national programmes or policies<sup>6</sup></li> </ul>
<b>In the area of management</b>	<ul style="list-style-type: none"> <li>» Develop, implement and update evidence-based, nationally approved guidelines/protocols/standards for management of priority cancers</li> <li>» Assess human resource requirements and develop plans to scale up to meet local needs</li> <li>» Ensure availability, affordability and accessibility of an essential cancer care package<sup>1</sup></li> <li>» Strengthen coordination of referral system with targets to reduce delays to diagnosis and treatment</li> </ul>	<ul style="list-style-type: none"> <li>» Availability of evidence-based guidelines/protocols/standards for management of priority cancers</li> <li>» Proportion of patients who complete a course of prescribed treatment</li> <li>» Availability of national human resource strategies and plans</li> </ul>
<b>In the area of palliative care</b>	<ul style="list-style-type: none"> <li>» Include palliative care within national cancer control plans</li> <li>» Develop, implement and update evidence-based, nationally approved guidelines/protocols/standards for palliative care</li> <li>» Introduce palliative care into the curricula of health care professionals</li> <li>» Develop affordable, multidisciplinary integrated palliative care services, including pain relief, psychosocial and spiritual support, in both hospital and community settings</li> <li>» Ensure availability and accessibility of opioids, analgesics and other essential palliative care medicines, addressing legal and regulatory barriers</li> </ul>	<ul style="list-style-type: none"> <li>» Availability of national guidelines/protocols/standards for palliative care</li> <li>» Access to palliative care assessed by morphine-equivalent consumption of strong opioid analgesics (excluding methadone) per death from cancer<sup>4</sup></li> <li>» Availability of training programmes for health care professionals</li> </ul>
<b>In the area of surveillance and research</b>	<ul style="list-style-type: none"> <li>» Establish and strengthen hospital- and population-based cancer registries that cover a population not less than one million</li> <li>» Develop a system to monitor quality of care and the performance of national cancer control programmes</li> <li>» Develop and implement a cancer research plan relevant to country needs</li> </ul>	<ul style="list-style-type: none"> <li>» Cancer incidence, by type of cancer, per 100 000 population<sup>7</sup></li> <li>» Availability of progress/gap analysis on implementation of national cancer control plan</li> <li>» Number of peer-reviewed publications related to cancer</li> </ul>

<sup>1</sup> Cancer care package includes diagnostic procedures, medicines and technologies, surgery and radiotherapy, and survivorship care.

<sup>2</sup> Tobacco demand reduction measures, WHO NCD Progress Monitor 2017: Increased excise taxes and prices; smoke-free policies; large graphic health warnings/plain packaging; bans on advertising, promotion and sponsorship; mass media campaigns.

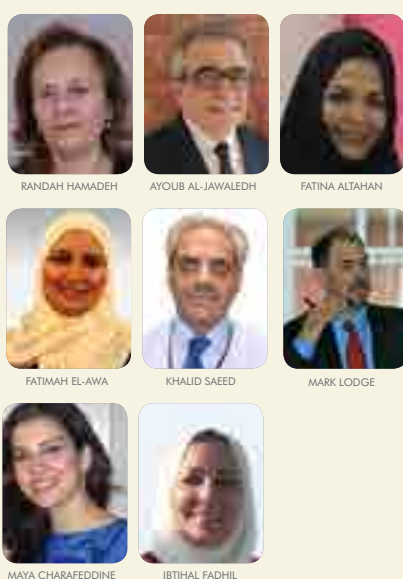
<sup>3</sup> Unhealthy diet reduction measures, WHO NCD Progress Monitor 2017: salt/sodium policies; saturated fatty acids and trans-fats policies; marketing to children restrictions; marketing of breast-milk substitutes restrictions.

<sup>4</sup> One of the 25 indicators of the WHO Global Monitoring Framework on NCDs <http://www.who.int/nmh/ncd-tools/indicators-definition/en/>.

<sup>5</sup> Priority cancers for early detection can be selected based on how amenable they are to early detection, and on their incidence (and projected future incidence) within the country.

# Cancer prevention: Modifiable risk factors

**Randah Hamadeh**, Professor of Community Medicine, Arabian Gulf University, Bahrain; **Ayoub Al-Jawaldeh**, Regional Advisor, Nutrition, WHO/EMRO, Cairo, Egypt; **Fatima Altahan**, Director of Cancer Control Programme, Ministry of Health, Saudi Arabia; **Fatimah El-Awa**, Regional Advisor, Tobacco Free Initiative, WHO/EMRO, Cairo, Egypt; **Khalid Saeed**, Regional Advisor, Mental Health and Substance Abuse, WHO/EMRO, Cairo, Egypt; **Mark Lodge**, Executive Director, International Network for Cancer Treatment and Research UK Office, Oxford, United Kingdom; **Maya Charafeddine**, American University of Beirut, Lebanon and **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait



In this chapter on cancer prevention, we consider the key modifiable cancer risk factors including tobacco use, excessive alcohol consumption, lack of physical activity and unhealthy diets. In each case we consider the current situation regarding these risk factors across the countries of the Eastern Mediterranean Region and describe the strategies that are in place, or not in place, to tackle them and how they should be best implemented, as well as the tools and policies provided by the World Health Organization, national governments and civil society. Social inequalities in cancer care are often made worse by conflict, forced migration and political instability, however, ensuring equitable access to preventive strategies of the most effective ways of minimizing cancer inequalities. Prevention remains the most cost-effective, long-term strategy for cancer control as it can be planned and implemented alongside other chronic disease prevention programmes, therefore increasing its impact.

Between 30–40% of all cancer cases are preventable. While estimated global combined annual costs of cancer diagnosis and management and the productivity loss due to disability and premature deaths may exceed even a high-income country's total annual budget, simple preventive measures can save lives, money and actually help governments to earn revenue (1). Levying higher taxes on tobacco products and alcohol to reduce their consumption is a classic example of such a preventive intervention. Cancer prevention should be an essential and prioritized component of all cancer control plans (2). In this chapter we will demonstrate that the most significant cancer risk factors (tobacco use, excessive alcohol consumption, lack of physical activity, unhealthy diet and environmental pollution) are also key risk factors for other chronic diseases such as cardiovascular diseases, Stroke, diabetes and respiratory diseases. Certain cancers associated with chronic infections are responsible for huge number of deaths among the most disadvantaged populations. Preventing such infections through vaccination and other measures cannot only save lives, but also reduce global inequality in cancer. Social inequalities in cancer are a crucial public health

issue, transcending geographic borders and hitting particularly hard the most disadvantaged populations due to their gender, socioeconomic status and geopolitical situations. Ensuring equitable access to preventive strategies is one of the most effective means to minimize the existing cancer inequalities (3).

Prevention offers the most cost-effective, long-term strategy for the control of cancer because it can be planned and implemented in the context of other chronic disease prevention programmes, as well as in the context of overall cancer control planning (4). Despite cancer being a global public health problem, many governments in the Eastern Mediterranean Region (EMR) have not yet fully implemented cancer prevention measures within their health agendas (4). This may be due more to a lack of political will within the region rather than to limited resources. Low-income and disadvantaged groups have less political influence, less access to health services, and lack the education that can empower them to make decisions to protect and improve their own health (2). The World Health Organization (WHO) has developed a list of “best buys” for noncommunicable disease (NCD) control (5) that include effective interventions to reduce cancer risk and

that are appropriate and highly affordable even in resource-constrained settings. The following section will cover the most common risk factors for cancer primary prevention in the EMR.

Regardless of resource level, every country can take steps to curb the cancer epidemic by undertaking primary prevention actions and thereby avoid unnecessary suffering and premature death from cancer in its population (2).

## Tobacco control

### *Prevalence of tobacco use in the EMR*

Globally, tobacco products cause 8 million deaths annually, of which 2.4 million are due to cancer (6). In the EMR, smoking has the second highest population attributable fraction (PAF) (14.9%), after infections (15.3%), with respect to cancer risk factors (7). In men and women, 14.9% and 0.4% of cancer cases, respectively, are attributed to smoking (7). There was variation in PAFs from smoking between countries in the region with Tunisia having the highest among males (36.0%) and Lebanon, in females (5.2%). A recent study from Lebanon had shown that 79% of lung cancer cases in males and 72% in females were attributed to smoking (8). Seven of the EMR countries have 0–9.9% of the deaths attributed to smoking, 12 countries have 10–19.9% and three countries have 20% or more (9).

The latest WHO global report on trends in prevalence of tobacco use released in 2021 projects an overall worldwide decrease in smoking by 2025 as a result of tobacco control efforts. The EMR is expected to see a 22% relative reduction in tobacco use by 2025. Although an improvement from previous trend reports, the EMR is still tracking slower than the global average reduction rate of 24% as the second slowest out of the six WHO regions. Despite the decrease in relative tobacco use prevalence, the number of tobacco users in the EMR is still expected to rise due to population growth. Tobacco use for men in the EMR lies in the global middle ground, with rates projected to drop from 44% in 2000 to 31% in 2025, if current tobacco control efforts continue. For females in the region, tobacco use rates, already considerably low compared to prevalence in other regions, are expected to drop from 10.2% in 2000 to 3.4% in 2025 (10). Fourteen of the EMR countries grow tobacco and seven manufacture it (Egypt, Iran, Jordan, Pakistan, Syria, Tunisia and Yemen (11).

There is great variation in the prevalence of tobacco smoking among countries in the region. The highest estimated age-standardized prevalence of tobacco use in the EMR countries in 2020 among adult ( $\geq 15$  years) males (56.8%) was in Jordan, while that for females (28.9%), and both sexes (38.2%) was in Lebanon. Oman had the lowest prevalence among males (15.5%) and both sexes (8%), and shared the same lowest rate as Egypt for females (0.4%) (10). Although females in the region generally have lower tobacco smoking rates than males,

the gender gap is narrowing mostly in waterpipe smoking (12). The region has the highest prevalence of waterpipe smoking among WHO regions (13). A study of adults aged 40 years and over in nine EMR countries showed that age- and gender-adjusted proportions of ever-smoking cigarettes or waterpipe ranged from 15.3% in Morocco to 53.9% in Lebanon. Waterpipe smoking was most frequent in Saudi Arabia (8.5%) and lowest in the Maghreb countries ( $<1.5\%$ ). Among women, Lebanon had the highest proportion of ever-waterpipe smokers (48.4%), with one study showing that waterpipe smoking was higher among females than males in the country (14, 15).

Current tobacco use rates amongst adolescents aged 13–15 years lie at 15.6% for boys and 8% for girls, amounting to an overall adolescent prevalence rate of 12%. The corresponding figures for use of smokeless tobacco are 4.7%, 3.1%, and 3.9%, respectively (10). Studies have also shown that waterpipe smoking is increasing among the young in the EMR (16). The most widespread form of tobacco use amongst youths in the EMR is cigarette smoking, which is highest in Palestine (17.5%), followed by Bahrain (13.4%), Kuwait (11.6%) and Lebanon (11.2%). The gender gap in tobacco use in adults also exists amongst adolescents, however it is narrower for smokeless tobacco, novel and emerging tobacco products, and waterpipe (17).

Despite the harmful effects of smoking electronic cigarettes and electronic waterpipe (18, 19) manufacturers and marketers promote them as cheaper and safer alternatives to traditional cigarettes (18), emphasizing their youth-friendly flavours and glamour, and even as a smoking cessation tool (20). Other forms of tobacco use are becoming more popular in the region, for example *Midwakh* gained popularity particularly among the young in some countries of the region (12, 21, 22). In the United Arab Emirates, it is the second most-common type of tobacco smoked among adult nationals (15%) (23). Moreover, 9.7% of 13–15-year-old males smoke it compared to 3.4% of their female peers in the United Arab Emirates (22). Among 7–12 grade students in Lebanon (12–18-year-olds), 6.7% (95% CI: 5.1, 8.8) and 2.7 (95% CI: 1.9, 3.7%), respectively, smoke *midwakh* (21).

The EMR has the highest percentage change (+65%) for cigarette consumption among all WHO regions from 1980 to 2016, greatly due to its significant population growth (9). However, the degree of smoking behaviour varies, with more than one third of males and females in Lebanon being light smokers ( $<10$  cigarettes/day), yet only 3.4% of males and 18% of females in Jordan being light smokers. Moreover, tobacco use is more common amongst those with lower education levels: a study showed how, compared to adults who had a primary school education or less, adults in Lebanon, Jordan and Palestine with a high school education and those

with a university education were significantly less likely to be current cigarette smokers (15). Tobacco companies see growth potential in the region to offset declining consumption elsewhere (24).

There are multiple challenges for tobacco control in the EMR including the implementation of existing legislation and the evidence based as well as the tobacco industry attempts to interfere and influence tobacco control policies.

### Implementation of tobacco control interventions in the EMR

The WHO 2019 and 2021 reports compared to previous reports, showed encouraging trends in smoking rates, owing it to advanced monitoring and tobacco control measures (5, 6). Thirteen out of 22 countries in the region have conducted adult, and in most cases also youth surveys, within the past five years, providing the essential insight needed to evaluate the current situation and way forward in the region (10). Despite the efforts made by the EMR, it is still behind all the other WHO regions except for the African region in policy implementation and enforcement (25). It is challenging for tobacco control to become a priority for decision-makers due to other competing health issues, especially in light of emergency situations and conflicts that several countries are going through. Furthermore, new tobacco products are being introduced, but not regulated, and are made accessible to young people, including novel tobacco and nicotine products (16).

However, there is major political commitment to tobacco control from a legislative perspective, as well as from a public health one among several countries in the region. This has been observed particularly in the Gulf Cooperation Council countries, where a significant positive shift recently took place in the area of tobacco taxation, along with Saudi Arabia becoming the first country in the region to adopt the plain tobacco packaging policy. Although, much more is needed, particularly in public education and research (26, 27). To strengthen political commitment, a High-level Ministerial Group on the Control of Tobacco and Emerging Tobacco and Nicotine Products was established in the 2021 Regional Committee. This group aims to foster high-level strategic leadership and policy dialogue to stimulate political commitment towards the WHO Framework Convention on Tobacco Control (FCTC) and MPOWER measures.

A total of 19 of 22 countries are parties to the FCTC with some implementing and imposing FCTC-mandated policies (28). In 2018, the Regional Committee approved a Regional Strategy and a Regional Framework for Action on Tobacco Control, which has supported countries in establishing comprehensive national tobacco control programmes. Evidence from Saudi Arabia revealed that the return on investment (RoI) for all

tobacco control interventions is US\$ 5.37 which means that every US\$ 1 invested could save up to US\$ 5.37 in future direct and indirect costs (29). Overall, countries have had some success implementing the FCTC, but significant obstacles remain, particularly in terms of enforcing tobacco control measures and adapting legislation and regulation to address novel tobacco products.

### *Tobacco-free public places*

Smoke-free legislation in public places is especially important to protect people from harmful second-hand smoke. This measure remains one of the key challenges in the region; although many countries have adopted tobacco-free public places policies (16 out of 22), implementation remains weak (30). Despite countries having adopted this policy, many still allow the establishment of designated smoking areas, defeating the purpose of protection from second-hand smoke as recommended by the WHO FCTC. Moreover, a recent projection by WHO showed a correlation between the presence of second-hand smoke in public places and youth tobacco use prevalence (31).

### *Graphic health warnings on tobacco packaging*

Placing graphic health warnings on tobacco packaging is another evidence-based measure recommended by the WHO FCTC, aiming to deter people from tobacco consumption (32). This is one of the most successful and widely adopted measures in the region, with 13 out of the 22 countries applying graphic health warnings at different sizes, and one country implementing plain packaging (Saudi Arabia). However, challenges remain due to countries not regularly renewing health warnings or missing essential characteristics of tobacco product labelling and packaging as recommended by the WHO FCTC and its guidelines (33).

### *Tobacco cessation programmes*

Multiple countries in the EMR have invested greatly in expanding their cessation services by increasing the number of cessation clinics, training healthcare professionals and cessation specialists, and increasing the availability of Nicotine Replacement Therapy (NRT). Repeated clinical tobacco-cessation counselling supported with accessible addiction treatments are cost-effective services (34). The provision of quitting services and consistency in delivering them are necessary to guarantee long-term results. Training and skill among TDT providers remain a challenge, especially when not consistently incorporated as part of the curriculum of healthcare professionals (35). A WHO Collaborating Centre specializing in tobacco cessation has been set up in Qatar's Hamad Medical Centre, which aims to fill this need through



specialized training for countries seeking to scale up their cessation services. Physicians giving even brief advice to their patients to quit smoking can increase their unassisted quit rate (2–3%) by an additional 1–3% (36).

Support for smoking cessation services is available through primary healthcare services to less than half the EMR population. However, in Morocco, Saudi Arabia, Syria and Tunisia this support is available in most healthcare facilities. In addition, nine EMR countries have cessation support and treatment in hospitals. Cessation support is free in Bahrain, Jordan, Kuwait, Qatar and Saudi Arabia. National toll-free quit lines are available in Egypt, Iran, Kuwait, Saudi Arabia and the United Arab Emirates (37). A study from the Quit Tobacco Clinics in Bahrain reported a higher quit rate among male shisha smokers than cigarette smokers (38).

Almost 70% of individuals in the EMR have legal access to nicotine-replacement therapy (NRT). Of these people, treatment costs are covered only for 23%. In 10 countries, NRT is accessible in pharmacies without prescription. Bupropion is available at pharmacies with a written prescription in seven countries and varenicline in 10 countries (nine with written prescription and one without) (37).

### Taxation

Despite the recent changes that took place in most GCC countries, where an excise tax on tobacco products was adopted, the EMR ranks among all regions with respect to taxation on tobacco products. It is evident that the increase in taxation rates led to a reduction in smoking (39). Saudi Arabia has witnessed a significant reduction following its 100% tax enforcement on tobacco products (40). Smuggling of tobacco products maybe a significant barrier facing the implementation of tobacco taxation in some countries in the region, which can be addressed through the implementation of the FCTC Protocol (41).

### Tobacco advertising and promotion

All countries in the region, except Somalia, have adopted partial or complete bans on tobacco advertising, promotion and sponsorship in collaboration with non-governmental bodies. There is significant use of tobacco products including electronic nicotine delivery systems (ENDS) in EMR country television productions. The increase in tobacco use by actors of both sexes in regional television series is noted mostly in those aired during Ramadan. There has also been an increase of tobacco scenes in Iranian films. The proportion of 13–15-year-olds in the EMR who view tobacco use on television varies among countries (60–90%) (42). These exposures frame smoking in a glamorous manner and were reported to have a positive association with smoking risk in adolescence (43).

### Waterpipe smoking and novel tobacco products

Waterpipe smoking poses a challenge in the implementation of tobacco control policies in the EMR. The waterpipe's attractive shapes and various tobacco flavours, its social acceptability and accessibility in most countries of the region, demand the adaptability and comprehensiveness of tobacco control policies (38). In a study of four EMR countries, tobacco flavour accounted for 81.4% of the waterpipe smoking decisions of university students (12). The social acceptability of waterpipe smoking poses another challenge. Over two thirds of university students in the EMR smoked their first waterpipe in the 15–19-year age group with over one third of females smoking it with family members (12). There is a misconception among EMR university students about the harmful effects of waterpipe smoking. When compared to cigarettes, only 11% considered waterpipe smoking addictive in contrast to 64% for cigarettes (19).

Novel and emerging tobacco products, including electronic nicotine delivery systems (ENDS), electronic non-nicotine delivery systems (ENNDS) and heated tobacco products (HTPs) have gained popularity in the region particularly among the young (12, 44). The growing popularity of *midwakh* in some EMR countries is also alarming (12, 21, 23). Furthermore, the tobacco industry is insistently encouraging these products in the region (11). Moreover, the evolution of these products and the interchangeability of the component parts have posed a unique challenge to their monitoring, surveillance, classification and regulation (7).

### Research on tobacco smoking and regulation

Evidence-based research on tobacco is pivotal in tobacco control. The scoping review that was conducted in seven EMR countries has noted a four-fold increase in the number of tobacco publications in the 14-year period from 2000 to 2013. However, the overall publication rate was generally low except for Lebanon and Bahrain. Most of the publications (69.8%) were on cigarette smoking and 21% on cigarettes and waterpipe. Less than 3% of the studies addressed policy with 27.4% having actionable messages to guide policy-makers (45). The study concluded that there is lack of evidence-based research.

Recommendations for tobacco control:

- EMR countries are urged to scale up their implementation of WHO FCTC policies and the six components of the MPOWER package of measures. Countries need to coordinate and cooperate to adopt effective tobacco control policies;
- monitor the prevalence of all types of tobacco use including ENDS, ENNDS, HTPs and *midwakh*;



- ➔ continue to conduct tobacco surveys among adults and youth regularly;
- ➔ scale up tobacco prevention policies including:
  - enforcing total ban on tobacco use in indoors public places without designated smoking areas;
  - implementing large graphic health warnings and plain packaging on all tobacco and nicotine products;
  - strictly implementing a comprehensive ban on advertising, promotion and sponsorship of all nicotine and tobacco control products;
  - increasing taxation rates on all tobacco and nicotine products in line with international best practices and WHO recommendations;
- ➔ provide accessible and affordable tobacco cessation programmes including NRT insurance coverage with the establishment of quit lines;
- ➔ increase the role of family physicians and primary healthcare in tobacco control advocacy;
- ➔ include prevention and cessation of tobacco use in the curricula of health professionals and residency programmes;
- ➔ integrate tobacco use hazards in school curricula;
- ➔ regulate tobacco distribution and sales;
- ➔ negate the misconception that certain tobacco products are not harmful or less harmful than cigarettes;
- ➔ modify social norms associated with waterpipe smoking;
- ➔ limit the use of fruit flavours in waterpipe tobacco and accurately label the contents;
- ➔ conduct research to assess trends in tobacco use, and to

evaluate the effectiveness of interventions;

- ➔ end tobacco industry interference into public health policies and tobacco control policies as per the WHO FCTC article 5.3 and its guidelines.

### Alcohol consumption

The harmful use of alcohol is a major risk factor for premature deaths and disabilities in the world. According to WHO, the harmful use of alcohol is one of the top 10 risks for burden of diseases and cause more than 5% of the global disease burden (46). Globally, WHO estimates there is 3 million deaths annually

Table 1: WHO best buys – Harmful use of alcohol

WHO Best Buys aim to reduce the harmful use of alcohol

<b>Effective interventions with cost effectiveness analysis (CEA) ≤ \$100 per DALY averted in low- and middle-income countries</b>	Increase excise taxes on alcoholic beverages
	Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media)
	Enact and enforce restrictions on the physical availability of retail alcohol (via reduced hours of sale)

Figure 1: Total alcohol per capita consumption (15+ years), worldwide (53)

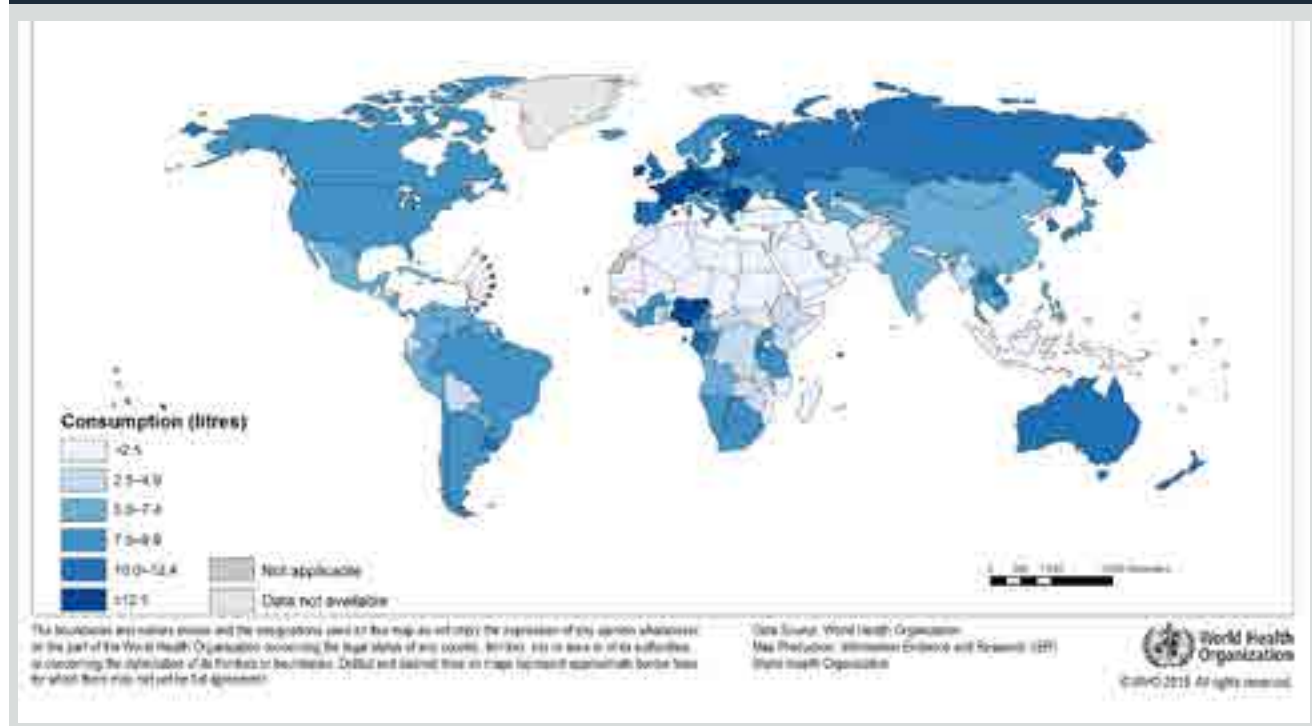
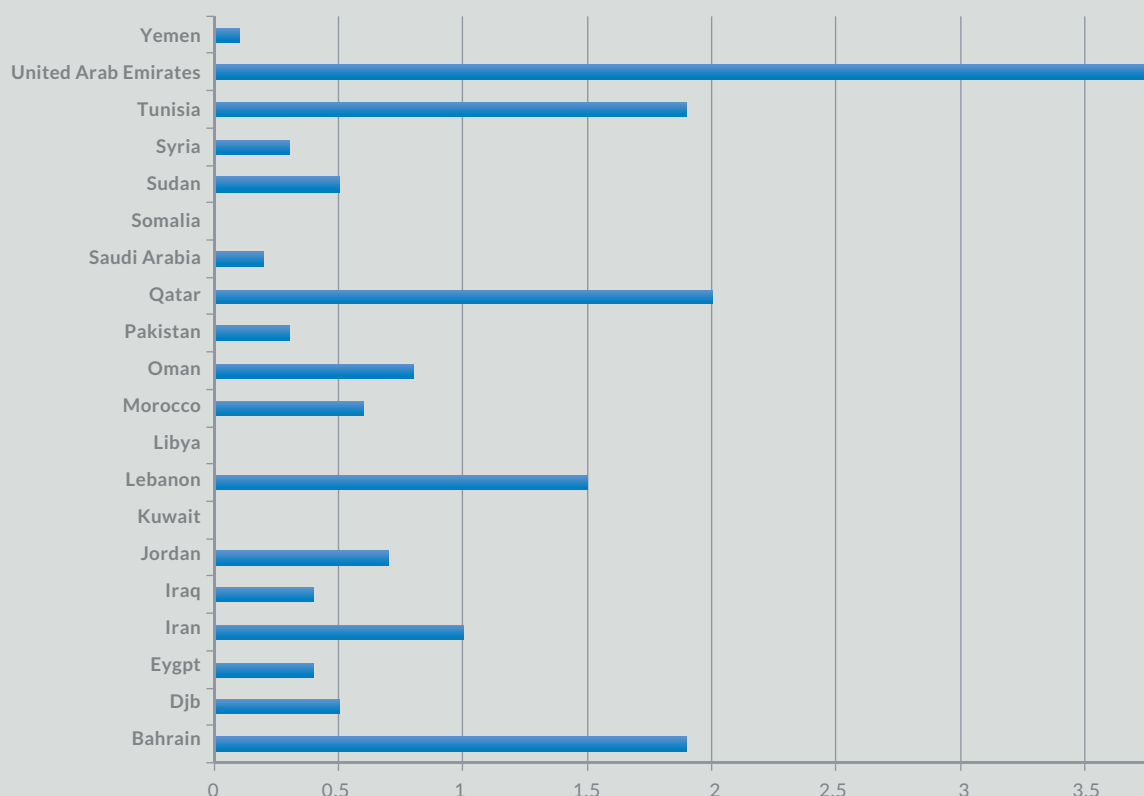


Figure 2: Total alcohol per capita consumption, litres of pure alcohol per capita in the EMR. Source (WHO NCD Data Finder).



attributable to alcohol consumption. Over three quarters of the deaths were among men (47). The relationship between the harmful use of alcohol and major NCDs including cancer is well documented (48,49,50). Harmful use of alcohol is known to cause heart disease, liver cancer, with strong associations with oropharynx, larynx, oesophagus, liver, colorectal and breast cancer (49, 50, 51, 52). Globally, 30% of deaths of oral and pharyngeal cancers, and 12% of the deaths caused by liver cancer were attributed to alcohol consumption (47). Some other cancers, such as pancreas and prostate cancer and melanoma, appear to be associated with the consumption of alcohol. However, the evidence needs further evaluation. In most cases, cancer risk is dose-dependent (48).

With regard to alcohol consumption, the EMR is the lowest compared to other WHO regions. Recent data published by WHO, shows the total per capita consumption of alcohol by individuals above 15 years of age is 0.6 litre of pure alcohol per year. This low level estimated to be almost 10 times lower than global consumption of 6.4 litres of pure alcohol per person aged 15 years or older per capita per year (47, 48). The low consumption rate is related to religious, muslim-majority countries that have enforced strict regulations banning alcohol sale and consumption, which is the case in most Arab countries

(48). (Figures 1, 2). The region has also consistently had the highest prevalence of countries with alcohol-availability restrictions, with 100% of responding countries reporting regulations for on-premise alcohol outlet locations and 88% for off-premise locations (47, 48).

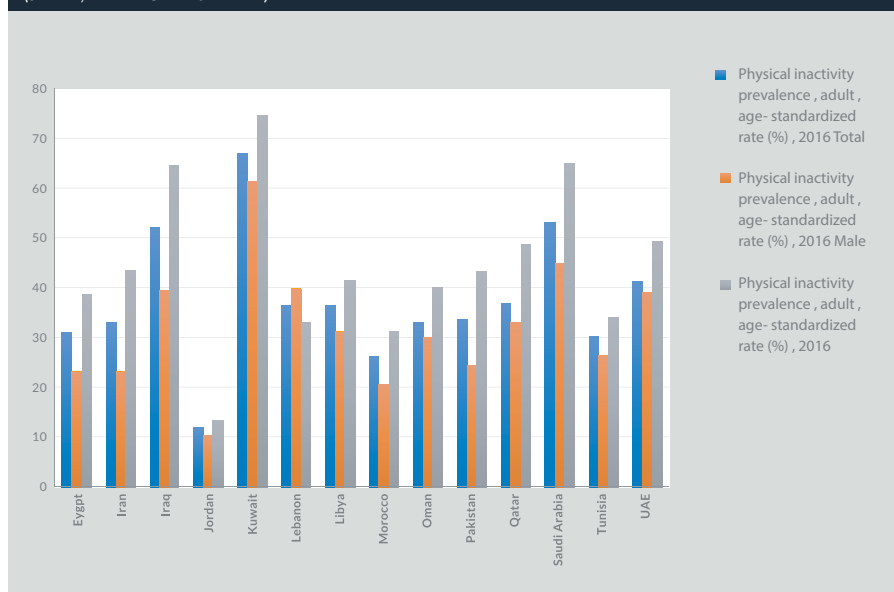
As for mortality data, all deaths attributable to alcohol consumption were lowest in the EMR where 0.7% of all deaths and 0.7% of all DALYs were attributable to alcohol consumption (42, 43). However, at individual level use, there is a wide variation between the countries and age groups in the region.

To prevent a rising trend, it is important for countries to implement the key evidence-based cost effective interventions recommended in the global strategy on the harmful use of alcohol and the WHO best buys (Table 1) (54, 55). Reducing the harmful use of alcohol is critical towards achieving NCD-related Sustainable Development Goals (SDGs), including the reduction of NCD premature mortality by 30% by 2030.

### Physical activity

Cancer occurrence is largely influenced by lifestyle and behavioural factors including physical activity. Physical inactivity is a global health challenge and has been identified

Figure 3: Physical inactivity prevalence among adult (18+) years, age-standardized rate (%), 2016 (source, WHO NCD Data Finder)



The global agenda and its commitments highlighted the importance of introducing policies and actions aimed at increasing physical activity in the entire population, including all aspects of daily living (56, 58).

### Obesity and overweight

Owing to the worldwide rise in overweight and obesity prevalence, concerns about their impact on health have also been increasing worldwide. In 2016, global surveys revealed that 38.9% of the adult population were overweight (BMI  $\geq 25\text{kg/m}^2$ ) and 13.1% were obese (BMI  $\geq 30\text{ kg/m}^2$ ). In the EMR, the latest prevalence of

as the fourth leading risk factor for global mortality (6% of deaths globally) and is reported to be associated with many types of cancers. (56). According to a recent WHO report, more than one-third of adults aged 18 years and older are physically inactive globally (1). Women were less active than men, with 32% of women and 23% of men not achieving the recommended levels for physical activity (57).

The health benefits of physical activity have been well documented. Regular physical activity has been shown to be associated with a lower risk of cardiovascular disease, diabetes, obesity, hypertension, hypercholesterolemia, arthritis, mental illnesses, and cancer, namely breast, endometrial and colorectal cancer. Some of this effect seems to be independent of weight control (58).

As for as cancer, evidence has shown that regular physical activity reduces the risk of breast and colon cancer, and possibly reduces the risk of uterine (endometrial) and prostate cancers (59, 60).

In the EMR, the prevalence of physical inactivity is one of the highest worldwide, reaching almost 70% in some countries (61). Based on data reported by the WHO STEPwise survey in the region, there is a significant difference in the level of physical inactivity among countries ranging from 68%, the highest, in Kuwait to 12%, the lowest, in Jordan (62) (Figure 3).

The differences in the prevalence of physical activity was also reported between the two sexes in the EMR. women reported a higher prevalence of insufficient physical activity (62). The lower prevalence of physical activity among females is more likely caused by cultural and social variables rather than biological factors. Culturally, women are not expected to practice physical activities in public. Although walking for fitness is relatively acceptable for women living in cities, it may not be the case in rural regions (61).

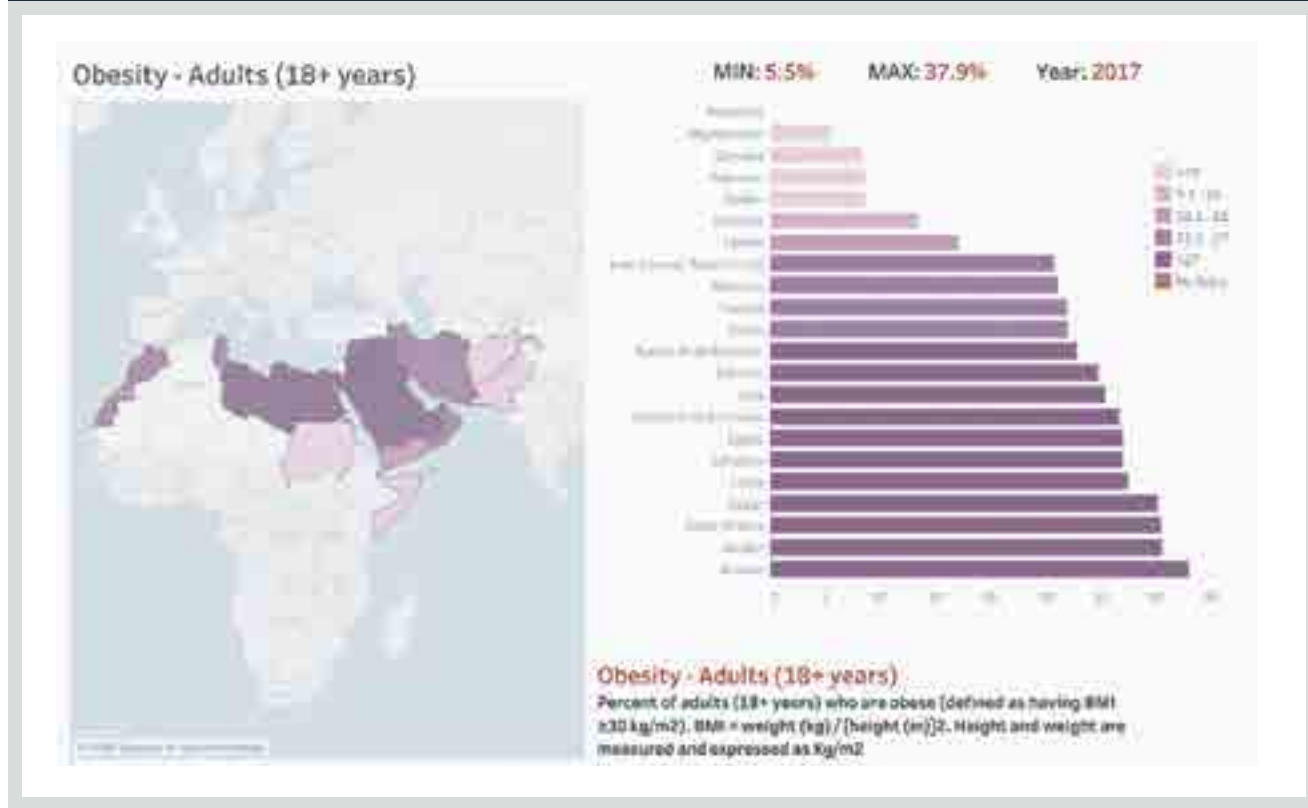
obesity in 2016 was estimated at 20.8%, while the prevalence of overweight was around 49%. The highest prevalence of more than 70% overweight has been reported in the Gulf countries, Kuwait and Qatar. Similarly, the highest prevalence of more than 30% obesity has been reported in Kuwait, Jordan, Saudi Arabia, Qatar, Libya, Lebanon, Egypt, United Arab Emirates and Iraq. Overweight prevalence among adults increased in the EMR by 27.2% while, obesity prevalence among adults increased by 56.3% between 2000 and 2016 (63) (Figure 4, Table 2).

In 2019, total cancers caused 23.6 million incident cases, 10 million deaths, and 250 million DALYs globally. In 2019, total cancers were the second-leading cause of death and DALYs globally (64). Worldwide, an estimated 19.3 million new cancer cases (18.1 million excluding non-melanoma skin cancer) were diagnosed in 2020, with about 10 million cancer deaths (9.9 million excluding non-melanoma skin cancer) (65). According to long-term predictions, the EMR countries will suffer from a startling increase in cancer patients, with a 1.8-fold increase by 2030 (66). Pakistan has the greatest number of cancer cases (170,668) in the EMR in 2020, followed by Egypt (129,577) and Iran (127,548) (67) (Figure 5; Table 2). Bahrain, Qatar, Iran, and Lebanon reported a 16% mortality rate due to cancer, Kuwait reported 15%, while Egypt reported 13% (68).

It is noticeable that most of the EMR countries revealed a relatively high rate of cancer incidence as nine countries in the region have cancer rates of more than 200/100,000. The highest cancer rates as revealed in 2020 have been reported in Egypt (258/100,000) followed by Lebanon (252.5/100,000) then Jordan (251.8/100,000) and Iran (245.2/100,000) followed by Syria (241.5/100,000), and Morocco (238.8/100,000) (67) (Figure 6; Table 2).

In the EMR, the total number of fatalities due to cancer

Figure 4: Percentage of obese adults (both sexes) in the EMR by country, WHO Regional Office of the Eastern Mediterranean Region, 2017 (91).



was 431,312 in 2019. Pakistan recorded the highest number (124,328) followed by Egypt (85,226), Iran (61,063), then Morocco (33,845) (63) (Figure 7; Table 2).

