



Regional  
**cervical cancer**  
elimination strategy  
for the Eastern  
Mediterranean



Regional  
**cervical cancer**  
elimination strategy  
for the Eastern  
Mediterranean

## WHO Library Cataloguing in Publication Data

Names: World Health Organization. Regional Office for the Eastern Mediterranean

Title: Regional cervical cancer elimination strategy for the Eastern Mediterranean / World Health Organization. Regional Office for the Eastern Mediterranean

Description: Cairo: World Health Organization. Regional Office for the Eastern Mediterranean, 2023

Identifier: ISBN 978-92-9274-079-5 (pbk.) | ISBN 978-92-9274-080-1 (online)

Subjects: Uterine Cervical Neoplasm - prevention & control | Uterine Cervical Neoplasm - mortality | Disease Eradication | Regional Health Planning | Health Plan Implementation | Strategic Planning | Eastern Mediterranean Region

Classification: NLM WP 480

### © World Health Organization 2023

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited. In any use of this work, there should be no suggestion that WHO endorses any specific organization, products or services. The use of the WHO logo is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO). WHO is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization.

**Suggested citation.** Regional cervical cancer elimination strategy for the Eastern Mediterranean. Cairo: WHO Regional Office for the Eastern Mediterranean; 2023. Licence: CC BY-NC-SA 3.0 IGO.

**Sales, rights and licensing.** To purchase WHO publications, see <http://apps.who.int/bookorders>. To submit requests for commercial use and queries on rights and licensing, see <http://www.who.int/about/licensing>.

**Third-party materials.** If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

**General disclaimers.** The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

# Contents

|                                                                                                                                   |           |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------|
| Foreword .....                                                                                                                    | v         |
| Acknowledgements .....                                                                                                            | vi        |
| Acronyms and abbreviations .....                                                                                                  | vii       |
| Executive summary .....                                                                                                           | viii      |
| Rationale and purpose.....                                                                                                        | viii      |
| Process of strategy development .....                                                                                             | viii      |
| Strategy content .....                                                                                                            | ix        |
| Way forward .....                                                                                                                 | x         |
| <b>1. Rationale and purpose .....</b>                                                                                             | <b>1</b>  |
| <b>2. Introduction and background .....</b>                                                                                       | <b>2</b>  |
| 2.1 Cervical cancer incidence, morbidity, mortality and co-factors in the Region..                                                | 2         |
| 2.1.1 Human papillomavirus (HPV) types .....                                                                                      | 2         |
| 2.1.2 Incidence .....                                                                                                             | 2         |
| 2.1.3 Morbidity and mortality .....                                                                                               | 2         |
| 2.1.4 Co-factors in the Region.....                                                                                               | 4         |
| 2.2 Global cervical cancer elimination strategy .....                                                                             | 4         |
| 2.3 Emerging research, technology and innovation enablers of progress<br>toward elimination .....                                 | 6         |
| <b>3. Current progress towards the goals in the Region.....</b>                                                                   | <b>7</b>  |
| 3.1 Data sources .....                                                                                                            | 7         |
| 3.2 HPV vaccination .....                                                                                                         | 7         |
| 3.3 Screening.....                                                                                                                | 9         |
| 3.3.1 Current programmes .....                                                                                                    | 9         |
| 3.3.2 Planning for HPV testing.....                                                                                               | 10        |
| 3.3.3 Perceived acceptability of self-collection .....                                                                            | 10        |
| 3.4 Treatment.....                                                                                                                | 12        |
| 3.5 Monitoring and surveillance .....                                                                                             | 12        |
| <b>4. Strategic actions to progress toward the elimination targets.....</b>                                                       | <b>14</b> |
| 4.1 Strategic action 1: To strengthen primary prevention by accelerating<br>HPV vaccine introduction and improving coverage ..... | 17        |
| 4.1.1 WHO guidelines .....                                                                                                        | 17        |
| 4.1.2 Actions to achieve the goals .....                                                                                          | 18        |
| 4.2 Strategic action 2: To improve cervical screening and pre-cancer treatment.                                                   | 20        |
| 4.2.1 WHO guidelines .....                                                                                                        | 20        |
| 4.2.2 Actions to achieve the goals .....                                                                                          | 21        |

|                                                                                                                                                                                                                                                                     |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 4.3 Strategic action 3: To reduce the burden of suffering caused by cervical cancer by improving the availability of early diagnosis, treatment, rehabilitation and palliative care services.....                                                                   | 25        |
| 4.3.1 WHO guidelines .....                                                                                                                                                                                                                                          | 25        |
| 4.3.2 WHO recommendations.....                                                                                                                                                                                                                                      | 26        |
| 4.3.3 Actions to achieve the goals .....                                                                                                                                                                                                                            | 26        |
| 4.4 Strategic action 4: To strengthen health systems to ensure integrated, efficient and equitable delivery of high-quality services across the vaccination, screening and treatment pillars, and appropriate and effective monitoring and evaluation systems ..... | 28        |
| 4.4.1 WHO recommendations.....                                                                                                                                                                                                                                      | 29        |
| 4.4.2 Actions to achieve the goals .....                                                                                                                                                                                                                            | 29        |
| 4.5 Strategic action 5: To improve communication, advocacy and social mobilization to counter vaccine hesitancy, increase awareness of prevention and treatment, and to improve acceptability of diagnosis .....                                                    | 32        |
| 4.5.1 WHO recommendations.....                                                                                                                                                                                                                                      | 33        |
| 4.5.2 Actions to achieve the goals .....                                                                                                                                                                                                                            | 33        |
| <b>5. Implementation.....</b>                                                                                                                                                                                                                                       | <b>36</b> |
| 5.1 Leveraging and strengthening partnerships.....                                                                                                                                                                                                                  | 36        |
| 5.2 Resource mobilization.....                                                                                                                                                                                                                                      | 37        |
| <b>6. Monitoring and evaluation .....</b>                                                                                                                                                                                                                           | <b>37</b> |
| <b>References .....</b>                                                                                                                                                                                                                                             | <b>41</b> |