Being obese is usually linked to an increased risk of hypertension and many NCDs, including diabetes,

cardiovascular disease (CVD), and cancers. Obesity is the key risk factor for type 2 diabetes, CVDs cancer, and premature death. The correlation between excess BMI and the risk of cancer incidence in esophagus, colon kidney, rectum, pancreas, gall bladder, post-menopausal breast, ovarian and endometrial

Figure 5: Number of Cancer cases, both sexes, in the EMR, 2020 (67)

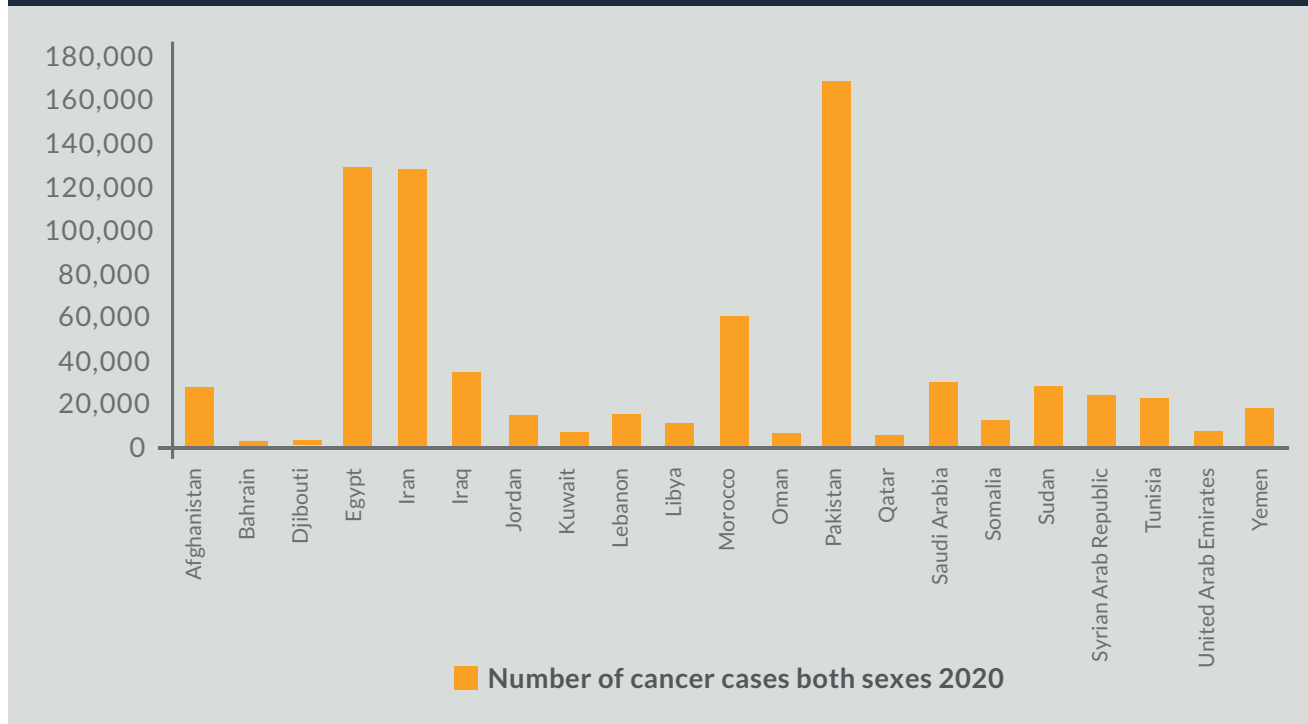


Table 2: Number of deaths, probability of dying attributed to cancer among adults, cancer trends, obesity prevalence, overweight prevalence and cancer trends attributable to excess body mass in the EMR (63, 67, 76)

	Number of deaths attributed to cancer	Probability of death due to cancer	Cancer cases (N)	Cancer rates/100000 (Age St.)	Cumulative cancer risk	Obesity prevalence among adults, BMI $\geq$ 30 (Age St.)	Overweight prevalence among adults, BMI $\geq$ 25 (Age-St.)	Cancer (%) due to excess BMI	Number of cancer cases among both sexes attributable to excess BMI
	Both	Both	Both	Both	Both	Both	Both	Both	Both
	2019	2016	2020	2020	2020	2016	2016	2012	2012
Afghanistan	15,565	8.00	20975	175.4	20	5.5	23	0.64	109
Bahrain	640	16.00	1177	180.6	26.66	29.8	65.8	5.2	43
Djibouti	508	7.00	737	146.6	15.21	13.5	38.6	2	10
Egypt	85,226	13.00	129577	258	31.39	32	63.5	4.4	4 400
Iran	61,063	16.00	127548	245.2	35.6	25.8	61.6	3.1	2 400
Iraq	15,004	11.00	31801	217.6	25.86	30.4	64.6	3.7	834
Jordan	6,075	12.00	11107	251.8	29.63	35.5	69.6	7.2	417
Kuwait	1,815	15.00	3716	185.3	27.97	37.9	73.4	7.2	107
Lebanon	9,078	16.00	11287	252.5	30.53	32	67.9	5.4	464
Libya	3,557	12.00	7388	212.8	28.17	32.5	66.8	5.1	287
Morocco	33,845	14.00	57772	238.8	26.96	26.1	60.4	3.2	1 000
Oman	1,750	11.00	3557	165.4	17.58	27	62.6	3.8	50
Pakistan	124,33	8.00	170668	178.7	19.81	8.6	28.4	1.7	2 300
Qatar	716	16.00	1435	172.2	28.55	35.1	71.7	4.9	45
Saudi Arabia	10,615	10.00	26505	152.1	20.13	35.4	69.7	6.8	1 000
Somalia	8,335	4.00	9140	189.7	20.24	8.3	28.4	1.2	79
Sudan	17,892	6.00	25347	153.4	17.85	8.6	28.9	1.3	236
Syria	13,742	9.00	20193	241.5	28.61	27.8	61.4	5.5	1 100
Tunisia	10,246	12.00	19031	214.9	28.05	26.9	61.6	4.4	504
UAE	2,103	12.00	4611	170.7	28.49	31.7	67.8	4.8	106
Yemen	9,210	6.00	14848	154.4	21.81	17.1	48.8	2.5	220

Figure 6: Cancer rates/100,000, age-standardized, both sexes 2020 (67)

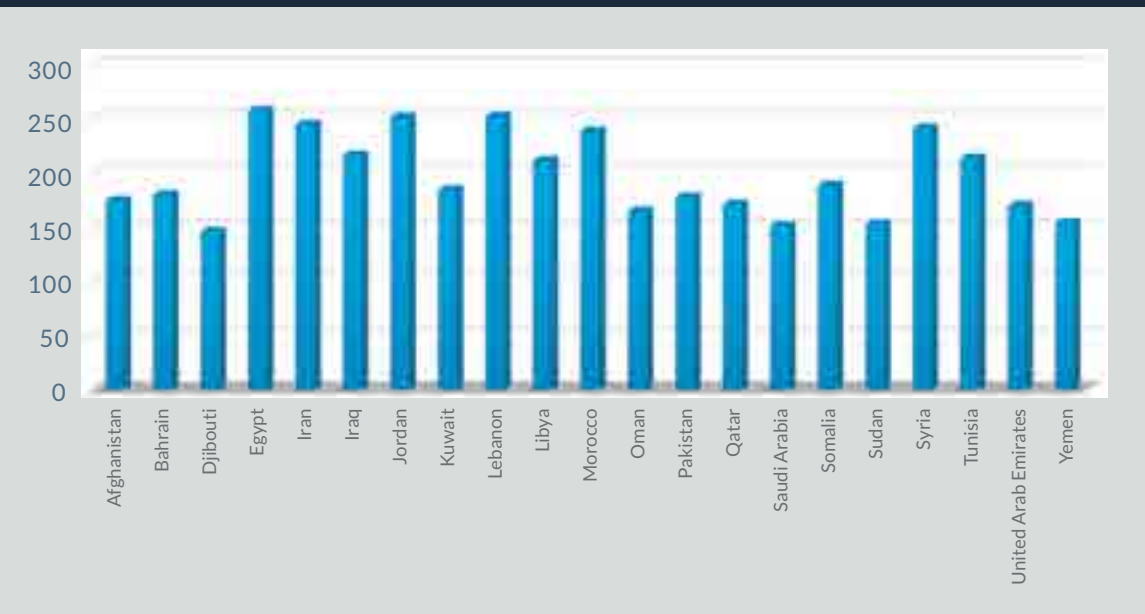


Figure 7: Number of deaths attributed to cancer, 2019 (63)

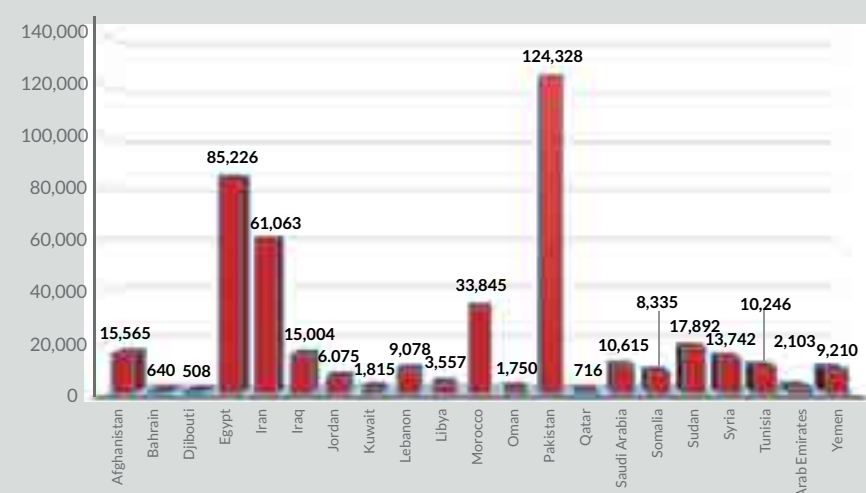


Figure 8: Number of cancer cases among both sexes due to excess BMI (67)

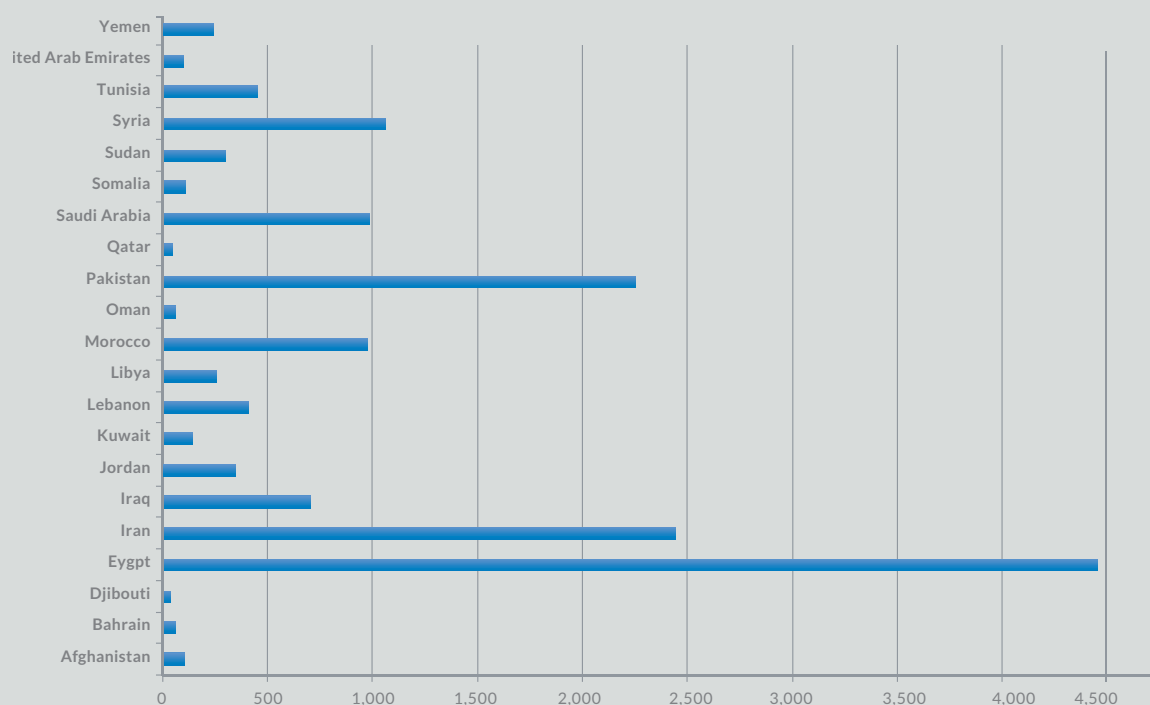


Figure 9: Cancer incidence sites in the EMR due to excess BMI (67, 76)

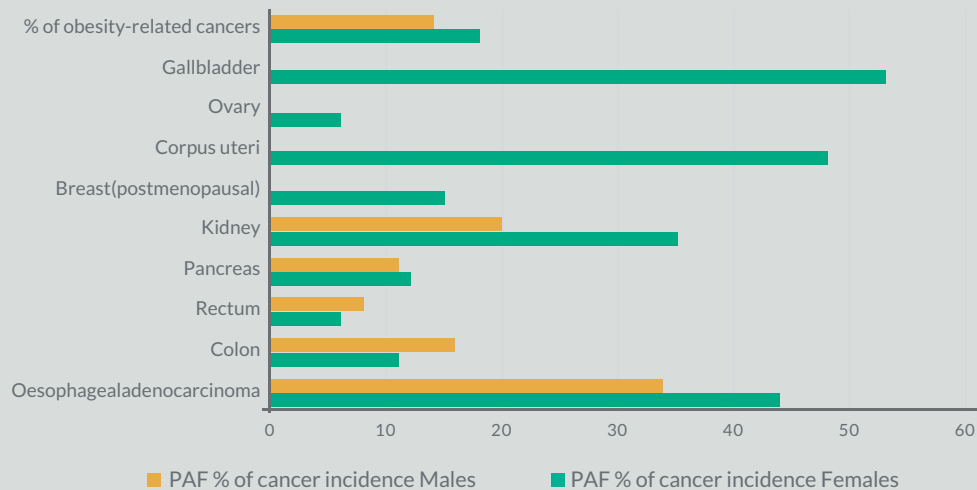




Figure 10: Correlation between prevalence of obesity and cumulative cancer risk among adults in the EMR (63, 67)

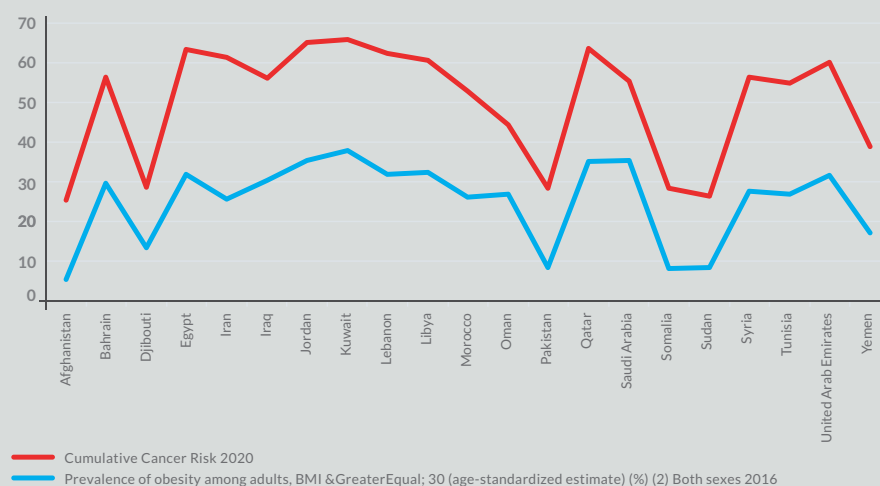
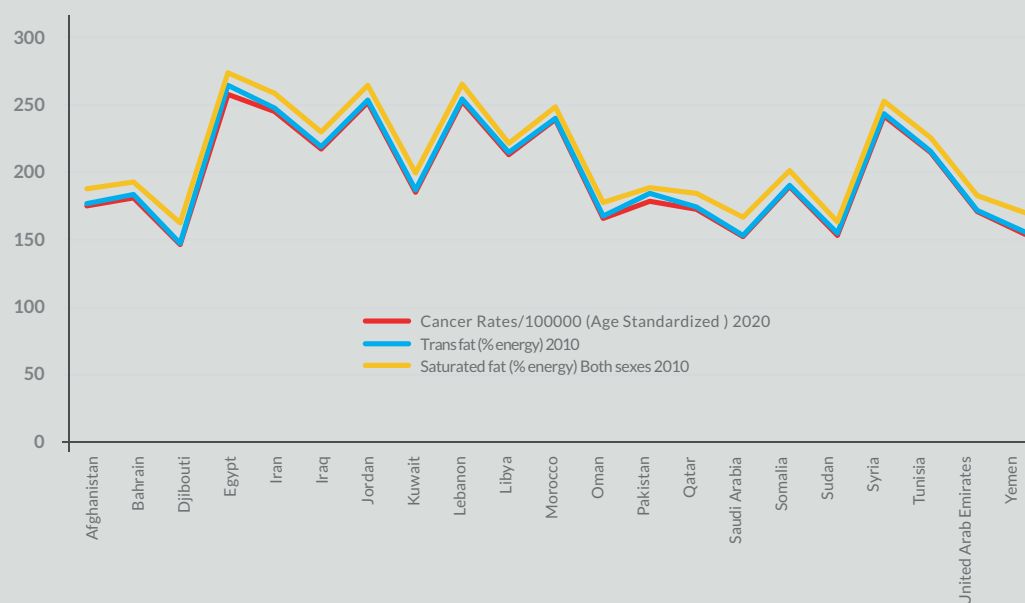


Figure 11: Correlation between prevalence of obesity and probability of death due to cancer in the EMR



Figure 12: Correlation between cancer rates, trans fat and saturated fat consumption (67, 76, 92)



cancer have been confirmed in literature (69–74). The estimated increase in risk of these cancers due to excess BMI ranged from 3–10% per unit increase in BMI (75). Moreover, in 2012, relatively, 3.6% of all cancers (excluding non-melanoma skin cancer) or 13% of all obesity-related cancers could be attributed to excess BMI in adults (76).

EMR countries are facing a rapid rise in NCDs and injuries as a share of the total disease burden as countries transition from traditional to modern health risks. In the EMR, the proportion of obesity-related cancers attributable to excess BMI is 16% while the proportion of all cancers, excluding non-melanoma skin cancers, attributable to excess BMI is 4.5% (67, 76) (Figures 5, 6).

The trends of obesity, cancer and death due to cancer coincide in the EMR (Figures 10, 11). The maximum prevalence of cancer attributable to excess body weight has been reported in Kuwait as 7.2%, Jordan 7.2 %, Saudi Arabia 6.8%, Lebanon 5.4%, Libya 5.1% and Qatar 4.9% (67) (Table 2).

It has been determined that lowering exposure to cancer risk variables such as diet, nutrition, and physical exercise could prevent approximately 40% of cancer cases (77). Adequate daily intake of fruit and vegetables has been linked to a lower incidence of CVDs (78), Stroke (79), type 2 diabetes (80), and some forms of cancer (81, 82). Intake of industrial TFAs has also been linked to an elevated risk of NCDs and related disorders such ovarian cancer (83). Figure 12 illustrates the coincidence between trans fatty acids intake and cancer rates among EMR countries.

Bahrain, one of the high-income Gulf countries, is suffering from an increase in cancer cases (84, 85). Breast, colorectal, lung cancers, non-Hodgkin lymphoma and leukaemia are the five most often diagnosed cancers in Bahrain (86). Obesity, smoking, leading a sedentary lifestyle, and eating a high-fat/low-fibre diet are all major risk factors for colorectal cancer in Bahrain. Almost a third of Bahrain's population is overweight or obese (87, 88).

A systematic evaluation of studies published between 1970 and 2020 in Iran that looked at the epidemiological features of gastric cancer found that poor economic status and food insecurity increased the risk of stomach cancer 2.42- and 2.57-fold, respectively. Furthermore, there was a link between stomach cancer risk and dairy products, processed red meat, fruit juice, legumes, smoked and salty seafood, salt, strong as well as hot tea use. There was also an inverse relationship between the ingestion of fresh fruit, citrus, and garlic and stomach cancer (89).

The intake of fats, protein, and calories was found to have a substantial positive relationship with the incidence of breast cancer in Saudi Arabia. The adjusted odds ratios for cholesterol, polyunsaturated fat, animal protein, saturated fat,

and total energy from dietary intake were 1.88 for cholesterol, 2.12 for polyunsaturated fat, 2.25 for animal protein, 2.43 for saturated fat, and 2.69 for total energy from dietary intake for the highest quartile of intake versus the lowest (90).

### Diet and healthy eating

According to WHO, the recommended healthy diet is one that consists of fruit, vegetables, legumes (e.g. lentils and beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat and brown rice). An unhealthy diet is a contributing cause to cancer diseases and other NCDs.

In the EMR, the average daily consumption of fruits and vegetables is 280 g per day which is lower than the WHO recommendations (At least 400 g of fruit and vegetables per day) excluding potatoes, sweet potatoes, cassava and other starchy roots (93).

The average consumption of raw sugar in the EMR is 80 g per day, while the recommended amount of sugar is less than 10% of total energy, which is equivalent to 50 g for a person of healthy body weight consuming about 2,000 calories per day. It is recommended that a healthy diet contains less than 5 g of salt (equivalent to about one teaspoon) per day and the sodium intake should be less than 2.3 g daily. In the EMR the average salt daily intake is 9.6 g. For instance, in Bahrain the consumption is very high, and reaches 14 g per day (94).

The American Heart Association recommends aiming for a healthy dietary pattern that contains about 13 g of saturated fat per day (5% to 6% of daily calories), while the trans fatty acids should be limited to be less than 1% of daily calories about 2 g per day. In the EMR the average saturated fats consumption is 10.35% of total energy, while the limit of trans fatty acids has been greatly exceeded in Egypt and Pakistan where average consumption reaches 6.5% and 5.8% from total energy, respectively (95).

### WHO regional policies and strategies to address obesity in the EMR

Actions to educate and inform the public about nutrition are widely implemented. More specifically, two thirds of countries have issued food-based dietary guidelines, more than half (56%) provide nutrition and diet counselling and more than a third (39%) have conducted media campaigns. There is much scope for improvement in nutrition labelling – while two thirds (67%) of countries have implemented rules on nutrition labelling, only 41% have issued rules relating to nutrition and health claims and only five countries have introduced simplified front-of-pack labelling (96).

The last decade has seen a step-up in action across the region to scale-up action to tackle unhealthy diets and reduce overweight and obesity. For instance, the Regional Framework

for Action on Obesity Prevention was adopted in 2018. More than half (97) of the region's countries have policies relating to trans fatty acids, with seven implementing specific measures to ban or virtually eliminate industrial trans fats. To address the high intakes of salt in the region, 14 countries had fully or partially implemented national salt reduction policies. By 2017, seven countries had adopted policies relating to aspects of marketing food to children, although concrete action in this area is still lacking. The second half of the decade saw several countries introducing taxes – several at a rate of 50% – on carbonated or sugar-sweetened beverages.

While progress has been noted in many EMR countries to improve physical activity and combat the challenges of obesity, EMR countries need to focus their efforts more towards multisectoral and intersectoral collaborations to improve physical activity and lower cancer risk, and obesity-related health problems. ■

#### *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.*

## References

- Bray F, Jemal A, Torre LA, Forman D, Vineis P. Long-Term Realism and Cost-Effectiveness: Primary Prevention in Combatting Cancer and Associated Inequalities Worldwide. *J Natl Cancer Inst* 2015 107(12): djv273.
- Prevention. (Cancer control: knowledge into action: WHO guide for effective programmes; module 2.) World Health Organization 2007.
- IARC, Reducing social inequalities in cancer: evidence and priorities for research / edited by S. Vacciarella, J. Lortet-Tieulent, R. Saracci, D.I. Conway, K. Straif, C.P. Wild. 2019.
- Romero Y, Trapani D, Johnson S, Tittenbrun Z, Given L, Hohman K, Stevens L, Torode J, Boniol M, Ilbawi A. National cancer control plans: a global analysis. *The Lancet Oncology*. 2018 19 (18):30681-8. DOI:https://doi.org/10.1016/S1470-2045(18)30681-8
- From Burden to "Best Buys": Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries Bloom DE ed al 2011 World Economic Forum
- Freedman ND, MJ T. Tobacco products: Massive and still growing causes of cancer worldwide. In: Wild CP, Weiderpass E, BW S, editors. World Cancer Report: Cancer Research for Cancer Prevention Lyon, France: International Agency for Research on Cancer. Lyon, France: International Agency for Research on Cancer; 2020. p. 50-9.
- Kulhanova I, Znaor A, Shield KD, Arnold M, Vignat J, Charafeddine M, et al. Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region. *Int J Cancer*. 2020;146(3):646-56.
- Charafeddine MA, Olson SH, Mukherji D, Temraz SN, Abou-Alfa GK, Shamseddine AI. Proportion of cancer in a Middle eastern country attributable to established risk factors. *BMC Cancer*. 2017;17(1):337.
- Drope J, Schluger N, Cahn Z, Drope J, Hamill S, Islami F, et al. The Tobacco Atlas. 6th ed. Atlanta, USA: American Cancer Society and Vital Strategies; 2018.
- WHO global report on trends in prevalence of tobacco use 2000-2025, fourth edition. Geneva: World Health Organization; 2021. License: CC BY-NC-SA 3.0 IGO.
- Bath Uo. Eastern Mediterranean Region 2020 [Available from: https://tobaccotatics.org/wiki/eastern-mediterranean-region/.
- Hamadeh RR, Lee J, Abu-Rmeileh NME, Darawad M, Mostafa A, Kheirallah KA, et al. Gender differences in waterpipe tobacco smoking among university students in four Eastern Mediterranean countries. *Tob Induc Dis*. 2020;18:100.
- WHO. WHO Framework Convention on Tobacco Control. Control and prevention of waterpipe tobacco products 2016 [Available from: https://www.who.int/fctc/cop/cop7/FCTC\_COP\_7\_10\_EN.pdf.
- Khattab A, Javai A, Iraqi G, Alzaabi A, Ben Kheder A, Koniski ML, et al. Smoking habits in the Middle East and North Africa: results of the BREATHE study. *Respir Med*. 2012;106 Suppl 2:S16-24.
- Nakkash R, Khader Y, Chalak A, et al. Prevalence of cigarette and waterpipe tobacco smoking among adults in three Eastern Mediterranean countries: a cross-sectional household survey. *BMJ Open* 2022;12:e055201. doi:10.1136/bmjopen-2021-055201
- Al-Mandhari A, Hammerich A, El-Awa F, Bettcher D, Mandil A. Full implementation of the WHO Framework Convention on Tobacco Control in the Eastern Mediterranean Region is the responsibility of all. *East Mediterr Health J*. 2020;26(1):4-5.
- Abu-Rmeileh NME, Khader YS, Abdul Rahim H, et al. Tobacco control in the Eastern Mediterranean region: implementation progress and persisting challenges *Tobacco Control* 2022;31:150-152.
- Prevention. CfDCa. Electronic nicotine delivery systems. Key facts. : CDC; 2016 [Available from: https://www.cdc.gov/tobacco/stateandcommunity/pdfs/ends-key-factsoct-2016.pdf.
- Makri OE, Pallikari A, Kagkalaris K, Mastronikolis SN, Karanasios G, Symeonidis C, et al. The Acute Effects of Electronic Cigarette Vaping and Tobacco Cigarette Smoking on Choroidal Thickness in Young, Healthy, Habitual, Dual Smokers. *Toxics*. 2020;8(4).
- Walley SC, Jenssen BP, Section on Tobacco C. Electronic Nicotine Delivery Systems. *Pediatrics*. 2015;136(5):1018-26.
- Affi R, Saravanan M, El Salibi N, Nakkash R, Rady A, Sherman S, et al. Evidence from the Lebanon Global School-based Student Health Survey on midwakh tobacco smoking in school students: a harbinger of the next global tobacco pandemic? *East Mediterr Health J*. 2020;26(1):116-21.
- Jawad M, Al-Houqani M, Ali R, El Sayed Y, El Shahawy O, Weitzman M, et al. Prevalence, attitudes, behaviours and policy evaluation of midwakh smoking among young people in the United Arab Emirates: Cross-sectional analysis of the Global Youth Tobacco Survey. *PLoS One*. 2019;14(4):e0215899.
- Al-Houqani M, Ali R, Hajat C. Tobacco smoking using Midwakh is an emerging health problem—evidence from a large cross-sectional survey in the United Arab Emirates. *PLoS One*. 2012;7(6):e39189.
- Nakkash R, Lee K. The tobacco industry's thwarting of marketing restrictions and health warnings in Lebanon. *Tob Control*. 2009;18(4):310-6.
- Heydari G. Quantitative comparison of WHO tobacco control measures: lessons from the Eastern Mediterranean Region. *East Mediterr Health J*. 2020;26(1):9-17.
- Hassounah S, Rawaf D, Khoja T, Rawaf S, Hussein MS, Qidwai W, et al. Tobacco control efforts in the Gulf Cooperation Council countries: achievements and challenges. *East Mediterr Health J*. 2014;20(8):508-13.
- Awaisu A, Hagi A, Ashour MA, Kheir N. Pictorial health warnings on cigarette packages in Qatar: preimplementation awareness and perceptions of ever-smokers versus never-smokers. *Nicotine Tob Res*. 2013;15(10):1765-72.
- WHO. Tobacco Free Initiative. WHO Framework Convention on Tobacco Control 2020 [Available from: http://www.emro.who.int/tfi/who-fctc/index.html.
- Diseases. UNITFotPaCoN. The Investment Case for Noncommunicable Disease Prevention and Control In the Kingdom of Saudi Arabia : Return on Investment Analysis
- WHO report on the global tobacco epidemic 2021: addressing new and emerging products. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.
- COVID-19 and beyond: banning the use of tobacco and e-cigarettes in public places. World Health Organization Regional Office for the Eastern Mediterranean; 2021. License: CC BY-NC-SA 3.0 IGO.
- Scollo, M., Hippolyte, D., & Miller, C. 12A.3 Evidence about the effects of health warnings. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2019. Available from: https://www.tobaccoinaustralia.org.au/chapter-12-tobacco-products/attachment-12-1-health-warnings/12a-3-evidence-about-effects-of-health-warnings
- Guidelines for implementation of Article 11 of WHO FCTC. Packaging and labelling of tobacco products. 2013. https://fctc.who.int/publications/m/item/packaging-and-labelling-of-tobacco-products
- Raupach T, Brown J, Herbec A, Brose L, West R. A systematic review of studies assessing the association between adherence to smoking cessation medication and treatment success. *Addiction*. 2014;109(1):35-43.
- Hawari FI, Bader RK. Advancing Tobacco Dependence Treatment Services in the Eastern Mediterranean Region: International collaboration for training and capacitybuilding. *Sultan Qaboos Univ Med J*. 2014;14(4):e442-7.
- Stead LF, Buitrago D, Preciado N, Sanchez G, Hartmann-Boyce J, Lancaster T. Physician advice for smoking cessation. *Cochrane Database Syst Rev*. 2013(5):CD000165.
- Al Mulla A, Hassan-Yassoub N, Fu D, El-Awa F, Alebshehy R, Ismail M, et al. Smoking cessation services in the Eastern Mediterranean Region: highlights and findings from the WHO Report on the Global Tobacco Epidemic 2019. *East Mediterr Health J*. 2020;26(1):110-5.
- Hamadeh RR, Ahmed J, Al-Kawari M, Bucheeri S. Quit tobacco clinics in Bahrain: smoking cessation rates and patient satisfaction. *Tob Induc Dis*. 2017;15:7.
- WHO technical manual on tobacco tax policy and administration. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.
- Batmanghelidj E, Heydari G. Sanctions, Smuggling, and the Cigarette: The Granting of Iran Office of Foreign Asset Control's Licenses to Big Tobacco. *Int J Prev Med*. 2014;5(2):138-44.
- El-Awa FMS, El Naga RA, Labib S, Latif NA. Tobacco advertising, promotion and sponsorship in entertainment media: a phenomenon requiring stronger controls in the Eastern Mediterranean Region. *East Mediterr Health J*. 2018;24(1):72-6.
- CDC. Tobacco Use in Top-Grossing Movies — United States, 2010–2016 Atlanta, USA: Centers for Disease Control and Prevention; 2017 [Available from: https://www.cdc.gov/mmwr/volumes/66/wr/mm6626a1.htm.
- Maziak W, Nakkash R, Bahelah R, Hussein A, Fanous N, Eissenberg T. Tobacco in the Arab world: old and new epidemics amidst policy paralysis. *Health Policy Plan*. 2014;29(6):784-94.
- Regional consultation on novel tobacco products: health effects, research needs and provisional recommended actions for regulators. *East Mediterr Health J*. 2020;26(1):129-30.
- Hamadeh RR, Borgan SM, Sibai AM. Cancer Research in the Arab World: A review of publications from seven countries between 2000-2013. *Sultan Qaboos Univ Med J*. 2017;17(2):e147-e54.
- Alcohol Consumption and Ethyl Carbamate : IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 96. Available from https://publications.iarc.fr/114. (Last accessed on 7 July 2020).
- World Health Organization (WHO) Global Status Report on Alcohol and Health. 2018. Available from: https://www.who.int/substance\_abuse/publications/global\_alcohol\_report/en/. (Last accessed on 10 July 2020).
- World Health Organization. Global Information System on Alcohol and Health. Geneva, Switzerland: World Health Organization, 2015.
- Jürgen Rehm, et al., The relation between different dimensions of alcohol consumption and burden of disease: 2010 an overview. *Addiction*. April. 2010. https://doi.org/10.1111/j.1360-0443.2010.02899.
- Lim, Vos & Flaxman, 2012, et al.: A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*, Volume 380, Issue 9859, 15 December 2012–4 January 2013, Pages 2224-2260
- Bagnardi et al. Alcohol consumption and site-specific cancer risk: a comprehensive dose–response meta-analysis. *British Journal of Cancer*, volume 112, 03 February 2015, pages580–593.
- Kulháňová I, et al. Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region. *Int J Cancer* ; 2020 Feb 1;146(3):646-656.

## References

53. WHO NCD Data Finder (last accessed on 11 July 2020).
54. WHO, Global Strategy to Reduce the Harmful Use of Alcohol. Geneva, Switzerland: WHO; 2010. Available at [http://www.who.int/entity/substance\\_abuse/alcstrategyaftereb.pdf](http://www.who.int/entity/substance_abuse/alcstrategyaftereb.pdf). Accessed July 10, 2020.
55. WHO, Tackling NCDs, 'Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases: WHO 2017. Available at <https://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf>. Accessed July 10, 2020.
56. WHO Global Recommendations on physical activity for health, WHO 2010. Available at [file:///Users/saif1980/Downloads/9789241599979\\_eng%20\(1\).pdf](file:///Users/saif1980/Downloads/9789241599979_eng%20(1).pdf). Accessed on 10 July 2020.
57. WHO Global action plan on physical activity 2018–2030. WHO 2018. Available at [file:///Users/saif1980/Downloads/9789241514187-eng%20\(1\).pdf](file:///Users/saif1980/Downloads/9789241514187-eng%20(1).pdf). Accessed on 13 July 2020.
58. Harris DJ, Atkinson G, Batterham A, et al. Lifestyle factors and colorectal cancer risk (2): a systematic review and meta-analysis of associations with leisure-time physical activity. *Colorectal Dis* Sep 2009; 11(7): 689e701.
59. Moore SC, Gierach GL, Schatzkin A, Matthews CE. Physical activity, sedentary behaviours, and the prevention of endometrial cancer. *Br J Cancer* Sep 28 2010; 103(7): 933e938.
60. Monnikhof EM, Elias SG, Vlems FA, et al. Physical activity and breast cancer: a systematic review. *Epidemiology* Jan 2007; 18(1): 137e157.
61. Mabry RM, Reeves MM, Eakin EG, Owen N. Evidence of physical activity participation among men and women in the countries of the Gulf cooperation council: a review. *Obes Rev* Jun 2010; 11(6): 457e464.
62. WHO NCD Data Finder. Available at <https://apps.apple.com/ro/app/who-ncd-data-finder/id1250210033>. Accessed on 8 July 2020.
63. World Health Organization. Global Health Observatory. Indicators. [www.who.int](http://www.who.int). Available online at: <https://www.who.int/data/gho/data/indicators> (accessed August 31, 2021).
64. Institute for Health Metrics and Evaluation. Institute for Health Metrics and Evaluation (2018). Available online at: <http://www.healthdata.org> (accessed August 30, 2021).
65. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. (2021) 71:209–49. doi: 10.3322/caac.21660
66. Arafa MA, Rabah DM, Farhat KH. Rising cancer rates in the Arab World: now is the time for action. *East Mediterr Health J*. (2020) 26:638–40. doi: 10.26719/emhj.20.073
67. Global Cancer Observatory. Global Cancer Observatory. [larc.fr](http://larc.fr) (2018). Available online at: <https://gco.iarc.fr/> (accessed October 16, 2021).
68. World Health Organization. Noncommunicable Diseases Country Profiles (2018).
69. Continuous Update Project Report. World Cancer Research Fund / American Institute for Cancer Research; 2010. *Food, Nutrition, Physical activity, and the Prevention of Breast Cancer*.
70. Continuous Update Project Report. World Cancer Research Fund / American Institute for Cancer Research; 2011. *Food, Nutrition, Physical activity, and the Prevention of Colorectal Cancer*.
71. Continuous Update Project Report. World Cancer Research Fund / American Institute for Cancer Research; 2012. *Food, Nutrition, Physical activity, and the Prevention of Pancreatic Cancer*.
72. Continuous Update Project Report. World Cancer Research Fund / American Institute for Cancer Research; 2013. *Food, Nutrition, Physical activity, and the Prevention of Endometrial Cancer*.
73. Continuous Update Project Report. World Cancer Research Fund / American Institute for Cancer Research; 2014. *Food, Nutrition, Physical activity, and the Prevention of Ovarian Cancer*.
74. Food, nutrition, physical activity and the prevention of cancer: a global perspective: a project of World Cancer Research Fund International. American Institute for Cancer Research. World Cancer Research Fund; Washington, D.C.: 2007.
75. Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. *Lancet*. 2008; 371(9612):569–78. [PubMed: 18280327]
76. Arnold M, Pandeya N, Byrnes G, Renehan AG, Stevens GA, Ezzati M, et al. (2015). Global burden of cancer attributable to high body-mass index in 2012: a population-based study. *Lancet Oncol*. 16(1):36–46. PMID: 25467404 (free full text available)
77. Ibrahim AS, Khaled HM, Mikhail NN, Baraka H, Kamel H. Cancer incidence in Egypt: results of the national population-based cancer registry program. *J Cancer Epidemiol*. (2014) 2014:437971. doi: 10.1155/2014/437971
78. Bazzano LA, He J, Ogden LG, Loria CM, Vupputuri S, Myers L, et al. Fruit and vegetable intake and risk of cardiovascular disease in US adults: the first National Health and Nutrition Examination Survey Epidemiologic Follow-up Study. *Am J Clin Nutr*. (2002) 76:93–9. doi: 10.1093/ajcn/76.1.93
79. Carter P, Gray LJ, Troughton J, Khunti K, Davies MJ. Fruit and vegetable intake and incidence of type 2 diabetes mellitus: systematic review and meta-analysis. *BMJ*. (2010) 341:c4229. doi: 10.1136/bmj.c4229
80. Maynard M, Gunnell D, Emmett P, Frankel S, Davey Smith G. Fruit, vegetables, and antioxidants in childhood and risk of adult cancer: the Boyd Orr cohort. *J Epidemiol Community Health*. (2003) 57:218–25. doi: 10.1136/jech.57.3.218
81. Papas MA, Giovannucci E, Platz EA. Fiber from fruit and colorectal neoplasia. *Cancer Epidemiol Biomarkers Prev*. (2004) 13:1267–70.
82. Nishida C, Uauy R, Kumanyika S, Shetty P. The joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases: process, product and policy implications. *Public Health Nutr*. (2004) 7:245–50. doi: 10.1079/phn2003592
83. Micha R, Mozaffarian D. Trans fatty acids: effects on cardiometabolic health and implications for policy. *Prostaglandins Leukot Essent Fatty Acids*. (2008) 79:147–52. doi: 10.1016/j.plefa.2008.09.008
84. Hamadeh RR, Abulfatih NM, Fekri MA, Al-Mehza HE. Epidemiology of breast cancer among Bahraini women: data from the Bahrain Cancer Registry. *Sultan Qaboos Univ Med J*. (2014) 14:e176–e82.
85. Nasaif HA, Al Qallaf SM. Knowledge of colorectal cancer symptoms and risk factors in the Kingdom of Bahrain: a cross-sectional study. *Asian Pac J Cancer Prev*. (2018) 19:2299–304. doi: 10.22034/APJCP.2018.19.8.2299
86. Cancer Today. [gco.iarc.fr](http://gco.iarc.fr). Available online at: <https://gco.iarc.fr/today/data/factsheets/populations/48-bahrain-fact-sheets.pdf> (accessed August 30, 2021).
87. Countries - The World Factbook. [www.cia.gov](http://www.cia.gov). Available online at: <https://www.cia.gov/the-world-factbook/countries/Bahrain> (accessed July 20, 2021).
88. Kingdom of Bahrain Ministry of Health. National Non-communicable Disease Risk Factors Survey 2007. Report of the National Non-Communicable Diseases STEPwise Survey (2009). Available online at: [http://www.who.int/ncds/surveillance/steps/2007\\_STEPS\\_Survey\\_Bahrain.pdf](http://www.who.int/ncds/surveillance/steps/2007_STEPS_Survey_Bahrain.pdf) (accessed July 20, 2021).
89. Kalan Farmanfarma K, Mahdavi N, Hassanipour S, Salehiniya H. Epidemiologic study of gastric cancer in Iran: a systematic review. *Clin Exp Gastroenterol*. (2020) 13:511–42. doi: 10.2147/CEG.S256627
90. Diet High in Trans Fatty Acids - Level 3 Risk. Institute for Health Metrics and Evaluation (2020). Available online at [http://www.healthdata.org/results/gbd\\_summaries/2019/diet-high-in-trans-fatty-acids-level-3-risk](http://www.healthdata.org/results/gbd_summaries/2019/diet-high-in-trans-fatty-acids-level-3-risk) (cited November 2, 2021).
91. <https://rho.emro.who.int/ThemeViz/TermID/146>.
92. Micha R, Khatibzadeh S, Shi P, Fahimi S, Lim S, Andrews KG, et al. Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: A systematic analysis including 266 country-specific nutrition surveys. *BMJ*. (2014) 348:g2272. doi: 10.1136/bmj.g2272
93. Healthy diet in EMR: [https://applications.emro.who.int/docs/EMROPUB\\_2019\\_en\\_23536.pdf?ua=1](https://applications.emro.who.int/docs/EMROPUB_2019_en_23536.pdf?ua=1)
94. Policy statement and recommended actions for lowering sugar intake and reducing prevalence of type 2 diabetes and obesity in the Eastern Mediterranean Region <http://www.emro.who.int/nutrition/strategy/policy-statement-and-recommended-actions-for-lowering-sugar-intake-and-reducing-prevalence-of-type-2-diabetes-and-obesity-in-the-eastern-mediterranean-region.html>.
95. Promoting healthy diet: reducing levels of salt, sugars and saturated fats in the food supply [http://www.emro.who.int/dsaf/emropub\\_2011\\_1274.pdf?ua=1](http://www.emro.who.int/dsaf/emropub_2011_1274.pdf?ua=1)
96. Strategy on Nutrition for the Eastern Mediterranean Region; 2020–2030 <http://applications.emro.who.int/docs/9789290222996-eng.pdf?ua=1>
97. Framework of Action on obesity Prevention in EMR: [http://applications.emro.who.int/docs/EMROPUB\\_2019\\_en\\_22319.pdf?ua=1](http://applications.emro.who.int/docs/EMROPUB_2019_en_22319.pdf?ua=1)



# Cancer prevention: Infection and environment as risk factors

**Ali Al Zahrani**, Principal Clinical Scientist and Senior Consultant, Gulf Centre for Cancer Control and Prevention, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia; **Ali Shamseddine**, Professor of Clinical Medicine and Director, Gastrointestinal/Genitourinary Cancer Program, Basile Cancer Institution, American University of Beirut, Lebanon; **Partha Basu**, Deputy Head, Early Detection, Prevention and Infections Branch, International Agency for Research on Cancer, Lyon, France; **Randah Hamadeh**, Professor of Community Medicine, Arabian Gulf University, Bahrain; **Hikmat Abdel-Razeq**, Deputy Director General, Chief Medical Officer and Professor, King Hussein Cancer Center, Jordan; **Maya Charafeddine**, American University of Beirut, Lebanon and **Fatima Altahan**, Director, Cancer Control Programme, Ministry of Health, Saudi Arabia



Infections and environmental factors can be potent cancer risk factors and therefore important areas where cancer prevention can play a vital role. This chapter explains, firstly, how infections such as Hepatitis B and C, HIV, *H pylori* and HPV can lead to specific cancers and how these impact on the Eastern Mediterranean Region. The second part looks at environment risks such as climate change, air pollution, exposure to chemicals and the use of fossil fuels, as well as the impact of radiation. The current situation across the region is assessed and recommendations are put forward for the health authorities involved.

## Infections as risk factors for cancer and their prevalence in the EMR

The well-established infectious causes of cancers are *Hepatitis B* (HBV) and *Hepatitis C virus* (HCV) responsible for liver cancer, *Helicobacter pylori* (*H pylori*) bacteria responsible for stomach cancers, *Human immunodeficiency virus* (HIV) responsible for Kaposi sarcoma, non-Hodgkin lymphoma and cervical cancer, *human papillomavirus* (HPV) responsible for cervical, vulvar and vaginal cancers in females, penile cancer in males, anal and oropharyngeal cancers in both sexes, *Epstein Barr virus* (EBV) is responsible for nasopharynx cancer, Hodgkin lymphoma and Burkitt lymphoma and *Schistosoma haematobium* (*S haematobium*) parasites responsible for bladder cancer. The highest burden of cancers attributed to a single risk factor in the Eastern Mediterranean region (EMR) is from those associated with infections, with an estimated PAF of 15.3% for males and 12.2% for females (1). The highest PAF for infection (29.3%) was reported in males from Egypt, a country well known for a very high prevalence of HBV and HCV infections (2).

### HBV and HCV infections and liver cancer

Viral hepatitis is a major worldwide healthcare problem and its prevalence is generally higher in the EMR compared to

the western world. Less than 1% of the European or North American population have chronic HBV infection, compared to up to 8% in some countries in the Middle East (3). Egypt, has the highest worldwide prevalence of HCV reaching up to 17.5%, whereas it is less than 1% in Lebanon, Saudi Arabia and Iran (4–6).

Chronic HBV and HCV infections can cause liver cirrhosis and lead to hepatocellular carcinoma, if left untreated (7). A study conducted by Sharafi et al, observed that HBV and HCV infections are responsible for 70% of liver cancers in the Middle East and North Africa (MENA) region (8). They demonstrated a 16.1% increase in the age-standardized incidence rate (ASR) of liver cancer attributable to HBV in the region between 1990 and 2017. The reported increase in ASR (31% and 47% for HBV- and HCV-related liver cancers, respectively) was highest in Egypt. Some of the countries have reported a reduction in liver cancer during the same period. Qatar reported the highest decrease in ASR of HBV- and HCV-related liver cancer, by 36% and 35.6%, respectively (8).

### *H pylori* infection and gastric cancer

*H pylori* is a gram-negative bacteria that colonizes the gastric mucosa. Chronic infection leading to gastric atrophy is

responsible for nearly 90% of the non-cardia gastric cancers (cancers occurring away from gastro-esophageal junction) (9). Non-cardia cancers are nearly twice as common as the cardia cancers (10). Those infected with *H pylori* have six times higher risk compared to the non-infected, yielding an attributable fraction of 74.7% for *H pylori* in non-cardia gastric cancers (11). Regular intake of salt preserved vegetable, meat or fish may damage the gastric lining, promote *H pylori* colonization and they have an additive effect (12).

A systematic review of 26 publications from eight EMR countries involving 13,692 participants with ages ranging between few months to 97 years, revealed a prevalence ranging between 22% and 88% (13). Living in rural overcrowded areas with poor sanitation, lower educational levels and low socioeconomic conditions were independent risk factors. The prevalence of *H pylori* and the incidence of gastric cancer has demonstrated a strong positive correlation – e.g. the *H pylori* prevalence exceeded 90% among adults aged 40 years or more living in the Ardabil province of Iran, which reported the highest gastric cancer incidence in the country (14). However, a decreasing trend in *H pylori* prevalence is observed in the EMR over recent years, as is the case in many developing countries (15).

#### *HIV infection and related malignancies*

Over the past 20 years, the annual number of new HIV infections has declined by almost 40% globally. Unfortunately, new HIV infections and HIV-related deaths are on the rise in the EMR (16, 17). A relatively low HIV prevalence in the population (0.1%) and a lack of comprehensive surveillance systems to identify asymptomatic high-risk individuals results in inaccurate prevalence data and a slow understanding of the features of the HIV epidemic in the EMR. Nearly 70% of individuals living with HIV in the region are in Pakistan, Iran and Sudan (18). Most of the HIV infections in the region are transmitted sexually and not through shared needles from intravenous drugs.

Kaposi sarcoma (KS) is among the earliest identified HIV-associated cancers and many of the affected patients have an unusually aggressive clinical course. KS along with non-Hodgkin lymphoma (NHL) and cervical carcinoma have been designated as AIDS-defining conditions (19). Following the wide-scale adoption of potent ART, the spectrum of cancer in HIV-infected patients has changed significantly; yet the rates of KS, NHL and cervical cancer remain 800 times, 40 times and 4 times higher, respectively, in HIV-infected populations compared to non-infected ones (20).

#### *HPV infection and related malignancies*

HPV is ubiquitous and the most common sexually transmitted

infection worldwide. Approximately 200 genotypes of HPV have been identified, of which types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, and 68 are considered as “carcinogenic”, with types 16 and 18 being the most potent of them. HPV is responsible for nearly all cervical cancers, 88% of anal cancers, 78% of vaginal cancers, 50% of penile cancers, 31% of oropharyngeal cancers, and 25% of vulvar cancers (21).

A meta-analysis including nearly a million women reported that the average global prevalence of HPV was 11.7%, with regional differences ranging between 1.7% and 35.4% (22). A systematic review and meta-analysis based on data collected from 26,536 women with normal cytology from 13 countries in the EMR estimated an average 9.3% HPV prevalence; HPV 16 and HPV 18 being the most common types with reported prevalence of 2.3% and 0.7%, respectively (23). The highest prevalence was reported in Saudi Arabia (19.0%) among the Asian countries and Morocco (19.0%) among the African countries. Women from Kuwait and Sudan had the lowest HPV prevalence (2.0% and 3.0%, respectively) among the Asian and African countries in the region.

#### *EBV infection and related malignancies*

EBV is another common infection, which infects 90% or more of the population globally, that has been found to cause Burkitt lymphoma, gastric carcinoma, Hodgkin lymphoma or nasopharyngeal carcinoma in a small minority of the infected populations. The virus tends to infect children aged 3–4 years in the low-resourced settings whereas, in more developed regions the infection does not occur before young adulthood (24). A study from Iran demonstrated that 91.5% of primary EBV infections occurred by the age of 10 years and a study from Bahrain showed the proportion to be 72.4% (25, 26). Acquisition of the infection in infancy increases the risk of malignancy. Globally, the virus is associated with approximately 1% of all cancers, causing 140,000 deaths annually (27).

Burkitt lymphoma is an aggressive form of NHL classified into endemic, sporadic, and AIDS-related. EBV is most commonly detected in the endemic types (>95%), which are mostly seen in children under 10 years in equatorial Africa, which is also an endemic zone for malaria. In the equatorial African countries that are endemic zones for malaria, the annual incidence of Burkitt lymphoma has been reported to be 5–10/100,000 children (28). The incidence is much lower in Tunisia and Egypt because they are no longer endemic for malaria.

EBV is also associated with 40–50% of Hodgkin lymphomas; overall, 90% of childhood Hodgkin lymphomas in less developed regions and 10% of gastric adenocarcinomas are associated with EBV (29). The virus is commonly detected in non-keratinizing and undifferentiated nasopharyngeal cancers as well. A systematic review reported a range of co-factors,

e.g. diet, co-infection with falciparum malaria or HIV, genetic predisposition and smoking for the EBV-associated cancers (29).