# Foreword

Building on the momentum created by the release of the *WHO global strategy to accelerate the elimination of cervical cancer as a public health problem* in 2020, the WHO Regional Office for the Eastern Mediterranean, in close consultation with Member States and partners, has developed a context-adapted regional cervical cancer elimination strategy aligned with the regional *Vision 2023: Health for all by all*. While having the same vision as the global strategy, which is to eliminate cervical cancer, the regional strategy also considers the contextual challenges, resources and competing priorities experienced by our Member States.

Globally, the major burden of cervical cancer comes from low- and middle-income countries. It is truly a disease of inequity since it occurs disproportionately among vulnerable women who face difficulties in accessing health care. Our Region faces major health status disparities within and between countries and includes both low-burden countries and also those with the highest cervical cancer incidence worldwide. The time has come to tackle these disparities and support critical interventions to provide all women with access to universal health coverage.

By committing to achieving the 90-70-90 targets by 2030, our Member States are setting themselves on a pathway to eliminate cervical cancer as a public health problem. Given the current epidemiological trends in the Region, many of our countries stand a good chance of progressing solidly towards the elimination of cervical cancer. To accelerate elimination efforts, we must promote high-level commitment and multisectoral collaboration by fostering partnerships that enable the establishment of sustainable national and regional programmes. We must also give significant attention to awareness-raising and prevention activities to increase service uptake and capacity-building through health system strengthening. Working together, we can move more efficiently and effectively towards this goal.

Conquering cervical cancer will mean a world where empowered women do not succumb to this disease and are able to give their full potential to their family and society. We are at a pivotal point and have an opportunity to contribute to eliminating the first cancer in history. Let us seize this opportunity and take concrete action together.

Dr Ahmed Al-Mandhari  
WHO Regional Director for the Eastern Mediterranean



# Acknowledgements

The World Health Organization (WHO) regional cervical cancer elimination strategy for the Eastern Mediterranean was conceptualized and prepared under the overall guidance and coordination of Dr Asmus Hammerich (Director, Department of Noncommunicable Diseases and Mental Health), Dr Lamia Mahmoud (Regional Adviser for Noncommunicable Diseases Prevention) and Dr Nasim Pourghazian (Technical Officer, Department of Programme Management).

The strategy was developed by the Australian Centre for the Prevention of Cervical Cancer, led by Professor Marion Saville (Executive Director) and Professor Julia Brotherton (Director), with contributions from Mr Callum Hensman and Ms Lena Elkman, in addition to the leadership of Dr Claire Nightingale and the contributions of Ms Claire Bavor and Ms Lucy Boyd from the University of Melbourne.

Staff at the WHO Regional Office for the Eastern Mediterranean who reviewed and revised the strategy document, providing valuable technical feedback, include: Dr Mohamed Afifi (Regional Adviser for Women's Health), Matilda Byström (Technical Officer, Noncommunicable Diseases Prevention/ Noncommunicable Diseases Management), Dr Maha El-Adawy, (Director, Department of Healthier Populations), Dr Hicham El Berri (Medical Officer, Noncommunicable Diseases Management), Dr Kamal Fahmy (Medical Officer, Immunization, Vaccine Preventable Diseases and Polio Transition), Dr Heba Fouad (Regional Surveillance Officer, Noncommunicable Diseases Surveillance), Dr Margarida Brito Goncalves (Technical Officer, Noncommunicable Diseases Prevention), Dr Rana Hajjeh (Director, Programme Management), Dr Asmus Hammerich (Director, Department of Noncommunicable Diseases and Mental Health), Dr Quamrul Hasan (Unit Head, Immunization, Vaccine Preventable Diseases and Polio Transition), Dr Yvan Hutin (Director, Department of Communicable Diseases), Dr Lamia Mahmoud (Regional Adviser for Noncommunicable Diseases Prevention), Dr Edrise Muller (Technical Officer, Noncommunicable Diseases Prevention), Dr Nasim Pourghazian (Technical Officer, Department of Programme Management), Dr Khalid Siddeeg (Regional Advisor for Child and Adolescent Health) and Dr Giuseppe Troisi (Technical Officer, Noncommunicable Diseases Prevention).

WHO gratefully acknowledges all Ministries of Health of Member States in the Eastern Mediterranean Region, cancer focal points, other United Nations agencies, especially the United Nations Population Fund (UNFPA) and Joint United Nations Programme on HIV and AIDS (UNAIDS), civil society and nongovernmental organizations, patient organizations, academic institutions and other partners for their support and contributions to the development of the strategy.

WHO also gratefully acknowledges the WHO country offices in the Eastern Mediterranean Region for their valuable contributions, including participation in the online technical consultation held from 7 to 9 June 2022 and the online survey held from 26 August to 6 September 2022.