#### *Parasite infections and related malignancies*

Schistosomiasis is one of the most common parasitic infections in the EMR, which infects around 12.7 million people (30). Schistosomiasis remains highly prevalent in Egypt, Sudan and Yemen, while being almost eradicated in other countries including Lebanon, Tunisia, Jordan, Syria and Oman (31). Lack of sanitation, poor personal hygiene and inadequate supply of potable water to drink, highly correlate with the prevalence of infection (32). *S. haematobium* has been known to cause squamous cell carcinoma of the urinary bladder. Egypt reported a very high prevalence (37–48%) of the infection nearly two decades ago when bladder cancer was the most prevalent cancer in males, with nearly 80% of the cancers being squamous cell carcinomas (33). However, with control of the infection, bladder cancer has significantly reduced in the country and transitional cell carcinoma has become the predominant type (34).

### **Evidence-based interventions to minimize exposure and/or reduce the impact of infection**

Prevention of hepatitis infection using the following strategies is the best way to reduce liver cancer burden in the EMR:

- **Preventing transmission of HBV from mother to baby:** Pregnant women should be screened for HBV and the newborn baby of the HBV positive mothers should be administered the hepatitis B vaccine along with immune globulin within 12 hours of birth. The pregnant women should receive prophylactic tenofovir therapy depending on the viral load.
- **Vaccination against HBV:** Three doses of the vaccines should be given to all children with the first dose given at birth. All adults at high risk for HBV infection, such as healthcare workers, intravenous (IV) drug users, or men who have sex with men should also be vaccinated.
- **Application of safety rules for injections, surgical procedures and blood transfusions:** These should be practised at all healthcare facilities. The IV drug users should have access to sterile needles.

High-risk populations should be screened routinely for hepatitis B and C infection. Treating HBV and HCV infected patients with conventional or pegylated interferon (IFN)-alpha the nucleoside analogs lamivudine, entecavir and telbivudine or the nucleotide analogue adefovir, dipivoxil and tenofovir will arrest progression to cirrhosis and liver cancer.

Limited, moderate quality evidence from a meta-analysis

of six RCTs demonstrates that searching for and eradicating *H. pylori* (usually with a 14-day therapy combining a proton pump inhibitor, amoxycillin and clarithromycin) can reduce the incidence of gastric cancer by a significant 34% in asymptomatic infected individuals (35). However, there was no impact on all-cause mortality and the harmful effect of the resistance developed against the antibiotics used for other common illnesses need to be carefully considered. Screening for *H. pylori* or gastric cancer is not yet recommended for healthy asymptomatic populations and multicentre, double-blind, randomized controlled trials to evaluate the effect of *H. pylori* eradication to prevent gastric cancer in 40–60 year old individuals is ongoing in the Republic of Korea (36). Preservation of food in refrigerators, improving food hygiene and avoiding salt-preserved foods can significantly reduce gastric cancer incidence.

Educating the population to avoid high-risk behaviour and ensuring safe and hygienic injection and surgical practices at every health facility are important primary prevention measures for HIV. Screening of women during pregnancy and regular screening of the high-risk populations can detect the infection early. The countries with high prevalence should have their own guidelines for screening. Every HIV positive individual should have access to counselling, further investigation and anti-retro-viral therapy (ART) as necessary. Men and women living with HIV should be made aware of the symptoms of common cancers associated with the infection. Every sexually active woman attending an ART clinic should be screened for cervical cancer following the national guidelines.

Vaccinating girls between 9 and 13 years of age with vaccine against HPV is the most effective primary prevention measure for cervical and other HPV-related cancers. Vaccination of adolescent girls together with quality-assured screening of women after 30 years of age may lead to elimination of cervical cancer as a public health problem. The World Health Organization has recommended HPV detection-based screening of sexually active women starting at the age of 30 years for the countries that can afford the test. Achieving a high coverage of the target population and ensuring appropriate treatment of the screen-detected precancers and cancers are absolutely essential to achieve the desired impact of screening in reducing cervical cancer incidence and mortality.

Improving sanitation, educating the children about hygienic practices and ensuring a regular supply of clean drinking water are crucial in decreasing the rate of transmission of EBV and schistosomiasis. Water filtration using chemicals and modern filtration systems has proven to decrease or even cease the transmission of certain parasites in drinking water. Improving the water supply infrastructure and regular maintenance of the water pipes prohibit any urine or stool contamination of

the drinking water. The population needs to be educated about the appropriate source of water to drink and use for cooking. Intermediate hosts like certain snails (*Biomphalaria spp.*, *Oncomelania spp.*, and *Bulinus spp.*) help in the transmission of schistosomiasis. Interrupting the life cycle of these species by using chemical molluscicides, can reduce the transmission of schistosomiasis. Controlling malaria through appropriate vector-borne disease control measures can reduce the EBV-associated cancers in children.

### Recommended priority interventions in the EMR to control infection-related cancers

There is great variability in resources and human development across the countries of the EMR. The gross national income (GNI) per capita varies between US\$ 1,850 in Afghanistan and US\$ 124,506 in Qatar (37). This is often reflected in the risk profiles, cancer control efforts and their success in reducing the burden of infection-related cancers in these countries. Great

variability exists even among countries that are geographically close by. For example, liver cancer is the number one cancer among Egyptian males while the cancer is not included in the top 10 cancers among Tunisian males and incidence of gastric cancer in Iranian males is six times higher than that reported in males in Saudi Arabia. Every EMR country has to prioritize its cancer control interventions depending on the cancer burden and risk profiles. Primary prevention is the most efficient tool to reduce the burden of infection related cancers.

Increased awareness of the population and health providers, screening of the high-risk populations and high coverage of HBV vaccination starting with the first dose at birth should be the priority to reduce HBV and HCV infections in all EMR countries. The coverage to three doses of the hepatitis B vaccine is quite low (<80%) in Lebanon, Pakistan, Somalia, Syrian Arab Republic and Yemen and needs to be improved (38). Even in countries with high vaccination coverage of children, healthcare workers who are at high risk for HBV

Table 1: Infection-related cancer

Infection related cancer	Priority recommendation(s)	Monitoring indicator(s)*
Gastric cancer ( <i>H. pylori</i> )	Water sanitation	<i>H. Pylori</i> prevalence by antibody-based tests (serology and urine test), urea breath test (UBT), and stool antigen test (SAT)
Liver cancer (HBV and HCV)	Hep B vaccination starting with a dose at birth	Hep B vaccination coverage (birth dose and all recommended doses); prevalence of chronic HBV and HCV
	Screening of pregnant women and high-risk populations for HBV and HCV	Proportion of pregnant women and high-risk populations screened
	Safe injection practices	Supply of disposable syringes and needles
	Treatment of HBV and HCV infections	Treatment coverage of HBV and HCV patients
AIDS-defining cancers (HIV)	Primary prevention through population awareness	Provision of HIV/AIDS awareness in schools
	Screening of high-risk population for HIV; screening of pregnant mothers	HIV prevalence in general and high-risk population; HIV prevalence in pregnant women;
	Access to further investigations and antiretroviral therapy (if required) for the HIV positive men and women	Percentage of HIV positive patients who are eligible and currently receiving ART
Cervical and other ano-genital cancers related to HPV	HPV vaccination of girls before they reach 15 years of age	HPV vaccination coverage
	Screening of women starting at 30 years of age (25 years for WLHIV)	Cervical cancer screening coverage
Bladder cancer (Schistosomiasis)	Water sanitation	Availability of clean potable water
All infection related cancers	Improved population awareness; better and prompt access to diagnosis and treatment for symptomatic population	Incidence of cancer
		Stage distribution of the cancers
		Delays in accessing diagnosis and treatment from symptom onset

\*Additional indicators included in the national programmes for control of Hepatitis and HIV should be monitored

infection are still sub-optimally vaccinated (39). In Egypt, a significant decrease in the incidence of HCV infection was noted in young adults after the implementation of prevention programmes by the Ministry of Health, such as safe blood transfusion activity, the use of auto-disabled syringes and the increase in awareness campaign in schools and universities (40). Such interventions along with access to treatment for hepatitis need to be strengthened further in countries with a high burden of liver cancer.

Until we have more evidence on effectiveness of *H pylori* eradication, countries in the EMR should focus on reducing the prevalence of infection by ensuring the supply of safe drinking water, improving living conditions and sanitation and creating a supply chain for fresh and better-preserved food. Creating population awareness about other risk factors of stomach cancer like obesity, physical inactivity, tobacco smoking, consumption of salt-preserved food, or processed meat should also be prioritized.

Interventions targeted to reduce the HBV/HCV prevalence (education of population and providers, proper sterilization, transfusion and injection practices, screening of high-risk populations and continued surveillance) are appropriate to keep the HIV prevalence at the current low level in the EMR. Access to ART should be improved and every ART clinic should have the facilities to screen eligible women for cervical cancer.

Countries with a high burden of cervical cancer in the region should follow the WHO guidelines on implementing both HPV vaccination of the adolescent girls and screening women for cervical cancer. However, there are countries that already have a very low incidence of cervical cancer. They may prioritize vaccination and consider screening only if cervical cancer shows an upward trend. High income countries with low cervical cancer burden may consider screening women infrequently (once every 10 years) with an HPV detection test. Well-designed, community-based, behavioural intervention programmes targeting young people to encourage safer sexual behaviours will guard against future shifts in the prevalence of sexually transmitted infections including HPV.

Creating healthy living conditions through better urban planning and public health engineering will ensure improved sanitation and access to safe drinking water and reduce prevalence of EBV, *H pylori* and schistoma infections.

Finally, every country needs to improve cancer registration and cancer early diagnosis facilities. A well-organized population-based cancer registry covering even a fraction of the population is immensely useful to understand the changing profiles of risk factors and the impact of cancer control measures. Ensuring prompt diagnosis of men and women with symptoms of common cancers and providing good quality treatment without any delay should be a matter of right for every citizen.

## Environmental risk factors for cancer

### *Environmental risk factors for cancer and their prevalence in the EMR*

Climate change, pollution, chemical exposures, and radiation contribute to 22% of the disease burden in the EMR (41). In 2014, the EMR was reported to be the second worst impacted region by climate change after Africa, with significant health effects (42, 43).

### *Air pollution and climate change*

The WHO estimated that nearly 7 million people die of outdoor (ambient) and indoor (household) air pollution every year globally (44). The EMR region witnessed rapid industrialization, rising population size and climate change that resulted in high levels of air pollution in urban areas (45). Changes in air quality have been linked to various cancers namely leukaemia, bladder cancer and lung cancer, which constitute around 40% of all cancer cases in men in the region (46). According to the WHO Global Ambient Air Quality Database the highest levels of particulate matters (PM) were reported in the EMR over all other WHO regions. Various EMR countries (Bahrain, 2007; Egypt, 2011; Jordan, 2010; Kuwait, 2014; and Pakistan, 2010) reported an annual PM<sub>2.5</sub> (particulate matter of less than 2.5 micrometres in diameter) levels above the WHO guideline value of 10 µg/m<sup>3</sup> (47). A study of the Gulf Cooperation Council (GCC) countries indicated that the PM<sub>2.5</sub> levels were not only high, but also were associated with excessive natural dust due to the storms that frequent the region (48). The same study reported other factors that contribute to air pollutants in the GCC region, which are heavy traffic, excessive use of subsidized energy, ongoing infrastructure projects, water desalination, and fossil fuel burning.

Household or indoor air pollution is caused by smoking, burning fossil fuels, and the use of domestic electricity generators with children and women the worst sufferers. It was estimated in 2010, that indoor pollution was causing more annual deaths than outdoor pollution in Afghanistan (41,164 deaths), Pakistan (114,806 deaths), Sudan (15,567 deaths) and Yemen (7,695 deaths) (49).

The WHO Conference on Health and Climate reviewed the evidence of climate change on health and estimated a quarter of a million deaths globally that would be attributed to climate change between 2030 and 2050 (50). The EMR is the second region after Europe to be vulnerable to heat exposure (51). It would be particularly challenged with 1–2°C temperature increase by 2030–2050 impacting health (52). It is well established that climate change has impact on cancer risk factors, cancer survival and access to cancer care (53). Two countries, Egypt and Iran (54), have reported that a temperature rise in the region would result in increased heat stress and skin cancer.



Table 2: The cancer sites associated with different chemicals, metals, dust and fibres, and occupations classified as “carcinogenic to humans” (Group 1), IARC (69)

Cancer sites	Chemicals	Metals	Dust and fibres	Industrial processes
Lungs	Diesel engine exhaust, Indoor emissions from combustion of coal, Benzo[a]pyrene, Coal tar pitch, Soot, Sulphur mustard	Arsenic, Beryllium, Cadmium, Chromium, Nickel and their compounds,	Asbestos, Silica dust	Aluminium production, Coal gasification, Coke production, Iron and steel founding
Mesothelioma			Asbestos, Erionite	Painting
Larynx, nasopharynx, nasal cavity and paranasal sinus	Acid mists, strong inorganic, Formaldehyde	Nickel compounds	Leather dust, Wood dust	Isopropyl alcohol production
Liver	Vinyl chloride			
Urinary bladder	Aromatic amines and dyes	Arsenic and inorganic arsenic compounds		Aluminium and Auramine production, Painting
Leukemias and lymphomas	Formaldehyde, Benzene, Ethylene oxide			Rubber production industry
Skin cancer	Coal tar pitch, Soot, Mineral oils,	Arsenic and inorganic arsenic compounds		Coal tar distillation

### Occupational exposure

The International Agency for Research on Cancer (IARC) has classified a range of chemicals, other agents and industrial processes as carcinogenic (Group 1: definitely carcinogenic) to humans and prolonged exposure to them at workplace is a significant occupational hazard (Table 2). Exposure to carcinogens in work environment has been linked with cancer of lungs, mesothelioma, larynx, nasopharynx, nasal cavity and paranasal sinus, liver, urinary bladder, leukemias and lymphomas and non-melanoma skin cancer (55). Workers in the mining, chemical and fertilizer industries, building construction and agricultural sector have the highest risk of exposure. The proportion of certain cancers attributed to carcinogens in the workplace are: mesothelioma, 94.9%; sino-nasal, 34.4%; lung, 14.5%; nasopharynx, 8.2%; and urinary bladder, 5.3% (56).

IARC has classified ionizing radiation as a Group 1 carcinogen that significantly increased the risk of mortality from cancers of lung, breast, ovaries, urinary bladder and gastrointestinal tract (57). Workers may be exposed to a high dose of ionizing radiation due to their specific nature of jobs. Radon ( $^{222}\text{Rn}$ ) is an inert gas with several radioactive isotopes which is formed by the radioactive decay of uranium-238 present in small quantities in soils and rocks. The gas escapes from rocks and soils into the air and tends to get concentrated in enclosed spaces, such as underground mines or the basements of houses. Inhalation of radon is the second-most common cause of lung cancer next to smoking and up to 14% of lung cancers are attributed to this carcinogen (58). Those working in medical diagnostic centres offering X-rays or CT

scans, radiation therapy centres, atomic energy plants or atomic weapons establishments are also exposed to ionizing radiations and have significantly higher mortality from rectal cancer, laryngeal cancer, all uterine cancers and leukaemias excluding chronic lymphoid leukemia (59).

Chronic exposure to aromatic amines, paints and black carbon and prolonged use of arsenic- or chlorine-contaminated water increases the bladder cancer risk and tobacco smoking has a synergistic effect (60). West Asian countries have significantly higher bladder cancer incidence (ASR 16.4/100,000) compared to the global average (ASR 9.6/100,000) (61). This cancer is the second most common cancer in males in Lebanon (16.8% of all cancers), Egypt (11.2% of all cancers), Iraq (9.7% of all cancers) and Jordan (9.5%) (61).

### Other environmental factors

Exposure to the carcinogenic compounds listed in Table 2 may happen due to contamination of water and food with these chemicals. Chemicals used as pesticides and fertilizers, effluents from industries, discarded items and waste from households may contain many harmful chemicals that may contaminate water and get into the food chain. Persistent organic pollutants (POPs) like polychlorinated biphenyls (PCBs), brominated flame retardants (BFRs), polychlorinated dibenzo-p-dioxins and -furans (PCDD/Fs), polybrominated diphenyl ethers (PBDEs), organochlorine pesticides or PAHs are released by various industries and the population may be chronically exposed to them even at small doses. These have been linked with breast cancer, prostate and non-Hodgkin lymphoma and leukemias (62). Radon exposure in the

households is an important cause of lung cancer, as mentioned earlier. However, this is not a major problem in the EMR. Even natural radionuclides may get into food and water and cause chronic exposure to radiation (63). Prolonged exposure to sun and exposure to ultraviolet radiation significantly increases the risk of skin cancers – both melanoma and squamous cell carcinoma. The tanning lamps used more frequently by youth emit UV radiation at doses that far exceed the dose to which skin is vulnerable when exposed to sunlight. In 2009, IARC classified the radiation emitted by tanning lamps as a carcinogenic to skin.

### **Evidence-based interventions to minimize exposure and/or reduce the impact of environmental risk factors**

The WHO has an operational framework for building climate resilience consisting of 10 components (leadership and governance; health workforce; vulnerability, capacity and adaptation assessment; integrated risk monitoring and early warning; health and climate research; climate resilient and sustainable technologies and infrastructure; management of environmental determinants of health; climate-informed health programmes; emergency preparedness and management and climate and health financing) and lists the interventions related to each risk (64). The climate change mitigation strategies and actions applicable to the healthcare sector include:

- ➔ improve energy supply and distribution efficiency;
- ➔ on-site renewable energy sources;
- ➔ reduced-energy devices;
- ➔ passive cooling, heating and ventilation strategies;
- ➔ facility wastewater and solid waste management;
- ➔ reduced greenhouse gas (GHG) emissions from anaesthesia gas use and disposal;
- ➔ reduced procurement carbon footprint;
- ➔ telehealth/telemedicine;
- ➔ health facilities in proximity to public transport and safe walking/cycling;
- ➔ conserve and maintain water resources. (65)

Standardized and reliable measurements can be used to determine air pollution level and the various types of pollutants in the atmosphere (66). Extensive campaigns can serve in increasing population awareness on cancer prevalence, risk factors, early detection and prevention (67). Various sources of air pollution need to be identified and adequate solutions should be made separately for each. Finally, building capacity in the health sector to engage with other sectors and contribute to preventive action in countries is a must (68).

Pragmatic population-based policies, an inter-sectoral approach and effective legislative actions are necessary to protect the individuals and the environment from exposure

to industrial carcinogens (69). These include earmarking the industries and workplaces using or emitting toxic chemicals, enforcing measures to minimize worker exposure to the workers, encouraging the substitution or phasing out the harmful chemicals and processes and treatment of effluents before releasing them into the environment. The pollution control board needs to be empowered to monitor the industries and act. Labour laws should look after the interests of workers and ensure that they are adequately compensated for cancers occurring due to willful negligence by industry. The threshold levels of emissions of carcinogenic agents should be fixed for every industry and strictly monitored. Incentivizing industries to minimize the use harmful chemicals and processes through accreditation, tax reliefs may also motivate them to introduce better and cleaner technologies. Those working in situations where exposure to ionizing radiations may happen, should follow national and international regulations for radiation protection, including regular measurement of exposure using the dosimeters. Education of employers, workers, health professionals and labour organizations is essential to recognize the work hazards, follow risk mitigation measures and report unusual occurrences of clusters of cancer cases.

### **Current status of implementation of interventions in the EMR and the scope for improvement**

Health authorities in the region need to support actions that address environmental pollution in a committed, coherent and coordinated manner (70). A sustainable programme with a clear agenda and constant follow-up are the key factors to making these policies a success. However, implementing this range of public health measures in the EMR is challenging in countries that are in conflict and preoccupied with economic crises and political adversities (71).

The Eastern Mediterranean Regional Office (EMRO) of WHO passed a resolution in 2008 (Box 1). The regional office proposed a framework for action on climate change and health which included several response targets, action requested from countries and WHO support. (WHO EMRO, 2017). Since the adoption of resolution EM/RC55/R.8 (WHO EMRO, 2008) in 2008, the majority of EMR countries had a second or third National Communication to the UNFCCC (UNFCCC) that included health as a section with variations in coverage and depth. The Paris Agreement in 2015 that was endorsed by 18 EMR countries aims to curb GHG emissions and commits countries to strengthen adaptation (UN, 2015). It includes implementing plans that should protect human health from the impact of climate change. Climate and health country profiles were initiated by WHO and to date only 10 countries (Egypt, Iran, Jordan, Kuwait, Morocco, Oman, Pakistan, Tunisia, UAE and Lebanon) have profiles. Table 3 summarizes the common

national responses of these countries. In addition to what is listed in Table 3, other laws and actions were taken by Oman, Jordan, Morocco, Pakistan, Tunisia and Lebanon.

The status of development or implementation of health adaptation to climate change as reported by countries are presented in Table 4.

Countries in the region still have to scale up and prioritize their actions towards curbing the health burden of climate change to implement the sustainable development goals successfully. In addition, mapping of environmental health risks should also be considered across the health priorities road map (41). Regulation of the industries with policies and laws to protect the interest of the workers as well as the general public is of great importance to control environmental exposure to carcinogens. An intersectoral approach involving the ministries of industry, water and natural resources, transport, food supply and health is needed to ensure industry compliance to quality standards and norms, proper disposal of household and industrial wastes, incentivizing organic farming, etc. Raising awareness among the public, policy-makers and all relevant stakeholders about the long-term benefit of a clean and healthy environment is crucial. Routine measurement of radon levels in buildings in EMR countries is not recommended.

Countries should increase their awareness campaigns and advocacy efforts, assess vulnerability to climate change, develop early warning surveillance and preparedness systems, and increase their resilience to extreme weather occurrences and reduce GHG emissions and other climate pollutants (72). Given the paucity of research in the region on the impact of climate change and environmental pollutants on health, there is an urgent need to conduct national and regional research to fill the knowledge gap, identify vulnerable populations and provide evidence for policy-makers (73).

## Conclusion

Every EMR country has to prioritize its cancer control

### Box 1: EMR Resolution on Health and Climate Change (EM/RC55/R.8)

- Endorsed a regional framework for health sector action in Member States to protect health from the effects of climate change.
- Urged countries to implement the framework for action.
- Urged countries to establish high-level effective coordination mechanisms for strengthening institutional capacity to protect health from climate change and to facilitate the engagement of the health sector in the national UNFCCC processes.
- Urged countries to establish early warning capacity for climate-sensitive diseases by integrating environmental monitoring information with the existing health surveillance system.

Source: (WHO EMRO, 2008)

interventions depending on the cancer burden and risk profiles. Primary prevention is the most efficient tool to reduce the burden of infection-related cancers. Therefore, it's imperative for each country in the EMR to take the necessary preventive measures to combat infection-related cancers by adopting an evidence-based approach that suits its' priorities.

The following measures are highly recommended:

- Increase awareness of the general population and high-risk groups about the excess risk of cancer due to certain types of infections and the importance of taking adequate preventive measures such as avoiding high-risk behaviour, safe food handling and preservation, proper personal hygiene. Governments should ensure there is a regular supply of clean drinking water.
- The screening of high-risk populations and high-levels of coverage by HBV vaccination, starting with the first dose at birth, should be the priority to reduce HBV and HCV infections in all EMR countries.
- Screen all pregnant women for HBV surface antigens during early prenatal visits and ensure that hospitals where infants are delivered have HBV surface Antigen testing capabilities.
- Countries with high burden of cervical cancer in the region should follow the WHO guidelines to implement both HPV

Table 3: National response by common actions and country

Response	Egypt	Iran	Jordan	Kuwait	Morocco	Oman	Pakistan	Tunisia	UAE	Lebanon
Ratified the UNFCCC	1992	1992	1992	1995	1995		1994	1992		1994
Ratified KYOTO PROTOCOL	1999	2005	2003	2005	2002	2005	2005	2003		2006
National Plan for Health and Climate Change	2011		2013		2009		2012		2017	2017
Commitment to reduce GHG emissions		4% by 2030	11% by 2025		32% by 2030					15% emissions reduction by 2030

Source (WHO)

Table 4: The status of development or implementation of health adaptation implementation climate resilient measures of climate change as reported by countries\*

Measure	Egypt	Iran	Jordan	Kuwait	Morocco	Oman	Pakistan	Tunisia	UAE	Lebanon
Country is currently implementing projects or programmes on health adaptation to climate change	x	✓	x	NA	✓	x	✓	x	NA	✓
Country has implemented actions to build institutional and technical capacities to work on climate change and health	✓	✓	x	NA	x	x	✓	✓	NA	x
Country has conducted a national assessment of climate change impacts, vulnerability and adaptation for health	x	✓	✓	NA	✓	✓	x	✓	NA	✓
Country has climate information included in Integrated Disease Surveillance and Response (IDSR) system, including development of early warning and response systems for climate-sensitive health risks	x	✓	x	NA	x	✓	x	✓	NA	x
Country has implemented activities to increase climate resilience of health infrastructure	x	x	x	NA	✓	x	x	x	NA	✓

\*WHO UNFCCC Health and Climate Change Country Profile Project.

vaccination of the adolescent girls and screening of women starting at 30 years of age for cervical cancer.

- ➔ Well-designed, community-based, behavioural intervention programmes targeting young people to encourage safer sexual behaviours will guard against future shifts in the prevalence of sexually transmitted infections including HIV and HPV.
- ➔ Improve cancer registration and cancer early diagnosis facilities. A well-organized population-based cancer registry is immensely useful in understanding the changing profiles of risk factors and the impact of the cancer control measures. ■

#### 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.

## References

- Ivana Kulhánová, Ariana Znaor, Kevin D Shield, Melina Arnold, Jérôme Vignat, Maya Charafeddine, Ibtihal Fadhil, Heba Fouad, Amal Al-Omari, Ali Saeed Al-Zahrani, Amani El-Basmy, Ali Shamseddine, Freddie Bray, Isabelle Soerjomataram. Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region. *Int J Cancer* 2020;146(3):646-656. doi:10.1002/ijc.32284
- Seyed Moayed Alavian, Hossein Haghighi. Relative Importance of Hepatitis B and C Viruses in Hepatocellular Carcinoma in EMRO Countries and the Middle East: A Systematic Review. *Hepat Mon* 2016;16:e35106.
- Gasim Ibrahim Gasim 1. Hepatitis B virus in the Arab world: where do we stand?. *Arab J Gastroenterol* 2013; 14: 35–43 DOI: 10.1016/j.ajg.2013.04.002
- M Askarian 1, R Mansour Ghanaie, A Karimi, F Habibzadeh. Infectious diseases in Iran: a bird's eye view. *Clin Microbiol Infect* 2012; 18: 1081–88. DOI: 10.1111/1469-0691.12021;
- Mercy Jelagat Karoney 1, Abraham Mogisi Siika. Hepatitis C virus (HCV) infection in Africa: a review. *Pan Afr Med J* 2013; 14: 44. DOI: 10.11604/pamj.2013.14.44.2199
- S Ramia, NM Melhem, K. Hepatitis C virus infection in the Middle East and North Africa "MENA" region: injecting drug users (IDUs) is an under-investigated population. *Infection* 2012; 40: 1–10. DOI: 10.1007/s15010-011-0236-z
- Birke Bartosch. Hepatitis B and C viruses and hepatocellular carcinoma. *Viruses*. 2010;2(8):1504-1509. doi:10.3390/v2081504
- Heidar Sharafi, Seyed Moayed Alavian. The Rising Threat of Hepatocellular Carcinoma in the Middle East and North Africa Region: Results From Global Burden of Disease Study 2017. *Clin Liver Dis* (Hoboken). 2020;14(6):219-223. Published 2020 Jan 29. doi:10.1002/cld.890
- Plummer M, Franceschi S, Vignat J, et al. Global burden of gastric cancer attributable to *Helicobacter pylori*. *Int J Cancer* 2015;136:487–90
- Colquhoun A, Arnold M, Ferlay J, et al. Global patterns of cardia and non-cardia gastric cancer incidence in 2012. *Gut* 2015. Volume 64, Issue 12
- International Agency for Research on Cancer. *Helicobacter Pylori*. IARC Monogr Eval Carcinog Risks Hum 2012; 100B.
- Gaddy JA, Radin JN, Loh JT et al. High dietary salt intake exacerbates *Helicobacter pylori* induced gastric carcinogenesis. *Infect Immun* 2013; 81: 2258–2267
- Ahad Eshraghian. Epidemiology of *Helicobacter pylori* infection among the healthy population in Iran and countries of the Eastern Mediterranean Region: A systematic review of prevalence and risk factors. *World J Gastroenterol* 2014 December 14; 20(46): 17618-17625 doi: 10.3748/wjg.v20.i46.17618
- Sotoudeh M, Derakhshan MH, Abedi-Ardakani B, Nouraei M, Yazdanbod A, Tavangar SM, Mikaeli J, Merat S, Malekzadeh R. Critical role of *Helicobacter pylori* in the pattern of gastritis and carditis in residents of an area with high prevalence of gastric cardia cancer. *Dig Dis Sci* 2008; 53: 27-33
- Global Guideline *Helicobacter pylori* in Developing Countries. *Journal of Digestive Diseases* 2011; 12: 319–326 doi: 10.1111/j.1751-2980.2011.00529.x
- Deniz Gökengin, Fardad Doroudi, Johnny Tohme, Ben Collins, Navid Madani. HIV/AIDS: trends in the Middle East and North Africa region. *Int J Infect Dis*. 2016;44:66-73. doi:10.1016/j.ijid.2015.11.008
- The Gap Report, 2014. UNAIDS; 2014. Available at: [http://www.unaids.org/sites/default/files/media\\_asset/UNAIDS\\_Gap\\_report\\_en.pdf](http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf)
- <http://www.emro.who.int/asd/about/hiv-situation-region.htm>
- Andrew E Grulich, Marina T van Leeuwen, Michael O Falster, Claire M Vajdic. Incidence of cancers in people with HIV/AIDS compared with immunosuppressed transplant recipients: a meta-analysis. *Lancet* 2007; 370
- Meredith S Shiels 1, Eric A Engels. Evolving epidemiology of HIV-associated malignancies. *Curr Opin HIV AIDS*. 2017 Jan;12(1):6-11. DOI: 10.1097/COH.0000000000000327
- Catherine de Martel, Martyn Plummer, Jerome Vignat, Silvia Franceschi. Worldwide burden of cancer attributable to HPV by site, country and HPV type. *Int J Cancer* 2017 Aug 15;141(4):664-670. DOI: 10.1002/ijc.30716
- Forman D., De Martel C., Lacey C.J., Soerjomataram I., Lortet-Tieulent J., Bruni L., et al. Global burden of human papillomavirus and related diseases. *Vaccine* 2012; 30, p. 12–
- Mohammad Farahmand, Zabihollah Shojai, Arash Arashkia; Zahra Salavatiha; Somayeh Jalilvand , Systematic review and meta-analysis of human papillomavirus prevalence and types among women with normal cervical cytology in the Eastern Mediterranean Region. *Future Virology*, Vol 2020 14, No. 11
- Hjalgrim H, Friborg J, Melbye M. The epidemiology of EBV and its association with malignant disease. In: Arvin A, Campadelli-Fiume G, Mocarski E, et al., eds. *Human Herpesviruses: Biology, Therapy, and Immunophylaxis*. Cambridge, UK: Cambridge University Press; 2007
- Mahsa Moeini, Mazyar Ziyaeyan, Sadaf Asaei, Mohammad Amin Behzadi. The incidence of Epstein-Barr virus primary infection among suspected patients referred to namazi hospital of Shiraz, Iran. *J Microbiol*. 2015 Apr 18;8(4):e16109. doi: 10.5812/jjm.8(4)2015.16109
- Eman Farid , Mohammed Al-Biltagi . Trend and seroprevalence of Epstein-Barr virus in Bahrain: 2001-2015. *East Mediterr Health J* 2018 Mar 5;23(12):821-829 DOI: 10.26719/2017.23.12.821
- Gulfaraz Khan, Muhammad Jawad Hashim. Global burden of deaths from Epstein-Barr virus attributable malignancies 1990-2010. *Infect Agent Cancer*. 2014 Nov 17;9(1):38 DOI: 10.1186/1750-9378-9-38
- Abdelwahid Saeed Ali , Mubarak Al-Shraim , Ahmed Musa Al-Hakami , Ian M Jones. Epstein-Barr Virus: Clinical and Epidemiological Revisits and Genetic Basis of Oncogenesis. *Open Virol J*. 2015 Nov 3;9:7-28. doi: 10.2174/1874357901509010007.
- Deniz Bakkalci, Yumeng Jia, Joanne R Winter, Joanna Ea Lewis, Graham S Taylor, Helen R Stagg. Risk factors for Epstein Barr virus-associated cancers: a systematic review, critical appraisal, and mapping of the epidemiological evidence. *Glob Health*. 2020 Jun;10(1):010405. DOI: 10.7189/jogh.10.010405
- Peter J. Hotez , Lorenzo Savioli, Alan Fenwick. Neglected Tropical Diseases of the Middle East and North Africa: Review of Their Prevalence, Distribution, and Opportunities for Control. *PLoS Negl Trop Dis*. 2012;6(2):e1475. doi:10.1371/journal.pntd.0001475
- Barakat R, El Morshedy H, Farghaly A. (2014) Human Schistosomiasis in the Middle East and North Africa Region. In: McDowell M., Rafati S. (eds) *Neglected Tropical Diseases - Middle East and North Africa*. *Neglected Tropical Diseases*. Springer, Vienna
- Bassem R Saab 1, Umaya Musharrafieh, Nabil T Nassar, Mustafa Khogali, George F Araji. Intestinal parasites among presumably healthy individuals in Lebanon. *Saudi Med J*. 2004 Jan;25(1):34-7.
- Fried B, Reddy A, Mayer D. Helminths in human carcinogenesis. *Cancer Lett* 2011;305:239e49.
- Ashley S. Felix, Amr S. Soliman, Hussein Khaled, Mohamed S. Zaghloul, Mousumi Banerjee, Manal El-Baradie, Mohamed El-Kalawy, Alaa A. Abd-Elseyed, Kadry Ismail, Ahmed Hablas, Ibrahim A. Seifeldin, Mohamed Ramadan, Mark L. Wilson. The changing patterns of bladder cancer in Egypt over the past 26 years. *Cancer Causes & Control* 2008 19(4):421–429
- Alexander C Ford, David Forman, Richard H Hunt, Yuhong Yuan, Paul Moayyedi. *Helicobacter pylori* eradication therapy to prevent gastric cancer in healthy asymptomatic infected individuals: systematic review and meta-analysis of randomised controlled trials. *BMJ* 2014; 348 doi: 10.1136/bmj.g3174
- Leja M, Park JY, Murillo R, et al. Multicentric randomised study of *Helicobacter pylori* eradication and pepsinogen testing for prevention of gastric cancer mortality: the GISTAR study. *BMJ Open* 2017;7:e016999.
- United Nations Development Programme. Human Development Report 2013: The Rise of the South: Human Progress in a Diverse World. United Nations Development Programme; 2013.
- <https://apps.who.int/gho/data/view.main-emro.80300-lang=en>
- Ghomraoui FA, Alfaqeh FA, Algaadheeb AS, Al-alshaiikh AS, Al-Hamoudi WK, Alswat KA. Medical students' awareness of and compliance with the hepatitis B vaccine in a tertiary care academic hospital: An epidemiological study. *J Infect Public Health* 2016;9:60-5.
- Amr Kandeel, Mohamad Genedy, Samir El-Refai, Anna L Funk, Arnaud Fontanet, Maha Talaat. The prevalence of hepatitis C virus infection in Egypt 2015: implications for future policy on prevention and treatment. *Liver Int*. 2017;37(1):45-53. doi:10.1111/liv.13186
- Al-Yousfi, A. B., Bakir, H., & Malkawi, M. (2018). The environmental health nexuses within the Strategic Roadmap: regional work priorities for the WHO Eastern Mediterranean Region (EMR) (Editorial). *East Mediterr Health J*, 24(2), 117-118.
- Al-Yousfi, A. B., Neira, M., & Bakir, H. (2016). Confronting climate change in the EMR: a win-win public health approach. *East Mediterr Health J*, 21(11), 781-782. doi: 10.26719/2015.21.11.781
- Smith KR, Woodward A, Campbell-Lendrum D, Chadee DD, Honda Y, Liu Q, & al., e. (2014). Human health: impacts, adaptation, and co-benefits. In: *Climate change 2014: impacts, adaptation, and vulnerability*. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
- <http://www.emro.who.int/media/news/9-out-of-10-people-worldwide-breathe-polluted-air.html>
- Khader Y.S. (2020) Air Pollution and Health Outcomes in the Eastern Mediterranean Region: Knowledge and Research Gaps and Need. In: Laher I. (eds) *Handbook of Healthcare in the Arab World*. Springer, Cham.
- Kulhánová I, Znaor A, Shield K, Arnold M, Vignat J, Charafeddine M, Fadhil I, Fouad H, Al-Omari A, Al-Zahrani A, El-Basmy A, Shamseddine A, Bray F, Soerjomataram I, "Proportion of cancers attributable to major lifestyle and environmental risk factors in the Eastern Mediterranean region". *International Journal of Cancer* 2019.
- Hamadeh, R. R., & Al-Roomi, K. A. (2014[RH1]). Air quality and seasonal variations in consultations for respiratory, allergic, dermatological and gastrointestinal diseases in Bahrain, 2007. *East Mediterr Health J*, 20(5), 309-316[RH2].
- Farahat, A. (2016). Air pollution in the GCC countries causes, effects[RH3], and aerosol categorization. *Arabian Journal of Geosciences*, 9(196). doi: DOI: 10.1007/s12517-015-2203y.
- <http://www.emro.who.int/about-who/rc61/impact-air-pollution.html>

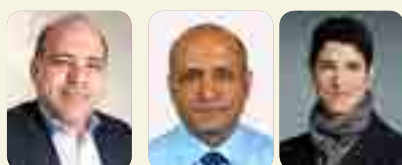


## References

50. WHO. (2014). Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s: World Health Organization.
51. Watts N et al. The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate. *Lancet* 2019 Nov 16;394(10211):1836-1878. doi: 10.1016/S0140-6736(19)32596-6.
52. UNDP. (2018). Climate Change Adaptation in the Arab States- Best practices and lessons learned. Retrieved April, 2020, from <https://www.undp.org/content/dam/undp/library/Climate%20and%20Disaster%20Resilience/Climate%20Change/Arab-States-CCA.pdf>
53. Leticia M Nogueira 1, K Robin Yabroff 1 Aaron Bernstein, Climate change and cancer. *CA Cancer J Clin*. 2020 Jul;70(4):239-244. DOI: 10.3322/caac.21610
54. Saeid Razi, Mostafa Enayatrad, Abdollah Mohammadian-Hafshejani, Hamid Salehiniya, Mehri Timothy Driscoll MBBS, Deborah Imel Nelson, Kyle Steenland, James Leigh, Marisol Concha-Barrientos, Marilyn Fingerhut, Annette Prüss-Üstün The global burden of disease due to occupational carcinogens *Am J Ind Med*. 2005 Dec; 48(6):419-31. <https://doi.org/10.1002/ajim.20209>
55. Rushton L, Hutchings SJ, Fortunato L, Young C, Evans GS, Brown T, et al. Occupational cancer burden in Great Britain. *Br. J. Cancer* 2012 Jun;107(Suppl 1):S3-7
56. International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; Vol. 100D. A Review of Human Carcinogens. Part D: Radiation/IARC Working Group on the Evaluation of Carcinogenic Risks to Humans, Lyon, France: WHO, 2012.
57. [https://apps.who.int/iris/bitstream/handle/10665/44149/9789241547673\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44149/9789241547673_eng.pdf?sequence=1).
58. C R Muirhead, J A O'Hagan, R G E Haylock, M A Phillipson, T Willcock, G L C Berridge, W Zhang Mortality and cancer incidence following occupational radiation exposure: third analysis of the National Registry for Radiation Workers *British Journal of Cancer* 2009 vol. 100, pp206-212
59. Martin C. S. Wong, Franklin D. H. Fung, Colette Leung, Wilson W. L. Cheung, William B. Goggins, C. F. Ng The global epidemiology of bladder cancer: a joinpoint regression analysis of its incidence and mortality trends and projection. *Sci Rep*. 2018;8(1):1129.
60. IARC GLOBOCAN
61. Lauby-Secretan B, Loomis D, Grosse Y, El GF, Bouvard V, brahim-Tallaa L, et al. Carcinogenicity of polychlorinated biphenyls and polybrominated biphenyls. *Lancet Oncol*. 2013 Apr;14(4):287-8.
62. United Nations Environment Programme and the World Health Organization. State of the Science of Endocrine Disrupting Chemicals. United Nations Environment Programme and the World Health Organization; 2012.
63. WHO. (2015). Operational framework for building climate resilient health systems. Geneva, Switzerland: World Health Organization.
64. World Bank. (2017). Climate Change and Health, Approach and Action Plan.
65. Monforte P, Ragusa MA. Evaluation of the air pollution in a Mediterranean region by the air quality index. *Environ Monit Assess*. 2018;190(11):625. Published 2018 Oct 2
66. Kulháňová I, Bray E, Fadhilb I, Ali Saeed Al-Zahrani, Amani El-Basmyd, Wagida A. Anware, Amal Al-Omarif, Ali Shamseddineg, Ariana Znaora, Isabelle Soerjomatarama, "Profile of cancer in the Eastern Mediterranean region: The need for action". *The International Journal of Cancer Epidemiology, Detection, and Prevention*. Elsevier 2017
67. Dhaini HR, Salameh T, Waked A, et al. Quantitative cancer risk assessment and local mortality burden for ambient air pollution in an eastern Mediterranean City. *Environ Sci Pollut Res Int*. 2017;24(16):14151-14162.
68. Carolina Espina, Kurt Straif, Soren Friis, M. Kogevinas, R. Saracci, Harri Vainio. European Code against Cancer 4th Edition: environment, occupation and cancer *Cancer Epidemiology* 39S (2015) S84-S92
69. Kulháňová I, Bray E, Fadhilb I, Ali Saeed Al-Zahrani, Amani El-Basmyd, Wagida A. Anware, Amal Al-Omarif, Ali Shamseddineg, Ariana Znaora, Isabelle Soerjomatarama, "Profile of cancer in the Eastern Mediterranean region: The need for action". *The International Journal of Cancer Epidemiology, Detection, and Prevention*. Elsevier 2017.
70. World Health Organization, Regional Office for the Eastern Mediterranean. (2014)? Report of The Regional Committee for the Eastern Mediterranean Sixty-first Session Tunis, Tunisia 19-22 October 2014. World Health Organization. Regional Office for the Eastern Mediterranean. <https://apps.who.int/iris/handle/10665/252236>
71. Al-Yousfi, A. B., Neira, M., & Bakir, H. (2016). Confronting climate change in the EMR: a win-win public health approach. *East Mediterr Health J*, 21(11), 781-782. doi: 10.26719/2015.21.11.
72. Khader, Y. S., Abdelrahman, M., Abdo, N., Al-Sharif, M., Elbetieha, A., Bakir, H., & Alemam, R. (2015). Climate change and health in the Eastern Mediterranean countries: a systematic review. *Rev Environ Health*, 30(3), 163-181. doi: 10.1515/revhe-2015-0013,

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

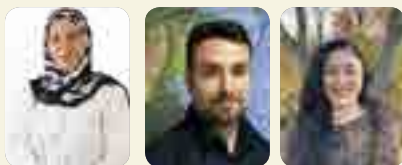
**Kazem Zendeheel**, Professor of Cancer Epidemiology, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran; **Partha Basu**, Deputy Head, Early Detection, Prevention and Infections Branch, International Agency for Research on Cancer, Lyon, France; **Ophira Ginsburg**, Senior Visiting Scientist, International Agency for Research on Cancer, Lyon, France; **Samar Al Homoud**, Professor of Colorectal Surgery and Section Head, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia; **Slim Slama**, Unit Head, NMH Department, World Health Organization, Geneva, Switzerland; **Rola Shaheen**, Chief of Radiology and Medical Director, Peterborough Regional Health Centre, Canada; **Deborah Mukherji**, Associate Professor of Clinical Medicine, American University of Beirut Medical Center, Lebanon, and Consultant Medical Oncologist, Clemenceau Medical Center Dubai, United Arab Emirates; **Ali Al Zahrani** Principal Clinical Scientist and Senior Consultant, Gulf Centre for Cancer Control and Prevention, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia and **Ibtihal Fahil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait



KAZEM ZENDEHEEL

PARTHA BASU

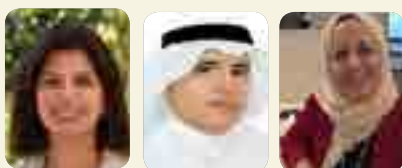
OPHIRA GINSBURG



SAMAR AL HOMOUD

SLIM SLAMA

ROLA SHAHEEN



DEBORAH MUKHERJI

ALI AL ZAHIRANI

IBTIHAL FAHIL

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.

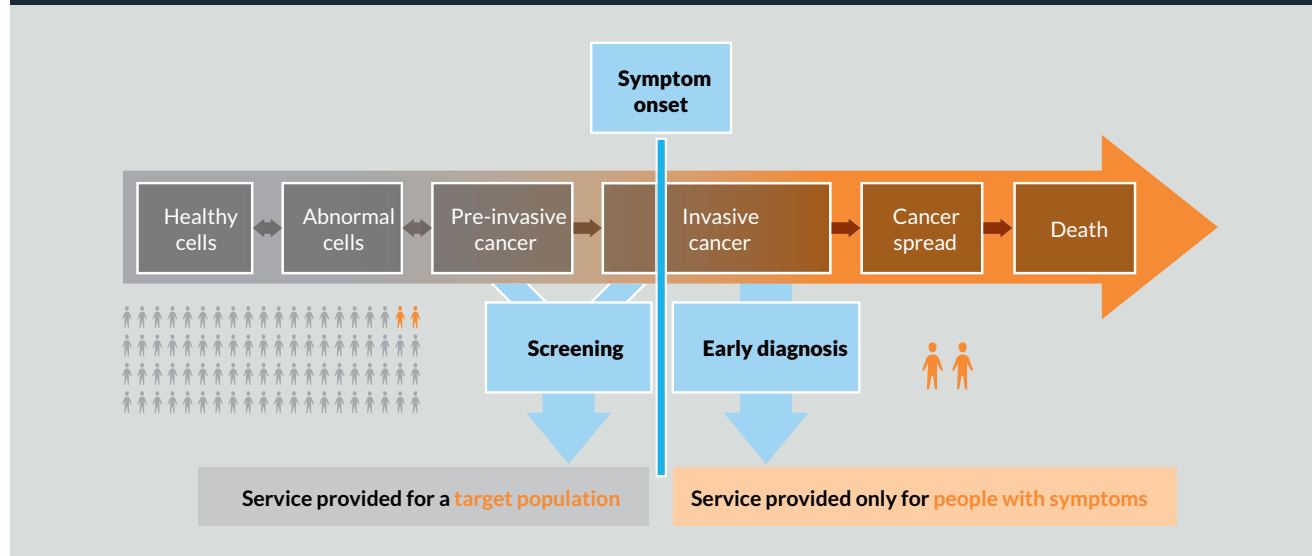
Recent data show that almost half of the EMR countries reported having organized population-based screening programmes for breast cancer. In addition, approximately one-third and one-fifth of the countries reported having population-based organized cervical and colorectal cancer screening. Nevertheless, 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/bitstream/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	1st	2nd	3rd	1st	2nd	3rd
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	Prostate	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	1st	2nd	3rd	1st	2nd	3rd
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 activity, 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 assurance. 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  $54.1 \pm SD 7.0$  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 psychocultural 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

#### 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.

trust using safe practice to ensure the public is protected against COVID19 much as possible. ■

#### 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.

## References

1. GLOBOCAN 2018 [Internet]. Available from: <https://gco.iarc.fr>. 2018 Or 2020 ?
2. Allemani C, Coleman MP, Group CW. Cancer survival: [corrected] the CONCORD-2 study - Authors' reply. *Lancet*. 2015;386(9992):429-30.
3. Organization WH. Tackling NCDs: 'Best Buys' and other recommended interventions for the prevention and control of noncommunicable diseases. World Health Organization; 2017.
4. World Health Organization. Guide to cancer early diagnosis. World Health Organization. 2017. Available from: <https://apps.who.int/iris/handle/10665/254500>.
5. Maajani K, Khodadost M, Fattahi A, Pirouzi A. Survival rates of patients with breast cancer in countries in the Eastern Mediterranean Region: a systematic review and meta-analysis. *East Mediterr Health J*. 2020;26(2):219-32.
6. World Health Organization. Towards a strategy for cancer control in the Eastern Mediterranean Region (No. WHO-EM/NCD/060/E). 2009.
7. Mrabti H, Sauvaget C, Benider A, Bendahhou K, Selmouni F, Muwonge R, et al. Patterns of care of breast cancer patients in Morocco - A study of variations in patient profile, tumour characteristics and standard of care over a decade. *Breast*. 2021;59:193-202.
8. Noone AM, Cronin KA, Altekruse SF, Howlander N, Lewis DR, Petkov VI, et al. Cancer Incidence and Survival Trends by Subtype Using Data from the Surveillance Epidemiology and End Results Program, 1992-2013. *Cancer Epidemiol Biomarkers Prev*. 2017;26(4):632-41.
9. Lyons G, Sankaranarayanan R, Millar AB, Slama S. Scaling up cancer care in the WHO Eastern Mediterranean Region. *East Mediterr Health J*. 2018;24(1):104-10.
10. World Health Organization. Early detection of cancers common in the Eastern Mediterranean Region 2017 August 29, 2021. Available from: <https://apps.who.int/iris/handle/10665/258889>.
11. Richards MA, Westcombe AM, Love SB, Littlejohns P, Ramirez AJ. Influence of delay on survival in patients with breast cancer: a systematic review. *Lancet*. 1999;353(9159):1119-26.
12. Badakhsh M, Balouchi A, Taheri S, Bouya S, Ahmadiarehsima S, Aminifard M. Attitude and Practice Regarding Breast Cancer Early Detection among Iranian Women: A Systematic Review. *Asian Pac J Cancer Prev*. 2018;19(1):9-16.
13. Koo MM, Unger-Saldana K, Mwaka AD, Corbex M, Ginsburg O, Walter FM, et al. Conceptual Framework to Guide Early Diagnosis Programs for Symptomatic Cancer as Part of Global Cancer Control. *JCO Glob Oncol*. 2021;7:35-45.
14. Sainsbury R, Johnston C, Haward B. Effect on survival of delays in referral of patients with breast-cancer symptoms: a retrospective analysis. *Lancet*. 1999;353(9159):1132-5.
15. Yusuf MA, Hussain SF, Sultan F, Badar F, Sullivan R. Cancer care in times of conflict: cross border care in Pakistan of patients from Afghanistan. *Ecancermedicalscience*. 2020;14:1018.
16. World Health Organization Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2017 global survey 2018.
17. Brown A, Ravichandran K, Warnakulasuriya S. The unequal burden related to the risk of oral cancer in the different regions of the Kingdom of Saudi Arabia. *Community Dent Health*. 2006;23(2):101-6.
18. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020.
19. World Health Organization. (2017). Tackling NCDs: 'best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. World Health Organization. <https://apps.who.int/iris/handle/10665/259232>.
20. WHO Consolidated Guideline on Self-Care Interventions for Health: Sexual and Reproductive Health and Rights. 2019.
21. Bruni L, Albero G, Serrano B, Mena M, Gómez D, Muñoz J, et al. ICO/IARC information centre on HPV and cancer (HPV information centre). Human papillomavirus and related diseases in the world Summary Report. 2019;17.
22. Collaborators GBDEMRHA. Trends in HIV/AIDS morbidity and mortality in Eastern Mediterranean countries, 1990-2015: findings from the Global Burden of Disease 2015 study. *Int J Public Health*. 2018;63(Suppl 1):123-36.
23. Selmouni F, Belakhel L, Sauvaget C, Abousselham L, Lucas E, Muwonge R, et al. Evaluation of the national cervical cancer screening program in Morocco: achievements and challenges. *J Med Screen*. 2019;26(3):162-8.
24. El Bcheraoui C, Basulaiman M, Wilson S, Daoud F, Tuffaha M, AlMazroa MA, et al. Breast cancer screening in Saudi Arabia: free but almost no takers. *PLoS One*. 2015;10(3):e0119051.
25. Othman A, Ahram M, Al-Tarawneh MR, Shahrouri M. Knowledge, attitudes and practices of breast cancer screening among women in Jordan. *Health care for women international*. 2015;36(5):578-92.
26. So VHT, Channon AA, Ali MM, Merdad L, Al Sabahi S, Al Suwaidi H, Al Ajeel A, Osman N, Khoja TAM. Uptake of breast and cervical cancer screening in four Gulf Cooperation Council countries. *Eur J Cancer Prev*. 2019 Sep;28(5):451-456. doi: 10.1097/CEJ.0000000000000466. PMID: 30260812.
27. [1] [https://en.wikipedia.org/wiki/Pink\\_Caravan](https://en.wikipedia.org/wiki/Pink_Caravan)
28. El Fakir S, Najdi A, Khazraji YC, Bennani M, Belakhel L, Abousselham L, Lyoussi B, Bekkali N, Nejari C. Breast Cancer Screening in Morocco: Performance Indicators During Two Years of an Organized Programme. *Asian Pac J Cancer Prev*. 2015;16(15):6285-8. doi: 10.7314/apjcp.2015.16.15.6285. PMID: 26434830.
29. Shaheen R, Slanetz PJ, Raza S, Rosen MP. Barriers and opportunities for early detection of breast cancer in Gaza women. *Breast*. 2011 Apr;20 Suppl 2:S30-4. doi: 10.1016/j.breast.2011.01.010. Epub 2011 Feb 12. PMID: 21316968.
30. (IARC) IAFRoC. Colorectal cancer screening guideline in primary care. Kingdom of Bahrain Ministry of Health, NCD Committee. (unpublished data).
31. Selmouni ea. Delivering colorectal cancer screening integrated to primary health care services in Morocco : lessons learnt from a demonstration project. *Cancer In Press*.
32. Salimzadeh H, Bishehsari F, Sauvaget C, Amani M, Hamzehloo G, Nikfarjam A, et al. Feasibility of Colon Cancer Screening by Fecal Immunochemical Test in Iran. *Arch Iran Med*. 2017;20(12):726-33.
33. <https://www.moh.gov.sa/en/Ministry/Projects/Colorectal-Cancer-Awareness/Pages/default.aspx>.
34. Salimzadeh H, Delavari A, Montazeri A, Mirzazadeh A. Knowledge and practice of iranians toward colorectal cancer, and barriers to screening. *International journal of preventive medicine*. 2012;3(1):29.
35. Warnakulasuriya KA, Ekanayake AN, Sivayoham S, Stjernsward J, Pindborg JJ, Sobin LH, et al. Utilization of primary health care workers for early detection of oral cancer and precancer cases in Sri Lanka. *Bull World Health Organ*. 1984;62(2):243-50.



# Access to cancer treatment and diagnosis in the Eastern Mediterranean Region

**Mojtaba Vand Rajabpour**, Oncologist, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran; **Rolando Camacho**, Global Technical Lead, City Cancer Challenge Foundation, Geneva, Switzerland; **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait; **Bassim J Al-Bahrani**, Head of the National Oncology Center, Royal Hospital, Muscat, Oman; **Hicham H Elberri**, Medical Officer, UHC/NMH Department, EMRO, World Health Organization, Cairo, Egypt; **Nagi S El Saghir**, Head, Division of Hematology-Oncology, Department of Internal Medicine, American University of Beirut Medical Center, Beirut, Lebanon; **Hikmat Abdel-Razeq**, Department of Medicine, King Hussein Cancer Centre, Amman, Jordan; **Ahmed Elhaj**, Professor of Oncology, Clinical Oncology Department, National Cancer Institute, University of Gezira, Sudan; **Gulin Gedik**, Coordinator, Health Workforce, EMRO, World Health Organization, Egypt and **Kazem Zendehelel**, Professor, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran



MOJTABA VAND  
RAJABPOUR



ROLANDO CAMACHO



IBTIHAL FADHIL



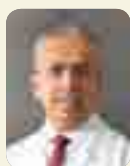
BASSIM ALBAHRANI



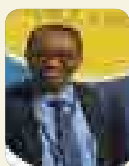
HICHAM H ELBERRI



NAGI S EL SAGHIR



HIKMAT ABDEL-RAZEQ



AHMED ELHAJ



GULIN GEDIK



KAZEM ZENDEHELEL

The burden of noncommunicable diseases (NCDs), including cancers, is increasing in the Eastern Mediterranean Region (EMR). Based on estimates, cancer incidence and mortality in the region will double within the next 20 years. Improvements in the infrastructure and access to the essential cancer care services would improve patient outcomes and decrease the cancer burden in the EMR region.

We studied the access of cancer patients to diagnostic and therapeutic services in the EMR countries. We compiled data from various sources including, WHO, national and global reports. In addition, we perform international surveys in six EMR countries with different demographic and income conditions, including Iran, Oman, Jordan, Lebanon, Sudan and Pakistan. We found that EMR countries have variable conditions regarding access to diagnostics facilities, including CT scanners, MRI, and PET-CT scanners. While some countries lack a single PET/PET-CT scanner, high-income countries have installed more than 10 per 10,000 patients.

Surgical oncology and subspecialties for cancer surgery are not available in most of the EMR countries. Radiotherapy coverage in Syria, Afghanistan, Yemen and Pakistan, is less than 30%, while the coverage of radiotherapy services in Oman, Morocco and Iraq is equal to 60%, 80% and 80%, respectively. In contrast, this figure is about 200% in Qatar and 400% in Jordan.

The availability of oncology medicines is acceptable in most EMR countries, except Afghanistan, Sudan, Palestine and Iraq, where access to essential systemic treatment is limited. Out-of-pocket (OOP) expenses in low- and middle-income countries reach 70–75%, indicating the need to establish insurance industries in these countries.

EMR countries need to regularly monitor the access of cancer patients to diagnostics and treatment technology. They should also have a plan for providing these facilities against future challenges, in terms of increasing incidence and burden of cancer in the region.

## Introduction

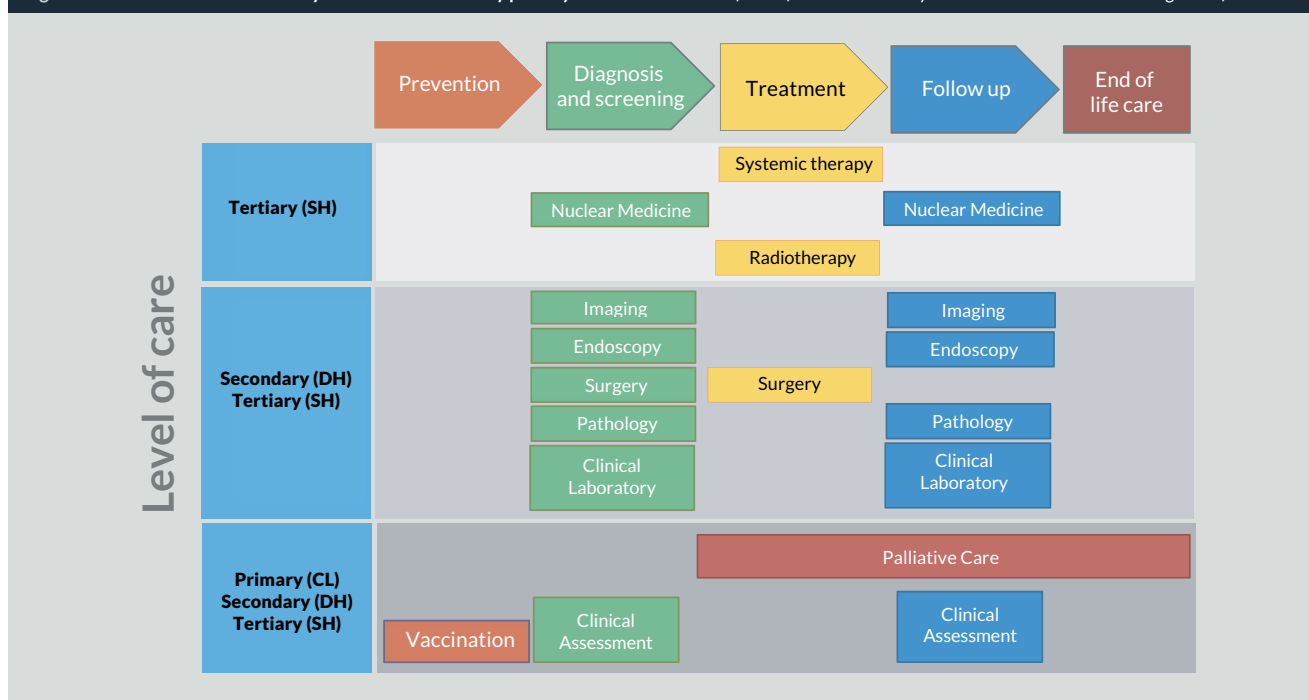
The Eastern Mediterranean Region (EMR) is facing an upward trend in the burden of all noncommunicable diseases (NCDs), including cancer. The incidence rate of cancer is going to increase cancer incidence considerably over the next 20 years. It is projected that in 2040 the cancer incidence will be

doubled solely based on population ageing and growth (1).

The diagnosis of cancer at an early stage and access to optimal treatment had a demonstrable effect on the decline of cancer mortality in most developed countries (2, 3). Cancer patients are usually diagnosed at the advanced stage in developing countries (2, 4) where human resource (HR),



Figure 1: Healthcare service delivery model used to identify priority medical devices list (Taken from WHO Priority Medical Device in Cancer Management)



physical capacity, and equipment are limited. However, recent awareness campaigns over the last two decades showed a trend for downstaging in several countries (5). The mortality to incidence ratio in the low- and middle-income countries (LMICs) is 20% higher than that in high-income countries (1). This difference is associated with access, quality of care, and cancer care efficiency (6). Hence, scientific approaches are needed to assure more affordability of cancer care in ways that would benefit all stakeholders (7).

The Sixty-sixth World Health Assembly endorsed the World Health Organization (WHO) Global Action Plan to prevent and control NCDs between 2013–2020 (resolution WHA66.10). One of the NCDs resolution targets is to ensure “80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities” (8). In 2014, WHO developed a project to address the medical devices needed for cancer management; the main goal was to increase their accessibility, especially in LMICs (Figure 1). The results led to a list of priority of medical devices for clinical interventions for cancer care (screening, diagnosis, treatment and palliation) at global and country levels for six different malignancies (breast, cervical, colorectal, leukemia, lung and prostate) (9).

Cancers are usually discovered through clinical examination, medical imaging and procedures such as endoscopy and cystoscopy, while final confirmation is made by histopathology tests. Besides, standard medical imaging and, recently, nuclear medicine methods such as bone scans and PET scans can increase accuracy for cancer staging. Treatments for cancers

include surgery (resection of tumours and possibly affected areas such as lymph nodes), systemic therapy (including chemotherapy, nuclear therapy, hormone therapy, targeted therapy and immunotherapy), and radiotherapy (including teletherapy and brachytherapy) (10).

We aim to investigate the existing conditions in EMR countries regarding diagnostic and therapeutic services for cancer patients, except prevention, early diagnosis and palliative care that are discussed elsewhere.

## Method

We used various sources of information to assess the access to diagnosis and treatment of cancer patients in the EMR, including:

- a) A review of the literature
- We reviewed the following documents in this study:
- ➔ WHO Cancer Country Profile 2020.
  - ➔ Assessing National Capacity for Prevention and Control of Noncommunicable Diseases: The 2015 Report of the Country Capacity Survey in the Eastern Mediterranean Region (11).
  - ➔ World Health Organization. Global Atlas of Medical Devices (2017) (9).
  - ➔ International Atomic Energy Agency, IRAC (Directory of Radiotherapy Centres).
  - ➔ World Health Organization. Global Health Expenditure Database.
  - ➔ ESMO International Consortium Study on the Availability, Out-of-Pocket Costs, and Accessibility of Antineoplastic Medicines in Countries Outside Europe (12).

Table 1: Workforce and human resource related to cancer treatment and diagnosis per 10,000 new cancer patients (Resource, WHO Cancer country profile 2020)

Country	Income	Radiation oncologist	Medical physicist	Surgeon	Radiologist	Nuclear medicine	Medical and pathology lab scientists
Bahrain	High	n/a	286.3	1917.9	n/a	47.7	n/a
Kuwait		n/a	n/a	223.3	558.3	139.6	n/a
Oman		n/a	75.3	1673.7	n/a	27.1	n/a
Qatar		n/a	158.7	531.7	n/a	39.7	4000
Saudi Arabia		24.5	102.1	n/a	1114.2	32.3	n/a
United Arab Emirates		n/a	74.4	n/a	1064.4	31.9	n/a
Iran	Upper middle	22.2	31.8	115.5	211.1	18.2	n/a
Iraq		n/a	23.7	531.7	n/a	39.7	4000
Jordan		20	n/a	n/a	n/a	26.6	1835.2
Lebanon		n/a	11.6	1472.8	231.3	8.7	309.4
Libya		n/a	n/a	n/a	95.1	15.9	n/a
Djibouti	Lower middle	n/a	0.0	252.2	n/a	0.0	44.5
Egypt		n/a	15.5	1859.4	283.2	8.1	164.4
Morocco		n/a	9.5	480.1	135.5	12.3	112.7
Pakistan		1.8	n/a	128.7	57.5	14.4	n/a
Palestine		n/a	n/a	n/a	n/a	n/a	n/a
Somalia		n/a	n/a	15.1	n/a	0.0	n/a
Sudan		n/a	10.9	116.5	n/a	1.2	13.6
Syria		n/a	12.9	n/a	n/a	4.3	n/a
Tunisia		n/a	18.9	205.7	n/a	37.8	225.2
Afghanistan	Low	n/a	n/a	n/a	n/a	n/a	n/a
Yemen		n/a	4.6	78.9	207.1	4.6	844.3

➔ Current Status of Nuclear Medicine Practice in the Middle East (13).

➔ World Bank Country Classification.

➔ Global Cancer Observatory (Globocan).

b) A “cancer technology survey” in six countries during 2015, including Iran, Lebanon, Jordan, Oman, Pakistan and Sudan that was updated in 2020.

c) The reports of the imPACT mission implemented in these six countries from 2010–2018.

We used “Tableau, 2021” software for mapping geographical data.

## Results and discussion

### Human resource development (HRD) for cancer control

Since there is limited information on HR conditions in EMR countries, we obtained data from studies conducted by the Cancer Country Profile and previous surveys (Table 1). There are no exact data about the number of medical and radiation oncology specialists in this region.

Although there are more than 100 surgeons for every 10,000 patients in most EMR countries, there is no detailed information on specialist cancer surgeons, including oncology surgeons, urologic oncologists and paediatric surgeons. Therefore, there is a shortage of human resources in this regard (Table 1). Specialists and facilities are concentrated in capitals and large cities, and specialists are not well distributed across the countries.

Despite the lack of a precise number of radiologists and

pathologists in all countries of the region, radiology and pathology specialties are advancing toward subspecialties. Organ-based radiology is developing and has an important role in the correct interpretation of radiography results regarding diagnosis and determining the stage of disease progression (14). Similarly, pathologists are working in a subspecialty manner on specific groups of diseases. Therefore, it is necessary to consider these points when providing the required specialists and improving the patients treatment quality (14).

According to the findings of the cancer technology survey, paediatric oncology faces serious limitations in Sudan and Pakistan, where most children are treated by adult oncologists. However, there are limitations in terms of paediatric radiotherapy in most EMR countries, and children are treated by adults' radiation oncologists.

The main problem in many EMR countries is the migration of specialists to high-income countries and those who stay in these countries after completion of the training courses. Considering the growing incidence of cancers in developing countries, this brain drain of specialists can quickly lead to serious challenges and shortcomings in the region (15).

### HRD governance and training

Unlike in Jordan, Lebanon, Pakistan and Sudan, ministries of health were responsible for training specialists and monitoring the activities of the private health sector in Iran and Oman. Iran, Jordan, Pakistan, Lebanon and Sudan have great capacities for training specialists in the fields related to cancer diagnosis

Table 2: Health insurance and out-of-pocket expenses in EMR countries – WHO database (Resource: <https://apps.who.int/nha/database/ViewData/Indicators/en>)

Country	Income	Domestic General Government Health Expenditure (GGHE-D) as % Current Health Expenditure (CHE)	Share of out-of-pocket expenditure on healthcare, 2017	Voluntary Health Insurance (VHI) as % of Current Health Expenditure (CHE)	Compulsory Health Insurance (CHI) as % of Current Health Expenditure (CHE)	Government Subsidy to Social Health Insurance (TRAN) as % of Social Health Insurance (SHI)
Bahrain	High	58.00%	30.60%	11.5%	0.0%	0.0%
Kuwait	High	87.40%	12.60%	0.0%	0.0%	-
Oman	High	87.70%	6.70%	3.5%	0.0%	-
Qatar	High	80.70%	8.90%	9.2%	0.0%	-
Saudi Arabia (2016)	High	66.7%	16%	13.2%	0.0%	-
UAE	High	72.00%	18.90%	7.6%	0.0%	-
Iran	Upper intermediate	51.20%	41.80%	7.0%	32.1%	86.1%
Iraq	Upper intermediate	41.90%	58.00%	0.0%	0.0%	0.0%
Jordan	Upper intermediate	44.80%	30.40%	15.5%	15.7%	78.6%
Lebanon	Upper intermediate	50.00%	33.20%	15.8%	23.9%	24.5%
Libya (2011)	Upper intermediate	63.3%	36.7%	0.0%	0.0%	-
Djibouti	Lower intermediate	47.00%	26.50%	0.0%	11.2%	0.0%
Egypt	Lower intermediate	33.00%	60.10%	0.8%	4.1%	0.0%
Morocco	Lower intermediate	42.90%	53.90%	0.7%	20.3%	0.0%
Pakistan	Lower intermediate	31.60%	60.20%	1.0%	0.9%	0.0%
Sudan	Lower intermediate	18.00%	72.50%	1.0%	10.7%	73.6%
Syria (2012)	Lower intermediate	45.3%	53.7%	0.0%	0.0%	-
Tunisia	Lower intermediate	57.10%	39.10%	3.1%	30.6%	0.0%
Afghanistan	Low	5.10%	75.50%	0.0%	0.0%	-
Yemen (2015)	Low	10.2%	81%	1.1%	0.0%	-

and treatment, including radiology, pathology, cancer surgery, radiation oncology and medical oncology. Although Oman also has capabilities in this regard, HR supply largely depends on the return of migrated specialists from developed countries because most training courses, especially in diagnostics, are held abroad.

#### *Cost of cancer care: Insurance status and out-of-pocket expenses*

A wide disparity and lack of equity in terms of out-of-pocket (OOP) expenses is highlighted in the EMR (Table 2). The rate of OOP expenses in high-income countries (25%) was much lower in comparison to upper-middle-income countries (50%) and low-income countries (70%).

Governments fund more than 65% of the current health expenditures (CHE) of patients in high-income countries. This figure is about 40% in upper-middle-income countries and 63% in Libya. It is variable in lower-middle-income countries, from 18% in Sudan to over 40% in Tunisia, Syria and Morocco (Table 2).

Compulsory, optional and social insurance services do not provide full coverage for the treatment of patients in the region. Accordingly, the share of insurance coverage is less than 10% in the high-income countries in this region. Moreover, compulsory insurance covers more health expenses in Iran (30%), Tunisia (24%), Lebanon (20%) and Morocco (20%).

Out-of-pocket expenses also vary based on the income level of each country. This is about 6–30% in high-income countries, 40–60% in middle-income countries, 70% in Sudan and 75–80% in Afghanistan and Yemen. Therefore, the development of the insurance industry, especially in low-income countries, seems to be a priority to reduce OOP expenses in this region.

Health insurance coverage and reducing OOP expenses is

the mainstay of improving access to care, increasing health insurance coverage could increase individuals access to prevention, early diagnosis, timely treatment and follow-up. Studies on previously uninsured adults in United States showed that when individuals are included in an insurance programme (Medicare) their access to care and preventive programmes was significantly increased (16). Patients who do not have health insurance are less likely to access high quality treatment and they have less chances of survival than insured people (17). The 2010 Patient Protection and Affordable Care Act (ACA) is the largest healthcare system change in the United States, which focused on improving the health insurance coverage. Recent studies have showed significant improvements in individuals' access to the continuum of cancer care after establishment of the ACA, and we could suggest similar programmes and regulations for improving health insurance status in EMR countries (18).

#### *Diagnostic imaging*

While diagnostic imaging such as conventional X-rays, ultrasound, mammography, CT and MRI are available in most EMR countries, Table 3 and Figures 2 and 3 show a lack of equity and an essential need for CT scans and mammograms in Iraq, Pakistan, Somalia, Sudan, Tunisia, Yemen, Syria and Afghanistan. The number of MRI scanners was less than 10 for 10,000 new cancer patients in Pakistan, Somalia, Sudan and Afghanistan.

#### *Nuclear medicine*

Advances in nuclear medicine have made undeniable contributions to the determination of the extent and stage,

Table 3: Medical Equipment in EMR countries, per 10,000 new cancer patients (Resource; cancer country profile 2020)

Country	Income	Mammography	CT scanner	MRI scanner	PET or PET/CT scan	New cancer patients
Bahrain	High	9.5	74.2	49.4	2.8	1048
Kuwait		Unknown	273.6	234.5	30.7	3582
Oman		45.2	138.5	111.4	6.0	3322
Qatar		111.1	246	309	15.9	1260
Saudi Arabia		81.7	251.6	158.5	11.0	24485
United Arab Emirates		129.6	422.8	373.9	12.7	4707
Iran	Upper middle	58.6	77.5	27.5	0.5	110115
Iraq		19.4	74.2	49.4	2.8	25320
Jordan		38.5	110.1	58.7	6.4	10898
Lebanon		185.6	161.9	63.6	9.3	17294
Libya		Unknown	98.3	52.3	1.6	6308
Djibouti	Lower middle	59.3	59.3	14.8	0.0	674
Egypt		26.4	54.3	15.1	1.5	128892
Morocco		43.6	53.0	22.7	2.3	52783
Pakistan		0.9	17.2	4.6	0.3	173937
Palestine		Unknown	Unknown	Unknown	Unknown	
Somalia		3.0	6.0	2.0	0.0	9942
Sudan		7.8	17.9	5.0	0.0	9398
Syria		n/a	25.9	19.4	0.9	25746
Tunisia		141.6	91.9	31.5	1.9	23170
Afghanistan	Low	1.0	3.6	1.5	0.0	15894
Yemen		17.4	66.8	23.5	0.0	19450

as well as the treatment, of cancers (13). Since most common cancers, such as breast and prostate cancers, affect the bones, bone scintigraphy can facilitate the examination of the bones affected in cancer patients (19). On the other hand, positron emission tomography (PET) helps to evaluate visceral metastases as well as the treatment response rate, especially in diseases such as lymphoma (20).

Based on a study conducted by the International Atomic Energy Agency (IAEA), most EMR countries (13) are equipped with facilities related to single-photon emission computed tomography (SPECT) and gamma spectroscopy. However, the quantity of equipment was lower than that needed at the time. Currently, there are no accurate or available statistics on the number of devices in the region, and more studies are needed in this field.

PET or PET-CT scanning was higher than 10 per 10,000 in Kuwait, Saudi Arabia and UAE, and higher than 5 per 10,000 in Lebanon, Qatar, Jordan and Oman, but lower than 5 per 10,000 in Morocco, Syria, Libya, Egypt, Iran, Bahrain and Pakistan (Table 3). Other countries in the region lack PET or PET-CT scanning.

In terms of access to basic diagnostic molecules, most countries in the region have access to I-131 and Mo99. Regarding therapeutic molecules, I-131 is easily accessible in almost all EMR countries (7).

### Endoscopy

The cancer technology survey showed that all endoscopy

modalities required for cancer diagnosis were available in the six study countries (Iran, Jordan, Lebanon, Oman, Pakistan and Sudan). Nevertheless, in Sudan, the prominent public cancer centre had a shortage of endoscopy services, endoscopy was mainly available in private centres where the cost can be 300 times higher. There was no significant waiting time for most diagnostic services, except for breast mammography, which could reach a maximum of two months, and an MRI appointment could take up to three months. Waiting time was not a significant barrier to cancer diagnosis, whereas financial support for patients was the main limitation in accessing diagnostic services.

### Guidelines for the management of cancer patients

Approved national guidelines and protocols for cancer referrals and management are crucial for cancer care. These guidelines can guarantee the provision of the best possible diagnosis and treatment for patients based on the circumstances of each country. According to the WHO country capacity survey conducted in 2015, national guidelines for the diagnosis and treatment of cancer have been developed in all EMR countries except Libya, Palestine, Syria, Tunisia, Afghanistan, Pakistan, Somalia, Djibouti and Yemen (Table 4). Although all the details of the guideline developments are not available, they usually adopt international guidelines.

There is no specific referral plan for patients in most LMICs and relevant guidelines are not available. In other words, it is not clear what path the patient should go through from the

Table 4: Treatment and palliative process, Cancer country profile 2020 and WHO EMR Country Capacity Survey 2016

Country	Cancer management guideline	Number of treatment services (surgery, radiotherapy, chemotherapy)	Public cancer centres per 10,000 population	Pathology services	Bone marrow transplant	Palliative care availability	Cancer surgery (public)	Subsidized chemotherapy (public)	Year
Bahrain	Available <sup>1</sup>	3	19.1	Available	Available	Available	Available	Available	2020
Kuwait	Available	3	11.2	Available	Not available <sup>2</sup>	Not available	Available	Available	2019
Oman	Available	3	6.0	Available	Available	Available	Available	Available	2019
Qatar	Available	3	7.9	Available	Not available	Not available	Available	Available	2016
Saudi Arabia	Available	3	4.1	Available	Available	Available**	Not available	Available	2019
UAE	Available	3	6.4	Available	Not available	Available	Available	Available	2019
Iran	Available	3	3.4	Available	Available	Not available	Available	Available	2019
Iraq	Available	3	17.4	Available	Not available	Not available	Available	Available	2016
Jordan	Available	3	3.7	Available	Available	Available**	Available**	Available	2019
Lebanon	Available	2	2.9	Available	Available	Available**	Available**	Available	2019
Libya	Not available	3	7.9	Available	Not available	Not available	Available	Available	2019
Djibouti	Available	1	Unknown	Available	Not available	Not available	Unknown	Unknown	2019
Egypt	Available	3	Unknown	Available	Available	Available	Available	Available	2019
Morocco	Available	3	1.9	Available	Available	Not available	Available	Available	2019
Pakistan	Not available	2	Unknown	Available	Not available	Not available	Available	Available	2019
Palestine	Unknown	Unknown	Available	Available	Unknown	Not available	Available	Available	2016
Somalia	Not available	0	Unknown	Available	Not available	Not available	Not available	Not available	2019
Sudan	Available	3	0.8	Not available	Not available	Unknown	Available	Available	2019
Syria	Available	3	3.0	Available	Not available	Not available	Available	Available	2019
Tunisia	Available	3	6.3	Available	Available	Not available	Not available	Not available	2016
Afghanistan	Not available	unknown	Not Available	Not available	Not available	Not available	Not available	Not available	2019
Yemen	Available	1	0.8	Available	Not available	Not available	Available	Available	2016

1. Available; in all the rows means generally available

2. Not available; in all rows means generally not available \*\* Available according to the technical survey findings

primary treatment level to specialized and subspecialized centres after being diagnosed with cancer or manifesting its symptoms (Table 4).

Based on the survey results, most specialists in all six EMR countries studied (i.e. Oman, Iran, Lebanon, Pakistan, Sudan and Jordan) stated that they follow international guidelines such as NCCN (National Comprehensive Cancer Network) to treat patients. The most important challenges of applying international guidelines are lack of facilities, the high cost of treatment in some cases, and other conditions specific to each country. There were no standard national guidelines, those generally accepted by most specialists, in the six countries studied. Although there are some documented experiences related to national guidelines for breast cancer, colorectal cancer, prostate cancer and melanoma in Iran, breast and prostate cancers in Sudan and for paediatric, breast and haematological malignancies in Lebanon, there is no nationwide audit or monitoring of the implementation of these guidelines and the treatment of patients based on the standards contained in them. Some private centres have their own internal monitoring systems (e.g. the American University of Beirut Medical Center in Lebanon and King Hussein Cancer Center in Jordan).

Adapting international guidelines according to national situations and consideration, execution monitoring, and auditing is recommended for EMR countries. It is especially recommended for low- and middle-income countries where many of the expensive treatments listed in international

guidelines are not accessible.

#### *The multidisciplinary cancer management team*

National institutions in Iran, Lebanon, Jordan, Sudan, and Oman have experience regarding the provision of comprehensive treatment to cancer patients, according to established protocols, by multidisciplinary teams consisting of all specialties such as pathology, radiology, surgical, medical and radiation oncology organized at each cancer site. Although this is not performed in all centres in these countries, many of the Iranian, Lebanese, Jordanian and Omani patients are treated by such multidisciplinary teams (21). Apart from these examples, due to the absence of organized tumour boards in most non-academic and community hospitals, cancer specialists usually hold meetings or participate in University Hospital Tumour Boards to discuss some of their patients when they see it necessary (22).

#### *Surgery*

It is estimated that around 70% of the patients with solid tumours undergo surgery. Surgery is often curative in the absence of metastatic disease, and 49% of cured cancer patients are treated with surgery.

As previously mentioned, the number of registered surgeons and anesthesiologists is acceptable in most EMR countries. A WHO survey in 2015 also showed that most countries in the region have access to cancer surgery services and equipment. Based on the Cancer Country Profiles 2020, the number of

**Table 5: Provision of radiotherapy in the Eastern Mediterranean Region (EMR): Relation between RT facilities, population and cancer incidence**  
 International Atomic Energy Agency, DIRAC (Directory of Radiotherapy Centers)

Country	Income	Number of Photon And Electron Beam RT	Number of Brachy Therapy	Number of new cancer patient per year	Patients need RT	Patient / RT unit	Coverage
Bahrain	High	1	?	1,048	524	524	100
Kuwait		4	1	3,582	1,791	448	100
Oman		2	1	3,322	1,661	831	60
Qatar		3	1	1,260	630	210	200
Saudi Arabia		31	9	24,485	12,242.5	395	130
United Arab Emirates		5	1	4,707	2,353.5	471	100
Iran	Upper middle	121	14	110,115	55,057.5	459	100
Iraq		19	0	25,320	12,660	666	80
Jordan		45	18	10,898	5,449	121	400
Lebanon		23	3	17,294	8,647	376	130
Libya		6	1	6,308	3,154	526	100
Djibouti	Lower middle			674	337	0	
Egypt		119		128,892	64,446	542	100
Morocco		42	23	52,783	26,391.5	628	80
Pakistan		58	10	173,937	86,968.5	1,499	30
Palestine				4,779	0	0	
Somalia				9,942	0	NA	NA
Sudan		10	2	9,942	4,971	497	100
Syria		7	2	25,746	12,873	1,839	27
Tunisia		23	14	23,170	11,585	504	100
Afghanistan	Low			15,894	7,947	0	
Yemen		1	0	19,450	9,725	9,725	5

surgeons in most EMR countries is also favourable, especially in Oman and Egypt who have the highest number of surgeons for every 10,000 patients, however, patients in Afghanistan and Somalia have limited access to these services (Table 2). There is limited data on the number of surgical subspecialists in most EMR countries, such as cancer surgeons, breast surgeons, and urologic oncologists.

Based on our survey, cancer surgery services in EMR countries varies from fully specialized sections for cancer treatment, organ-based subspecialty (e.g. breast cancer surgery, urologic cancers surgery, and head and neck cancers surgery), to general surgery in non-specialized structures. The results also indicated that the duration of delay in surgery and treatment of patients is usually less than three or four weeks, suggesting an acceptable level of accessibility to surgical treatments for cancer patients in this region.

Given this status in the region, it would be highly recommended to develop subspecialty surgical training courses and to support patients undergoing surgical procedures in specialized centres.

#### **Systemic therapy, chemotherapy, hormone therapy, targeted therapy and immunotherapy**

Systemic therapy currently plays an important role in the treatment of cancers. There are different types of systemic therapy. Chemotherapy, hormone therapy, target therapy and other immunotherapies are the main types of systemic

treatment, and this treatment has been used to reduce the risk of recurrence, increase the survival rate of cancer patients as well as metastatic patients, reduce acute symptoms, and prevent rapid progression of the disease (23). However, the main issue is providing the medicines, and the problem with targeted therapies and immunotherapies is the high cost of these drugs (23).

There has always been a debate about the supply of oncology medicines. Because of the high cost of these drugs, countries must find more cost-effective alternatives. It is especially important for LMICs to determine which cancer medicines must always be available. In 1985, the WHO Expert Committee prepared a list of cost-effective drugs and published it under the title of the "WHO Essential List of Oncology Medicine" (24). This list has been updated recently in 2019 "WHO Model List of Essential Medicines" (25). One of the main objectives of such a list was to ensure the full accessibility of these drugs for cancer patients in low-income countries (24).

A survey conducted by the ESMO International Consortium in 2017 (12) investigated non-European countries, including EMR countries, in terms of accessibility and availability of the drugs mentioned in the "WHO Essential List of Oncology Medicine". The results showed that the availability of oncology medicines is at a good level in most EMR countries, except Afghanistan, Sudan, Palestine and Iraq. In fact, the drugs mentioned in this list are always available in most countries. Afghanistan and possibly Yemen are experiencing far more serious problems than other



countries, in a way that essential medicines are not available to patients in more than half of the cases.

In terms of drug expenses, 100% of expenses in Afghanistan and Pakistan and 50–100% of expenses in Morocco are paid by patients. In Iran, patients' share of drug expenses is less than 25%. However, these data are related to the years before 2017, and now conditions have changed. The implementation of the Health System Transformation Plan in Iran in 2017 has reduced cancer patients' share of drug expenses to less than 10%.

Developing a list of essential medicines for cancer treatment is probably the first step for every country to supply these drugs and ensure their accessibility. The next step is to ensure that these drugs are administered only by their exact indication (26). For instance, as an expensive anti-cancer drug, Herceptin is only required for 20% of patients with breast cancer with positive Her2 receptors. Accordingly, a serious supervision mechanism has been developed in Iran to ensure drug administration is only for indicated cases (27). The biosimilar drug production technology is a new approach developed recently for reducing the burden of expensive drugs and is used in India (26) and Iran to supply the required drugs. Compulsory licensing is another approach developed in Thailand, India and Iran to increase access to expensive drugs by producing expensive drugs and providing them to patients without observing their patent (28, 29). Of course, this approach can be associated with some disadvantages, and governments should consider the pros and cons of this strategy (25, 6). Similar difficulties exist regarding the immunotherapy drugs or personalized medicines because they are newly developed agents and have not attracted the attention of health authorities in the Middle East. However, given the increasing development and proven effectiveness of these drugs in a wide range of cancer patients, long-term planning for accessibility of these drugs is inevitable.

The cancer technology survey indicated that not only the drugs mentioned in the WHO Essential List used, but also newer and more effective medicines were provided to patients in Oman, Jordan, Lebanon and Iran. Ministries of health provide these drugs to patients for free in Oman, Jordan and Lebanon (for people who have no insurance). There is no essential list in Pakistan and Sudan. Although cancer drugs are entirely free in Sudan, they are not necessarily available in 100% of cases.

The WHO Country Capacity Survey, 2015, reported that subsidized chemotherapy is available in almost all EMR countries. Somalia, Tunisia and Afghanistan have severe restrictions on chemotherapy services (Table 4). The survey findings also backed this result. Accordingly, chemotherapy beds are available in all six studied countries (Oman, Iran, Jordan, Pakistan, Somalia and Lebanon), and the general principles of patient, physician and caregiver safety are observed. Oncology medicines are prepared and injected

under the highest international standards in several centres in Iran, Jordan and Lebanon. Also, there is virtually no waiting time for chemotherapy counseling or hospitalization in any of these six countries.

The main problem with the accessibility of chemotherapy services is that most specialized centres are located in major cities. Patients living in small towns and villages have to travel for hours to receive these services. Other countries in the region can use Oman's successful experience in this regard.

To increase cancer patient's access to treatment and optimize the existing specialized human resources, the Ministry of Health of Oman created "satellite clinics" (SC) located in regional hospitals outside the capital city (more than 250 km from Muscat). Internists and nurses from these hospitals have been trained for six months at the National Centre of Oncology (NCO) and programmed to be retrained and participate in national conferences and seminars as part of their continuous medical education programme. Patients are first seen by a medical oncologist and a radiation oncologist from the NOC who attend a SC every month. The staff from the SC also participates in these clinics. Patients under follow-up are also seen as needed. SC's staff maintains continuous communication with the NOC via email, fax and telephone. The SC has a dedicated area with a security cabinet and a trained pharmacist for the preparation of the oncology medicines. The SC is included in the oncology medicines plan.

#### *Bone marrow transplantation*

Most EMR countries lack equipment and infrastructure for bone marrow transplantation. The WHO Cancer Country Profiles 2020 reported that bone marrow transplantation is generally available in Oman, Saudi Arabia, Iran, Egypt and Morocco, and there are restrictions in other countries (Table 4). However, the "cancer technology survey" results demonstrated that some private medical centres in Pakistan offer services related to bone marrow transplantation, fully funded by patients. In Lebanon and Jordan, cancer centres and university hospitals have specialized BMT units, some covered by insurance, some by ministries of health, and some by donations. It seems that EMR countries can take advantage of each other's experiences in establishing dedicated medical centres and the training required for specialized personnel.

For example, The BMT Centre at the Shariati Hospital in Iran, is an internationally recognized state-of-the-art transplantation centre, that performs over 400 transplants every year (including 150 on children) and is an excellent opportunity for training in the region.

#### *Radiation therapy*

About 50% of cancer patients need to receive radiotherapy

Figure 2: Distribution of CT Scanner devices in EMR Countries, 2021 (Number of CT scanner per 10,000 new cancer patients)

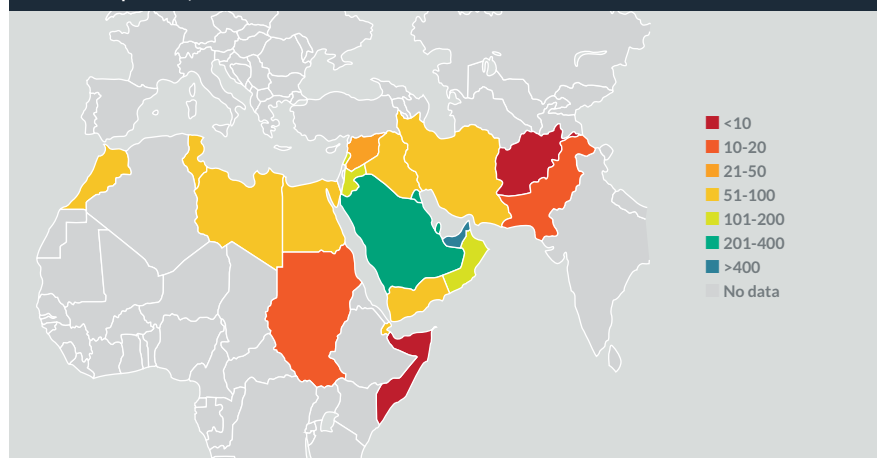


Figure 3: Distribution of mammography devices in EMR Countries, 2021 (Number of devices per 10,000 new cancer patients)

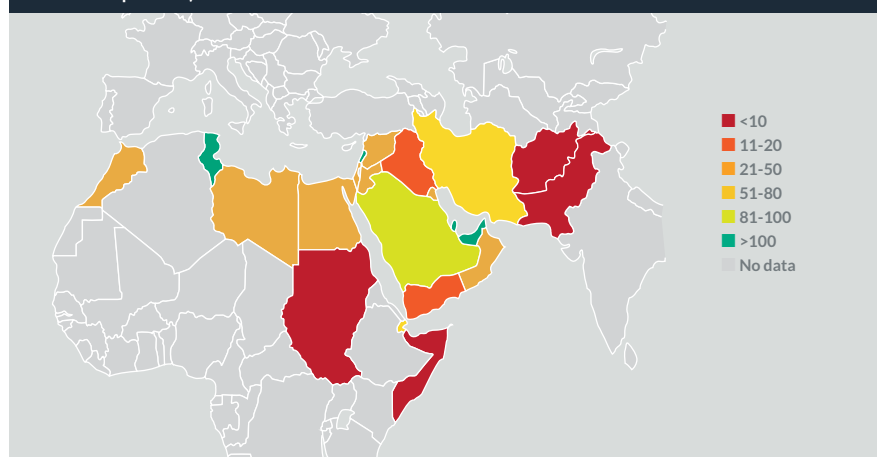
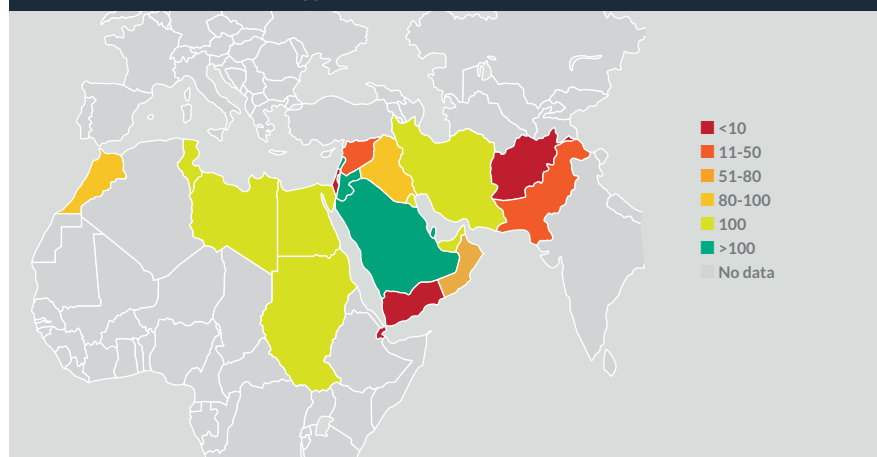


Figure 4: Coverage of needs for radiotherapy devices in EMR Countries, 2021 (1,000 patients need a minimum of one radiotherapy device)



Because the initial capital investment in radiotherapy units and housing is costly and they require highly specialized staff required to plan and deliver radiotherapy, the provision of radiotherapy is often seen as exceedingly expensive (33). However, due to the high throughput of the equipment and its long life, and because most patients are treated as outpatients, radiotherapy is, in fact, one of the most cost-effective modalities of cancer therapy (34).