## Acronyms and abbreviations

|        |                                                          |
|--------|----------------------------------------------------------|
| AEFI   | adverse events following immunization                    |
| CIN2+  | cervical intraepithelial neoplasia of grade 2 or higher  |
| EPPCCC | essential package of palliative care for cervical cancer |
| HPV    | human papillomavirus                                     |
| IAEA   | International Atomic Energy Agency                       |
| IARC   | International Agency for Research on Cancer              |
| MI4A   | Market Information for Access to Vaccines                |
| NCD    | noncommunicable disease                                  |
| PCR    | polymerase chain reaction                                |
| SAGE   | Strategic Advisory Group of Experts on immunization      |
| UHC    | universal health coverage                                |
| UNFPA  | United Nations Population Fund                           |
| UNICEF | United Nations Children's Fund                           |
| VIA    | visual inspection with acetic acid                       |
| WHO    | World Health Organization                                |

# Executive summary

## The rationale and purpose of the strategy

Despite being a preventable and curable disease, cervical cancer is responsible for a large burden of suffering in women around the world, especially in low- and middle-income countries. To uphold the right to health for adolescent girls and women, it is important that disparities in access to high-quality health services are addressed.

In 2020, the World Health Organization (WHO) set a goal to eliminate cervical cancer as a public health problem globally by 2120 (1). To reach this goal, WHO's Member States should strive to meet the following interim scale-up targets by 2030:

- 90% of girls are fully vaccinated with human papillomavirus (HPV) vaccine by 15 years of age;
- 70% of women are screened using a high-performance test by 35 years of age and again by 45 years of age;
- 90% of women with pre-cancer are treated, and 90% of women with invasive cancer are managed.

To build on the momentum of the *Global strategy to accelerate the elimination of cervical cancer as a public health problem (2)*, a regional cervical cancer elimination strategy has been developed for the WHO Eastern Mediterranean Region that is adapted to the religious, cultural, social, economic and geographical contexts in the Region.

The regional strategy is a resource for the development of national strategies and implementation plans in countries/territories of the Region to achieve and maintain the goals outlined in the global strategy for cervical cancer elimination.

## The process of the strategy's development

The regional strategy was developed in several phases. The first phase included a readiness assessment survey and stakeholder engagement plan, followed by development of a situation analysis that informed the initial draft of the regional strategy. The draft strategy was shared with representatives from Member States and technical experts, and further discussed during a regional consultation, held virtually, from 7 to 9 June 2022. Finally, a written online consultation to facilitate further stakeholder (including civil society) input into the strategy was held from 26 August to 6 September 2022. All findings were then summarized and consolidated to produce the strategy.

## The strategy's content

The regional strategy sets out the following five strategic actions for the Region:

- **Strategic action 1:** To strengthen primary prevention by accelerating HPV vaccine introduction and improving coverage
- **Strategic action 2:** To improve cervical cancer screening and pre-cancer treatment
- **Strategic action 3:** To reduce the burden of suffering caused by cervical cancer by improving the availability of early diagnosis, treatment, rehabilitation and palliative care services
- **Strategic action 4:** To strengthen health systems to ensure integrated, efficient and equitable delivery of high-quality services across the vaccination, screening and treatment pillars, and appropriate and effective monitoring and evaluation systems
- **Strategic action 5:** To improve communication, advocacy and social mobilization to counter vaccine hesitancy, increase awareness of prevention and treatment, and improve acceptability of diagnosis.

These actions are based on the three core pillars of the global strategy (actions 1 to 3), plus two enablers relevant for the Region (actions 4 and 5): health systems strengthening; and improving communication, advocacy and social mobilization. The additional cross-cutting actions were included as they contribute to improving the overall integration of services and health outcomes in the Region and support other regional goals for health and development.

For each of these five strategic actions, the strategy outlines a series of specific actions to facilitate progress on achieving the WHO interim targets set out in the global elimination strategy.

A guidance framework for implementation, monitoring and evaluation in the Region is also included in the strategy. The framework provides targets and indicators for the ongoing assessment of progress toward the elimination threshold. Key targets include the 90-70-90 targets, as well as the overall elimination goal of a reduction in cervical cancer incidence to less than 4 per 100 000 women per year and reducing the mortality to incidence ratio. Meeting these targets will require a focus on strengthening national databases and registries for vaccination, screening and cancer incidence, including patient referral and tracking systems, and standard of care pathways.

## The way forward

Cervical cancer is unique in that it is a noncommunicable disease caused by an infectious agent. This can be challenging to manage in siloed health system structures, as successful control requires collaboration across groups in the health system, at all levels, that may not have previously worked together. However, as the only cancer almost entirely caused by an infectious agent, cervical cancer is the first cancer that the global community has ever attempted to eliminate. It is the right of all women to receive quality health services, and they themselves, their families and communities deserve our collective best efforts to unite behind this common goal.

This strategy represents a commitment by all countries and territories of the Eastern Mediterranean Region to reduce the burden of suffering caused by cervical cancer through improving prevention (vaccination and screening), early detection (screening and diagnosis) and treatment. All countries and territories of the Region will strive to:

- reach and maintain an incidence rate below the elimination target of less than 4 per 100 000 women per year; and
- reduce the mortality to incidence ratio for cervical cancer.<sup>1</sup>

Member States whose routine data suggest that they are already below the elimination target will equally commit to reducing the mortality to incidence ratio through early detection and to alleviate the suffering often experienced with delayed diagnosis, while continuing to strengthen cancer registries.

Member States may choose to adopt a relative reduction incidence target in their national strategies, should current data suggest that they are below the global elimination target.

For all Member States, the importance of continuing to strengthen cancer registries and building systems to monitor progress towards meeting the targets will be a critical part of this strategy.