The findings of the “cancer technology survey” showed that radiotherapy centres in all six studied countries provide services related to 3D conformal radiation therapy, linear particle accelerator, 3-D treatment planning system, CT simulation, and patient immobilization. On the other hand, a limited number of newer technologies, such as intensity-modulated radiation therapy (IMRT), are being developed and are available to treat patients, especially in Oman, Jordan and Lebanon. This new technology is also available to patients in Iran’s public and private healthcare sectors. Although some techniques such as stereotactic radiosurgery (SRS) have been introduced in Iran, Oman, Lebanon, Jordan and Pakistan, they may not be widely available to patients in Iran, Oman and Pakistan. These facilities are available in Iran’s private healthcare sector to a limited extent. The conflicts and political instability in the region have negatively impacted on provision of the services; the new sanctions imposed on Iran have restricted the accessibility of such

(30, 31). Lower- and middle-income countries face serious restrictions on providing radiotherapy services to their patients worldwide, as 50% of patients in most of these countries do not have access to radiotherapy services (32). Recent studies showed a strong association between access to radiotherapy and enough radiotherapy devices, indicating that other access factors, such as radiation megavoltage machines in a country, are an important factor in radiotherapy (31).

equipment. Radiotherapy quality assurance programmes are carried out in most EMR countries, and all six countries studied have planned and developed programmes to evaluate and ensure the quality of radiotherapy care.

There is no accurate and precise information on the number of radiation oncologists, medical physicists, radiation therapy technologists and biomedical engineers in EMR countries. Reports show no serious shortage in these personnel in Iran,

Oman, Lebanon, Jordan, Lebanon and Pakistan. Nevertheless, the repair and maintenance of devices and equipment are considered a major problem in Sudan and Iran (especially after international Sanctions).

International estimates suggest that 50% of cancer patients need radiotherapy. On the other hand, a radiotherapy device can annually provide standard services to 500 patients (33, 34), based on GLOBOCAN's estimates of the annual incidence of cancers in each of the EMR countries and the IAEA data (DIRAC) on the number of teletherapy devices,

Fortunately, there are enough radiotherapy devices in most EMR countries, as the availability of these devices is about 100% and more in 13 of the 21 countries in the region (Table 5; Figure 4). However, there is a lack of equity on access to radiotherapy devices in Syria, Afghanistan, Yemen and Pakistan, as less than 30% of the needs of patients is met. The coverage of radiotherapy services in Oman, Morocco and Iraq is equal to 60%, 80%, and 80%, respectively, whereas this figure is about 400% in Jordan and 200% in Qatar.

The EMR countries have different conditions in terms of brachytherapy. Although brachytherapy is very cost-effective and inexpensive and causes minimal complications, it is not yet well developed in many countries in the region (35). However, there are a few but an insufficient number of brachytherapy devices in some countries such as Iran, Saudi Arabia, Jordan, Sudan and Tunisia. Morocco, equipped with 23 brachytherapy devices versus 40 teletherapy seems to be the leading country in this region in this regard. This is also being considered even in the countries with 100% and more coverage of radiotherapy.

Incidence of cancer varies between EMR countries; accordingly, the need for radiotherapy services are also variable. On the other hand, an increasing awareness of patients and physicians about the possibility of using radiotherapy can increase the need and demand for radiotherapy services. Since the incidence of cancer is increasing in EMR and developing countries, the existing equipment that covers 100% of needs may fail to do so in the near future. For example, two teletherapy devices in Oman met all the radiotherapy needs in 2015. These two devices can currently meet only 60% of the demand considering the increasing incidence of cancers in recent years (GLOBOCAN data from 2012–2018). Therefore, these countries should develop multi-year vision plans to achieve the desired goals by 2040.

Another problem is the geographical distribution of radiotherapy centres. Since these centres are mainly located in large cities, many patients cannot easily receive radiotherapy services due to the long distances between their place of residence and these centres. To overcome this problem, the government of Oman has constructed some hostels to

accommodate the patients visiting radiotherapy centres for free. Some charity centres in Iran and Jordan provide inexpensive and low-cost accommodations for needy patients. Lebanon is a small country, and patients may choose the closest centre to them, and that offers less expensive treatment than the cancer centre that they are primarily using.

The issue we addressed regarding the accessibility of diagnostic and treatment facilities was simply the number of devices and geographical access. Most oncology centres are located in large cities, while many people live far from these cities. Studies have shown that long distances from centres can lead to a delayed or late diagnosis in the advanced stages of the disease. On the other hand, some treatments such as chemotherapy or target therapy should be performed every week for six months to one year. Some other treatments, such as radiotherapy, should be done in 35 daily sessions (36). The distance between the patient's residential place and the medical centres providing such services may discourage the patient from initiating or continuing the treatment (37, 38).

It has also been proven that patients can achieve better therapeutic results in centres with a high volume of clients, whereas receiving treatments in distant centres may be associated with more complications and less desirable therapeutic effects (39). Therefore, the establishment of necessary infrastructure to increase the access to early diagnosis services in all areas, development of national referral guidelines, rapid referral of patients to the appointed centres, and the provision of travel and accommodation facilities to patients can effectively prevent delayed diagnosis and treatment among patients living in distant areas (16).

Some models of remote service delivery have been designed in recent years to respond to the increasing need for palliative care in distant areas. Accordingly, patients receive the necessary services under the supervision of a physician, who has completed specialized courses in palliative care. These physicians work under the supervision of a team of specialists and consult them whenever necessary on a daily or weekly basis (40). In addition, such medical centres can plan to provide services, such as chemotherapy, radiotherapy, and follow-up tests, to patients by physicians or nurses who are in direct contact with a team of specialists (41). This can be an appropriate solution to reduce the problems of long-term treatment in cancer patients from a distant area.

There has been a successful initiative in India called the Pend Harker Model, which involved task shifting and the empowerment of an alternative oncology workforce. This model of cancer care delivery is widely used across four states in India. The model involved creating nodal cancer units in government-run district hospitals and creating a physician point of contact for cancer in every unit. The method involved

training general physicians for a month and giving them technomonitoring backup for every cancer patient they see. They were supposed to play multiple roles, including early diagnosis, patient care, including chemotherapy and palliative care. One of their essential roles is advocacy and public education (42). Benchmarking from this kind of model could be recommended, especially for countries with a lack of human resource and infrastructures in the EMR region.

#### *Future direction*

The EMR countries are challenged with an increasing incidence and mortality of cancer projected to double by 2040. Therefore, availability and access to quality cancer care need to be augmented. More broadly, there is a need to develop core and essential diagnostic and treatment facilities, in particular in low-resource countries. There is a need to enhance innovative financing mechanisms to improve access to cancer care.

EMR countries have different and variable conditions in terms of the accessibility of diagnostic and therapeutic services for cancer patients. A major challenge of cancer care in many countries is the supply of human resources specialized in cancer diagnosis and treatment. In addition, many medical specialists in these countries migrate to more developed countries to pass specialized training courses. The migration of specialists in the developed countries is another problem in this regard. Therefore, these countries need to take advantage of regional potential to train specialized personnel, empower their educational systems to provide specialized training courses, and provide better living facilities for medical specialists in order to guarantee the human resources needed for cancer diagnosis and treatment. For example, Pakistan, Iran, Lebanon and Jordan have provided adequate infrastructure for training specialized and subspecialized oncology specialists; other countries in the region can become both models for these four countries in the development of infrastructure and plan training courses in cooperation with them (15).

To scale up access to essential technologies for cancer diagnosis and treatment in the EMR, there is a need to invest in cancer surveillance and develop a robust information system, including a population-based cancer registries (at least covering a representative region of each country), a mortality system and an information system for all early detection programmes ensuring linkage among them.

The insurance industry has not much developed in EMR countries, and the majority of cancer diagnosis and treatment costs are funded either by patients or governments. Expanding insurance companies and finding solutions to reduce treatment costs should be among the top priorities of EMR countries, especially LMICs such as Afghanistan, Pakistan, Yemen and Morocco. ASCO, NCCN and BHGI have published guidance on

implementation of resource-stratified guidelines and can be very useful for planning in LMICs and the EMR (43, 44).

Afghanistan, Iraq, Pakistan, Somalia and Sudan currently face serious restrictions on diagnostic facilities such as CT scans and MRIs. These countries hence need to plan to meet the required equipment and facilities.

A national list of essential oncology medicines should be developed based on the WHO Essential Medicines List and the resources available to ensure access for all cancer patients to them; the list should be updated regularly. Consider developing and updating a national plan to ensure access to cancer diagnosis and treatment as part of the NCCP, including facilities and equipment based on the current availability, geographical distribution, needs and resources available. National inventory should be implemented and kept updated. The technology available in neighbouring countries should also be considered for possible collaboration.

Adaptation of cancer early diagnosis referral guidelines from the primary healthcare level to the secondary and tertiary levels based on the specific conditions of each country is another priority that should be considered in the development of cancer control programmes in the region in addition to the development of national resource-appropriate guidelines for cancer diagnosis and treatment. The establishment of the necessary infrastructure to implement and monitor the proper implementation of the locally adapted guidelines is an important step and should be taken into account in all countries of the region.

Another top priority in all EMR countries is the development of multidisciplinary teams and the establishment of the necessary infrastructure for decision-making and planning for the treatment of patients in these teams. National and regional collaboration is feasible and the use of online video conferencing, virtual training and using digital technologies for learning should be encouraged.

As the first cancer treatment modality, surgical procedures require the supply of subspecialized human resources. Although specialized surgeons, such as general surgeons, are available in most countries in the region, it is especially important to recruit trained organ-based specialists in cancer surgery.

One of the top priorities for some EMR countries, especially for the LMICs, including Afghanistan, Pakistan and Yemen, concerning systemic therapy is to prepare a list of essential medicines and provide the necessary infrastructure for the permanent and free supply of them.

The availability of radiotherapy devices and equipment is less than 30% in Yemen, Afghanistan, Syria, Sudan and Pakistan. Therefore, these countries need to plan to provide the necessary equipment and facilities for radiotherapy. Since the

estimates show that the number of cancer patients will almost double in the next 10 to 20 years, other EMR countries should also plan to provide appropriate equipment and facilities for cancer diagnosis and treatment (45). Collaboration across the region, and government investment into cancer care at the patient level, would result in vast improvements in access to cancer care. ■

#### 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.*

#### Key recommendations:

- ➔ Build capacity and train subspecialists for cancer care including paediatric oncologists and onco-surgeons.
- ➔ Expand the insurance industry and providing the required infrastructure to reduce out of pocket expenditure, particularly in low-income countries in the region.
- ➔ Develop and implement national clinical practice and patient referral guidelines according to the specific conditions of each country in the region.
- ➔ Prepare and update the essential cancer medicines list, and ensure the proper accessibility and availability of medicines in each country, particularly in low-income countries.
- ➔ Plan how to supply the equipment for surgery, chemotherapy, radiotherapy and cancer diagnostic services, given the increase in the incidence rate of cancer over the next 10 to 20 years.
- ➔ Establish a cancer care network in the region for capacity building, exchange programmes, consultation services and medical tourism.
- ➔ Conduct regular surveys and assess the status quo of human resources including specialists, subspecialists, equipment, infrastructure and access to cancer care at regional, national and subnational levels.



## References

- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018;68(6):394-424.
- Koo MM, Swann R, McPhail S, Abel GA, Ellis-Brookes L, Rubin GP, et al. Presenting symptoms of cancer and stage at diagnosis: evidence from a cross-sectional, population-based study. *Lancet Oncol*. 2020;21(1):73-9.
- Boyle P, d'Onofrio A, Maisonneuve P, Severi G, Robertson C, Tubiana M, et al. Measuring progress against cancer in Europe: has the 15% decline targeted for 2000 come about? *Annals of Oncology*. 2003;14(8):1312-25.
- El Saghir NS, Khalil MK, Eid T, El Kinge AR, Charafeddine M, Geara F, et al. Trends in epidemiology and management of breast cancer in developing Arab countries: a literature and registry analysis. *International journal of surgery*. 2007;5(4):225-33.
- El Saghir NS, Assi HA, Jaber SM, Khoury KE, Nachev Z, Mikdashi HF, et al. Outcome of breast cancer patients treated outside of clinical trials. *Journal of Cancer*. 2014;5(6):491.
- Hanna TP, Kangolle AC. Cancer control in developing countries: using health data and health services research to measure and improve access, quality and efficiency. *BMC Int Health Hum Rights*. 2010;10:24.
- Elzawawy A. Science and affordability of cancer drugs and radiotherapy in the world—win-win scenarios. *Advances in cancer management*. 2012:255-78.
- Organization WH. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. 2013.
- Organization WH. WHO list of priority medical devices for cancer management: World Health Organization; 2017.
- Miller KD, Nogueira L, Mariotto AB, Rowland JH, Yabroff KR, Alfano CM, et al. Cancer treatment and survivorship statistics, 2019. *CA: a cancer journal for clinicians*. 2019;69(5):363-85.
- Organization WH. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2015 country capacity survey in the Eastern Mediterranean Region. 2016.
- Cherny NI, Sullivan R, Torode J, Saar M, Eniu A. ESMO International Consortium Study on the availability, out-of-pocket costs and accessibility of antineoplastic medicines in countries outside of Europe. *Annals of Oncology*. 2017;28(11):2633-47.
- Paez D, Becic T, Bhonsle U, Jalilian AR, Nuñez-Miller R, Osso Jr JA, editors. Current status of nuclear medicine practice in the Middle East. *Seminars in Nuclear Medicine*; 2016: Elsevier.
- Nass SJ, Cogle CR, Brink JA, Langlotz CP, Balogh EP, Muellner A, et al. Improving cancer diagnosis and care: patient access to oncologic imaging expertise. *Journal of Clinical Oncology*. 2019;37(20):1690.
- El Saghir NS, Anderson BO, Gralow J, Lopes G, Shulman LN, Moukadem HA, et al. Impact of merit-based immigration policies on brain drain from low-and middle-income countries. *JCO global oncology*. 2020;6:185-9.
- Levit LA, Balogh E, Nass SJ, Ganz P. Delivering high-quality cancer care: charting a new course for a system in crisis: National Academies Press Washington, DC; 2013.
- Stockdale H, Guillory K. In American Cancer Society Cancer Action Network. Why cancer patients depend on medicare for critical coverage (Available at <http://www.acscan.org/content/wp-content/uploads/2013/06/2013-Medicare-Chartbook-Online-Version.pdf> (accessed January 2016))[Google Scholar]. 2013.
- Zhao J, Mao Z, Fedewa SA, Nogueira L, Yabroff KR, Jemal A, et al. The Affordable Care Act and access to care across the cancer control continuum: A review at 10 years. *CA: a cancer journal for clinicians*. 2020;70(3):165-81.
- Coleman R, Rubens R, Fogelman I. Reappraisal of the baseline bone scan in breast cancer. *Journal of nuclear medicine*. 1988;29(6):1045-9.
- Early JF. Nuclear medicine in cancer diagnosis. *The Lancet*. 1999;354(9181):853-7.
- El Saghir NS, El-Asmar N, Hajj C, Eid T, Khatib S, Bounedjar A, et al. Survey of utilization of multidisciplinary management tumor boards in Arab countries. *The Breast*. 2011;20:S70-S4.
- El Saghir NS, Charara RN, Kreidieh FY, Eaton V, Litvin K, Farhat RA, et al. Global practice and efficiency of multidisciplinary tumor boards: results of an American Society of Clinical Oncology international survey. *Journal of global oncology*. 2015;1(2):57-64.
- Arruebo M, Vilaboa N, Sáez-Gutiérrez B, Lambea J, Tres A, Valladares M, et al. Assessment of the evolution of cancer treatment therapies. *Cancers (Basel)*. 2011;3(3):3279-330.
- Sikora K, Advani S, Koroltchouk V, Magrath I, Levy L, Pinedo H, et al. Essential drugs for cancer therapy: a World Health Organization consultation. *Annals of Oncology*. 1999;10(4):385-90.
- Organization WH. World Health Organization model list of essential medicines: 21st list 2019. World Health Organization; 2019.
- Chivukula MV, Tisocki K. Approaches to improving access to essential cancer medicines in the WHO South-East Asia Region. *WHO South-East Asia Journal of public health*. 2018;7(2):62-6.
- Rouhollahi MR, Nejad SM, Harirchi I, Zarei B, Keshtmand G, Sadighi S, et al. Recommendations for management of the Trastuzumab (Herceptin) among Iranian breast cancer patients, a policy brief. *Basic & Clinical Cancer Research*. 2014;6(2):27-34.
- Bognar CLFB, Bychkovsky BL, Lopes Jr GdL. Compulsory licenses for cancer drugs: does circumventing patent rights improve access to oncology medications? *Journal of global oncology*. 2016;2(5):292-301.
- Rockers PC, Wirtz VJ, Umeh CA, Swamy PM, Laing RO. Industry-led access-to-medicines initiatives in low-and middle-income countries: strategies and evidence. *Health Affairs*. 2017;36(4):706-13.
- Rosenblatt E, Izeuska J, Anacak Y, Pynda Y, Scalliet P, Boniol M, et al. Radiotherapy capacity in European countries: an analysis of the Directory of Radiotherapy Centres (DIRAC) database. *The lancet oncology*. 2013;14(2):e79-e86.
- Rosenblatt E, Fidarova E, Zubizarreta EH, Barton MB, Jones GW, Mackillop WJ, et al. Radiotherapy utilization in developing countries: An IAEA study. *Radiotherapy and Oncology*. 2018;128(3):400-5.
- Barton MB, Frommer M, Shafiq J. Role of radiotherapy in cancer control in low-income and middle-income countries. *The lancet oncology*. 2006;7(7):584-95.
- Rosenblatt E. Planning national radiotherapy services. *Frontiers in oncology*. 2014;4:315.
- Atun R, Jaffray DA, Barton MB, Bray F, Baumann M, Vikram B, et al. Expanding global access to radiotherapy. *The lancet oncology*. 2015;16(10):1153-86.
- Grover S, Longo J, Einck J, Puri P, Brown D, Chino J, et al., editors. The unique issues with brachytherapy in low-and middle-income countries. *Seminars in radiation oncology*; 2017: Elsevier.
- Peto R, Davies C, Godwin J, Gray R, Pan H, Clarke M, et al. Comparisons between different polychemotherapy regimens for early breast cancer: meta-analyses of long-term outcome among 100,000 women in 123 randomised trials. *Lancet (London, England)*. 2011;379(9814):432-44.
- Cosway B, Douglas L, Armstrong N, Robson A. Travelling for treatment; does distance and deprivation affect travel for intensity-modulated radiotherapy in the rural setting for head and neck cancer? *J Laryngol Otol*. 2017;131(6):546-8.
- Williams F, Jeanetta S, James AS. Geographical Location and Stage of Breast Cancer Diagnosis: A Systematic Review of the Literature. *Journal of health care for the poor and underserved*. 2016;27(3):1357-83.
- Vetterlein MW, Löppenberg B, Karabon P, Dalela D, Jindal T, Sood A, et al. Impact of travel distance to the treatment facility on overall mortality in US patients with prostate cancer. *Cancer*. 2017;123(17):3241-52.
- Katzman JG. ECHO telementoring for pain, palliative care, and opioid management: Progress, challenges, and future goals. *Pain Medicine*. 2020;21(2):220-5.
- Babu R, Dhanasekaran K, Mehrotra R, Hariprasad R. Leveraging technology for nation-wide training of healthcare professionals in cancer screening in India: a methods article. *Journal of Cancer Education*. 2020:1-7.
- Pendharker D. Oncology leadership development using decentralization, task shifting, techno-mentoring and creation of alternate oncology workforce. *Journal of Clinical Oncology*. 2019;37(15\_suppl):e18043-e.
- Chuang LT, Temin S, Camacho R, Dueñas-Gonzalez A, Feldman S, Gultekin M, et al. Management and Care of Women With Invasive Cervical Cancer: American Society of Clinical Oncology Resource-Stratified Clinical Practice Guideline. *Journal of Global Oncology*. 2016;2(5):311-40.
- Mutebi M, Anderson BO, Duggan C, Adebamowo C, Agarwal G, Ali Z, et al. Breast cancer treatment: A phased approach to implementation. *Cancer*. 2020;126 Suppl 10:2365-78.
- Anderson BO, Cazap E, El Saghir NS, Yip C-H, Khaled HM, Otero IV, et al. Optimisation of breast cancer management in low-resource and middle-resource countries: executive summary of the Breast Health Global Initiative consensus, 2010. *The lancet oncology*. 2011;12(4):387-98.



# Cancer care in humanitarian crises

**Raya Saab**, Associate Professor, Children's Cancer Institute, American University of Beirut Medical Center, Lebanon; **Slim Slama**, Unit Head, NMH Department, World Health Organization, Geneva, Switzerland; **Asem Mansour**, CEO and Director General, King Hussein Cancer Center, Amman, Jordan; **Zahi Abdul Sater**, Program Division Manager and Coordinator of the Conflict Medicine Program, Global Health Institute, American University of Beirut, Lebanon; **Rola El Sayed**, Hematology Oncology Fellow, American University of Beirut Medical Center, Lebanon and **Deborah Mukherji**, Associate Professor of Clinical Medicine, American University of Beirut Medical Center, Lebanon and Consultant Medical Oncologist, Clemenceau Medical Center Dubai, United Arab Emirates



RAYA SAAB



SLIM SLAMA



ASEM MANSOUR



ZAHİ ABDUL SATER



ROLA EL SAYED



DEBORAH MUKHERJI

The humanitarian response to crises has historically involved acute provision of emergency care with a focus on trauma management and the prevention and treatment of acute infections. With regional conflicts lasting for many years resulting in health system breakdowns, conflict-affected populations have become more vulnerable including large numbers of refugees and migrants requiring ongoing support in neighbouring countries. Consequently, management of noncommunicable diseases (NCDs), including cancer, has become an increasingly challenging issue given the complexity of care delivery, limited availability of resources and lack of accurate data on which to base policy decisions.

Humanitarian crisis is a term used to describe a situation of human emergency causing physical, economic or environmental damage that overwhelms a community's potential to manage its population's needs (1). The World Health Organization's Eastern Mediterranean Region (EMR) has been heavily affected by protracted armed conflict with more than 42 million people across the region estimated to require some form of humanitarian assistance in 2020 (2). Countries directly affected by conflict include Syria, Yemen, Libya, Iraq and the Occupied Palestinian Territory, with neighbouring countries such as Lebanon, Jordan and Turkey hosting large populations of refugees. According to data from the United Nations High Commissioner for Refugees (UNHCR), in 2019 the Middle East and North Africa region was the origin of 7.3 million refugees, 90% of whom were from Syria. In addition, the region hosts 11.5 million internally displaced people who may face significant barriers to healthcare access (3, 4).

## Cancer care in fragile and conflict-affected countries in the EMR

Of the 21 member states and Palestine (West bank and Gaza Strip) comprising the WHO EMRO area, seven are classified by the World Bank to be affected by high- or medium-intensity conflict, in addition to Lebanon, the Occupied Palestinian Territories and Sudan which are considered to be affected by high levels of institutional and social fragility (5). For populations living in countries directly or indirectly affected by conflict, security and economic situations are dynamic

and intertwined, making regional generalizations impossible and service planning dependent on local needs assessment. Dewachi and colleagues introduced the concept of therapeutic geographies to describe the geographic reorganization of healthcare within and across borders under conditions of war (6). Recent conflicts affecting the region have taken place in urban settings involving various state, non-state and foreign stakeholders. Universally, these have resulted in devastating and enduring effects on public health and healthcare infrastructure (7).

Within the EMR, huge variation exists among countries regarding the availability of data on cancer incidence, stage at diagnosis and treatment outcomes (8). In countries directly affected by conflict and those hosting refugees, data collection becomes even more challenging and deprioritized. Unfortunately, without accurate data on which to base economic analysis and policy decisions, cancer care for the most vulnerable in the region remains chronically under-resourced (9). A glaring repercussion is the lack of progress towards universal health coverage (UHC), a global priority highlighted by the United Nations Sustainable Development Goals (UN SDGs) ensuring that all people receive the health services they need without experiencing financial hardship (10). Based on the Global Burden of Diseases, Injuries and Risk Factors Study (GBD) 2019, a framework for measuring UHC effective coverage has been constructed by weighting each effective coverage indicator relative to its associated potential health gains, as measured by disability-adjusted

Table 1: Fragile and conflict-affected countries of the EMR (5) universal health coverage index and effective coverage indicators for cancer in 2019 reported on a scale of 0–100 (11)

Country	World Bank classification	UHC effective coverage index	Acute lymphoid leukemia treatment	Breast cancer treatment	Cervical cancer treatment	Uterine cancer treatment	Colorectal cancer treatment
Afghanistan	High-intensity conflict	39	5	18	15	18	7
Libya	High-intensity conflict	66	21	65	57	74	47
Somalia	High-intensity conflict	24	5	2	1	1	1
Syria	High-intensity conflict	58	29	69	58	78	53
Iraq	Medium-intensity conflict	58	18	64	53	74	48
South Sudan	Medium-intensity conflict	42	6	9	4	7	4
Yemen	Medium-intensity conflict	49	6	38	30	41	21
Lebanon	Fragile	75	69	85	79	91	68
Palestine	Fragile	61	20	65	52	74	49
Sudan	Fragile	52	9	46	40	47	29

life years for each location-year and population-age group (11). The UHC effective coverage framework includes several indicators related to cancer care including treatment of acute lymphoid leukemia treatment, breast cancer, cervical cancer, uterine cancer and colorectal cancer which can provide some insights into the sub-optimal levels of cancer care in fragile and conflict-affected countries in the region with the caveat that cancer incidence and mortality data from these areas is based on modelled estimates rather than accurate population-based registries (Table 1).

As an inevitable consequence of regional instability, programmes for cancer prevention, diagnosis and treatment in conflict-affected areas have been severely disrupted as resources are diverted to acute healthcare needs. The challenges in providing cancer care services are compounded by damage to facilities, lack of specialized healthcare professionals and limited availability of medical equipment and therapeutics (12, 13). In Gaza, which has been under conditions of protracted conflict for many years, deficiencies in cancer care services and delays in the provision of travel permits required to access treatment outside Gaza have contributed to poor survival outcomes (14). A cross-sectional study of physicians in Syria in 2016 reported that access to specialist physicians, cancer diagnostics and management options within both government-controlled and besieged cities was severely limited (12). On interviewing patients undergoing cancer treatment and their families in Sulaymaniyah, Iraq, Skelton described the challenges faced by patients struggling to obtain care while navigating security issues and fragmented healthcare access. Patients reported visits to multiple hospitals across different cities due to shifting security conditions requiring the sale of personal assets to finance treatment in a mixture of public and private clinics and difficulties obtaining medications from various sources (15).

Resulting from the conflict-induced deficiencies in cancer care services in many parts of the EMR, oncology centres

in neighbouring countries have seen growing numbers of non-refugee patients who travel backwards and forwards across borders to seek care (16–18). A study interviewing patients travelling from Iraq to Beirut, Lebanon, for cancer treatment identified high levels of financial distress with reliance on the sale of possessions, homes and vast networks to raise funds. Thematic analysis identified several drivers for travelling across borders for treatment including the exodus of Iraqi specialist doctors, destruction of hospitals or road blockages, referrals by Iraqi doctors to Lebanese hospitals, geographic proximity of Lebanon and the lack of diagnostic equipment, radiotherapy machines and reliable provision of chemotherapy in Iraq (19). The authors identified deficiencies in communication between healthcare providers and patients regarding cost and duration of treatment required to engage in shared decision-making and management of limited resources. It should be recognized that patients seeking self-funded cancer care across borders from conflict-affected regions represent a vulnerable war-affected population with specific needs.

The literature on the impact of armed conflict on cancer incidence and mortality is sparse, methodologically poor and often contradictory. There is a pressing need to address this relative “data poverty” and for more rigorous longitudinal and cohort studies of populations affected by conflict to inform the development of basic cancer care recommendations and post-conflict cancer control planning (20).

### Cancer care for refugees and migrants

Refugees are defined and protected by international law as persons fleeing armed conflict or persecution who are not able to safely return to their country of origin; migrants are defined as persons who would continue to receive the protection of their government if they chose to return to their country of origin (21). The scale and complexity of recent conflict within the EMR has resulted in unprecedented levels of forced displacement and successive waves of refugees

crossing borders. At the end of 2019, Syrians continued to be the largest forcibly displaced population worldwide with the majority of refugees hosted in Turkey (3.6 million). Lebanon and Jordan have also hosted large numbers of refugees with Lebanon, Jordan and Turkey ranking second, fourth and fifth, respectively, when comparing the number of refugees they host in relation to the population size globally. In Lebanon, one in seven of the current population are refugees, putting a huge strain on an already fragile healthcare system (3, 22). Also within the EMR, Pakistan hosts 1.4 million refugees from neighbouring Afghanistan (3).

As the burden of NCDs grows among displaced populations who are in need of long-term healthcare provision and preventative services, management of the protracted humanitarian crises in the region has become increasingly complex and costly (23). Each host country has developed a different strategy depending on local resources. In Jordan and Lebanon, the UNHCR co-ordinates various healthcare providers from both public and private sectors with the assistance of nongovernmental organizations (NGOs). In Turkey, services are covered by the Governmental Disaster and Emergency Management Presidency (AFAD) (22).

Cancer care in particular poses huge financial and ethical challenges for policy makers. More than 98% of Syrian refugees live outside of camp settings and have been displaced for more than 5 years. Despite the fact that only 2% of this population are above 60, programmes that can reduce cancer risk factors and screen for early detection of disease can save lives and resources (3, 24). Abdul-Khalek and colleagues recently published the first population-based modelling study estimating the direct costs of cancer care among Syrian refugee populations residing in Jordan, Lebanon and Turkey. Total cancer care costs for all 4.74 million Syrian refugees hosted in these countries in 2017 was estimated to be €140.23 million using the cost per capita approach, €79.02 million using the age-standardized incidence approach and €33.68 million using the crude incidence approach. Taking the lowest estimated cost and country population and Gross Domestic Product (GDP) and model predictors, the financial burden of cancer care was highest for Turkey (€25.18 million), followed by Lebanon (€6.4 million) and Jordan (€2.09 million) (25).

Accurate data on the incidence of cancer in refugee populations is sparse, however, a report from Turkey, where treatment for Syrian refugees is provided by public hospitals, showed that between 2012 and 2015, 38,243 cancer cases were recorded. With the mean age of the population diagnosed with cancer 43 years, the most commonly diagnosed cancers were breast cancer (28.21%), lymphoid leukemia (8.11%) and colon cancer (6.57%) (26). In Jordan, using age- and sex-specific population-based incidence rates, it has been estimated that

over 850 Syrians are diagnosed with cancer annually, with the most common cancers diagnosed being breast, colorectal and lung cancer (27). While cancer care for Syrian refugees in Jordan was initially subsidized to the same level as insured nationals, this changed in 2014 due to increasing strain on the healthcare system (28). Currently in both Jordan and Lebanon, refugees registered with the UNHCR with complex healthcare needs including cancer treatment are referred to an Exceptional Care Committee (ECC) to decide on treatment funding on a case-by-case basis. Due to funding restrictions, treatment of advanced malignancy is rarely covered. Of the 289 applications for cancer treatment reviewed by the UNHCR ECC in Jordan between 2016 and 2017, only 40% of these were approved and funded; in Lebanon between 2015 and 2017, 357 applications were received of which 79% were approved (24).

With the available data on the expected cancer incidence rates in the refugee population, it is evident that a large proportion of patients are not accessing the treatment they need. In Jordan the King Hussein Cancer Foundation has been able to assist a growing number of adults and children to receive care at the King Hussein Cancer Center however innovative funding solutions and investment in broader regional health system strengthening will be required to improve equitable access to cancer care for both refugees and host populations (9, 27). Investing in community-based measures to increase awareness, address cancer risk factors and promote early detection of common malignancies such as breast cancer has the potential to improve outcomes and decrease treatment costs (29-31).

Unlike adult cancer diagnosis and treatment, paediatric cancer care is generally focused in regional referral centres which may have access to additional funding from both governments and NGOs. The American University of Beirut Medical Center and the Children's Cancer Centre of Lebanon Foundation, in partnership with St Jude Children's Research Hospital and the American Lebanese Syrian Associated Charities, have established three successive funding programmes to treat displaced children with cancer in Lebanon. Through these programmes, 575 children were evaluated between 2011 and 2017, and 311 received direct support demonstrating the importance of a coordinated approach to priority-setting and management, and highlighting the remaining gap in addressing the needs of almost half of the patients with newly diagnosed cancer, and patients with relapsed disease (32). It has been estimated that between 60 and 100 children are diagnosed with cancer each year in the Syrian refugee population in Turkey. Governmental healthcare coverage, communication difficulties, poor adherence to hygiene measures and delays in access to outpatient

medications were identified as significant challenges to the delivery of optimal care (33). A comparative study from a single institution in Turkey has reported inferior survival rates in a cohort of Syrian refugee children with cancer compared to Turkish children underlining the complexity of delivering high-quality care to disadvantaged communities even in settings where inpatient treatment is provided free of charge (34).

## Areas for development

Cancer control in humanitarian crises is a hugely challenging topic lacking accurate data on which to inform evidence-based policy recommendations (9, 35). In the context of regional healthcare system fragility, relying on individual countries to address the lack of equitable access to cancer prevention, diagnosis and treatment strategies is unlikely to result in

significant change. All countries directly or indirectly affected by conflict require international assistance to strengthen population-based cancer registries and implement resource-adapted national cancer control plans. Collaborative efforts to improve data collection, impactful research and pragmatic management guidelines should be facilitated to address the growing disparities in cancer outcomes. ■

## 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.

## References

- WorldVision. What is a humanitarian disaster? October 2020; Available from: <https://www.wvi.org/disaster-management/what-humanitarian-disaster>.
- UNOCHA. Global Humanitarian Overview 2020. 2020.
- UNHCR. Global Health Trends Forced Displacement in 2019. 2019.
- UNHCR. UN High Commissioner for Refugees (UNHCR), Policy on UNHCR's Engagement in Situations of Internal Displacement, 18 September 2019, UNHCR/HCP/2019/1. 2019.
- Bank W. List of Fragile and Conflict-Affected Situations. 2020.
- Dewachi O et al. Changing therapeutic geographies of the Iraqi and Syrian wars. *Lancet*, 2014. 383(9915): p. 449-57.
- Mowafi H. Conflict, displacement and health in the Middle East. *Glob Public Health*, 2011. 6(5): p. 472-87.
- Znaor A et al. Use of cancer data for cancer control in the Eastern Mediterranean Region: results of a survey among population-based cancer registries. *International journal of cancer*, 2020.
- Ilbawi A, Slama S. Cancer care for refugees: time to invest in people and systems. *Lancet Oncol*, 2020. 21(5): p. 604-605.
- Schmidt H, Gostin LO, Emanuel EJ. Public health, universal health coverage, and Sustainable Development Goals: can they coexist? *Lancet*, 2015. 386(9996): p. 928-30.
- Collaborators, GUHC. Measuring universal health coverage based on an index of effective coverage of health services in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*, 2020. 396(10258): p. 1250-1284.
- Sahloul E et al. Cancer Care at Times of Crisis and War: The Syrian Example. *Journal of global oncology*, 2017. 3(4): p. 338-345.
- El Saghir NS et al. Cancer Care for Refugees and Displaced Populations: Middle East Conflicts and Global Natural Disasters. *Am Soc Clin Oncol Educ Book*, 2018. 38: p. 433-440.
- Al Waheidi S. Breast cancer in Gaza-a public health priority in search of reliable data. *Eccancermediscience*, 2019. 13: p. 964.
- Skelton M, Mula-Hussain LYI, Namiq KF. Oncology in Iraq's Kurdish Region: Navigating Cancer, War, and Displacement. *J Glob Oncol*, 2018. 4: p. 1-4.
- Yusuf MA et al. Cancer care in times of conflict: cross border care in Pakistan of patients from Afghanistan. *Eccancermediscience*, 2020. 14: p. 1018.
- Abdul-Sater Z, et al. Cancer Registration in the Middle East, North Africa, and Turkey: Scope and Challenges. *JCO Glob Oncol*, 2021. 7: p. 1101-1109.
- Dewachi O, Rizk A, Singh NV. (Dis)connectivities in wartime: The therapeutic geographies of Iraqi healthcare-seeking in Lebanon. *Glob Public Health*, 2018. 13(3): p. 288-297.
- Skelton M et al. High-cost cancer treatment across borders in conflict zones: Experience of Iraqi patients in Lebanon. *Journal of Global Oncology*, 2020. 2020(6): p. 59-66.
- Jawad M et al. The impact of armed conflict on cancer among civilian populations in low- and middle-income countries: a systematic review. *Eccancermediscience*, 2020. 14: p. 1039.
- UNHCR. UNHCR viewpoint: "Refugee" or "migrant" – Which is right? October 2020; Available from: <https://www.unhcr.org/news/latest/2016/7/55df0e556/unhcr-viewpoint-refugee-migrant-right.html>.
- Akik C et al. Host country responses to non-communicable diseases amongst Syrian refugees: a review. *Confl Health*, 2019. 13: p. 8.
- Naja F et al. Burden of non-communicable diseases among Syrian refugees: a scoping review. *BMC Public Health*, 2019. 19(1): p. 637.
- Spiegel PB et al. Cancer in Syrian refugees in Jordan and Lebanon between 2015 and 2017. *The Lancet. Oncology*, 2020. 21(5): p. e280-e291.
- Abdul-Khalek RA et al. The economic burden of cancer care for Syrian refugees: a population-based modelling study. *Lancet Oncol*, 2020. 21(5): p. 637-644.
- Göktaş B et al., Cancer Incidence Among Syrian Refugees in Turkey, 2012–2015. *Journal of International Migration and Integration*, 2018. 19(2): p. 253-258.
- Mansour A, Al-Omari A, Sultan I. Burden of Cancer Among Syrian Refugees in Jordan. *J Glob Oncol*, 2018. 4: p. 1-6.
- Marzouk M et al. "If I have a cancer, it is not my fault I am a refugee": A qualitative study with expert stakeholders on cancer care management for Syrian refugees in Jordan. *PLoS ONE*, 2019. 14(9): p. e0222496.
- Alawa J, Alhalabi F, and Khoshnood K. *Breast Cancer Management Among Refugees and Forcibly Displaced Populations: a Call to Action*. *Current Breast Cancer Reports*, 2019. 11(3): p. 129-135.
- Alawa J et al. Cancer Awareness and Barriers to Medical Treatment Among Syrian Refugees and Lebanese Citizens in Lebanon. *Journal of cancer education: the official journal of the American Association for Cancer Education*, 2020. 35(4): p. 709-717.
- Al Qadire M, Aljezawi M, Al-Shdayfat N. Cancer Awareness and Barriers to Seeking Medical Help Among Syrian Refugees in Jordan: a Baseline Study. *J Cancer Educ*, 2019. 34(1): p. 19-25.
- Saab R et al. Displaced children with cancer in Lebanon: A sustained response to an unprecedented crisis. *Cancer*, 2018. 124(7): p. 1464-1472.
- Kebudi R et al. Refugee children with cancer in Turkey. *Lancet Oncol*, 2016. 17(7): p. 865-867.
- Yagci-Kupeli B, Ozkan A. Syrian and Turkish children with cancer: a comparison on survival and associated factors. *Pediatric hematology and oncology*, 2020: p. 1-10.
- Gheorghe A et al. Economics of Pediatric Cancer in Four Eastern Mediterranean Countries: A Comparative Assessment. *JCO global oncology*, 2020. 6: p. 1155-1170.

# Childhood cancer in the Eastern Mediterranean Region

**Raya Saab**, Children's Cancer Institute, Department of Pediatrics and Adolescent Medicine, American University of Beirut Medical Center, Beirut, Lebanon; **Ranin Soliman**, Children's Cancer Hospital Egypt, Cairo, Egypt; **Asim Belgaumi**, Department of Oncology, Aga Khan University, Karachi, Pakistan; **Leila Hessissen**, Pediatric Hematology Oncology Center of Rabat, Rabat, Morocco; **Tezer Kutluk**, Hacettepe University Cancer Institute and Faculty of Medicine, Department of Pediatric Oncology, Ankara, Turkey; **Lydia Konig**, World Health Organization, Regional Office for the Eastern Mediterranean, Cairo, Egypt; **Sawsan Jaffar Sawan Al Madhi**, Friends of Cancer Patients, United Arab Emirates; **Iyad Sultan**, King Hussein Cancer Center, Amman, Jordan; **Mhamed Harif**, Centre Hospitalier Universitaire Tanger Tétouan Al Hoceima, Casablanca, Morocco and **Nasim Pourghazian**, World Health Organization, Regional Office for the Eastern Mediterranean, Cairo, Egypt

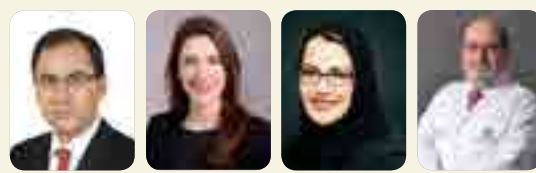


RAYA SAAB

RANIN SOLIMAN

ASIM BELGAUMI

LEILA HESSISSEN



TEZER KUTLUK

LYDIA KONIG

SAWSAN JAFFAR SAWAN  
AL MADHI

IYAD SULTAN



MHAMED HARIF

NASIM POURGHAZIAN

Among the six regions of the World Health Organization, the Eastern Mediterranean Region (EMR) has the second highest incidence of childhood cancer (defined as age 0–14) per capita. At the same time, the survival of childhood cancer patients is seen to strongly depend on the gross national income, causing a difference from an average of 20% of survival in low- and middle-income countries to 80% survival in high-income countries.

This shows the big potential to cure more childhood cancer patients in a region like the EMR where low- and middle-income countries are in the majority and thereby, reducing premature noncommunicable disease mortality – part of the Sustainable Development Goals of the United Nations agenda.

This chapter offers an overview of the current situation with childhood cancer treatment in the EMR from a health system perspective, including the status quo of the region in terms of organization and availability of services, training and research, as well as an examination of regional challenges to overcome.

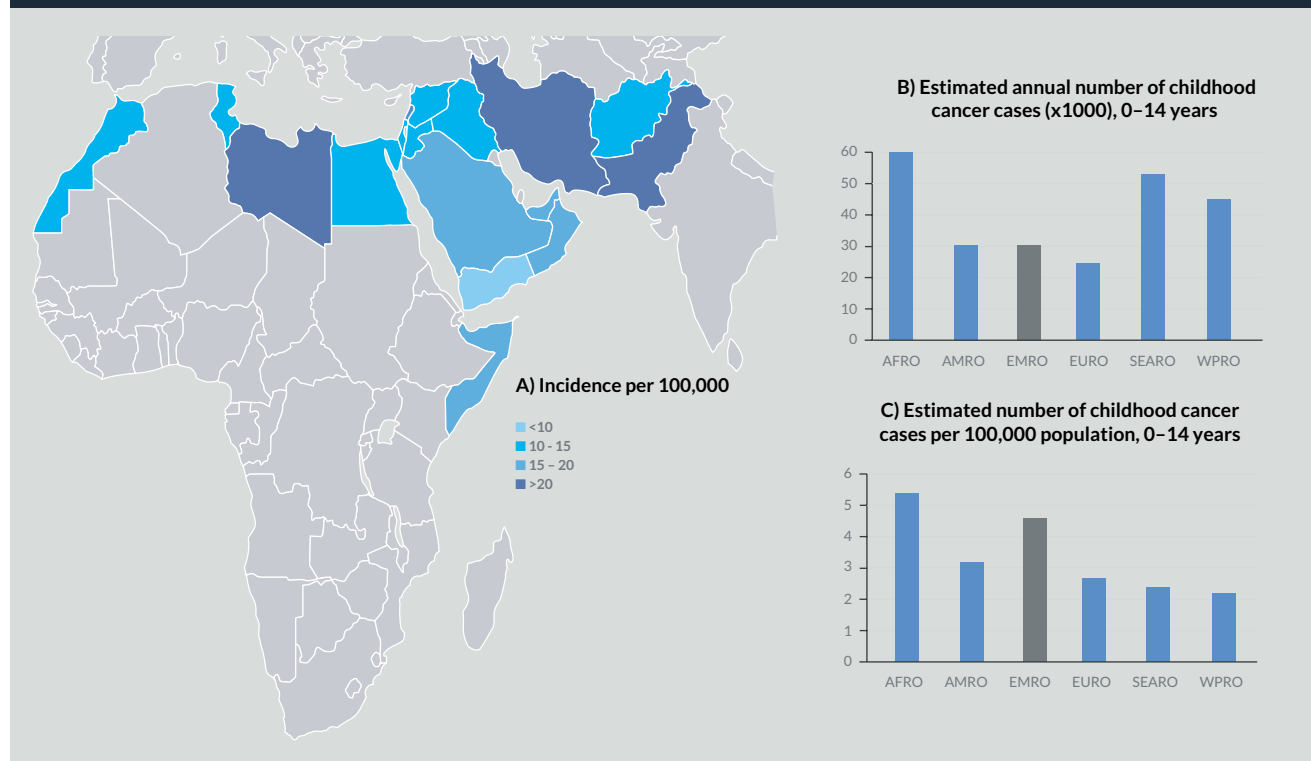
Childhood cancer is a leading cause of death among children and adolescents, with large disparities in survival rates between and within countries. In high-income countries with strong healthcare systems, survival rates for the most common childhood cancers surpass 80%, while the average survival approximates 20% in resource-limited settings (1, 2). Decreasing this disparity and increasing the global average survival to 60% by 2030 is one of the overarching aims of the Global Initiative for Childhood Cancer (GICC), launched by the World Health Organization (WHO) in partnership with St Jude Children's Research Hospital in 2018. As part of the GICC, six common childhood cancers (acute lymphoblastic leukemia, Burkitt lymphoma, Hodgkin lymphoma, retinoblastoma, Wilms tumour, low-grade glioma) have been identified as tracers for monitoring progress; chosen because they are relatively common across EMR countries as well as highly curable with proven therapies (1, 3). With childhood cancer contributing to premature NCD mortality,

the GICC will not only serve the Sustainable Development Goal (SDG) target 3.4 to reduce premature NCD mortality by one third by 2030, but is also an opportunity to operationalize the 2017 World Health Assembly resolution 70.12 on cancer prevention and control in the context of an integrated approach (4).