WHO will work with its Member States and partners to jointly support implementation of the regional strategy to improve access to HPV vaccination, screening, treatment for cervical pre-cancer and management of cervical cancer, and to eventually achieve elimination of cervical cancer in the Region.

---

<sup>1</sup> The mortality to incidence ratio compares the number of cervical cancer deaths with the number of new cases diagnosed over a period. It can be measured using routine cancer registry and death registry data and will vary depending upon the quality, completeness and timeliness of data. With stable data sources, when cervical cancer is diagnosed at a later stage when cure is less likely, the mortality to incidence ratio will be higher. A falling mortality to incidence ratio may suggest improved detection of early-stage cervical cancer through screening or increased awareness of disease symptoms and/or improvements in availability and access to treatment. Note that the mortality to incidence ratio is NOT the same as survival, which requires individual linked follow-up/outcome data for each case.

# 1. Rationale and purpose

Cervical cancer is a preventable disease that – when detected early and appropriately treated – can be cured. Despite this, cervical cancer is responsible for a large burden of suffering among women around the world. Truly a disease of inequity, cervical cancer incidence is far higher in low- and middle-income countries than in high-income countries. By closing the disparity between those who have access to high-quality health services and those who do not, adolescent girls' and women's rights to health can be upheld.

In 2020, Member States of the World Health Organization (WHO) endorsed the Global strategy to accelerate the elimination of cervical cancer as a public health problem (1). WHO set a goal to eliminate cervical cancer globally by 2120 and an elimination target of less than 4 cases per 100 000 women per year (2). As stated in the global strategy, it is time for an ambitious, concerted and inclusive vision to guide all countries to achieve this goal (2). The economic, cultural, religious, geographic and social diversity

in our world means that granularity in the necessary elements and implementation of the global strategy needs to be added at a regional level, and likely also at the country level. The necessary technical tools and guidelines are available to achieve the elimination targets, but their implementation in many regions of the world has been limited.

This regional strategy provides a resource for the development of national strategic action and implementation plans in countries of the Eastern Mediterranean Region, to facilitate achieving and maintaining the elimination targets outlined in the global strategy (2). The document is informed by a regional consultation meeting on the draft global strategy held in 2019, a situational analysis conducted in 2019, a regional cervical cancer survey with nominated focal points from ministries of health in 2022, a regional strategy consultation meeting in 2022 and a subsequent online written consultation, as well as the most recent WHO NCD country capacity survey findings. The regional strategy aligns with WHO's global strategy but is tailored to the context of the countries and territories of the Eastern Mediterranean Region.

## 2. Introduction and background

The WHO Eastern Mediterranean Region has a population of nearly 679 million people spread across 22 countries and territories. There is enormous economic, religious, linguistic, cultural and geographic diversity between and within the Member States. The Region contains some of the world's richest countries and some of the most challenging humanitarian emergencies and protracted crises. Major inequities exist between and within Member States, which are further exacerbated by conflict, mass movements and displacement of people, economic and gender inequality, climate change and the COVID-19 pandemic. As outlined in the recent report on *Progress on the health-related Sustainable Development Goals and targets in the Eastern Mediterranean Region, 2020*, improvements have been made in the last decade; however, sociocultural barriers and a lack of policies still prevent women and girls across the Region from realizing their right to positive health outcomes (3).

### 2.1 Cervical cancer incidence, morbidity, mortality and co-factors in the Region

#### 2.1.1 Human papillomavirus (HPV) types

Almost all cases of cervical cancer are caused by persistent infection with HPV. There are more than 100 types of HPV, of which at least 14 are oncogenic. Two of these – HPV types 16 and 18 – are responsible for approximately 70% of cervical cancer cases globally (4), and recent analysis has demonstrated these two types were present in 74.5% of invasive cervical cancer cases in the

Eastern Mediterranean Region (5). HPV prevalence in the Region is currently estimated at 9.8% among women with normal cervical cytology (6). Most HPV infections are cleared spontaneously by the immune system within two years of infection. However, in about 10% of cases, infection can persist leading to the development of pre-cancerous lesions and eventually cervical cancer over a 10- to 20-year period. There are many factors that are associated with viral persistence, including HIV infection, smoking and prolonged oral contraceptive use. These co-factors are discussed in subsection 2.1.4 below.

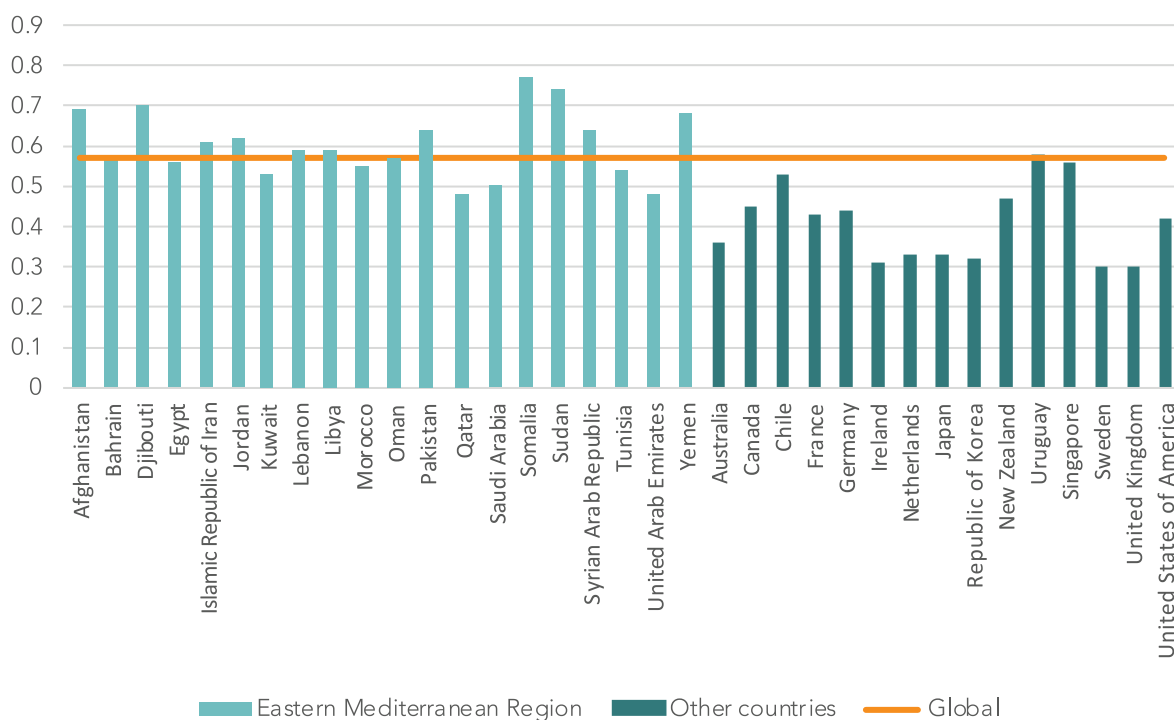
#### 2.1.2 Incidence

Globally, age-standardized incidence rates of cervical cancer vary from less than 10 per 100 000 women in the lowest risk countries to 75 per 100 000 in the highest risk countries. Most countries in the Eastern Mediterranean Region have estimated age-standardized incidence rates of less than 10 per 100 000 women. Four countries have age-standardized incidence rates higher than 10 per 100 000 women: Somalia (25.4 per 100 000), Djibouti (13.4 per 100 000), Afghanistan and Morocco (both 10.4 per 100 000) (7). However, limitations in cancer registration data in the Region (see section 2.1.3, below) mean that incidence rates should be interpreted with caution, as they are likely to be underestimates in many countries.

#### 2.1.3 Morbidity and mortality

Cervical cancer is not only one of the leading causes of cancer death in the world, but also has substantial impacts on quality of life. For women with late-stage cervical cancer, extreme refractory pain, offensive vaginal discharge, chronic bleeding, and fistulae between the bladder, vagina and rectum can leave

**Fig 1. Mortality to incidence ratios in the Eastern Mediterranean Region and globally, 2020**



women isolated from their families and their communities. The suffering is extreme (8). In the Eastern Mediterranean Region, despite many countries reporting a low incidence of cervical cancer, the burden of cervical cancer disease is increasing (9). Moreover, the mortality to incidence ratio (the ratio of the rate of deaths to rate of new cancer cases) is reasonably high (over 0.5 in most Member States), which suggests that diagnoses are occurring late, potentially due to a lack of opportunities to screen and diagnose early to maximize curative opportunities (7). Delayed diagnosis has been reported through research studies in many countries in the Region (10). In these cases, palliative care to reduce suffering is essential, but often not available (10–12).

**Fig. 1** depicts the mortality to incidence ratios for each of the Member States, the global average mortality to incidence

ratio, and a number of other high-income countries progressing toward the elimination thresholds. While comparison between health systems and contexts is challenging, it is presented to demonstrate that mortality to incidence ratios below 0.5 are achievable.

Population-based cancer registries systematically collect data on reportable cancers in a geographically defined area (13). The cervical cancer burden and mortality data in Member States of the Eastern Mediterranean Region are derived from cancer registries where available. The International Agency for Research on Cancer (IARC) reports that only four of the 22 countries and territories of the Region are able to provide good quality cervical cancer incidence and mortality data, and that these rates may consequently be underestimated in some countries (14). Establishing and

strengthening existing cancer registries will ensure reliable and timely data that can be used to monitor progress towards cervical cancer elimination. WHO reports that national registries have been established in eight countries, including Bahrain, Islamic Republic of Iran, Jordan, Lebanon, Oman, Qatar, Saudi Arabia and Syrian Arab Republic (15). A further eight countries have established registries at the subnational level, including Egypt, Iraq, Libya, Morocco, Pakistan, United Arab Emirates, Tunisia and Yemen, while Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates) participate in a subregional cancer registry. Plans to establish cancer registries are underway in the occupied Palestinian territory and Sudan (15).

## **2.1.4 Co-factors**

### **2.1.4.1 Tobacco smoking**

In 2020, WHO estimated that one third (33.0%) of men in the Region smoked tobacco, while the rates for women were 4.2% (16,17). Tobacco smoking appears to be an independent risk factor for the development of cervical cancer (16,18). A 2018 meta-analysis showed that even exposure to second-hand smoke is associated with an increased risk of cervical cancer (odds ratio 1.7; 95% confidence interval 1.4–2.07), making tobacco smoking an important modifiable risk factor in the Region (19).

### **2.1.4.2 HIV infection**

HIV infection is associated with an increased risk of persistent HPV infection (20). A 2021 meta-analysis reported that the risk of cervical cancer increases six-fold among women living with HIV (21). HIV prevalence across the Region is low, at only 0.1% of the adult population. However, it should be noted

that 70% of people living with HIV in the Region reside in three countries (Pakistan, Islamic Republic of Iran and Sudan). Given the important link between HIV infection and cervical cancer, it is important to consider the particular cervical screening needs of women living with HIV.

### **2.1.4.3 Oral contraceptive use**

Prolonged use of oral contraceptives is associated with an increased risk of cervical cancer; however, a 2007 analysis demonstrated that the risk does decline after use of oral contraceptives ceases (22).