The WHO Report on Cancer 2020 with data from the International Agency for Research on Cancer (IARC) estimates 33,808 new cases of childhood cancer in the WHO Eastern Mediterranean Region (EMR) in 2018. It should be noted that this only includes children aged 0–14 years (5). Figure 1A shows the estimated age-standardized incidence rates for cancers in children aged 0–14 years in the EMR countries, as reported by GLOBOCAN in 2018. The EMR had the second to lowest estimated annual number of childhood cancer cases compared to other WHO regions (Figure 1B). However, it has a significantly smaller population, such that the per capita number of annual childhood cancer cases is in fact the second



Figure 1: Estimated annual childhood cancer cases in EMR region. All data are extracted from the IARC GLOBOCAN 2018. A) Incidence of cancer cases in children 0–14 years old, by EMR country. Shades correspond to the range shown in the legend on the right. B) Estimated age-standardized burden of cancers in children aged 0–14 years in the specified WHO regions. C) Number of estimated childhood cancer cases in children aged 0–14 per 100,000 population in the specified WHO regions. WHO regions: AFRO = African; AMRO = the Americas; EMRO = Eastern Mediterranean, EURO = European, SEARO = South-East Asia, and WPRO = Western Pacific



highest compared to other regions, superseded only by the African region (AFRO) (Figure 1C) (6).

The purpose of this narrative review is to give a comprehensive overview of the situation of childhood cancer in the WHO Eastern Mediterranean region from a health system perspective. In addition, some examples from Turkey are included. We focus on the availability of services, training and research capacities, as well as challenges in the region hampering service delivery and survival outcomes.

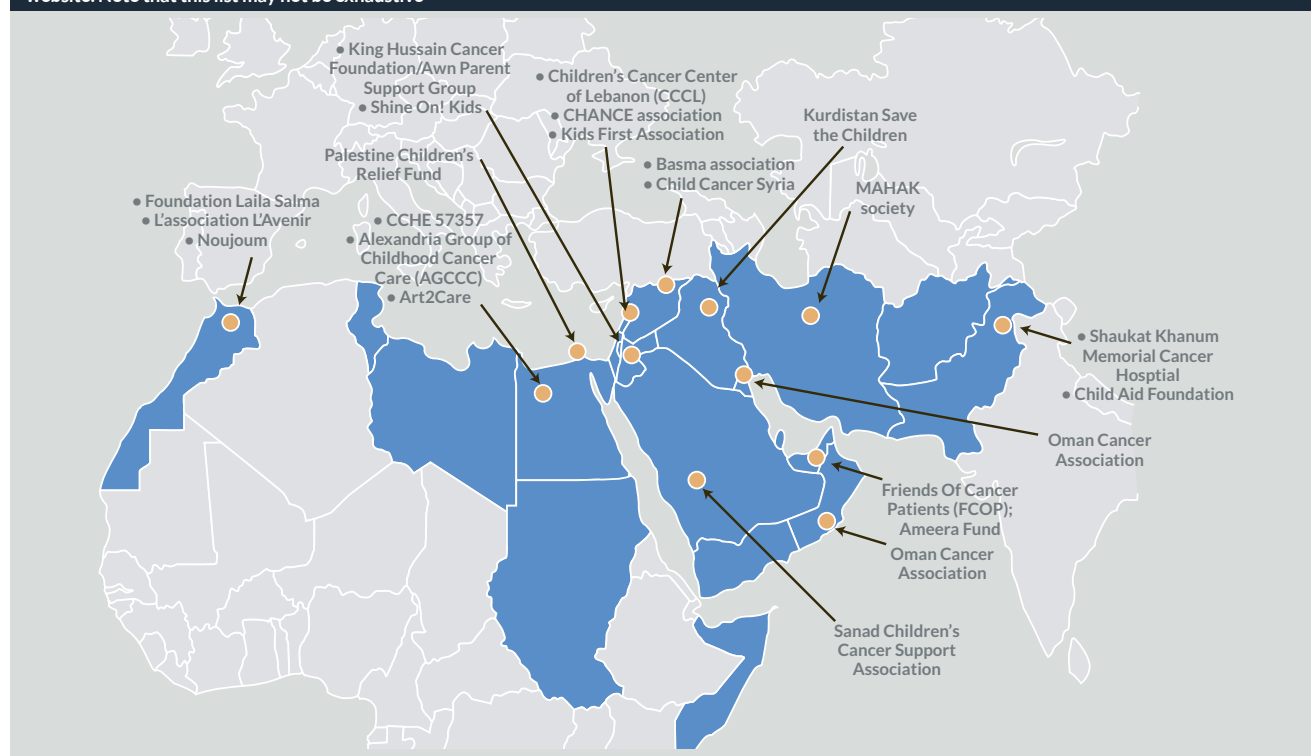
### Organization of services

**National cancer control and healthcare plans:** Countries in the EMR are diverse in many aspects: socioeconomic factors, organization of services, level of complexity of healthcare systems, as well as cultural and language differences. Few have formal national cancer control programmes, and childhood cancer being a relatively minor component of the disease burden, frequently follows the general healthcare coverage. In the cancer monitoring progress survey that was carried out by the WHO Regional Office for the Eastern Mediterranean in 2019 (7), only six countries – Kuwait, Morocco, Oman, Sudan, Tunisia, and the United Arab Emirates – reported that childhood cancer was included in their priority benefits package, which typically also includes the required access to essential paediatric cancer medicines as defined by the WHO (8).

The Gulf Cooperation Council (GCC) countries – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates – all of which fall within the World Bank high-income category, have healthcare systems where financing of paediatric cancer care is provided by the government for all nationals. For non-nationals, however, who comprise a large proportion of the population, healthcare for paediatric cancer in these cases is dependent on insurance plans, or in their absence, not covered at all. For other countries in the region, governmental coverage of healthcare costs for paediatric cancer can vary, with the majority having private and public healthcare sectors of varying service infrastructure, and where governmental healthcare coverage, when applicable, is primarily carried out at the public hospitals. The latter in turn, are frequently under staffed and lacking in adequate resources for effective treatment delivery. In the private healthcare sector, the cost is higher, and essentially unaffordable to the majority of patients. In countries such as Egypt, Jordan and Lebanon, specific childhood cancer charity organizations affiliated with a particular childhood cancer hospital, have filled in the financial gap for a large proportion of patients, helping ensure accessibility to care at well-equipped private sector or university cancer centres (9–11). Nevertheless, the scale of these successful financing interventions is still not sufficient enough to reach all paediatric cancer cases in the respective



Figure 2: Distribution and list of regional childhood cancer civil society organizations, as extracted mostly from the Childhood Cancer International (CCI) website. Note that this list may not be exhaustive



countries, but it has alleviated the cost for a substantial proportion of patients.

**Quality of healthcare services:** In the EMR, there are several well-established cancer centres of excellence where patients can expect to receive high-quality care similar to that available in advanced healthcare systems. Consequently, the care outcome is also comparable. These centres, however, are only able to support a proportion of children with cancer in their respective countries, with the remaining children seeking care in hospitals with less facilities, less well-trained human resources, weaker multidisciplinary services, and less financial support, which are all necessary to successfully deliver standard-of-care paediatric oncology treatments.

The assessment of quality care delivery is difficult in most EMR countries, due to the limited cancer registry data, which precludes accurate determination of the burden of childhood cancer within the population. Accordingly, no data exists regarding indicators for quality provision and effectiveness of the available cancer care. Cancer registries, when they do exist, are either hospital-based, or are limited in scope and lack outcome and survival data. The information that is available is mostly derived from single hospital-based registries and reports the outcome on only a subset of patients, making national generalization difficult and fraught with biases. The lack of such data registries also limits the ability to conduct quality and performance monitoring of treatment delivery and patient outcome nationally (12).

**Professional societies and organizations:** In recent years, the EMR has witnessed an increase in educational, awareness and lobbying efforts focusing on paediatric cancer care. International medical professional organizations such as regional branches of the International Society of Paediatric Oncology (SIOP), the Paediatric Oncology East & Mediterranean (POEM) collaborative group, Groupe Franco-Africain d'Oncologie Pédiatrique (GFAOP), and the Eastern Mediterranean Bone Marrow Transplantation Group (EMBMT), have been active in enhancing communication, collaboration, and educational activities among paediatric oncology healthcare professionals across the region. Multinational organizations such as the Union for International Cancer Control (UICC) and Childhood Cancer International (CCI) have also been including increasing numbers of regional NGOs (Figure 2) to lobby for more effective paediatric cancer care.

### Paediatric oncology – a multidisciplinary and collaboration model

The complexity of effective treatment regimens for childhood cancer makes a multidisciplinary approach necessary. This includes not only provision of the various clinical disciplines needed for diagnosis, treatment and supportive care, but also the training of healthcare professionals and investing in research infrastructure. This multidisciplinary model is one of the main drivers behind the success witnessed in

paediatric cancer survival during the last 50 years and sets the framework for further development (13). The modalities used in the treatment of paediatric cancers are mainly surgery, chemotherapy including biological agents, and radiotherapy. A number of relevant healthcare specialities (Box 1) are essential for effective treatment in paediatric oncology, and platforms for multidisciplinary exchange (Box 2) are needed to enhance treatment planning and appropriate delivery, and to ensure continuing education and maintenance of expertise (14). Clear referral networks and connections between primary and secondary care centres on the one hand and tertiary care centres that are equipped with well-coordinated multidisciplinary elements, on the other hand, are necessary to enable early diagnosis, good quality of care, and reasonable outcomes.

There are several good examples of institutions in the EMR that combine the disciplines and specialties required for the multidisciplinary care of paediatric patients with cancer. These include well-established cancer hospitals in Egypt, Jordan, Lebanon, and Saudi Arabia, among others. However, the number of comprehensive paediatric cancer centres in the EMR is still limited and unable to serve the breadth of patients in need. There is also a paucity of databases or reports addressing the region's availability of multidisciplinary care, research and training. Therefore, the multidisciplinary model must be a priority within the national cancer control strategies and plans.

The feasibility of implementation of a multidisciplinary model for paediatric oncology care across the nation, and its impact on childhood cancer outcomes, is demonstrated by the experience of Turkey. Paediatric oncology in Turkey started as a discipline in the late 1960s and early 1970s and finally became a specialty in 1983, merging with paediatric haematology in 2011. After the 2000s, more specialists became available across Turkey, but still some centres remain without specialists. The centres which do not have all the required specialties in-house, overcome this by collaborating with other comprehensive centres. Currently, multidisciplinary teams are available in all major cities. As a result of such efforts, the overall 5-year survival of children with cancer in Turkey is currently estimated around 70% (15). In comparison, while the survival at national level is not available for the early years of the establishment of the paediatric oncology speciality, an institutional study on 5-year survival carried out at Hacettepe University during the 1970s showed a 23.6% survival rate (16).

As paediatric cancer is a relatively rare disease, national and international collaborations are imperative for continuing clinical advancement and the sharing of expertise, as well as the successful addressing of research questions. Most

#### Box 1: Main disciplines and services necessary for paediatric cancer care

- Paediatric haematology/oncology
- Surgical sub-specialties and anaesthesiology:
  - Paediatric surgery
  - Neurosurgery
  - Orthopaedic surgery
  - Ophthalmologic surgery
- Imaging
  - Radiology; paediatric radiology, neuroradiology, interventional radiology
  - Nuclear medicine
- Pathology, molecular biology/genetics
- Radiotherapy
- Oncology nursing
- Paediatric sub-specialties: infectious diseases, intensive care, cardiology, nephrology, gastroenterology, neurology, immunology, endocrinology, pulmonology, etc)
- Palliative care, psychosocial support, social services and supportive care
- Stem cell transplantation
- Supporting units: pharmacy, blood banks, nutrition, respiratory therapy, social services, data management

#### Box 2: Collaborative and multidisciplinary platforms for paediatric cancer units

- Tumour boards and other multidisciplinary educational and research meetings
- Inter-departmental programmes and relationships within the institution
- Multi-institutional collaborations
- National pediatric oncology/hematology societies
- Regional cooperative groups and societies (POEM, GFAOP, etc)
- Major international groups (SIOP, COG, BFM, etc)

paediatric oncology professionals in the EMR are actively engaged within the major relevant international medical societies, such as the International Society of Paediatric Oncology (SIOP). Through initiatives such as the SIOP - Global Health Network, much work is underway to attempt to address the inequity of access to appropriate care for children with cancer in developing countries (17), including suggestions for adapted best approaches of care in resource-limited settings (18–21). Initiatives with international cancer centres, for example in the form of twinning programmes, have also helped in programme building and bridging the survival gap (22).

National societies and regional collaborations have become major portals among the paediatric oncology community to bring together different disciplines to share knowledge and expertise. They also have great potential to act as platforms to address the main barriers affecting paediatric cancer care in the region, such as the lack of human capacity, financial support, support for research and training, and political will and prioritization (12). The Moroccan Society of Hematology and Pediatric Oncology produces various national guidelines (acute lymphoblastic leukemia, Hodgkin's disease, retinoblastoma, medulloblastoma and pain management, organized three continental meetings and conducted several clinical research programmes and also contributed

significantly to education and advocacy for children with cancer in the country

(23, 24). The Middle East Childhood Cancer Alliance (MECCA) was established in 2000 (25), and worked on data collection in acute lymphoblastic leukemia (26). More recently, the Paediatric Oncology East and Mediterranean (POEM) Group, established in 2013, now comprises hundreds of members from 28 regional countries, providing a platform for collaboration, capacity building initiatives, training and education, and collaborative research initiatives across the region (27, 28, 29). In North Africa, paediatric oncology units in 2000 formed the French African Paediatric Oncology Group (GFAOP), which has initiated prospective adapted regimens for the five most frequent and curable childhood cancers (Burkitt lymphoma, Wilms tumours, retinoblastoma, Hodgkin disease and acute lymphoblastic leukemia) (30) and created the African School of Paediatric Oncology (31). Such collaborative groups are expected to have a major role in prioritizing and coordinating projects and efforts that have the potential to drive paediatric oncology care, research, and policy in the region.

### Availability of services

While the required diagnostic tools (e.g., imaging modalities, immunohistochemistry, flow-cytometry, and cytogenetics) are largely available in the major cancer centres, the capacity for conducting a comprehensive diagnosis may be lacking in different centres even within the same country, leading to a considerable subnational variety (32). During recent years, expanded facilities have been developed in most of the EMR countries, either within the public domain or supported by charitable organizations. This has increased the capacity and quality of childhood cancer care, with many more children being correctly diagnosed and treated. In many countries, however, these centres are concentrated in major cities, which require travel and often relocation for families seeking care (32–34). The establishment of similar centres, or the creation of satellite units, in smaller cities and towns is beginning to happen in some countries, such as Egypt and Pakistan, and is expected to result in a much-needed improvement in local access to care (12).

Early diagnosis, timely referral, and appropriate intensity of treatment and management of side effects, are essential prerequisites for improved childhood cancer outcome. With few exceptions, EMR countries lack a clear referral system for paediatric oncology care. In many of the high-income countries, such as those that constitute the GCC, there is significant investment in health and development of primary care systems that can facilitate early referrals, but this has at yet not matured (35). As such, in most of the EMR, children

with cancer may be treated at any public or private hospital, as determined by their treating physician and the hospital's financial considerations, rather than a specific guidance regarding acuity of care or intensity of therapy, or the presence of needed multidisciplinary and nursing expertise. The assessment of local resource needs (workforce, beds, imaging, and treatment modalities) versus their availability, therefore, becomes difficult, as paediatric cancer patients are staggered across hospitals of various tiers, contributing to a variable outcome that is not accurately captured. Referral responsibility is often relegated to individual physicians and to the patients' families. Delayed, inappropriate, and missed referrals result in higher stages at presentation, advanced comorbidities, and even failures in diagnosis (36). In Pakistan, for example, it is believed that diagnosis is made in only half the number of children estimated to develop cancer within the population (32).

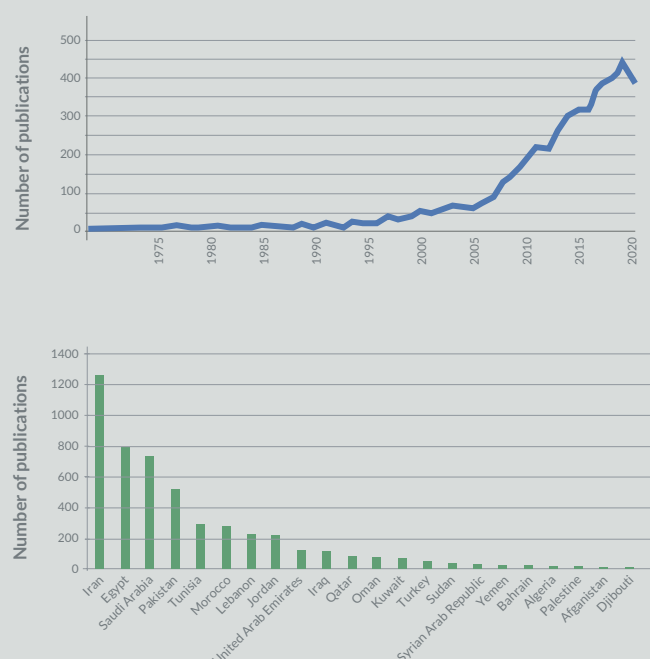
National paediatric cancer treatment guidelines have started to be initiated in some countries but are still lacking in most. When they do exist, their implementation is difficult to assess. Similarly, national guidelines for palliative care are still lacking in most EMR countries, while some hospitals are working to introduce palliative care to paediatric patients as a continuous service, through efforts driven primarily by NGOs (37–39).

Importantly, the supply of cancer chemotherapeutic drugs, particularly those used for childhood cancers, has been inconsistent and inadequate, in line with worldwide concerns (40–42). While high-income countries are also affected, low- and middle-income countries are disproportionately impacted, including within the EMR (43–45). The availability and utilization of supportive care medications, including opioids, also remains a problem in many developing countries and specifically in the EMR (46, 47).

### Training

The availability of multiple-accredited institutions of higher education, medical schools, nursing schools, and regional medical training programmes, continues to contribute to the improvement in available expertise and human resources in the EMR. Many well-reputed institutions of higher education and cancer centres in the EMR offer long-, and/or short-, term training opportunities for physicians and nurses. However, because the EMR comprises Arabic-based, English- and American-based, and French-based systems of education, some differences exist in training and certification details and requirements across the region. The Francophone countries, for example, do not have board-certified sub-specialization. Instead, clinicians that undergo paediatric oncology training recognized by a university will receive a formal diploma and

**Figure 3: Scientific publications identified via SCOPUS search engine, published between 1 January 1951 and 30 September 2020. A) Number of publications per year, over the period 1 January 1970 – 30 September 2020. B) Number of publications by country of author affiliations. Additional author affiliations on the same publications from outside the EMR were excluded from this graph**



SCOPUS search methodology: The below terms related to paediatric oncology topics, within title, abstract, or keywords, in any language, and different spellings were included: Age term (pediatric, infant, child, adolescent, teen, youth, or young) AND oncology term (oncology, cancer, tumor, lymphoma, sarcoma, leukemia, rhabdo-myosarcoma, osteosarcoma, fibrosarcoma, neoplasm, carcinoma, malignancy/ies, wilms tumor, nephroblastoma, retinoblastoma, retinal glioma, eye cancer, neuroblastoma, esthesioneuroblastoma, ganglioneuroblastoma, ganglioneuroma, or neuroepithelioma) AND country affiliation (Afghanistan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Palestine/Ghaza/West Bank, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen, Middle East, Near East, East Mediterranean, West Mediterranean, MENA, EMRO, Arab, Levant, East Africa, North Africa, West Africa, Maghreb, Mashriq, Sahara).

are eligible to practice. Importantly, an Arab Board certification has been developed for paediatric haematology-oncology as a subspecialty since 2017, with specifications regarding training programme eligibility criteria, graduation examination requirements, and criteria for the acknowledgement of the degree. However, its implementation is still lagging. Some countries, such as Saudi Arabia and Pakistan, have established country-specific board examinations for paediatric haematology-oncology, that are mandatory for those planning to practice as consultants. Activation of such certifications across the region will be useful to formalize standards of training and allow graduates to pursue academic and clinical positions across the Arab countries. To date, most of the subspecialty training programmes bestow a university-specific certificate acknowledged within the country, and equivalency certificates would be required for those seeking employment in other regional countries. There remains a necessity for structured needs assessment, to ensure that current and future

graduates apply their experience in areas where they are most needed and where they can substantially impact their environment and continue to advance their careers.

As for short-term training, most of the major cancer centres and university hospitals offer a subspecialty, as well as nursing, pharmacy, and other service observerships or hands-on clerkships, with national and international accreditation. However, these have historically been under utilized, likely due to logistic constraints and the lack of a strategic plan for training, by hospitals at which the potential beneficiaries are employed. Initiatives such as the African School of Paediatric Oncology (Ecole Africaine d'Oncologie Pediatrique, EAOP), which was established by the Francophone African Group of Paediatric Oncology GFAOP (48), is an example of efforts at providing short-term intensive courses for nurses, nurse educators, paediatric surgeons, as well as formal diploma in paediatric oncology (31). The availability of this and several similar training programmes in the region, have the potential to enhance the numbers of skilled paediatric oncology healthcare professionals in the EMR.

## Research

Childhood cancer research is indispensable for progress in determining disease burden, promoting delivery of services, and improving survival outcomes (49). In the EMR, regional data availability and analysis remains patchy, limiting knowledge regarding local and regional disease patterns and gaps (1). Thus, strategic planning for cancer control should include promoting and investing in research infrastructure including data registries, health informatics, well-trained researchers, research laboratories, regulatory oversight, and specimen biobanking.

The EMR already boasts a number a renowned and internationally accredited universities and research programmes within major cancer centres. These have already contributed significantly to the understanding of cancer patterns and childhood cancer characteristics and outcomes in their respective countries. A literature search for scientific publications in paediatric oncology, from the EMR region over the period 1 January 1951 to 30 September 2020, identified 4,645 manuscripts, with 70% of those published after 2010 (Figure 3).

Indeed, multiple universities and cancer centres in the region have the required infrastructure for clinical and epidemiologic research, as well as translational and basic

research capabilities, such as clinical research institutes, institutional review boards, biostatistics expertise, basic laboratory space and core research facilities. A few centres have also successfully initiated prospective paediatric tumour biorepositories with annotated clinical data. These will be instrumental for genomic and biology research into the genetic determinants of disease in the regional paediatric patient populations. However, funding sources for research remain very limited in the region, and in many cases are severely restricted either in funding amounts, or in the eligibility of investigators based on national (and not regional) residence.

### Regional challenges

The lack of accurate and accessible data regarding childhood cancer incidence and outcome is one of the major challenges in identifying and implementing needed changes to improve care. There is a clear need for national registries for childhood cancer across the region, that can capture all relevant data effectively and accurately.

Significant collaborative efforts and civil society actors in the region are contributing to the regional childhood cancer agenda, while paediatric oncology diagnostic and treatment interventions remain poorly reflected in national benefit packages. Few countries in the region, regardless of their socioeconomic status, have developed comprehensive and formal national cancer control programmes that include childhood cancer, and thus the management of these complex cancers, which require specialized and multidisciplinary care, all too often fall into general health care coverage – leading to delayed diagnosis and suboptimal care. Socioeconomic factors and geographic constraints still act as barriers to care, even in countries where multidisciplinary childhood cancer centres exist. Several studies have shown a clear correlation between socioeconomic status and treatment outcomes, indicating that childhood cancer survival could be improved if financial and logistic constraints and information dissemination is better addressed to help improve uptake of services (34).

Development of referral networks based on levels of care, and introduction of accreditation processes for such levels, are needed to ensure that paediatric cancer patients are treated in settings that afford them the best chances for cure and would identify the areas where investment is needed in specific therapeutic modalities at each referral centre based on tier and patient numbers. National prioritization of essential medications is critical to ensure uninterrupted treatment and successful outcomes. This is particularly important in the case of paediatric oncology where a set of specific medications are used, which affects their prioritization due to the demand and supply forces typical for uncommon diseases. In addition, strengthening the primary healthcare systems would be

expected to decrease the current high rates of delayed diagnosis, which are known to contribute to poorer outcomes.

Political instability and prolonged wars in several countries in the region, most notably in Syria, Iraq, Libya, and Yemen, have decimated the healthcare infrastructure and resulted in an exodus of healthcare workers, which has affected paediatric oncology as well as other disciplines. Paediatric oncology units in these countries have been struggling to maintain quality care for children with cancer, with some successes in specific twinning initiatives (12), though much remains to be done with rebuilding in the midst of continuing political instability. These conflicts have also increased the burden of care on neighbouring countries, such as Lebanon, Jordan, Turkey, and others, due to increases in refugee numbers and traveling patients seeking medical care (50–52). These patients have little or no healthcare coverage, and while their management poses an ethical and moral imperative on host countries including public and private hospitals, it creates a major financial and resource utilization burden that has not been adequately addressed to date and that should be treated as an international responsibility.

### The way forward

The current WHO GICC provides the regional paediatric oncology community with a unique opportunity to elevate the priority of childhood cancer as part of national cancer prevention and control agendas, while creating a regional platform to improve advocacy and clinical practice by joining forces of existing regional collaborative efforts. The potential decrease in childhood cancer mortality planned through the GICC would be a substantial contribution to the achievement of SDG target 3.4 to reduce premature NCD mortality by 2030. This gives the paediatric oncology community an opportunity and a strengthened voice when engaging with national policymakers, highlighting the importance of including childhood cancers as part of national benefit packages and the wider cancer agenda. By bringing together the WHO public health approach and access to national level stakeholders, with the global oncology expertise of St Jude Children's Research Hospital, regional centres of excellence, global leaders in paediatric oncology clinical care, and regional paediatric oncology societies, the initiative will capitalize on global and regional resolutions, the UHC agenda and the SDGs, to achieve national level scale up of ongoing childhood cancer efforts in the region.

Some of the key priorities for countries in the region to enable such change under the GICC umbrella will be (a) leverage of regional collaborations to bring together key stakeholders and centres in support of regional implementation of the GICC, (b) strengthened advocacy efforts to ensure the inclusion of



paediatric oncology care as part of UHC benefit packages, (c) establishment of childhood cancer registries to foster research and evidence-informed policy, and (d) strengthen health system components necessary for improved paediatric oncology services including e.g., access to essential medicines, improved diagnostic and treatment service delivery, and planning and provision of relevant training and capacity-building opportunities to meet the regional paediatric oncology workforce needs. ■

*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.*

## References

- Gupta, S., Howard, S., Hunger, S., Antillon, F., Metzger, M. et al. "Treating Childhood Cancers in Low- and Middle-Income Countries." In: Disease Control Priorities (third edition): Volume 3, Cancer, edited by H Gelband, P Jha, R Sankaranarayanan, S Horton Washington, DC: World Bank [Internet]. [cited 2020 Nov 23]. Available from: <http://dcp-3.org/chapter/900/treating-childhood-cancers-low-and-middle-income-countries>
- Howard SC, Zaidi A, Cao X, Weil O, Bey P, Patte C, et al. The My Child Matters programme: effect of public-private partnerships on paediatric cancer care in low-income and middle-income countries [Internet]. Vol. 19, *The Lancet Oncology*. Lancet Publishing Group; 2018 [cited 2020 Nov 23]. p. e252–66. Available from: <https://pubmed.ncbi.nlm.nih.gov/29726390/>
- Steliarova-Foucher E, Colombet M, Ries LAG, Moreno F, Dolya A, Bray F, et al. International incidence of childhood cancer, 2001–10: a population-based registry study. *Lancet Oncol* [Internet]. 2017 Jun 1 [cited 2020 Nov 23];18(6):719–31. Available from: <http://www.iarc.fr/>
- Geneva: World Health Organization. Resolution WHA70.12 - Cancer prevention and control in the context of an integrated approach [Internet]. 2017 [cited 2020 Nov 23]. Available from: <http://www.who.int/nmh/events/2015/technical-note-en.pdf?ua=1>
- Geneva: World Health Organization. WHO report on cancer: setting priorities, investing wisely and providing care for all [Internet]. 2020 [cited 2020 Nov 24]. Available from: <https://www.who.int/publications/i/item/who-report-on-cancer-setting-priorities-investing-wisely-and-providing-care-for-all>
- GLOBOCAN. Estimated Number of Cancer Cases in 2018 [Internet]. International journal of cancer. 2018 [cited 2020 Feb 22]. Available from: [http://gco.iarc.fr/today/online-analysis-pie?v=2018&mode=cancer&mode\\_population=continents&population=900&populations=&key=total&sex=2&cancer=39&type=0&statistic=5&prevalence=0&population\\_group=0&ages\\_group%5B%5D=5&ages\\_group%5B%5D=13&nb\\_items=7&group\\_can](http://gco.iarc.fr/today/online-analysis-pie?v=2018&mode=cancer&mode_population=continents&population=900&populations=&key=total&sex=2&cancer=39&type=0&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=5&ages_group%5B%5D=13&nb_items=7&group_can)
- WHO EMRO. Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region [Internet]. 2017 [cited 2020 Nov 25]. Available from: <http://www.who.int/nmh/ncd-tools/indicators-definition/en/>
- WHO Model List of Essential Medicines for Children - 6th list, 2017 [Internet]. [cited 2020 Dec 8]. Available from: <https://www.who.int/publications/i/item/EMLc-6>
- CCCL :: Children's Cancer Center of Lebanon [Internet]. [cited 2020 Nov 25]. Available from: <https://cccl.org.lb/>
- King Hussein Cancer Foundation and Center - Homepage [Internet]. [cited 2020 Nov 25]. Available from: <https://www.khcc.jo/?language=en>
- Children's Cancer Hospital Egypt 57357 (CCHE) website [Internet]. [cited 2020 Nov 25]. Available from: <https://www.57357.org/en/home-page/>
- Basbous M, Al-Jadiry M, Belgaumi A, Sultan I, Al-Haddad A, Jeha S, et al. Childhood cancer care in the Middle East, North Africa, and West/Central Asia: A snapshot across five countries from the POEM network. *Cancer Epidemiol*. 2020 Jun 2;101727.
- Cantrell MA, Ruble K. Multidisciplinary care in paediatric oncology. *J Multidiscip Healthc* [Internet]. 2011 May 30 [cited 2020 Nov 24];4:171–81. Available from: <http://pmc/articles/PMC3141835/?report=abstract>
- Fennell ML, Das IP, Clauser S, Petrelli N, Salner A. The organization of multidisciplinary care teams: Modeling internal and external influences on cancer care quality. *J Natl Cancer Inst - Monogr* [Internet]. 2010 [cited 2020 Nov 24];2010(40):72–80. Available from: <https://pubmed.ncbi.nlm.nih.gov/20386055/>
- Kutluk MT, Yeşilipek A. Paediatric cancer registry in Turkey 2009–2019 (TPOG & TPHD). *J Clin Oncol*. 2020 May 20;38(15\_suppl):e22513–e22513.
- Kutluk T, Sahiner UM, Akýüz C, Yalçın B, Ahmet Demir, Varan A BM. A Hospital based paediatric cancer registry, Hacettepe Experience 1971–2004. 41st Congress of SIOP (International Society for Paediatric Oncology). 5–9 October 2009, Sao Paulo, Brazil. *Pediatr Blood Cancer*. 2009;(PP024):851–2.
- Arora RS, Challinor JM, Howard SC, Israels T. Improving Care for Children With Cancer in Low- and Middle-Income Countries-A SIOP PODC Initiative. *Pediatr Blood Cancer* [Internet]. 2016 Mar 1 [cited 2020 Nov 25];63(3):387–91. Available from: <https://pubmed.ncbi.nlm.nih.gov/26797891/>
- Howard SC, Davidson A, Luna-Fineman S, Israels T, Chantada G, Lam CG, et al. A framework to develop adapted treatment regimens to manage paediatric cancer in low- and middle-income countries: The Paediatric Oncology in Developing Countries (PODC) Committee of the International Paediatric Oncology Society (SIOP). *Pediatr Blood Cancer* [Internet]. 2017 Dec 1 [cited 2020 Nov 25];64:e26879. Available from: <http://doi.wiley.com/10.1002/pbc.26879>
- Parikh NS, Howard SC, Chantada G, Israels T, Khatib M, Alcasabas P, et al. SIOP-PODC adapted risk stratification and treatment guidelines: Recommendations for neuroblastoma in low- and middle-income settings. *Pediatr Blood Cancer* [Internet]. 2015 Aug 1 [cited 2020 Nov 25];62(8):1305–16. Available from: [www.Cure4Kids.org](http://www.Cure4Kids.org)
- Parkes J, Hendricks M, Ssenyonga P, Mugamba J, Molyneux E, Schouten-van Meeteren A, et al. SIOP PODC adapted treatment recommendations for standard-risk medulloblastoma in low and middle income settings. *Pediatr Blood Cancer* [Internet]. 2015 Apr 1 [cited 2020 Nov 25];62(4):553–64. Available from: <https://pubmed.ncbi.nlm.nih.gov/25418957/>
- Hesseling P, Israels T, Harif M, Chantada G, Molyneux E. Practical recommendations for the management of children with Endemic Burkitt Lymphoma (BL) in a resource limited setting. *Pediatr Blood Cancer* [Internet]. 2013 Mar 28 [cited 2020 Nov 25];60(3):357–62. Available from: <http://doi.wiley.com/10.1002/pbc.24407>
- Rodriguez-Galindo C, Friedrich P, Alcasabas P, Antillon F, Banavali S, Castillo L, et al. Toward the cure of all children with cancer through collaborative efforts: Paediatric oncology as a global challenge [Internet]. Vol. 33, *Journal of Clinical Oncology*. American Society of Clinical Oncology; 2015 [cited 2020 Nov 25]. p. 3065–73. Available from: <http://pmc/articles/PMC4979198/?report=abstract>
- El Kababri M, Benmiloud S, Cherkaoui S, El Houdzi J, Maani K, Ansari N, Khoubila N, Kili A, El Khorassani M, Madani A, Tazi MA, Ahid S, Hessissen L, Quessar A, Harif M, Khatib M, André N. Metro-SMOP 01: Metronomics combination with cyclophosphamide-etoposide and valproic acid for refractory and relapsing pediatric malignancies. *Pediatr Blood Cancer*. 2020 Sep;67(9):e28508. doi: 10.1002/pbc.28508. Epub 2020 Jul 13. PMID: 32658380
- Harif M, Madani A, Hessissen L, Zafad S, Khatib M, Quessar A, Bencheikroun S. Maladie de Hodgkin de l'enfant. Expérience marocaine [Childhood Hodgkin's disease in Morocco]. *Arch Pediatr*. 2009 Jun;16(6):675–7. French. doi: 10.1016/S0929-693X(09)74108-9. PMID: 19541126.
- Freedman L, Edwards B, Ries L, Young JL. Cancer incidence in four member countries (Cyprus, Egypt, Israel, and Jordan) of the Middle East Cancer Consortium (MECC) compared with US SEER. undefined. 2006;
- Al-Mulla NA, Chandra P, Khatib M, Madanat F, Vossough P, Torfa E, et al. Childhood acute lymphoblastic leukemia in the Middle East and neighboring countries: A prospective multi-institutional international collaborative study (CALLME1) by the Middle East Childhood Cancer Alliance (MECCA). *Pediatr Blood Cancer* [Internet]. 2014 [cited 2020 Nov 25];61(8):1403–10. Available from: <https://pubmed.ncbi.nlm.nih.gov/24648275/>
- Saab R, Belgaumi A, Muwakkit S, Obeid A, Galindo C-R, Jeha S, et al. The Paediatric Oncology East and Mediterranean (POEM) group – A regional collaborative platform for childhood cancer healthcare professionals. *Pediatr Hematol Oncol J*. 2020 Mar;5(1):3–6.
- Saab R, Obeid A, Gachi F, Boudiaf H, Sargsyan L, Al-Saad K, et al. Impact of the coronavirus disease 2019 (COVID-19) pandemic on paediatric oncology care in the Middle East, North Africa, and West Asia region: A report from the Paediatric Oncology East and Mediterranean (POEM) group. *Cancer* [Internet]. 2020 Sep 15 [cited 2020 Nov 25];126(18):4235–45. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1002/cncr.33075>
- Poem Group [Internet]. [cited 2020 Nov 25]. Available from: <http://www.poemgroup.org/>
- Harif M, Traoré F, Hessissen L, Moreira C, Atteby JJ. Challenges for paediatric oncology in Africa [Internet]. Vol. 14, *The Lancet Oncology*. Lancet Oncol; 2013 [cited 2020 Nov 25]. p. 279–81. Available from: <https://pubmed.ncbi.nlm.nih.gov/23561740/>
- Hessissen L, Patte C, Martelli H, Coze C, Howard SC, Kili A, et al. African school of paediatric oncology initiative: Implementation of a paediatric oncology diploma program to address critical workforce shortages in French-speaking Africa. *J Glob Oncol* [Internet]. 2019 [cited 2020 Nov 24];2019(5). Available from: <https://pubmed.ncbi.nlm.nih.gov/31657980/>
- Jabeen K, Ashraf MS, Iftikhar S, Belgaumi AF. The Impact of Socioeconomic Factors on the Outcome of Childhood Acute Lymphoblastic Leukemia (ALL) Treatment in a Low/Middle Income Country (LMIC). *J Pediatr Hematol Oncol*. 2016 Nov 1;38(8):587–96.
- Metzger ML, Howard SC, Fu LC, Peña A, Stefan R, Hancock ML, et al. Outcome of childhood acute lymphoblastic leukaemia in resource-poor countries. *Lancet*. 2003 Aug 30;362(9385):706–8.
- Mostert S, Gunawan S, Wolters E, van de Ven P, Sitaresmi M, van Dongen J, et al. Socio-economic status plays important role in childhood cancer treatment outcome in Indonesia. *Asian Pacific J Cancer Prev*. 2012;13(12):6491–6.
- Al-Othman S, Haoudi A, Alhomoud S, Alkhenizan A, Khoja T, Al-Zahrani A. Tackling cancer control in the Gulf Cooperation Council Countries [Internet]. Vol. 16, *The Lancet Oncology*. Lancet Publishing Group; 2015 [cited 2020 Dec 8]. p. e246–57. Available from: <https://pubmed.ncbi.nlm.nih.gov/25943069/>
- Ghafoor T, Khalil S, Farah T, Ahmed S, Sharif I. Prognostic Factors in Childhood Acute Myeloid Leukemia; Experience from A Developing Country. *Cancer Rep* [Internet]. 2020 Oct 9 [cited 2020 Dec 8];3(5). Available from: <https://onlinelibrary.wiley.com/doi/10.1002/cnr2.1259>
- Mojen LK, Rassouli M, Eshghi P, Zendedel K, Sari AA, Karimooi MH, et al. Paediatric palliative care in Iran: Applying regionalization of health care systems. *Asian Pacific J Cancer Prev* [Internet]. 2018 May 1 [cited 2020 Dec 8];19(5):1303–11. Available from: <http://pmc/articles/PMC6031829/?report=abstract>
- Pakseresht M, Baraz S, Rassouli M, Rejeh N, Rostami S, Mojen LK. A comparison of symptom management for children with cancer in Iran and in the selected countries: A comparative study. *Indian J Palliat Care* [Internet]. 2018 Oct 1 [cited 2020 Dec 8];24(4):451–8. Available from: <http://pmc/articles/PMC6199834/?report=abstract>
- Weng XR, Nakdali R, Almoosawi B, Al Saeed M, Maiser S, Al Banna M. Health Care Providers' Attitudes and Beliefs on Providing Palliative Care to Patients in Bahrain: Findings From a Qualitative Study. *J Pain Symptom Manage*. 2020 Nov 11;

## References

40. DeCamp M, Joffe S, Fernandez C V., Faden RR, Unguru Y. Chemotherapy drug shortages in paediatric oncology: A consensus statement. *Paediatrics* [Internet]. 2014 Mar 1 [cited 2020 Dec 8];133(3):e716–24. Available from: <https://paediatrics.aappublications.org/content/133/3/e716>
41. Martei YM, Iwamoto K, Barr RD, Wiernkowski JT, Robertson J. Shortages and price variability of essential cytotoxic medicines for treating children with cancers. *BMJ Glob Heal* [Internet]. 2020 [cited 2020 Dec 8];5:3282. Available from: <http://dx.doi.org/10.1136/bmjgh-2020-003282>
42. Ruff P, Al-Sukhun S, Blanchard C, Shulman LN. Access to Cancer Therapeutics in Low- and Middle-Income Countries. *Am Soc Clin Oncol Educ B*. 2016 May 19;(36):58–65.
43. Bazargani YT, de Boer A, Schellens JHM, Leufkens HGM, Mantel-Teeuwisse AK. Selection of oncology medicines in low- and middle-income countries. *Ann Oncol* [Internet]. 2014 [cited 2020 Dec 8];25(1):270–6. Available from: <https://pubmed.ncbi.nlm.nih.gov/24356638/>
44. Robertson J, Barr R, Shulman LN, Forte GB, Magrini N. Essential medicines for cancer: WHO recommendations and national priorities. *Bull World Heal Organ*. 2016;
45. Cohen P, Friedrich P, Lam C, Jeha S, Metzger ML, Qaddoumi I, et al. Global access to essential medicines for childhood cancer: A cross-sectional survey. *J Glob Oncol* [Internet]. 2018 Dec 30 [cited 2020 Dec 8];2018(4):1–11. Available from: <https://ascopubs.org/doi/10.1200/JGO.18.00150>
46. Cleary J, Radbruch L, Torode J, Cherny NI. Next steps in access and availability of opioids for the treatment of cancer pain: Reaching the tipping point? *Ann Oncol* [Internet]. 2013 Dec [cited 2020 Dec 8];24(SUPPLEMENT11). Available from: <https://pubmed.ncbi.nlm.nih.gov/24285231/>
47. Knaul FM, Bhadelia A, Rodriguez NM, Arreola-Ornelas H, Zimmermann C. The Lancet Commission on Palliative Care and Pain Relief—findings, recommendations, and future directions. *Lancet Glob Heal* [Internet]. 2018 Mar 1 [cited 2020 Dec 8];6:S5–6. Available from: <http://dx.doi.org/10.1016/S0140-6736>
48. Francophone African Group of Paediatric Oncology GFAOP [Internet]. [cited 2020 Nov 24]. Available from: <http://e-gfaop.org/>
49. O'Leary M, Krailo M, Anderson JR, Reaman GH. Progress in Childhood Cancer: 50 Years of Research Collaboration, a Report From the Children's Oncology Group. *Semin Oncol* [Internet]. 2008 Oct [cited 2020 Dec 8];35(5):484–93. Available from: <https://pubmed.ncbi.nlm.nih.gov/18929147/>
50. Saab R, Jeha S, Khalifeh H, Zahreddine L, Bayram L, Merabi Z, et al. Displaced children with cancer in Lebanon: A sustained response to an unprecedented crisis. *Cancer* [Internet]. 2018 Apr 1 [cited 2020 Dec 8];124(7):1464–72. Available from: <http://doi.wiley.com/10.1002/cncr.31273>
51. Hamdan-Mansour AM, Abdel Razeq NM, AbdulHaq B, Arabiat D, Khalil AA. Displaced Syrian children's reported physical and mental wellbeing. *Child Adolesc Ment Health* [Internet]. 2017 Nov 1 [cited 2020 Dec 8];22(4):186–93. Available from: <http://doi.wiley.com/10.1111/camh.12237>
52. Abdul-Khalek RA, Guo P, Sharp F, Gheorghe A, Shamieh O, Kutluk T, et al. The economic burden of cancer care for Syrian refugees: a population-based modelling study. *Lancet Oncol* [Internet]. 2020 May 1 [cited 2020 Dec 8];21(5):637–44. Available from: [www.thelancet.com/oncology](http://www.thelancet.com/oncology)

# Palliative care in the Eastern Mediterranean Region: An overview

**Hibah Osman**, Physician, Dana-Farber Cancer Institute, USA; Assistant Professor, Harvard Medical School, USA and Founding Board Member, Balsam – Lebanese Center for Palliative Care; **Sami Alshammari**, Palliative care Consultant, KFMC; National Palliative Care Lead Ministry of Health, Saudi Arabia and Chairman, Saudi Society of Palliative Care, Saudi Arabia; **Maryam Rassouli**, Professor, Cancer Research Centre, Shahid Beheshti University of Medical Sciences, Tehran, Iran; **Iman Al-Diri**, Pain and Palliative Care Consultant, Kuwait Cancer Control Centre, Kuwait and Pediatric Pain and Palliative Care Consultant, NBK Children's Hospital, Kuwait; **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait; **Azza Hassan**, Chief of Palliative Medicine and Fellowship Director of Hospice and Palliative Medicine at the National Centre for Cancer Care and Research, Hamad Medical Corporation, Doha, Qatar; **Omar Shamieh**, Consultant Physician and Chairman, Department of Hospice and Palliative Medicine, King Hussein Cancer Center, Jordan; Director, Center of Palliative and Cancer Care in Conflict, King Hussein Cancer Center, Jordan and Associate Professor, Faculty of Medicine, University of Jordan, Jordan; **Samy Alsirafy**, Professor of Clinical Oncology, Kasr Al-Ainy School of Medicine and Head of the Palliative Medicine Unit – Kasr Al-Ainy Centre of Clinical Oncology and Nuclear Medicine, Cairo, Egypt; **Ghadeer Alarjeh**, Senior Palliative Researcher and Instructor, Centre for Palliative and Cancer Care in Conflict, King Hussein Cancer Center, Amman, Jordan; **Nasim Pourghazian**, Technical Officer, UHC/NMH WHO EMRO, Cairo, Egypt and **Khalid Al Saleh**, Radiation Oncologist, Kuwait Cancer Control Center, Kuwait City, Kuwait



HIBAH OSMAN



SAMI ALSHAMMARI



MARYAM RASSOULI



IMAN AL-DIRI



IBTITAL FADHIL



AZZA HASSAN



OMAR SHAMIEH



SAMY ALSIRAFY



GHADEER ALARJEH



NASIM POURGHAZIAN



KHALID AL SALEH

Cancer and other chronic diseases are already a significant and growing public health problem in the Eastern Mediterranean Region (EMR). Cancer is the fourth-ranked cause of death in the region, and the burden is predicted to increase in the future. Given the impact of the late presentation of cancer and the growing incidence of other chronic illnesses, as well as the increasing number of people having other severe life-threatening diseases, including the COVID-19 pandemic, the call for action to improve and strengthen palliative care is of paramount importance in the EMR.