### **2.1.4.4 High parity**

High parity is associated with a higher risk of cervical cancer (23,24). Although a crude measure, total fertility rates in the Region vary, with seven Member States having a total fertility rate (births/woman) of more than three.

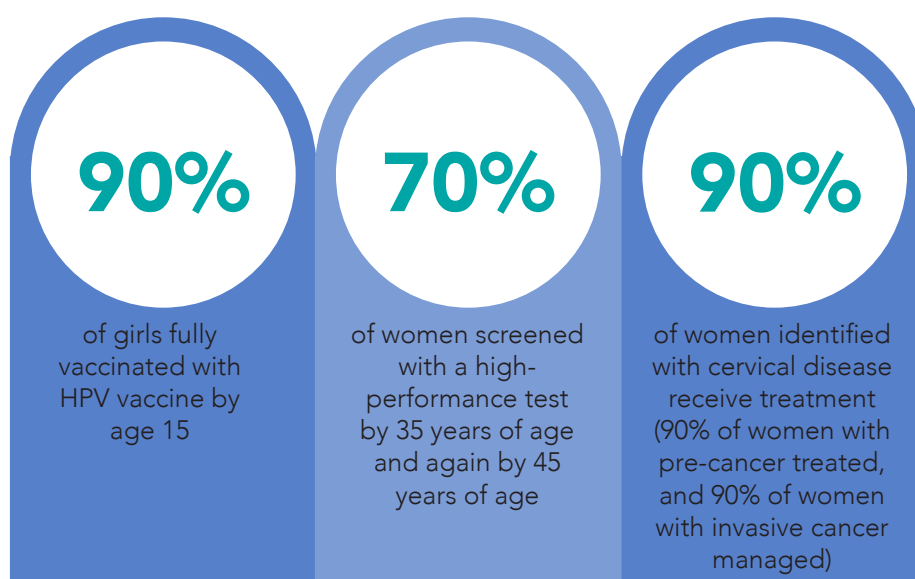
## **2.2 Global cervical cancer elimination strategy**

In 2020, WHO launched the global strategy to accelerate the elimination of cervical cancer as a public health problem by 2120 (defined as an incidence of less than 4 cases per 100 000 women per year (2)). This will be the first time the world has had the evidence base and technology to eliminate a cancer. While the technology and knowledge to achieve the elimination targets do exist, they have not been implemented on a global scale, particularly in regions where the burden is highest.

The global strategy proposes that all Member States should strive to meet the interim targets by 2030. Achieving these targets will significantly advance progression towards elimination of cervical cancer. These targets (**Fig. 2**) aim to have:



**Fig 2. WHO interim targets**



90% of girls fully vaccinated with HPV vaccine by 15 years of age; 70% of women screened using a high-performance test by 35 years of age and again by 45 years of age; and 90% of women with pre-cancer treated, and 90% of women with invasive cancer managed.

Modelling using global data has provided evidence of the added benefits of the three pillars – vaccination, screening and treatment – working together. By 2030, the introduction of HPV vaccination alone would have very little impact on mortality; however, introducing vaccines in conjunction with scaling up twice-lifetime screening and scaling up cancer treatment would reduce mortality by 34.2% and avert 300 000 deaths. Even more pronounced are the longer-term effects. By 2070, vaccination alone would reduce mortality by 61.7% and avert 4.8 million deaths; when introduced in conjunction with screening and treatment, mortality can be reduced by 88.9%, averting 14.6 million deaths (25).

The global strategy not only presents an opportunity to eliminate a preventable

form of cancer, but also aligns with other global and regional commitments made by countries/territories of the Eastern Mediterranean Region (3,26,27). In addition to the 90-70-90 interim targets, the global strategy proposes strategic actions to support: a) health system enablers; b) partnerships, advocacy and communication; and c) surveillance, monitoring and evaluation (2). These strategic actions directly align with those in the Region's Vision 2023 to build health capacity, enhance preparedness, strengthen partnerships, advocate for health, mobilize resources and foster innovation (27).

In addition, the global elimination strategy contributes significantly to the achievement of the Sustainable Development Goals, including target 3.4 to reduce premature mortality from noncommunicable diseases (NCDs) by one third by 2030, while aligning with other global and regional reproductive health, immunization and NCD targets (26).

## 2.3 Emerging research, technology and innovation enablers of progress toward elimination

As momentum builds across the world to eliminate cervical cancer as a public health problem, new evidence, technologies and innovations are emerging to facilitate action.

**Infrastructure developments:** The global laboratory response to the COVID-19 pandemic, in addition to the response to the AIDS epidemic, provides an opportunity to leverage polymerase chain reaction (PCR) capability and capacity in scaling up HPV tests. In addition, the infrastructure established to support COVID-19 vaccination efforts can be leveraged.

**Vaccination:** In December 2022, the WHO Strategic Advisory Group of Experts on immunization (SAGE) issued recommendations for a one-dose HPV vaccine regimen, based on emerging evidence, stating that a single dose has comparable efficacy and duration of protection as a two-dose vaccine schedule (28). Accordingly, SAGE recommends that dose schedules for HPV vaccination be updated to one- or two-dose schedules for both the primary target group of girls aged between 9–14 years, and for girls aged 20 years or younger. This lower-resource vaccination schedule can mitigate many barriers – including financial constraints – to achieving high coverage, as well as the need to recall people for second and third doses.

**HPV tests:** HPV tests, although expensive, enable much longer screening intervals than previous screening tests (cytology and visual inspection with acetic acid (VIA)) due to a very high negative predictive value. Global modelling has demonstrated

that twice-lifetime HPV testing can have a considerable impact on cervical cancer incidence and mortality (25). Because of the considerably reduced number of lifetime screens required, HPV-based screening has been found to be cost-effective in almost all settings globally (20,25,29–31). In addition, HPV tests are much easier to implement and quality assure than either cytology or VIA.

**Self-collection to increase reach and acceptability:** HPV testing has enabled the possibility of self-collection. There is good evidence that self-collected vaginal samples tested for HPV are as accurate as clinician-collected cervical samples for the detection of cervical intraepithelial neoplasia of grade 2 or higher (CIN2+) (32). This opens important opportunities to increase the reach of screening programmes, since health workers are not required to undertake a pelvic exam on all screened women, only those in whom HPV is detected. There is also good evidence that self-collection is highly acceptable to health workers and to women (33), overcoming many barriers to screening inherent in either cytology or VIA-based approaches.

**Screen and treat to reduce loss to follow-up:** WHO screening guidelines (34) allow test-and-treat approaches in resource-constrained settings, and this approach significantly reduces loss to follow-up between screening and treatment. It is particularly helpful in small, remote communities and in settings where women are required to travel long distances to access health care services. In these settings, treatment is usually delivered via thermo-coagulation rather than cryotherapy. Thermo-coagulators are small, portable devices that do not require gas cylinders.

# 3. Current progress towards the goals in the Region

## 3.1 Data sources

In 2022, a survey was conducted with Member States of the Eastern Mediterranean Region to inform the development of the regional elimination strategy. The survey collected information on Member States willingness and readiness to adopt WHO's global strategy to accelerate the elimination of cervical cancer as a public health problem, and perceived barriers to its implementation. The survey included four sections: Country overview, HPV vaccination, Cervical cancer screening, and Cancer treatment and palliative care. Twenty of the 22 countries and territories of the Region nominated country-level contacts and responded to the survey.

The survey was distributed online utilizing REDCap, in addition to the option of hard copies being provided and submitted via email. Survey distribution commenced on 22 March 2022, and the process was concluded by 22 June 2022. The respondents contacted were individuals with authority and expertise in the fields of cancer control, women's health and immunization, who were nominated by the respective health ministry. The results of the survey were self-reported by one or two individual respondent(s) and showed some inconsistencies with the country profiles provided by WHO on

cervical cancer burden, which were also self-reported (7). Therefore, information collected in this survey may not be representative of the current situation in some countries.

**Table 1** summarizes the survey data, including reported status of country plans and programmes. Overall, 70% of respondents thought the elimination target of less than 4 per 100 000 women per year was appropriate for the Region (and 80% considered it relevant for their own country) given that some Member States have estimated incidence rates already below this threshold, whereas 95% thought that a relative reduction target by 2030 may be appropriate.

## 3.2 HPV vaccination

The advent of HPV vaccines will change the epidemiology of HPV. HPV vaccines, initially bivalent or quadrivalent, induce immunity to HPV types 16 and 18, while quadrivalent vaccines also target types 6 and 11 which cause genital warts. The more recent development of a nonavalent vaccine, with coverage for seven oncogenic HPV types, offers protection for up to 90% of cervical cancers as well as HPV types 6 and 11 (35). This vaccine promises to extend cancer prevention effectiveness among those who receive the vaccine prior to HPV exposure.

Of the 20 countries and territories of the Region that provided responses to the vaccination survey, three countries had current national HPV vaccination programmes (Libya, Saudi Arabia and United Arab Emirates). Of the remaining

---

<sup>1</sup> A respondent in the online consultation in August–September 2022 indicated that Saudi Arabia is now vaccinating girls in 7th grade at school and offering vaccine to girls aged 9–18 years through primary health care.

<sup>2</sup> A response in the online consultation in August–September 2022 indicated that coverage is now 82% in the United Arab Emirates.

**Table 1. Current and planned national cancer prevention and control strategies, HPV vaccination and cervical screening programmes in the Region, from the 2022 elimination readiness survey**