There is considerable variability in the development and organization of palliative care services across the countries of the EMR. Yet, data revealed that the development of palliative care in the majority of EMR countries continues to remain uneven, uncoordinated and poorly integrated across broader healthcare systems. Weak commitments and limited investment in palliative care services are significant challenges to advancing palliative care in the region.

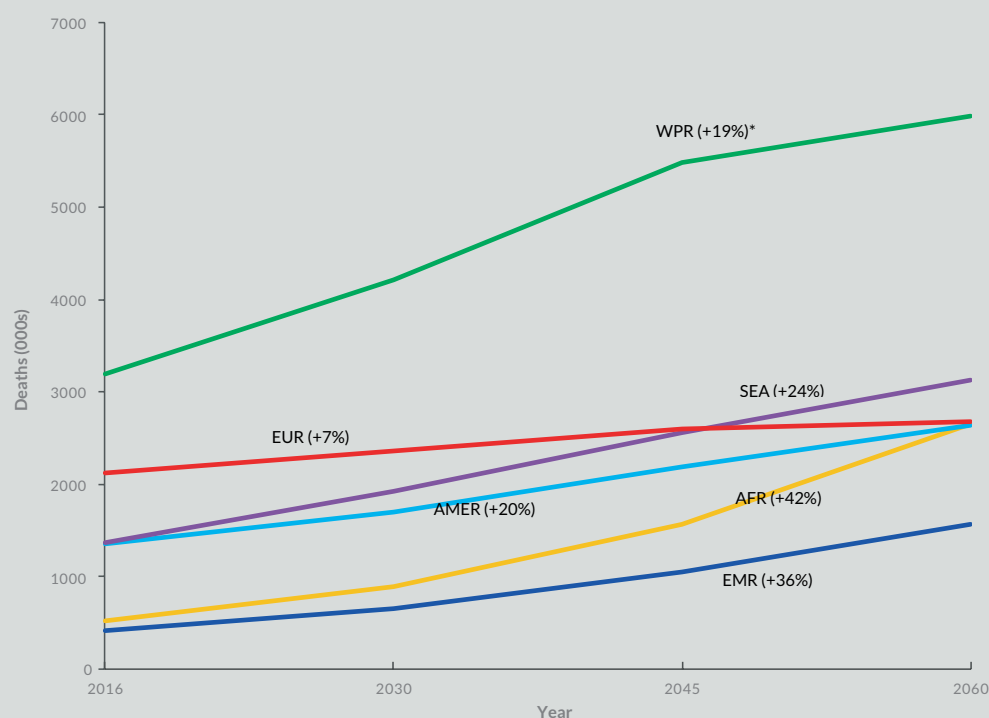
To improve access to palliative care services, countries need to invest in integrating palliative care into primary care. Given the particular cultural-religious context in most EMR countries, home-based palliative care services are vital and require special attention. Most importantly, all countries need to review and amend the regulatory limitations on the prescription of palliative care medicines.

Palliative care is an interdisciplinary medical approach that aims to improve the quality of life and alleviate the suffering of patients and their families, facing problems associated with life-threatening diseases, through the prevention and relief of pain and other forms of physical, psychosocial and spiritual distress. Palliative care, not only improves the quality of life of patients and their families

but also reduces unnecessary hospitalizations and use of healthcare services, and is thus a cost-saving public health intervention (1, 2).

Palliative care is required for the management of a wide range of life-threatening diseases of both noncommunicable (e.g. cancer, cardiovascular and chronic respiratory diseases), communicable (HIV/AIDS), as well as serious traumas

Figure 1: Cancer mortality projections by WHO region (developed using GLOBOCAN data, 2020)



WPR (Western Pacific Region), EUR (European Region), SEA (South-East Asia Region), AMER (Region of the Americas), AFR (African region), EMR (Eastern Mediterranean Region). \*Average percentage increase per 15-year interval. Data source: WHO Health statistics and information systems: [https://www.who.int/healthinfo/global\\_burden\\_disease/projections/en/](https://www.who.int/healthinfo/global_burden_disease/projections/en/)

and neurological diseases (3). In the context of the global commitment to palliative care, the World Health Assembly Resolution (WHA67.19) calls for governments to commit to evidence-based, accessible palliative care (4).

The Universal Health Coverage goals also call for the “full spectrum of essential, quality health services, from health promotion to prevention, treatment, rehabilitation, and palliative care.” The Global human rights architecture includes pain relief and palliative care (5, 6).

In the EMR, cancer and other chronic diseases are already recognized as an important and growing public health problem. Cancer is the fourth-ranked cause of death in the region and the burden is predicted to increase in the future (Figure 1) (7). Moreover, cancer is generally diagnosed at a relatively advanced stage in most EMR countries, which in turn makes the need for palliative care more crucial in the region (8). This review article provides an overview of the development of palliative care in EMR countries and highlights the main challenges.

### Organization and provision of palliative care in the EMR

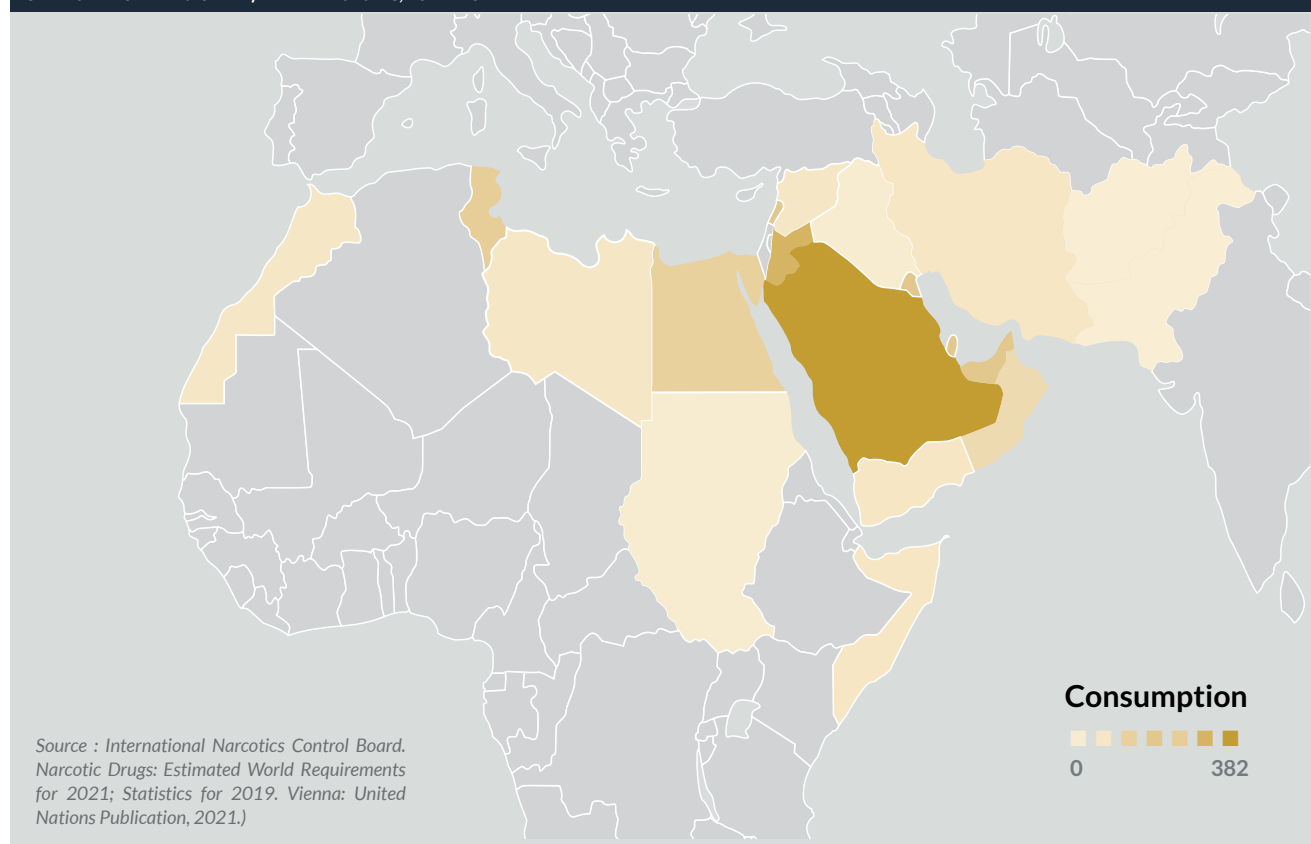
According to the WHO Guidelines for the Provision of Palliative Care, ideally, palliative care services should be provided from the time of diagnosis of a life-limiting illness,

adapting to the needs of patients and their families as the disease progresses into its terminal phase. Thus effective palliative care services should be integrated into the existing health system at all levels of care, especially community and home-based care (4, 9). Hence, there is a need to involve the public and the private sectors, adapted to a specific cultural, social and economic setting. Furthermore, to respond to the requirements in a community and make the best use of scarce resources, palliative care services should be strategically linked to prevention, early detection, and treatment services for both adults and children (4, 9).

While many countries in the EMR have not yet considered palliative care as a public health need, it is therefore not included in their health agendas. Yet, several initiatives and best practices have been developed in the region, such as in Jordan, Saudi Arabia, Oman, Qatar, Morocco, Lebanon and Egypt; however, services have been in large part restricted in reach and not fully integrated into the national health strategy (10-14, 15).

Most palliative care services are provided in tertiary hospitals and cancer centres in urban areas and major cities, with few benefits reaching rural areas. In most countries, palliative care services continue to be limited to cancer patients, and predominantly those at a more advanced stages of illness, and few centres provide paediatric palliative care services.

Figure 2: Average consumption of narcotic drugs, in defined daily doses for statistical purposes per million inhabitants per day (excluding preparations in Schedule III and methadone) in EMR countries, 2017–2019



Palliative care practice is also limited to specialists, and there has been no concerted effort to integrate it into primary care. The limited number of palliative care specialists in the region has severely restricted access to palliative care (14).

Nearly half of the EMR countries have no outpatient or inpatient practice for palliative care, no home care, or hospice care. No spiritual care providers, occupational therapists, or psychotherapists are made available for patients in paediatric oncology centres. Children usually die in the hospital, unlike adult patients who prefer to die at home due to the difficulty of parents dealing with their child's death process (14).

Palliative care services are provided in standalone centres in Kuwait, though no sufficient evidence on the outcomes of such experience (15).

Almost in all countries in the EMR, service provision has been challenged due to a lack of commitments and prioritization in the national programming and budgeting. Funding has not been consistent, and many of the service providers are nongovernmental organizations that depend on donations (14). This has made organizations vulnerable to fluctuations in funding and has resulted in a significant variability in the quality of care provided.

In Jordan, all Jordanian patients with cancer (adults and children) are fully financially insured for the treatment modalities (e.g. chemotherapy, radiotherapy, bone marrow

transplantation and palliative care services) by the government. However, palliative care is mainly given to cancer patients treated at King Hussein Cancer Centre and the Albasheer Hospital (16).

In Qatar, all expenses related to cancer therapies including palliative care and other modalities are being met by the Government of Qatar at the National Center for Cancer Care and Research (NCCCR).

Nevertheless, countries such as Lebanon and Jordan started their first palliative care programmes as inpatient services, then home-care services were initiated, for example the Almalath Foundation in Jordan was established in the 1990s (14, 16). In the Gulf States (Kuwait, Qatar and Saudi Arabia) palliative care was initiated as inpatient and outpatients services in large academic training centres. Hospital-based services include dedicated units as well as outpatient consultation services (14).

Hospice services are very limited in the region, apart from a few examples such as the paediatric hospice in Kuwait (Abdulla House) (17).

The availability of opioids and opioid consumption in the region tends to reflect the patterns of service availability (Figure 2). Countries with more developed palliative care service providers have a higher opioid consumption and generally have a wider variety of opioids. Most countries in the region have access to morphine and fentanyl, while methadone and



hydromorphone tend to be available in fewer countries. Laws and regulations regarding opioid prescription vary depending on the specialty of the physician prescribing (14). For example, opioid prescribing is limited to oncologists in Tunisia, physicians practising in governmental hospitals in Iraq or physicians in the larger regional hospitals in Oman. Some countries like Lebanon, Jordan and Qatar have expanded prescribing to pain specialists and palliative care physicians. Most of the countries in the EMR allow outpatient opioid prescription to be valid only up to 14 days. Whereas few countries allow dispensing the same prescription up to 30 days (14).

Most countries have improper pain assessments and suboptimal pain management, with a significant shortage of opioids (14).

Cultural misconceptions and population demographics have also been barriers to the growth of palliative care services (14, 18, 19). Choosing to avoid aggressive interventions such as resuscitation when care is deemed futile is impossible in some countries (20). For example, in the United Arab Emirates, it is not legal to place a “Do Not Resuscitate – DNR” order on a patient’s chart (21). However, many palliative care services in countries like Saudi Arabia, Jordan, Kuwait, Qatar, Lebanon and Egypt hospice and palliative care practices are based on international standards with proper cultural adaptation to meet their local public needs. Therefore, stopping aggressive interventions at end of life and futile management replaced by comfort care are the norm. On the other hand, DNR is ethically, religiously and legally acceptable in Jordan, Saudi Arabia and Qatar for terminally ill patients especially for those with advanced cancer with no potential curable options (22).

### Training, education and research

Education is the main prerequisite for providing palliative care. In most studies on palliative care needs in the region, educational needs are mentioned as one of the most important common needs (23). However, due to the vastness of the area, various socioeconomic situations and different incidence rates of cancer, a concentrated (focused) curriculum for palliative care provision may not be very desirable (1). Since educational programmes should be developed based on the role and duties of the care providers, the level of development of palliative care and the authority of the health professionals, such as physicians and nurses, in each country will determine the palliative care educational needs. However, the World Health Organization (WHO) has proposed guidelines to be implemented in low- and middle-income countries as a practical model (2).

Palliative care education programmes are categorized based on the level and needs of healthcare providers, for example, general knowledge about palliative care and end-of-life care are provided in many countries, for general practitioners and

undergraduates students, while palliative care medical training currently exists in only a few countries in the region (14, 23).

This training is provided in two ways: formal academic education and non-formal education via short-term programmes and workshops (3). Since university-level medical and nursing education exists in most countries in the region, these items are included in the curriculum of the related disciplines (4–6). For instance, in Lebanon, a 21-hour course is included in the curriculum of medical students (13).

There is some specialist training, which is certified, to train leaders and researchers in palliative care (3), but this exists only in some countries in the region. In Jordan, for example, there are different levels of specialized academic education in palliative care, including a master’s degree in palliative care nursing, and a pain diploma granted by The School Nursing in Jordan (5). In Saudi Arabia and Jordan, palliative care is recognized as a subspecialty by the local medical council (24). In Saudi Arabia, Qatar, Jordan and Iran, a subspecialty fellowship programme in palliative medicine is being implemented (4, 6, 8, 9, 24). In Lebanon, a palliative care fellowship programme is developed, though not implemented as yet (8, 24).

Short-term and informal programmes are the second type of educational training courses where individuals receive certificates and will be able to provide specialty services. These are available for nurses and physicians in some countries of the region.

Cross-border collaborations promoting palliative care training and education for physicians and nurses are being practised in the region, where well-resourced centres such as King Hussein Cancer Centre in Jordan and the Oman Cancer Association in Oman, KFSHRC in Riyadh, Saudi Arabia and Kuwait Palliative Care Centre in Kuwait are running regular short and long training courses to build regional capacity and support low-resource countries (14, 23).

Challenges do exist, including the lack of expert instructors in this field, limited resources for online training and the lack of commitment to and recognition of palliative care programmes as an independent discipline (11–13).

### Palliative care research

Research is often considered as an inseparable part of palliative care. Since there is a wide range of cultures, religions and historical and social backgrounds in the countries of the region, the priorities and research needs vary according to the conditions of each country. The requirements of the palliative care system in each country should be addressed with regard to the situation of that country (14).

Despite the importance of research and increasing attention to this issue, carrying out research and publishing papers in these countries are in their early stages. Most countries

face challenges related to insufficient research support, problems in accessing resources, a shortage of researchers and instructors in the field of palliative care and language barriers. Overcoming these challenges requires measures such as developing mentorship, conducting educational courses on research methodology and training researchers through train-the-trainer courses. Successful examples of these strategies include training courses on palliative care research in cooperation with the Oman Cancer Association and the Oncology Nurses' Society for nurses and physicians in the region (10). Furthermore, collaboration between some Middle East and North Africa countries and international research support programmes such as the R4HC-MENA's (Research for Health in Conflict in the Middle East and North Africa) programme, that is supported by United Kingdom, opened active channels of training and conducting research. Many countries in the Middle East including Jordan, Turkey, Lebanon and Palestine were involved in this project whose aim was to support research development and capacity building via conducting many collaborative research studies and staff training (25, 26).

According to SCOPUS data on the countries of the region, the number of papers on palliative care produced between 2016 and 2019 has increased from 62 in 2016 to 90 in 2019, which is evidence of increasing attention to this subject (27, 28).

### Regional challenges

Access to palliative care services is a major challenge in the region. It is estimated that only 5% of adults who are in need of palliative care receive it (23).

The variability of health systems in the EMR translates into a vast difference in resources, priorities and health system structures, making planning at regional level challenging (14, 23). This is limited not only to the level of national laws and policies but extends to medical education and training. Diversity in languages also influences the training where medical and nursing school curricula use different languages for instruction and have a widely differing curricular structure.

Conflict, political instability and forced displacement have marred the region for decades and have also impacted on the development of palliative care. Half of the countries in the region have suffered emergencies, political instabilities making it difficult for the establishment of new programmes like palliative care (23, 27). In countries like Tunisia, advocates worked hard to lobby, establish relationships, and develop plans and strategies for the development of palliative care with leaders in the ministry of health only to find themselves having to start from scratch when a new regime with a new leadership took over and priorities shifted (14). This scenario repeats itself in most countries, which poses a major barrier to

improving palliative care.

Although some of the higher income countries have adequate numbers of providers who have received training in palliative care, many of them are expatriates with temporary contracts. This results in a loss of valuable human resources who are essential to the advancement of the field. The lack of recognition of palliative care as a specialty in many countries remains a major barrier to growth as healthcare professionals are discouraged from joining this specialty (14). Many challenges exist (Table 1) within the areas of governance, public awareness, human resources, training and medication for palliative care.

### Palliative care and the COVID-19 pandemic

Worldwide restrictions on social interaction and travel imposed by the COVID-19 pandemic has altered the practice of palliative care (14, 29). The necessary use of personal protective equipment (PPE) and limited contact with patients and families has made this medical practice, which is heavily dependent on communication and physical presence, extremely challenging. Telehealth technologies including telephone and videoconferencing have been used to replace in-person care. Medical management, family conferencing and bereavement support have all been conducted remotely during the pandemic. This may have contributed to facilitating access to patients in remote settings, however, the nature of the physician-patient-family interaction has undoubtedly suffered (30, 31). The level of preparedness of Mediterranean countries to respond to the pandemic varied significantly due to the lack of support and resources (26).

### Paediatric palliative care

According to the evidence, 21.6 million children in the world need palliative care services, about 8.2 million of whom need specialty services, with 98% of the latter group living in low- and middle-income countries. The Middle East has the highest number of children in need of these services, after Africa and Southeastern Asia (33, 34). In various studies, countries are classified in different ways in terms of their potential. In 2011, most countries in the region were placed at level one, i.e. providing no paediatric palliative care (PPC) services. Iran, Qatar and Egypt have been classified as level two, with the capacity to provide palliative care services, and only Jordan and Saudi Arabia are placed on the third level by providing local services (35). Data reported by the Middle East atlas also showed that PPC is still limited and is being implemented in few countries (36). However, in recent years, PPC seems to be developing alongside adult services.

The background of PPC in the region dates back to 2004-2005, and to the establishment of this type of care in Jordan

Table 1: Lists of key challenges for palliative care in the region (14, 23, 28)

Policies and regulations	Culture and public awareness
<ul style="list-style-type: none"> <li>• Absence of laws that acknowledge and define that palliative care is part of the healthcare system.</li> <li>• Lack of regional/national robust healthcare strategies related to the establishment and development of palliative care</li> <li>• Lack of national standards of care for describing palliative care.</li> <li>• Absence of clinical guidelines and protocols.</li> <li>• Poor/inconsistent implementation of a national strategy on palliative care implementation.</li> <li>• Weak infrastructure for primary healthcare, home healthcare and community services.</li> <li>• Financial challenges such as lack of insurance coverage for palliative care services</li> </ul>	<ul style="list-style-type: none"> <li>• Misconceptions regarding the use of opioids for pain relief.</li> <li>• Lack of public awareness campaigns.</li> <li>• Value of family decision-making over patient autonomy and choice.</li> </ul>
Medication availability	Education
<ul style="list-style-type: none"> <li>• Limited availability of opioids and specific palliative care medication in the primary healthcare sector (28).</li> <li>• Policy restriction (prescribing, dispensing and administration)</li> <li>• Lack of training and experience of non-specialized palliative care professionals in safely using such medication.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of palliative education in medical schools.</li> <li>• Lack of knowledge about opioids practice and pain management</li> <li>• Lack of palliative education in nursing schools and postgraduate education.</li> <li>• Lack of palliative care education in other healthcare disciplines (social work, physiotherapy, etc)</li> <li>• Expanding Lack of postgraduate palliative care education courses at national level for postgraduates.</li> <li>• Lack of undergraduate and postgraduate level palliative care education training/courses at a national or regional level.</li> </ul>

and Kuwait (6, 37). A 2011 study considered that PPC was a priority due to the young population of most Middle-Eastern countries, as well as delayed cancer diagnosis, and in this regard, some paediatric oncologists began to receive training in seven countries (38, 39). Currently, there is a specialized paediatric palliative team in Kuwait and Jordan providing services in various settings such as home, hospital and hospice (37, 40). The King Hussein Cancer Centre (KHCC) provides home care, inpatient and outpatient services for children (40). In other countries of the region, including Lebanon, Egypt, Iran and Saudi Arabia, PPC services are mostly provided in paediatric specialty hospitals, and the team members consist of paediatric oncologists, nurses and social workers, and other disciplines who have only passed courses on palliative care (6, 38). Therefore, it can be said that in this region, PPC is offered as a general service and the absence of specialty services is still noteworthy.

### The way forward

As projected, the region is expected to have a dramatic increase in cancer incidence in the coming years, with more people needing palliative care. While attention to PC has increased significantly in recent years, huge variations exist in the development and organization of palliative care across the region. Data revealed that the development of palliative care in the majority of EMR continues to remain uneven, uncoordinated and poorly integrated across broader healthcare systems. The main barriers to palliative care

development and integration include misunderstandings about palliative care, the non-inclusion of palliative care in national health policies, lack of education and training for healthcare professionals, limited access to controlled medicines necessary for palliative care, and limited research (2). The 2014 World Health Assembly resolution, which stresses the importance of integrating palliative care as a core component of health systems, and current Universal Health Coverage efforts in the region, provides the region with essential entry points and policy opportunities to strengthen the regional palliative care agenda. EMRO countries are urged to implement the WHA resolution on palliative care that necessitates integrating palliative care into countries' healthcare systems (1). Countries need to take bold actions to overcome barriers and address the increasing needs for palliative care, and emphasis should be directed towards:

- ➔ Scaling up home-based care and expanding access to palliative care services at the primary healthcare level.
- ➔ Addressing regulatory limitations to prescription of and accessibility to essential palliative care medicines.
- ➔ Document and showcase benefits of palliative care for adults and paediatrics, both in terms of health outcomes and health system cost savings; to raise awareness and promote the integration of palliative care into the health systems of the region.
- ➔ Make use of the WHO EMRO regional network of palliative care experts as a platform to exchange experiences and support initiatives in new countries, including mentorship

and educational exchange to promote palliative care research efforts in the region.

- Promoting research as an essential component to develop effective palliative care models, to help provide a strong evidence base to inform palliative care policy especially in limited-resources countries (1).
- Raising awareness about the importance of the early introduction of palliative care is a priority in the region.
- Make use of the existing regional networks and civil society organizations including patient advocates, to provide a platform to exchange experiences and support initiatives in new countries, including mentorship and educational exchange to promote palliative care research efforts in the region.
- Promoting research as an essential component in developing effective local palliative care models and to explore barriers to early referral to palliative care among healthcare professionals as well as patients and their families.

The COVID-19 crisis has brought attention to and enhanced the understanding of palliative care and the central role it plays for both effective health systems and the affected individual's right to healthcare. The ongoing crisis has also highlighted the need to invest in the development of telemedicine and online consultations for palliative care, providing the agenda with an improved means to expand and reach the unmet needs (3). ■

#### *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.*

## References

- Gonzalez-Jaramillo V, Fuhrer V, Gonzalez-Jaramillo N, Kopp-Heim D, Eychmüller S, Maessen M. Impact of home-based palliative care on health care costs and hospital use: A systematic review. *Palliat Support Care*. 2021 Aug;19(4):474-487. doi: 10.1017/S1478951520001315. PMID: 33295269.
- World Health Organization. *Integrating Palliative Care and Symptom Relief into Primary Health Care: A WHO Guide for Planners, Implementers and Managers*. World Health Organization; 2018.
- Lewington J, Namukwaya E, Limoges J, Leng M, Harding R. Provision of palliative care for life-limiting disease in a low income country national hospital setting: how much is needed?. *BMJ Support Palliat Care*. 2012;2(2):140-144. doi:10.1136/bmjspcare-2011-000188.
- World Health Assembly 67. Strengthening of palliative care as a component of comprehensive care throughout the life course. Published online 2014.
- Gwyther L, Brennan F, Harding R. Advancing palliative care as a human right. *J Pain Symptom Manage*. 2009;38(5):767-774. doi:10.1016/j.jpainsymman.2009.03.003.
- Knaul FM, Farmer PE, Krakauer EL et al. Alleviating the access abyss in palliative care and pain relief-an imperative of universal health coverage: the Lancet Commission report [published correction appears in Lancet. 2018 Mar 9;]. *Lancet*. 2018;391(10128):1391-1454. doi:10.1016/S0140-6736(17)32513-8.
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries [published correction appears in CA Cancer J Clin. 2020 Jul;70(4):313]. *CA Cancer J Clin*. 2018;68(6):394-424. doi:10.3322/caac.21492
- GBD 2015 Eastern Mediterranean Region Cancer Collaborators. Burden of cancer in the Eastern Mediterranean Region, 2005-2015: findings from the Global Burden of Disease 2015 Study. *Int J Public Health*. 2018;63(Suppl 1):151-164. doi:10.1007/s00038-017-0999-9.
- World Health Organization. Planning and Implementing Palliative Care Services: A Guide for Programme Managers. World Health Organization; 2016.
- Alshammary S, Abdullah A, Duraisamy B, Anbar M. Palliative care in Saudi Arabia: Two decades of progress and going strong. *J Heal Spec*. 2014;2:59.
- Omran S, Obeidat R. Palliative Care Nursing in Jordan. *J Palliat Care Med* 2015 51. 2015;5(1):1-4. doi:10.4172/2165-7386.100054005.
- Mojen LK, Rassouli M, Eshghi P, Sari AA, Karimooi MH. Palliative Care for Children with Cancer in the Middle East: A Comparative Study. *Indian J Palliat Care*. 2017;23(4):379-386. doi:10.4103/IJPC.IJPC\_69\_17.
- Daher M, Doumit M, Hajjar R, Hamra R, Naifeh Khoury M, Tohmé A. Integrating palliative care into health education in Lebanon. *J Med Liban*. 2013;61(4):191-198. doi:10.12816/0001457.
- Osman H (Hibah), Rihan A (Alaa), Garralda E (Eduardo), et al. Atlas of Palliative Care in the Eastern Mediterranean Region. Published online 2017. Accessed August 15, 2021. <https://dadun.unav.edu/handle/10171/43303>.
- Al-Saleh K, Al-Awadi A, Soliman NA et al. Timing and Outcome of Referral to the First Stand-Alone Palliative Care Center in the Eastern Mediterranean Region, the Palliative Care Center of Kuwait. *Am J Hosp Palliat Care*. 2017;34(4):325-329. doi:10.1177/1049909115625959.
- Abdel-Razeq H, Mansour A, Jaddan D. Breast Cancer Care in Jordan. *JCO Glob Oncol*. 2020;6:260-268. doi:10.1200/JGO.19.00279.
- Al-Sayer H. Paediatric palliative care in Kuwait. *Medical Principles and Practice*. 2007;16(Suppl. 1):53.
- Givler A, Bhatt H, Maani-Fogelman PA. The Importance Of Cultural Competence in Pain and Palliative Care. In: *StatPearls. Treasure Island (FL): StatPearls Publishing; May 28, 2021*.
- Hassankhani H, Rahmani A, Best A, Taleghani F, Sanaat Z, Dehghannezhad J. Barriers to home-based palliative care in people with cancer: A qualitative study of the perspective of caregivers. *Nurs Open*. 2020;7(4):1260-1268. Published 2020 Apr 22. doi:10.1002/nop2.503.
- Dakessian Sailian S, Salifu Y, Saad R, Preston N. Dignity of patients with palliative needs in the Middle East: an integrative review. *BMC Palliat Care*. 2021;20(1):112. Published 2021 Jul 16. doi:10.1186/s12904-021-00791-6.
- Aljethaily A, Al-Mutairi T, Al-Harbi K, Al-Khonezan S, Aljethaily A, Al-Homaidhi HS. Pediatricians' Perceptions Toward Do Not Resuscitate: A Survey in Saudi Arabia and Literature Review. *Adv Med Educ Pract*. 2020;11:1-8. Published 2020 Jan 6. doi:10.2147/AMEP.S228399.
- Shamieh O, Richardson K, Abdel-Razeq H, Harding R, Sullivan R, Mansour A. COVID-19-Impact on DNR Orders in the Largest Cancer Center in Jordan. *J Pain Symptom Manage*. 2020;60(2):e87-e89. doi:10.1016/j.jpainsymman.2020.04.023
- Fadhil I, Lyons G, Payne S. Barriers to, and opportunities for, palliative care development in the Eastern Mediterranean Region. *Lancet Oncol*. 2017;18(3):e176-e184. doi:10.1016/S1470-2045(17)30101-8
- Shamieh O, Richardson K, Abdel-Razeq H, Mansour A, Payne S. Gaining Palliative Medicine Subspecialty Recognition and Fellowship Accreditation in Jordan. *J Pain Symptom Manage*. 2020 Nov;60(5):1003-1011. doi: 10.1016/j.jpainsymman.2020.05.016. Epub 2020 May 20. PMID: 32442479.
- Guo P, Alajarmeh S, Alarja G, et al. Compounded trauma: A qualitative study of the challenges for refugees living with advanced cancer. *Palliat Med*. 2021;35(5):916-926. doi:10.1177/02692163211000236.
- Spacey A, Porter S, Board M, Scammell J. Impact of the COVID-19 pandemic on end of life care delivery in care homes: A mixed method systematic review [published online ahead of print, 2021 Jul 30]. *Palliat Med*. 2021;2692163211029806. doi:10.1177/02692163211029806.
- Zeinah GF, Al-Kindi SG, Hassan AA. Middle East experience in palliative care. *Am J Hosp Palliat Care*. 2013;30(1):94-99. doi:10.1177/1049909112439619.
- Connor S, Bermedo M. *Global atlas of palliative care at the end of life*. London: Worldwide Palliative Care Alliance; 2014. Google Scholar. 2014.
- Knapp C, Woodworth L, Wright M et al. Pediatric palliative care provision around the world: a systematic review. *Pediatr Blood Cancer*. 2011;57(3):361-368. doi:10.1002/pbc.23100.
- Pastrana T, De Lima L, Pettus K et al. The impact of COVID-19 on palliative care workers across the world: A qualitative analysis of responses to open-ended questions. *Palliat Support Care*. 2021;19(2):187-192. doi:10.1017/S1478951521000298.
- Boufkhed S, Harding R, Kutluk T, Hussein A, Pourghazian N, Shamieh O. What Is the Preparedness and Capacity of Palliative Care Services in Middle-Eastern and North African Countries to Respond to COVID-19? A Rapid Survey. *J Pain Symptom Manage*. 2021 Feb;61(2):e13-e50. doi: 10.1016/j.jpainsymman.2020.10.025. Epub 2020 Nov 21. PMID: 33227380; PMCID: PMC7679234.
- Gostin LO, Abubakar I, Guerra R, Rashid SF, Friedman EA, Jakab Z. WHO takes action to promote the health of refugees and migrants. *Lancet*. 2019;393(10185):2016-2018. doi:10.1016/S0140-6736(19)31051-7.
- McNatt ZZ. Addressing noncommunicable diseases among urban refugees in the Middle East and North Africa - a scoping review. *Confl Health*. 2020;14:9. Published 2020 Feb 18. doi:10.1186/s13031-020-0255-4.
- Kassem II. Refugees besieged: The lurking threat of COVID-19 in Syrian war refugee camps. *Travel Med Infect Dis*. 2020;38:101736. doi:10.1016/j.tmaid.2020.101736.
- World Health Organization. Preparedness, prevention and control of coronavirus disease (COVID-19) for refugees and migrants in non-camp settings. [https://www.who.int/publications/i/item/preparedness-prevention-and-control-of-coronavirus-disease-\(covid-19\)-for-refugees-and-migrants-in-non-camp-settings](https://www.who.int/publications/i/item/preparedness-prevention-and-control-of-coronavirus-disease-(covid-19)-for-refugees-and-migrants-in-non-camp-settings). Accessed April 17, 2020.
- Barasteh S, Azimi AV, Khademi F, Goharinezad S, Rassouli M. Covid-19 and nursing home residents: The potential role of geriatric nurses in a special crisis. *Nursing Practice Today*. 2020;7(3): 163-164. doi.org/10.18502/npt.v7i3.3343
- Shankar A, Saini D, Roy S et al. Cancer Care Delivery Challenges Amidst Coronavirus Disease - 19 (COVID-19) Outbreak: Specific Precautions for Cancer Patients and Cancer Care Providers to Prevent Spread. *Asian Pac J Cancer Prev*. 2020;21(3):569-573. Published 2020 Mar 1. doi:10.31557/APJCP.2020.21.3.569.
- World Health Organization. *Integrating Palliative Care and Symptom Relief into Primary Health Care: A WHO Guide for Planners, Implementers and Managers*. World Health Organization; 2018.
- Connor SR, Downing J, Marston J. Estimating the Global Need for Palliative Care for Children: A Cross-sectional Analysis. *J Pain Symptom Manage*. 2017;53(2):171-177. doi:10.1016/j.jpainsymman.2016.08.020
- Shamieh O, Hui D. A comprehensive palliative care program at a tertiary cancer center in Jordan. *Am J Hosp Palliat Care*. 2015 Mar;32(2):238-42. doi: 10.1177/1049909113513316. Epub 2013 Nov 20. PMID: 24259403.



# Cancer surveillance in the Eastern Mediterranean Region

**Saleh A Alessy**, Assistant Professor, Public Health Department, College of Health Sciences, Saudi Electronic University, Riyadh, Saudi Arabia; **Ariana Znaor**, Scientist, Section of Cancer Surveillance/Hub Officer, International Agency for Research on Cancer, Lyon, France; **Ze Shen**, MPH candidate, University of Southern California, USA; **Ali Al Zahrani**, Principal Clinical Scientist and Senior Consultant, Gulf Center for Cancer Control and Prevention, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia; **Ali Shamseddine**, Professor of Clinical Medicine and Director of Gastrointestinal/Genitourinary Cancer Programme at Haematology, American University of Beirut, Lebanon; **Heba Fouad**, Regional Surveillance Officer, NCD Surveillance Unit, WHO EMRO, Cairo, Egypt; **Kazem Zendehelel**, Professor of Cancer Epidemiology, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran; **Sultan Eser**, Professor of Public Health, Balikesir University, Medical Faculty and International Agency for Research on Cancer/Global Initiative for Cancer Registry, Izmir Hub, Izmir, Turkey; **Zahi Abdul-Sater**, Programmes Division Manager, Conflict Medicine Programme Coordinator, Global Health Institute, American University of Beirut (AUB), Lebanon; **Jawad Al-Lawati**, Senior Consultant in Public Health, Directorate General of Primary Health Care, Ministry of Health, Muscat, Oman; and **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait



SALEH A ALESSY



ARIANA ZNAOR



ALI AL ZAHrani



ALI SHAMSEDDINE



HEBA FOUAD



KAZEM ZENDEHEDEL



SULTAN ESER



ZAHl ABDUL-SATER



JAWAD AL-LAWATI



IBTIHAL FADHIL

Cancer is a major cause of morbidity and mortality in the Eastern Mediterranean Region (EMR). Population-based cancer registration is vital to guide cancer prevention, care and policies. Although cancer registries have improved in the EMR, they still face many obstacles including political instability, shortage of human and technical resources, lack of sustainable funding, and regulatory processes. In this review, we provide an overview on the population-based cancer registration status in the EMR and shed light on the future directions towards high quality data. We envisioned that this review would provide policy-makers and health planners with the initiatives that would improve and empower population-based cancer registration in the EMR.

The Eastern Mediterranean region (EMR), with a population over 700 million, faces many health challenges (1). Cancer is one of the biggest public health challenges with a tremendous health and economic burden in the EMR. The latest GLOBOCAN estimation of cancer incidence in the EMR is over 730,000, and mortality over 450,000 cancer-related deaths in 2020 (Figures 1, 2) (2). Health systems and cancer care in the EMR vary by sub-region and country based on several factors including structure of the healthcare system, emergencies and conflicts, and economy status (3). Moreover almost half of countries in the region are in state of emergency or/and in conflict (3).

Cancer registration is a process of collecting high quality patient's identifications and tumour characteristics and ensuring secured storage for such data to be properly analyzed

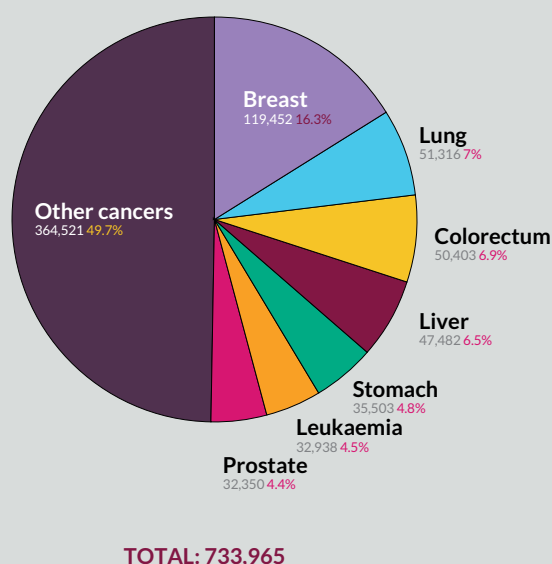
and used. There are two types of cancer registries: hospital-based and population-based registries. Hospital-based registries focus on collecting information on cancer patients in a particular hospital for hospital policy development or the assessment of cancer treatment outcomes. Whereas, population-based cancer registration plays a crucial role in the planning of national cancer control and prevention strategies, monitoring and evaluation of cancer care services, and epidemiological and clinical research (4). Reliable population-based cancer registry data are widely used to monitor cancer incidence and trends, patterns of geographical distribution, and survival at population level (5, 7).

Population-based cancer registration coverage has increased in the last two decades in the EMR despite many obstacles (6). Yet there are some limitations to cancer registration in

Table 1: Cancer registries in the EMR by type and year of foundation. Adapted from (3, 7)

Registry name	Country	Year founded	Type
Bahrain Cancer Registry	Bahrain	1998	Population based
Egypt National Population-based Cancer Registry	Egypt	2007	Population based
Ministry of Health, Iraqi Cancer Board, Iraqi Cancer Registration Section	Iraq	1974	Hospital and population based
The King Hussein Cancer Centre Tumour Registry	Jordan	2006	Hospital based
Jordan Cancer Registry	Jordan	1996	Population based
Saudi Cancer Registry	Saudi Arabia	1992	Population based
Kuwait Cancer Registry	Kuwait	1970	Population based
National Cancer Registry	Lebanon	2002	Population based
Benghazi Cancer Registry	Libya	2003	Population based
Casablanca Cancer Registry	Morocco	2004	Population based
Oman Cancer National Registry	Oman	1996	Population based
The Palestinian National Cancer Registry	Palestine	1998	Population based
National Centre for Cancer Care and Research Registry	Qatar	unknown	Hospital based
Qatar National Cancer Registry (QNCR)	Qatar	2012	Population based
Sudan National Cancer Registry	Sudan	2009	Hospital based
Syrian National Cancer Registry	Syria	2001	Hospital based
North Tunisian Cancer Registry	Tunisia	1996	Population based
United Arab Emirates National Cancer Registry	UAE	2013	Population based
Iranian National Cancer Registry	Iran	2016	Population based
Golestan Population-based Cancer Registry	Iran	2006	Population based

Figure 1: Estimated number of cancer cases by type in 2020 in both sexes across all ages for the WHO Eastern Mediterranean Region. Adapted from GLOBOCAN 2020



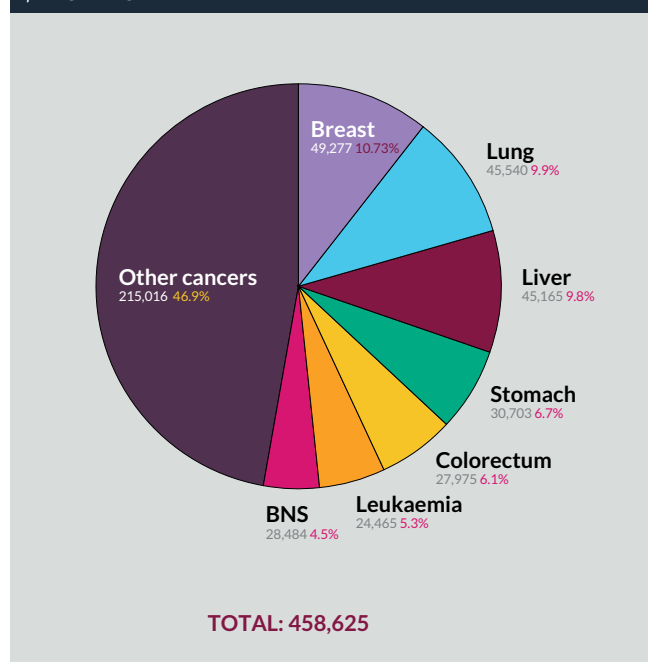
the region due to the shortage of funding and poor quality of data, population mobility and instability due to political disputes that involve several EMR countries (3). Therefore many improvements are needed to help cancer registries in the region to provide accurate and reliable data that would help to formulate evidence-based cancer care policies (6). This review provides an overview on the cancer registration status in the EMR and sheds light on the future directions for improvement.

### Cancer registration status in EMR

According to Cancer Incidence in Five Continents (CI5) report, there is considerable variation across the region, both in terms of cancer registry coverage and data quality reflecting the varying degrees of maturation (7). Fourteen out of the 20 have functional cancer registries in place (either subnational or national), Afghanistan, Djibouti and Somalia do not have any type of cancer registration system yet.

Table 1 shows a list of cancer registries in the EMR by their type and year of foundation, as reported in recent publications that detailed and compared all cancer

Figure 2: Estimated number of cancer related death by type in 2020 in both sexes across all ages for the WHO Eastern Mediterranean Region. Adapted from GLOBOCAN 2020



registration in the EMR (3, 6).

In the Gulf Cooperation Council (GCC) States, health ministers issued a joint resolution to emphasize the importance of launching national cancer prevention and control programmes in each member state, which includes Kuwait, Saudi Arabia, Bahrain, Qatar, United Arab Emirates and Oman). In response to that, the Gulf Centre for Cancer Registration (GCCR) was established in 1998 to provide technical support to the newly established population-based cancer registries in the Gulf region, to provide cancer incidence statistics among GCC States, and to encourage epidemiological and clinical cancer research (8). The GCCR data was the main source for the Gulf region's strategic cancer control and prevention action plans for more than 20 years. Unfortunately, most of the EMR countries are now affected by halted or chronic states of conflict and instability (3). For example, healthcare systems including cancer care and registration in Syria, Yemen, Lebanon, Iraq and Palestine have been largely affected by these conflicts (3, 9).

One of the major limitations in most EMR countries is related to access to cancer patients details from the private and semi-governmental healthcare sectors, which greatly affect population cancer incidence and survival statistics (9). In cancer registration, mortality data is an important independent data source for the assessment of the cancer burden. Despite the pivotal role of mortality data in cancer registration and in policy-making, outcome monitoring and efficient use of cancer care resources, such important data are either suboptimal or not available. Absence of a national multisectoral framework

that brings all stakeholders in the decision loop, in addition to financial constraints and a shortage of skilled staff are the main reasons for the poor quality of data in most EMR countries. For example, conflicts and refugee mobility across some areas of Syria, Iraq, Lebanon and Libya have doubled the challenges in these areas in terms of a lack of accurate census and mortality data (3, 9). Despite the development of healthcare systems and advances in health information systems in the GCC, the GCC States still face challenges in updating vital status data on cancer incidence among expatriates due to their high mobility, and subsequently a large proportion of the GCC population are lost to follow-up (9, 10). Unique patient identification numbers are essential to ensure data collection from different sources and to eliminate duplicates, however, many EMR registries do not collect them, which subsequently increases the workload by registry staff to collect required data while ensuring accuracy and completeness. Such practices limits data linkage between different national data repositories.

### Future direction in cancer registration

Cancer registries in the EMR need to be empowered to play their role in national cancer control programmes. For example, population-based registries in some developed countries have been a reliable source for cancer statistics, monitoring screening programmes (11), and cancer care outcomes (12, 14). Whereas some EMR registries still need to expand their role in order to provide reliable cancer statistics. Besides their crucial role in cancer control policies, data from population-based cancer registries can be expanded to link with other national datasets. Advances in data collection methods, bioinformatics, and data quality assurance have allowed for further enhancements to include more data on cancer management, patient experience and measures on quality of life to be collected and linked with the national cancer registry (15). For example, in England in the United Kingdom, several datasets have been established and then linked to the National Cancer Registration and Analysis Service hosted by Public Health England. These data include information on patients' diagnosis, treatment including chemotherapy and radiotherapy, socioeconomic status, quality of life, patient experience with cancer care and Patient Reported Outcomes Measures (PROMs) (16). The National Cancer Institute in the United States have linked large cancer registration data from SEER to patient satisfaction, medical expenditures, Medicare data and Medicaid (17). In Scandinavian cancer registries, years of collected clinical data have been linked to the population-based cancer registration to allow for detailed analysis of cancer care quality, clinical studies, cancer patients diagnosis and subsequent care outcomes (18). These registries have shown to be effective in updating cancer care-related

policies and benchmark comparisons to provide high quality and equitable cancer care (14, 18, 19).

There is a need to develop a roadmap for reliable sources of data, clear governance, and well-defined data collection pathways to enable healthcare planners, clinicians and researchers to use cancer registry data to improve cancer care policies and enhance cancer care outcomes. The EMR efforts in cancer control are now well supported and acknowledged by the World Health Organization (WHO) and the International Agency for Research on Cancer (IARC). The Global Initiative for Cancer Registry Development (GICR) programme was established to further support countries to develop, maintain, and sustain their population-based registries (20, 21). Nowadays, several countries in the region have been included in the latest CI5 and more submissions are expected for Volume XII, compiling data from 2017–2023.

Moreover, ensuring permanent staffing for cancer registration is a key step for sustainable population-based registries, as an adequately trained workforce is vitally important to ensure high quality cancer registration. It is therefore important to establish continuous staff training programmes through courses and workshops, e-learning and mentoring using resources provided by GICR (20). Countries with limited technical resources are encouraged to take advantage of the GICR, which is a partnership led by IARC that aims to assist low- and middle-income countries in building cancer registry capacities, including technical training, advocacy and building regional networks (22). Those countries with existing cancer registries that are not population-based cancer registries should focus on raising standards for registration quality and building on or extending existing registry activities to a population-based cancer registry and improve data quality and coverage without compromising data accuracy standards (20).

The regulatory and governance aspects of setting up and sustaining a population-based cancer registry requires a high level of commitment at national level. Mandating cancer as a reportable disease is strongly recommended for population-based cancer registries (24). Regulatory and governance aspects are also significant in strengthening cancer research, with national and international groups with mutual interests that would enhance collaboration and advance data utilization (20). This is particularly important for countries with limited resources to exchange experiences in building local capacities.

Despite these recent achievements in population-based cancer registries in several countries in the EMR, there are still exciting challenges. Countries are therefore encouraged to explore new ways to translate evidence generated from cancer data to create policy changes in cancer prevention and management. This calls for the need to provide high quality

data and bring policy-makers on board to recognize existing gaps and challenges in cancer surveillance, as well as in the evidence-based solutions.

Workshops and courses, such as those provided by IARC and WHO EMRO, that emphasize the effectiveness of population-based cancer registry use for cancer control and prevention activities (23), are of great help in building capacity and should also allow policy-makers and key stakeholders to make informed decisions. Countries with functional population-based cancer registries in the region such as GCC States should also take the lead in supporting countries with limited capacities to develop and maintain their cancer surveillance activities. Experts and professionals working with cancer registries are also encouraged to share their expertise through site visits, regional workshops and liaising with IARC hubs and other regional efforts.

Finally, besides the disruption that the COVID-19 pandemic has imposed to cancer care services, it has also caused collateral damage to population-based cancer registration (24). This disruption was most pronounced in low- and middle-income countries (24). It is therefore important to ensure policy-makers' continue their commitment to supporting cancer registration. Migration from paper-based to paperless electronic data flow whenever possible would be a breakthrough evolution in cancer registration and would ultimately benefit countries in achieving their national strategic goals for cancer control and prevention. ■

#### 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.*

## References

- Kulháňová I, Bray F, Fadhill I, et al. Profile of cancer in the Eastern Mediterranean region: The need for action. *Cancer Epidemiol.* 2017;47:125-132. doi:10.1016/j.canep.2017.01.009.
- The Global Cancer Observatory. *Cancer Today.*
- Abdul-Sater Z, Shamseddine A, Taher A, et al. Cancer Registration in the Middle East, North Africa, and Turkey: Scope and Challenges. *JCO Glob Oncol.* 2021;(7):1101-1109. doi:10.1200/go.21.00065.
- Forsea A. Cancer registries in Europe—going forward is the only option. *Ecancermedalscience.* 2016;10:1-15. doi:10.3332/ecancer.2016.641.
- Dos Santos Silva I. The role of cancer registries. In: *Cancer Epidemiology: Principles and Methods.* IARC; 1999.
- Znaor A, Fouad H, Majnani F, et al. Use of cancer data for cancer control in the Eastern Mediterranean Region: Results of a survey among population-based cancer registries. *Int J Cancer.* 2021;148(3):593-600. doi:10.1002/ijc.33223.
- International Agency for Research on Cancer. *Cancer Incidence in Five Continents.* Published 2021. Accessed September 9, 2021. <https://ci5.iarc.fr/Default.aspx>.
- Al-Othman S, Haoudi A, Alhomoud S, Alkhenizan A, Khoja T, Al-Zahrani A. Tackling cancer control in the Gulf Cooperation Council Countries. *Lancet Oncol.* 2015;16(5):e246-e257. doi:10.1016/S1470-2045(15)70034-3.
- Znaor A, Eser S, Anton-Culver H, et al. Cancer surveillance in northern Africa, and central and western Asia: challenges and strategies in support of developing cancer registries. *Lancet Oncol.* 2018;19(2):e85-e92. doi:10.1016/S1470-2045(18)30019-6.
- World Health Organization. Intercountry Consultation on Assessment of Civil Registration and Vital Statistics Systems in the Region.; 2009. [https://apps.who.int/iris/bitstream/handle/10665/115991/who\\_em\\_hst\\_208\\_e\\_en.pdf](https://apps.who.int/iris/bitstream/handle/10665/115991/who_em_hst_208_e_en.pdf)
- Maroni R, Massat NJ, Parmar D, et al. A case-control study to evaluate the impact of the breast screening programme on mortality in England. *Br J Cancer.* 2021;124(4):736-743. doi:10.1038/s41416-020-01163-2.
- Cancer Research UK. Statistics by cancer type. Published 2020. Accessed January 30, 2020. <https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type>.
- Møller H, Henson K, Lichtenborg M, et al. Short-term breast cancer survival in relation to ethnicity, stage, grade and receptor status: national cohort study in England. *Br J Cancer.* 2016;115(11):1408. doi:10.1038/bjc.2016.335.
- Arnold M, Rutherford MJ, Bardot A, et al. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-based study. *Lancet Oncol.* 2019;20(11):1493-1505. doi:10.1016/S1470-2045(19)30456-5.
- Alessy S, Lichtenborg M, Davies EA. Comparison of the linked cancer registry and cancer patient experience survey datasets in England and the United States. In: Abstracts. Vol 8. *British Medical Journal Publishing Group*; 2019:A24.1-A24. doi:10.1136/bmj-2019-PSF.55
- Henson KE, Elliss-Brookes L, Coupland VH, et al. Data Resource Profile: National Cancer Registration Dataset in England. *Int J Epidemiol.* Published online April 23, 2019. doi:10.1093/ije/dyz076.
- Chawla N, Urato M, Ambs A, et al. Unveiling SEER-CAHPS®: A New Data Resource for Quality of Care Research. *J Gen Intern Med.* 2015;30(5):641-650. doi:10.1007/s11606-014-3162-9.
- Nilbert M, Thomsen LA, Winther Jensen J, et al. The power of empirical data; lessons from the clinical registry initiatives in Scandinavian cancer care. *Acta Oncol (Madr).* 2020;59(11):1343-1356. doi:10.1080/0284186X.2020.1820573.
- Allemani C, Weir HK, Carreira H, et al. Global surveillance of cancer survival 1995-2009: Analysis of individual data for 25 676 887 patients from 279 population-based registries in 67 countries (CONCORD-2). *Lancet.* 2015;385(9972):977-1010. doi:10.1016/S0140-6736(14)62038-9.
- Bray F, Znaor A, Cueva P, et al. *Planning and Developing Population-Based Cancer Registration in Low-or Middle-Income Settings.* International Agency for Research on Cancer; 2014.
- Roshandel G, Semnani S, Fazel A, et al. Building cancer registries in a lower resource setting: The 10-year experience of Golestan, Northern Iran. *Cancer Epidemiol.* 2018;52 (January):128-133. doi:10.1016/j.canep.2017.12.014.
- International Agency for Research on Cancer. The Global Initiative for Cancer Registry Development. Published 2021. Accessed September 9, 2021. <https://gicr.iarc.fr/about-the-gicr/>
- IARC Learning. Evidence-based professional development for cancer researchers and health professionals. Published 2021. Accessed September 9, 2021. <https://learning.iarc.fr/>.
- Soerjomataram I, Bardot A, Aitken J, et al. Impact of the COVID-19 pandemic on population-based cancer registry. *Int J Cancer.* Published online September 3, 2021:ijc.33792. doi:10.1002/ijc.33792.



# Role of regional civil society organizations in cancer control in the Eastern Mediterranean Region

**Fatemeh Toorang**, Researcher and PhD candidate in food policy, Cancer Research Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran; **Kazem Zendeheh**, Professor of Cancer Epidemiology, Cancer Research Centre, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran; **Ibtihal Fadhil**, Chair, Eastern Mediterranean NCD Alliance, Kuwait City, Kuwait; **Hana Chaar**, General Manager, Child Cancer Center Lebanon, Beirut, Lebanon; **Nisreen Qatamish**, Director General, King Hussein Cancer Foundation, Jordan; **Sawsan Al Madhi**, Director General, Friends of Cancer Patients, Sharjah, United Arab Emirates; **Hadi Abu Rasheed**, Head of Professional Development and Scientific Research Department, Qatar Cancer Society, Qatar



FATEMEH TOORANG



KAZEM ZENDEHEH



IBTIHAL FADHIL



HANA CHAAR



NISREEN QATAMISH



SAWSAN AL MADHI



HADI ABU RASHEED

Civil society organizations (CSOs) play a key part within the cancer control continuum, ranging from service delivery, raising awareness, advocacy with policy-makers, patient empowerment, monitoring progress and accountability, and engaging in research. A thriving, independent and empowered civil society in cancer control can hold policy-makers accountable and shape health services to better respond to people's needs, particularly in underserved areas and for hard-to-reach populations, ultimately contributing to improving cancer control services.

Here we attempt to shed light on the role and contributions of CSOs to the cancer control agenda, highlighting a few examples of CSOs engagement and contributions to cancer control programmes throughout the cancer control continuum from prevention to rehabilitation.

Cancer is one of the leading causes of disability and death worldwide. GLOBOCAN estimated that 19.3 million new cancer cases (18.1 million excluding nonmelanoma skin cancer) and almost 10.0 million cancer deaths (9.9 million excluding nonmelanoma skin cancer) occurred in 2020 (1). There is a disparity in its distribution around the world as it is decreasing in some developed countries but is increasing in low-income countries where the access to care is lower. Cancer incidence in Eastern Mediterranean Region (EMR) is lower than in high-income countries where it is still the fourth cause of death, however, the accelerated trends will change the situation in near future (2). Unfortunately, it is anticipated that the largest increment in cancer incidence among World Health Organization (WHO) regions will happen in EMR countries, where projection modelling has shown that cancer incidence will have doubled by 2040 (3, 4).

The region consists of diverse countries which are extremely different in economic aspects. This fact could mainly explain the discrepancies in access to cancer care and implementation of cancer prevention programmes (2). However, most countries are in the middle- or low-income group based on World Bank

which results in lower resources to allocate to health (2). Inadequate resources for cancer control along with a dramatic increase in cancer incidence in the EMR countries, emphasizes the value of a comprehensive and effective cancer control programme.

Another substantial problem in EMR countries which is also common in most parts of the world is not involving all stakeholders in cancer policy-making (5). Comprehensive cancer control plans are scarce in this region and existing plans have been devised without an effective partnership with stakeholders (5).

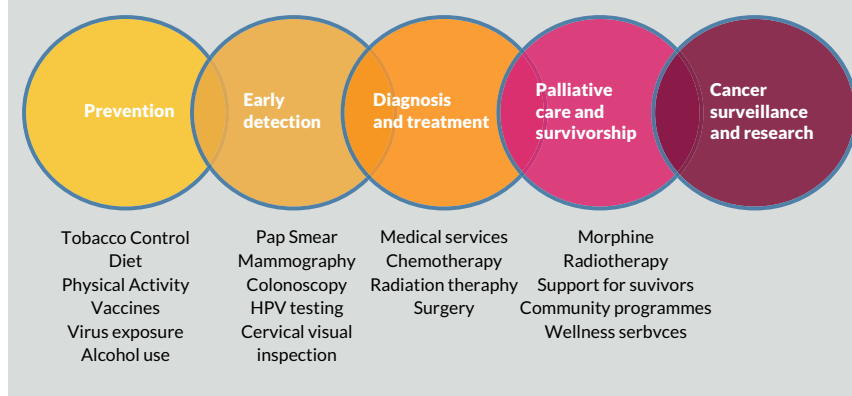
A comprehensive cancer control plan should cover every aspect in the cancer control continuum (Figure 1). However, in low- and middle-income countries usually most resources are allocated to diagnosis and treatment with the least, and often no resources, directed to prevention (2). Following this, there is therefore an urgent necessity to raise budgets and, more importantly, set more sensible priorities.

In moving forward to build a solid and effective cancer response for better health, resilient health systems, WHO has recognized the need to partner with all stakeholders

Figure 1: CSOs has a great role in cancer prevention and control



Figure 2: Illustration of the cancer control continuum and some of the interventions available at each stage



at different levels. Their five main roles (Figure 1) consist of advocacy, capacity building, knowledge exchange, providing evidence-based information, coalition building, monitoring and service provision (7, 8). Although their main efforts are focused on advocacy and communication to address cancer control, mobilizing resources in partnership with the private sector, delivery of cancer services (9), raising awareness among communities and healthcare professionals, monitoring

including CSOs to guide and coordinate effective responses through addressing national policies, including the integration of cancer care into Universal Health Care benefit packages. Regional CSOs are well positioned to play a critical role in cancer control

Furthermore in 2017, the 70th World Health Assembly endorsed a cancer resolution: “Cancer prevention and control in the context of an integrated approach”, which highlighted the need for strong partnerships between government and civil society, building on the role and contribution of the health-related nongovernmental organizations and patient organizations to support, as appropriate, the provision of services for the prevention, control, treatment and care of cancer, including palliative care.

## The role of CSOs in cancer control

Civil society organizations are entities outside governmental organizations and distinct from any commercial institutions. They comprised a variety of entities such as research institutions and think tanks, nongovernmental organizations (NGOs), community groups, charities, faith-based organizations, professional associations, trade unions and voluntary organizations (6). Governments’ priorities change when the political environment shifts through democratic or undemocratic measures. However, CSOs have a more robust position, which can help achieve consistency in cancer control programmes. They are recognized as a identifiers of innovative ideas and implementers of creative models in health systems worldwide (6).

These organizations are already involved in all parts of the continuum of cancer control all over the world and

progress and developing shadow reports, building the capacity of CSOs and health professionals, research (including operational research), and advocacy for voices and engagement of people living with cancer, including vulnerable groups such as refugees and patients in low- and middle-income countries.

Globally, CSOs have been very active in advocacy, raising awareness, collations, resource mobilization and patient empowerment in high-income countries (10, 11). However, a review of cancer control plans in different countries revealed that a CSO’s role is limited and that they are rarely engaged in the policy-making process (12).

The engagement of CSOs is well reflected throughout the cancer control continuum from prevention to palliative care and rehabilitation (Figure 2).

## Cancer prevention

Cancer prevention is defined as minimizing or eliminating exposure to potential environmental causes of cancer. It is estimated that 50% or more of cancers’ incidence is attributed to three factors: tobacco, infection and unhealthy nutrition, and lack of physical activity (13). Eastern Mediterranean countries have the highest rate of modifiable lifestyle risk factors worldwide. Tobacco use, unhealthy diet and physical inactivity are major regional health affecting factors. EMR populations consume sugar, salt and trans-fatty acids well above WHO recommended levels (14).

### Tobacco control

The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) which introduces measures to decrease the demand for tobacco along with limiting its

production, distribution and availability and supply, came into force in 2005 (15). In line with this framework, WHO developed a set of six measures to diminish tobacco demand, known as MPOWER (16). Most EMR countries (19 out of 22) are parties to WHO FCTC (17). Tobacco advertising, promotion and sponsorship have been banned in 10 countries, national legislation banning smoking in indoor public places has been established in most countries and 15 countries put warnings on cigarette packets (18, 19). Unfortunately, the EMR has a lowest price of tobacco products and no countries in this region have implemented the six measures of the WHO FCTC and only six countries implemented at least three measures from MPOWER (17). In the last WHO report on the prevalence of tobacco smoking, this region was the only WHO region that predicted showing an increase in prevalence of tobacco use among men (20). Moreover, there is a concern about increasing smoking prevalence in women (17). Tobacco smoking is prevalent in this region as dual waterpipe and cigarette use and it is a crucial issue in cancer control in this countries (21).

Civil society organizations have been taking part in the FCTC since the beginning as 200 CSOs from 90 countries are members of the convention and have been supporting the development, ratification and implementation of the treaty. The Framework Convention Alliance (FCA) is a heterogeneous alliance of CSOs from all over the world which was initiated through the FCTC process and it continued its actions to ensure FCTC implementation in all countries (22). The FCA developed several innovative measures including two awards to compel countries to accept the FCTC. Their awards, named the "Orchid Award" and the "Dirty Ashtray Award", described different countries and industries operation in tobacco control and revealed the latent reason of disagreements. It was effective in weakening the big four – China, Japan, Germany and the United States – position against FCTC (22). The FCA became a good example of CSOs effectiveness and power to inform public and politicians about health issues and to force national and international governments to ratify and implement advantageous policies (22).

Although CSOs are in their infancy in most EMR countries, they have built advocacy campaigns and push their governments to act more proactively on tobacco control programmes. Some governments are not impartial to tobacco control as there is a conflict of interest.

Some of the best practices in the region, include the King Hussein Cancer Foundation's lead on the development of an effective strategy to limit exposure to tobacco smoke in public areas. The Foundation's smoke free zone certification programme, which is undertaken in collaboration with local government encourages companies or other local institutions to prevent smoking inside their premises. Another successful

#### Box 1: Cervical cancer CSO initiatives

➔ The European Cervical Cancer Association initiated a network of politicians called "Politicians Against Cervical Cancer", which supports integration of HPV vaccination into cancer prevention programmes. They provided an impressive white paper to support national HPV vaccinations in their region. They made a strong alliance with other associations like European Public Health Alliance (EPHA) to support European Union efforts to prevent cervical cancer (33). Women Against Cervical Cancer (WACC) is another network of about 50 CSOs in 20 countries which are guided by medical experts. It is a creative approach to share medical knowledge with the public through CSOs. The network provides standard and accurate information through websites, meetings, flyers and videos in multiple languages. Medical experts can refresh their information for the public about the acceptance of vaccinations and other valuable data through researches done by CSOs as well (33).

example is the NGOs coalition to ratify and implement tobacco control policies in Egypt.

Several CSOs are engaged in tobacco control and play a crucial role in compelling governments to ratify and implement the FCTC in their countries (6). This involves lobbying with community leaders and other influential people, i.e. religious leaders, health professionals or teachers (2).

Another example of the engagement of CSOs is the collaboration with communities of schools and universities to boost tobacco control and create a tobacco-free environment. The Qatar Cancer Society (QCS) has been running a "World No Tobacco Day" art and video competition in collaboration with the Ministry of Education and Higher Education among the schools and university students to mobilize their communities to encourage healthy habits and tobacco abstinence in future generations, as well as creating advocates for tobacco control in every household. In addition, there is recognition of corporates that have tobacco free facilities. The QCS has also been working on spreading awareness about smoking cessation at clinics and health centres.

#### Vaccination

Some chronic infections are clearly distinguished as carcinogenic agents. Among them, hepatitis B (HBV) and human papillomaviruses (HPVs) are preventable through vaccination (2). In 2009, WHO estimated the incidence of HBV in the EMR at over four million people annually (23). The high prevalence of HBV infection in this region convinced Member States to adapt a target for reducing HBV infection to less than 1% among children aged <5 through childhood vaccination by 2015 (24). The EMR countries have reached a remarkable achievement in the HBV vaccination of infants with coverage rising from only 6% in 1992 to 83% in 2014 (24).

Contrary to this, the introduction of HPV vaccination programmes is very slow in the EMR. While most countries in

the EMR have endorsed the WHO global strategy for cervical cancer elimination (25), implementation of the strategy has been affected by several factors including HPV vaccination hesitancy and vaccine unavailability (26). There are huge disparities in HPV vaccinations worldwide and only 2.7% of vaccinated women live in low- and middle-income countries (27). Among the 91 countries who introduced HPV vaccination only two, the United Arab Emirates and Morocco, are from the EMR (28). Other Gulf Cooperation Council (GCC) countries such as Qatar and Saudi Arabia in the process of introducing HPV vaccination.

Incidence rates of cervical cancer vary between EMR countries, with highest rate registered in Somalia (24/100,000 population) and the lowest in Iraq (1.9/100,000 population). It should be mentioned that several EMR countries lack robust cancer data to assess the real burden of cervical cancer and HPV infection (29, 30).

HPV vaccines are expensive and some EMR countries cannot afford them and, unfortunately, most of them do not qualify for GAVI support. Many countries in this region did not consider HPV vaccinations mainly due to lack of data on the disease burden, moreover, most countries presumed other health problems were more important (31). However, the availability of HPV vaccine in many countries did not remarkably increase the vaccine coverage due to vaccine hesitancy (26). This refusal to take the vaccine could be due to concerns about safety and cultural or religious sensitivities. Based on these reasons, CSOs could be for or against vaccinations. Some CSOs are worried about side effects of the vaccine and some believe HPV vaccination will increase sexual relationships outside of marriage (31).

Civil society organizations such as First Ladies Initiatives and Cervical Cancer Prevention Initiatives who are pro-vaccination can play a substantial role in increasing access and acceptance of HPV vaccination. They could enhance cervical cancer registries, advocate to establish HPV vaccination and increase public awareness to mobilize the public (31, 32). They could initiate joint vaccine procurement programmes for EMR countries to improve their purchasing power (31). The CSOs who work on cervical cancer prevention should also embrace other CSOs working on women's empowerment, sexual and reproductive rights, maternal and HIV/AIDS to insure more successful activities (27).

Friends of Cancer Patients (FOCP) in Sharjah, United Arab Emirates, led the regional work on HPV and cervical cancer elimination in partnership with the Ministry of Health and Prevention in the United Arab Emirates, United Nations Population Fund (UNFPA) and WHO. Two regional forums were organized under the leadership of CSOs resulting in key recommendations to scale up the fight against HPV (Sharjah

Declaration Document).

In Morocco, local CSOs have been very active in raising community awareness and they displayed a positive role in high-level advocacy that led to the introduction of the HPV vaccination programme in Morocco, implemented in November 2021 (31).

The Qatar Cancer Society has been doing annual community cervical cancer awareness campaigns in Qatar that have included workshops in collaboration with the public and private sectors in addition to media campaigns in local newspapers, TV, radio, websites, and social media platforms. The annual campaign spread knowledge about the signs and symptoms of the disease, its risk factors, as well as methods of prevention and early detection including HPV vaccination and Pap smears with HPV testing. Also, private healthcare clinics participated in the campaigns by providing free Pap smear tests.

### *Lifestyle modifications*

The WHO recommended a set of cost-effective evidence-based interventions ("best buys") to reduce the exposure to NCD risk factors as an important step in cancer prevention in the EMR (2). There is a great deal of research which highlights the importance of effective policies to decrease cancer risk by making healthy choices as easy choices (34).

Civil society organizations have not acted strongly in advocacy for food reformulation or taxing less healthy foods national or internationally. For example, 81% of participants in the Codex Committees between 1989 and 1991 were from industry, and only 1% were from public interest groups. This resulted in food standards that favour the food industries' interest (35). Consumer-representing CSOs are not active in most countries and occupy just an informal role in governance (35).

Reducing sodium intake is one of the "best buys" advised by WHO to prevent and control NCDs around the world. This followed by a voluntary global target of a 30% reduction in salt intake among population by 2025 (36, 37). Sodium intake in EMR countries ranged from 5.22–13.5 g/person/day, where the recommendation of WHO is less than 5g/person/day (38, 39). A number of salt reduction initiatives have been undertaken in this region, but there is a lack of comprehensive data on salt intake in many countries and greater public activity is needed to reduce salt intake (40).

Regional civil society's activity is predominantly focused on raising awareness among the public and health professionals. They have endorsed the idea that public education on NCD risk factors is CSOs most important priority followed by advocacy (41).

As part of these regional CSO initiatives, the Qatar Cancer Society has been including the lifestyle modification as a

methodology for cancer prevention, including healthy eating habits and being physically active, in all of its cancer awareness campaigns with a major emphasis during the Gulf Federation for Cancer Control's GCC Cancer Awareness Week and the Union International for Cancer Control's World Cancer Day. In addition to working with the Ministry of Education and Higher Education as part of the school health awareness programme "Your Success is in Your Health" that focuses mainly on healthy lifestyle among school students.

### Cancer early detection

Early detection is a crucial step in cancer control which could increase survival rates (5). While the majority of EMR countries do not have well organized cancer screening programmes, most screening activities remain mostly opportunistic (43), and associated with late stage presentation for most cancers.

Civil society organizations have the capacity and are in the best position to support early diagnosis programmes through regular campaigns to improve public awareness, training of health professional and the public on the early signs and symptoms of common cancers. In order to improve screening uptake, CSOs could help in raising awareness, fighting cultural barriers and stigmas (2).

In Jordan, the King Hussein Cancer Foundation brought about a successful example of how an NGO's activity to enhance the early diagnosis of cancer and other NCDs impacted positively on the early diagnosis of breast cancer. The proportion of late stage diagnosis declined from 56% to 23% between 2005 and 2009, thus the survival rate showed a substantial increase (44). A similar approach in Morocco in addition to a health professionals training programme increased early stage diagnosis of breast cancer (45).

Several charities in Iran shown a great interest in cancer screening campaigns. The Society for Helping Cancer Patients, located in Mazandaran Province of Iran, established few clinics for the early detection of cancer. This society performed a campaign to screen women over 40 for breast cancer. A total of 5,994 women were screened in 2018, which was followed by 2,278 mammography scans and 1,586 ultrasound evaluations (42). Other charities, such as Shams, Daheshpour, Nastarn and Pejvaktaher hold campaigns on the early signs of cancer and there are even some screening programmes in Iran (46).

The Friends of Cancer Patients in the United Arab Emirates has performed several awareness and educational campaigns about prevention and screening of cancers including the Pink Caravan (for breast cancer and cervical cancer awareness and screening), Shanab (for prostate and testicle cancer awareness and screening), skin cancer awareness, and ANA for childhood cancer awareness. In Lebanon, the Children's Cancer Center of Lebanon (CCCL) organized several educational sessions for

paediatricians with a focus on the early detection of tumours in children.

The Qatar Cancer Society has conducted monthly comprehensive multi-media collaborative community cancer awareness campaign with each month focusing on different cancer according to the top 10 most common cancers in Qatar. The monthly campaign will focus on the signs and symptoms, risk factors, prevention and early detection for a specific cancer. This monthly cancer awareness calendar has had significant momentum since 2018 and the establishment of the Qatar Cancer Awareness Calendar under the leadership of Ministry of Public Health – National Cancer Programme and the involvement of all the main stakeholders of the cancer control community in Qatar including Qatar Cancer Society. People living with cancer and others were involved in those campaigns as cancer awareness advocates and champions. Also public and private sector primary healthcare professionals were given continuing medical education activities co-organized by the Qatar Cancer Society and the academic and health entities that focus on cancer early detection and screening.

### Service delivery

Civil societies' role in service delivery is well documented in the region. Many CSOs have a long existing experience in delivering cancer care, for instance MAHAK a non-profit charity-based organization in Iran, funded entirely by donations, has supported 35,000 children affected with cancer up to 1999. MAHAK mainly focus on treatment of childhood cancer.

MAHAK's activities are not limited to the hospital, it supports children with cancer who are treated in other hospitals. Moreover, it has supported 2,438 refugee children as it is officially recognized by UN High Commissioner for Refugees (UNHCR) as the organization which helps refugee children (Afghan and Iraqi) in and out of refugee camps. In 2007, this NGO was presented with the Swiss SGS NGO Benchmarking Award for the best and most transparent NGO in the Middle East.

In Jordan, King Hussein Cancer Centre (KHCC) provides another example of a non-profit NGO providing cancer treatment for over 7,000 adult and children cancer patients every year from Jordan and the region. KHCC's bone marrow transplantation (BMT) is one of the largest and most successful BMT programmes in the Middle East which performs approximately 250 bone marrow transplants each year with cure rates compatible with international standards. It has several other activities in early detection of cancer and research.

Other successful regional examples is the Friends of Cancer Patients in United Arab of Emirate, Qatar Cancer Society in Qatar, and the Children's Cancer Center of Lebanon (CCCL) in Lebanon. The first two associations provide access to treatment for cancer patients through financial aid and also



offering support group for moral and psychological support for cancer patients and their families. The CCCL administers and covers treatment, free of charge, for almost 40% of kids with cancer in Lebanon and refugees from neighbouring countries.

### Palliative care

Despite the long existing needs for palliative care in EMR, only few countries have established palliative care programmes within their public health system (5).

Gaps in regional palliative care is related to a multiplicity of factors including, but not limited to, poor commitments, scarcity of resources, lack of technical capacity, limited funding, emphasizing the need to actively engage CSOs in enhancing palliative care in this region.

Home care and psychological support of patients and their families are two important parts of palliative care which could be effectively improved by CSOs (2). Volunteers who are trained and supported by CSOs could play important roles in this field. Moreover, there are some preconception about pain, death and some concern about abuse of narcotic substances (2) which could all be rectified by CSOs' public campaigns and education initiatives. Regional CSOs have played a critical role in enhancing palliative care services through advocacy, training, psychological and financial support to patients; supply of equipment and medications and service delivery in many countries (48).

Some examples from the region:

- ➔ In Pakistan, 17 out of 20 palliative care centres are private, whereas charitable service are provided mainly by volunteers (48).
- ➔ The Al-Malath foundation for humanistic care has a hospice with a team of volunteer nurses who provide medical and psychological support in Jordan.
- ➔ The Jordan Palliative Care Society enhances the culture of palliative care through advocacy, networking, education and training (49, 50).
- ➔ The Lebanese Centre for Palliative Care performed capacity building activities beside providing comprehensive support to patients (51).
- ➔ The Children's Cancer Centre of Lebanon (CCCL) provides palliative care in hospital and at home.
- ➔ The Oman Cancer Association has provided between 2017 and 2019 comprehensive training in palliative care for the region in collaboration with the Oncology Nursing Society and the Omani Ministry of Health.
- ➔ SANAD is an independent nongovernmental, non-profit organization that provides home hospice care to advanced chronically and terminally ill patients and their families in Lebanon. Also SANAD undertakes extensive awareness-raising activities at the the community and

the medical and nursing professions level to facilitate a better understanding of the issues and the concepts behind hospice and palliative care in Lebanon.

### Advocacy for cancer control

Civil society organizations play a key role in health advocacy, especially in high-income countries. They convene different organizations from extremely different background behind common goals and build strong alliances and collaborations to powerfully advocate through public opinion polling and preparing white papers. They prepare effective fact sheets which translate complicated science topics into more understandable papers for the public and politicians (7). The most successful CSO alliance is the FCA, which is a powerful coalition of more than 200 organizations from 90 countries. It exemplified an effective coalition which brought about a powerful advocacy (22). Several examples of national coalitions against tobacco has been made in EMR countries such as Egypt, Jordan, Lebanon and Pakistan (41). For example, the NCD Alliance Pakistan (NCDA-PAK) was set up in 2014, this is a partnership between leading cardiologists, the Pakistan Medical Association, media and health professionals, CSOs and lawyers. It focuses on tobacco control and is a member of FCA and it works on cancer control as well (41).

### Opportunities and challenges

Civil societies in the EMR have great powers to mobilize volunteers and enjoy strong support from the population. However, they are facing multiple challenges including a lack of sustainable funding, limited technical and administrative capacity, weak coordination at local and regional levels, weak leadership and a poor connection with government (59).

Lack of trust and a suspicion of the role CSOs play is the most important barrier to CSO activities in this region and elsewhere. It largely stems from authoritarian political governance and xenophobia. Some governments consider CSOs to be advantageous, however, most view them as threatening and illegitimate organizations that should be limited (60). However, the growth in CSOs is an ineluctable part of transitional period which is happening in the EMR.

Limited funding resources is an enormous obstacle towards CSO performance in the EMR countries. Unfortunately, lack of resource could place CSOs in direct competition with each other which is a considerable barrier to building coalitions (58). On other note, receiving funding from industry or even governmental organizations will increase the chance of conflict of interest and halt appropriate assessment of governmental activities or weaken a CSO's position to voice their concerns and limit the harmful activities of industry.

While most local CSOs rely on volunteers, often lack skills

and knowledge. Advocates should receive specialized training and should not treat their roles as a hobby. A coalition with specialist scientific institutions could enhance their ability and promote their credibility to make more sensible and trustworthy advocacy.

While there is a huge potential in the EMR to develop a coalition and united actions based on a cultural and religion background, there are some strong conflicts in the region which disturb this and ignite conflicts which not only weaken CSOs' positions but also brings serious problems to cancer control programmes. Geopolitical conflicts and economic crises among countries in this region limit CSOs' capacities (14).

Civil societies need a responsible and free media that help them encourage public debates and challenge all stakeholders including governments to be fair and transparent and to force them to make evidence-based policy (61). There are several examples of the alliance of the media with CSOs to force

governments to make more appropriate decisions. The case promoting exclusively breast feeding, access to HIV medication and restrictions on tobacco marketing are good examples of such alliance (61).

By acknowledging the pivotal role of CSOs, governments need to support the CSOs functions and provide the right platform and legislation to empower CSOs through professional education and training. It is important to perceive them as a communities' voice and ratify legal protections for them. They should be strengthened and encouraged to provide the power and direction for effective health change in this region (61).

However, CSOs success stories and strong civil societies are a symbol of a healthy democracy and could empower society to improve quality of life. Unfortunately, most CSOs in the EMR are still far from meeting their potential in all health-related issues including cancer control. ■

## References

1. Sung, H., Ferlay, J., Siegel, R., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal For Clinicians*, 2021, 71(3), p.209-249..
2. Organization, W.H., *Towards a strategy for cancer control in the Eastern Mediterranean Region*, 2009.
3. Rastogi, T., A. Hildesheim, and R. Sinha, Opportunities for cancer epidemiology in developing countries. *Nature Reviews Cancer*, 2004. 4(11): p. 909-917.
4. Dey, S. and A.S. Soliman, Cancer in the global health era: opportunities for the Middle East and Asia. *Asia Pacific Journal of Public Health*, 2010. 22(3\_suppl): p. 75S-82S.
5. Lyons, G., et al., Scaling up cancer care in the WHO Eastern Mediterranean Region. *East Mediterr Health J*, 2018. 24(1): p. 104-110.
6. Malinowska-Sempruch, K., et al., Civil society—a leader in HIV prevention and tobacco control. *Drug and Alcohol Review*, 2006. 25(6): p. 625-632.
7. Champagne, B.M., E. Sebríe, and V. Schoj, The role of organized civil society in tobacco control in Latin America and the Caribbean. *Salud publica de Mexico*, 2010. 52: p. S330-S339.
8. Organization, W.H., *Stop the global epidemic of chronic disease: a practical guide to successful advocacy*. 2006.
9. Azenha, G., et al., The role of breast cancer civil society in different resource settings. *The Breast*, 2011. 20: p. S81-S87.
10. Organization, W.H., *Strategic alliances: The role of civil society in health*, 2001, World Health Organization.
11. Grey, N. and A. McMikel, The growing burden of cancer and the role of NGOs. *Cancer Control*, 2003: p. 142-145.
12. Dunn, J., et al., Engaging NGOs in national cancer-control efforts. *The Lancet Oncology*, 2013. 14(11): p. 1044-1046.
13. Kushi, L.H., et al., American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. *CA: a cancer journal for clinicians*, 2012. 62(1): p. 30-67.
14. Gostin, L.O., et al., Legal priorities for prevention of non-communicable diseases: innovations from WHO's Eastern Mediterranean region. *Public health*, 2017. 144: p. 4-12.
15. Organization, W.H., *WHO framework convention on tobacco control*, 2004, WHO Regional Office for South-East Asia.
16. Heydari, G., et al., Third study on WHO MPOWER Tobacco Control Scores in Eastern Mediterranean countries 2011-2015. *East Mediterr Health J*, 2017. 23(9): p. 598-603.
17. Al-Lawati, J.A. and J. MacKay, Tobacco control in the Eastern Mediterranean Region: the urgent requirement for action. *Eastern Mediterranean Health Journal*, 2020. 26(1): p. 6-8.
18. Organization, W.H., *WHO report on the global tobacco epidemic 2019: Offer help to quit tobacco use*. 2019.
19. El-Awa, F., et al., The status of tobacco control in the Eastern Mediterranean Region: progress in the implementation of the MPOWER measures. *Eastern Mediterranean Health Journal*, 2020. 26(1): p. 102-109.
20. Organization, W.H., *WHO global report on trends in prevalence of tobacco smoking 2000-2025*. 2018: World Health Organization.
21. Jawad, M., J.T. Lee, and C. Millett, Waterpipe tobacco smoking prevalence and correlates in 25 Eastern Mediterranean and Eastern European countries: cross-sectional analysis of the Global Youth Tobacco Survey. *Nicotine & Tobacco Research*, 2016. 18(4): p. 395-402.
22. Mamudu, H.M. and S.A. Glantz, Civil society and the negotiation of the Framework Convention on Tobacco Control. *Global public health*, 2009. 4(2): p. 150-168.
23. Organization, W.H., *The growing threats of hepatitis B and C in the Eastern Mediterranean region: a call for action*, 2009.
24. Allison, R.D., et al., Hepatitis B control among children in the Eastern Mediterranean Region of the World Health Organization. *Vaccine*, 2016. 34(21): p. 2403-2409.
25. Organization, W.H., WHO position on HPV vaccines. *Vaccine*, 2009. 27(52): p. 7236-7237.
26. Eskola, J., et al., How to deal with vaccine hesitancy? *Vaccine*, 2015. 33(34): p. 4215-4217.
27. Ginsburg, O., Global disparities in HPV vaccination. *The Lancet Global Health*, 2016. 4(7): p. e428-e429.
28. Dochez, C., et al., Strengthening national teams of experts to support HPV vaccine introduction in Eastern Mediterranean countries: Lessons learnt and recommendations from an international workshop. *Vaccine*, 2020. 38(5): p. 1114-1119.
29. Organization, W.H., Human papillomavirus vaccines: WHO position paper, May 2017—Recommendations. *Vaccine*, 2017. 35(43): p. 5753-5755.
30. Vaccarella, S., L. Bruni, and M. Seoud, Burden of human papillomavirus infections and related diseases in the extended Middle East and North Africa region. *Vaccine*, 2013. 31: p. G32-G44.
31. Jumaan, A.O., et al., Prospects and challenges in the introduction of human papillomavirus vaccines in the extended Middle East and North Africa region. *Vaccine*, 2013. 31: p. G58-G64.
32. LaMontagne, D.S., et al., Progress in HPV vaccination in low-and lower-middle-income countries. *International Journal of Gynecology & Obstetrics*, 2017. 138: p. 7-14.
33. Laurent-Ledru, V., A. Thomson, and J. Monsonego, Civil society: a critical new advocate for vaccination in Europe. *Vaccine*, 2011. 29(4): p. 624-628.
34. Khatib, O. and M. Aljurf, Cancer prevention and control in the Eastern Mediterranean region: the need for a public health approach. *Hematology/oncology and stem cell therapy*, 2008. 1(1): p. 44-52.
35. Lee, K., Civil society organizations and the functions of global health governance: what role within intergovernmental organizations? *Global health governance: the scholarly journal for the new health security paradigm*, 2010. 3(2).
36. Organization, W.H., Salt reduction and iodine fortification strategies in public health: report of a joint technical meeting convened by the World Health Organization and The George Institute for Global Health in collaboration with the International Council for the Control of Iodine Deficiency Disorders Global Network, Sydney, Australia, March 2013. 2014.
37. Webster, J., et al., Target salt 2025: a global overview of national programs to encourage the food industry to reduce salt in foods. *Nutrients*, 2014. 6(8): p. 3274-3287.
38. Lee, E., The world health organization's global strategy on diet, physical activity, and health: Turning strategy into action. *Food & Drug LJ*, 2005. 60: p. 569.
39. Powles, J., et al., Global, regional and national sodium intakes in 1990 and 2010: a systematic analysis of 24 h urinary sodium excretion and dietary surveys worldwide. *BMJ open*, 2013. 3(12): p. e003733.
40. Al Jawaldeh, A., B. Rafi, and L. Nasreddine, Salt intake reduction strategies in the Eastern Mediterranean Region. *Eastern Mediterranean Health Journal*, 2018. 24(12).
41. Organization, W.H. and N. Alliance, *Mapping of NCD Civil Society Organizations in the WHO Eastern Mediterranean Region*, 2015, WHO EMRO: Cairo.
42. Nahviou, A., et al., Role of Cancer Charity Organizations in Breast Cancer Prevention in Iran. *Basic & Clinical Cancer Research*, 2020. 12(4): p. 166-176.
43. Pourghazian, N., et al., Strengthening the early detection of common cancers in the Eastern Mediterranean Region. *Eastern Mediterranean Health Journal*, 2019. 25(11): p. 767-768.
44. Taha, H. A bottom-up model for strengthening breast cancer early detection services in Jordan. in *Proceedings of the Geneva Health Forum*. 2015.
45. Obtel, M., et al., Using surveillance data to understand cancer trends: an overview in Morocco. *Archives of Public Health*, 2015. 73(1): p. 45.
46. *The Role of Charities in Prevention and Detection of Breast Cancer*. 2, 2019. 3(3): p. 290-299.
47. Stjernsward, J., K.M. Foley, and F.D. Ferris, The public health strategy for palliative care. *Journal of pain and symptom management*, 2007. 33(5): p. 486-493.
48. Fadhill, I., G. Lyons, and S. Payne, Barriers to, and opportunities for, palliative care development in the Eastern Mediterranean Region. *The Lancet Oncology*, 2017. 18(3): p. e176-e184.
49. Bingley, A. and D. Clark, *Palliative care in Jordan. Palliative Care in the Region Represented by the Middle East Cancer Consortium: A Review and Comparative Analysis*. National Cancer Institute. Bethesda, MD, USA, 2008: p. 83-94.
50. Stjernsward, J., et al., Jordan palliative care initiative: a WHO Demonstration Project. *Journal of pain and symptom management*, 2007. 33(5): p. 628-633.
51. Osman, H., Development of palliative care in Lebanon: obstacles and opportunities. *Lebanese Medical Journal*, 2015. 103(1716): p. 1-5.
52. Epelman, S. and I. Magrath, Planning cancer control—the view of an NGO. *The Lancet Oncology*, 2013. 14(5): p. 388-390.
53. Al Nsour, M. and R. Kaiser, Networking for applied field epidemiology-Eastern Mediterranean Public Health Network [EMPHNET] Conference 2011. *EMHJ-Eastern Mediterranean Health Journal*, 17 (12), 990-993, 2011, 2011.
54. Al Nsour, M., The Eastern Mediterranean Public Health Network: A Resource for Improving Public Health in the Eastern Mediterranean Region. *JMIR public health and surveillance*, 2019. 5(3): p. e14992.
55. El-Jardali, F., et al., Use of health systems evidence by policymakers in eastern Mediterranean countries: views, practices, and contextual influences. *BMC health services research*, 2012. 12(1): p. 200.
56. Vian, T., Review of corruption in the health sector: theory, methods and interventions. *Health policy and planning*, 2008. 23(2): p. 83-94.
57. Index, C.P., Transparency international. URL: [http://www.transparency.org/news/feature/cpi\\_2013\\_now\\_is\\_the\\_time\\_for\\_action](http://www.transparency.org/news/feature/cpi_2013_now_is_the_time_for_action), 2010.
58. Tandilittin, H. and C. Luetteg, Civil society and tobacco control in Indonesia: the last resort. *The Open Ethics Journal*, 2013. 7(1).
59. *Regional meeting on strengthening partnership with civil society organizations for the prevention and control of noncommunicable diseases 2015*, World Health Organization, Regional Office for the Eastern Mediterranean: Cairo, Egypt
60. Pollard, A., Court, J.(2005) How civil society organisations use evidence to influence policy processes: a literature review. *Overseas Development Institute (ODI)*, 2005: p. 8-11.
61. Blas, E., et al., Addressing social determinants of health inequities: what can the state and civil society do? *The Lancet*, 2008. 372(9650): p. 1684-1689.

[www.cancercontrol.info](http://www.cancercontrol.info)