| Country/territory              | National cancer prevention and control strategy | Plans to include cervical cancer targets | National vaccination programme | Plans for vaccination programmes | National screening programme and primary method | Plans for screening programmes                                                          |
|--------------------------------|-------------------------------------------------|------------------------------------------|--------------------------------|----------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------|
| Afghanistan                    | ✘<br>Planning to develop                        |                                          | ✘                              | No plans                         | ✘                                               | Does not plan to implement                                                              |
| Bahrain*                       | ✓                                               | ✓                                        | ✘                              | Microplanning stage              | ✓<br>Cytology                                   | Planning to implement HPV screening                                                     |
| Egypt                          | ✘<br>Planning to develop                        |                                          | ✘                              | Scoping stage                    | ✘                                               | Planning to start a new programme using HPV screening                                   |
| Islamic Republic of Iran       | ✓                                               | ✘                                        | ✘                              | Microplanning stage              | ~ <sup>^</sup><br>HPV                           | Planning to implement HPV screening                                                     |
| Jordan                         | ✘<br>Planning to develop                        |                                          | ✘                              | No plans                         | ~                                               | Unsure of future plan                                                                   |
| Kuwait                         | ✓                                               | ✓                                        | ✘                              | Pre-launch phase                 | ~                                               | Decision yet to be made                                                                 |
| Lebanon                        | ✓                                               | ✘                                        | ✘                              | No plans                         | ~                                               | Does not plan to implement                                                              |
| Libya                          | ✘<br>Planning to develop                        |                                          | ✓ <sup>^</sup>                 | N/A                              | ✘                                               | Decision yet to be made                                                                 |
| Morocco                        | ✓                                               | ✘                                        | ✘                              | Microplanning stage              | ✓<br>VIA                                        | Revision underway, currently piloting an HPV screening programme                        |
| Occupied Palestinian territory | ✘<br>Planning to develop                        |                                          | ✘                              | No plans                         | ✘<br>Primary method unclear                     | Decision yet to be made                                                                 |
| Oman                           | ✓                                               | ✘                                        | ✘                              | Scoping stage                    | ✘                                               | Planning an awareness campaign                                                          |
| Pakistan                       | ✘<br>No plans to develop                        |                                          | ✘                              | No plans                         | ✘                                               | Does not plan to implement                                                              |
| Qatar                          | ✓                                               | ✓                                        | ✘ <sup>^</sup>                 | Scoping stage                    | ~ <sup>^</sup><br>Cytology                      | Decision yet to be made                                                                 |
| Saudi Arabia**                 | ✘ <sup>^</sup><br>No plans to develop           |                                          | ✓ <sup>^</sup>                 | N/A                              | ✘                                               | Decision yet to be made                                                                 |
| Somalia                        | ✘<br>No plans to develop                        |                                          | ✘                              | No plans                         | ✘                                               | Decision yet to be made                                                                 |
| Sudan                          | ✘<br>Planning to develop                        |                                          | ✘                              | No plans                         | ~<br>VIA                                        | Planning to start a new programme using HPV screening – "passive, not active screening" |
| Syrian Arab Republic           | ✘<br>Planning to develop                        |                                          | ✘                              | No plans                         | ✓<br>Cytology                                   | No response                                                                             |
| Tunisia                        | ✓                                               | ✓                                        | ✘                              | Scoping stage                    | ✓<br>Cytology                                   | Pilot underway for HPV screening                                                        |
| United Arab Emirates           | ✓                                               | ✓                                        | ✓                              | N/A                              | ✓<br>Combination HPV/cytology                   | The screening programme was revised in 2018                                             |
| Yemen                          | ✓                                               | ✓                                        | ✘                              | No plans                         | ✘                                               | Planning to implement a national programme 2022–2025                                    |

<sup>^</sup> Inconsistent with WHO country profiles ✓ National programme ~ Subnational programme only ✘ No national or subnational programme.

\* Microplanning stage – employing community action to inform and plan the development of a programme, utilizing a bottom to top approach.

\*\* Consultation in August/September 2022 indicated that Saudi Arabia has a national cancer control plan 2014–2025.

Note: No response from Djibouti or Iraq.

17, eight countries were considering implementing a future programme, while nine had decided against a potential programme. Of the three current vaccination programmes, two programmes target girls aged between 13 and 14 (with no catch-up for older girls), while only the Saudi Arabia programme aims to vaccinate females up to the age of 26.<sup>1</sup> Full dose coverage was reported as 29% for the United Arab Emirates in 2020.<sup>2</sup> Coverage data was not reported for Libya or Saudi Arabia (7).

Countries and territories with plans to implement a vaccination programme in the future cited current concerns with the cost and supply of vaccines and the potential for population hesitancy to vaccinate. Most of these Member States were still within the scoping stage of these programmes.

Countries and territories which indicated that there were no current plans to implement a vaccination programme cited concerns with cost, and the need for more information. Stakeholders from some Member States indicated that a vaccination programme would not be

cost-effective given the perceived current low burden of cervical cancer and HPV infection within the country.

The main barriers identified across all countries/territories were vaccine hesitancy related to stigma around HPV infection and safety concerns, the cost of the programme, the HPV vaccine supply and a lack of demand for the vaccine. Barriers are listed in **Table 2**.

### 3.3 Screening

#### 3.3.1 Current programmes

Of the 20 countries and territories that provided responses to the screening survey, five had implemented a national screening programme, six had implemented a subnational screening service and the remaining nine had no current screening programme. In the countries/territories with a national programme, three were using cytology as a primary test, one was using VIA, and one was using a combination depending on age (co-test approach using HPV testing and cytology). These are summarized in **Table 1**.

**Table 2. Barriers to establishing a vaccination programme**

| Barriers to establishing an HPV vaccination programme                    | Percentage |
|--------------------------------------------------------------------------|------------|
| Vaccine hesitancy – perception of HPV infection                          | 65%        |
| Vaccine hesitancy – safety concerns                                      | 60%        |
| Cost of programme                                                        | 55%        |
| HPV vaccine supply                                                       | 45%        |
| Lack of demand for HPV vaccination                                       | 40%        |
| Loss to follow-up for second dose                                        | 30%        |
| Lack of existing infrastructure to support vaccination in this age group | 25%        |
| Lack of political will                                                   | 25%        |
| Ability of programme to reach all girls                                  | 20%        |
| Lack of experience vaccinating this age group                            | 15%        |

Screening coverage across the Region varies, with none of the countries and territories reaching greater than 70% ever screened. WHO targets are for 70% of women to be screened twice in a lifetime, once by 35 years of age and again at 45 years of age. While these data are not specific enough to be used as an indicator, they do currently suggest that no country in the Region has yet reached the WHO elimination target for screening (Fig. 3).

### 3.3.2. Planning for HPV testing

Currently, only one country has implemented a national HPV-based screening programme (United Arab Emirates – co-testing). Three countries are planning to transition an existing programme to HPV DNA testing, and four are planning a new programme with HPV

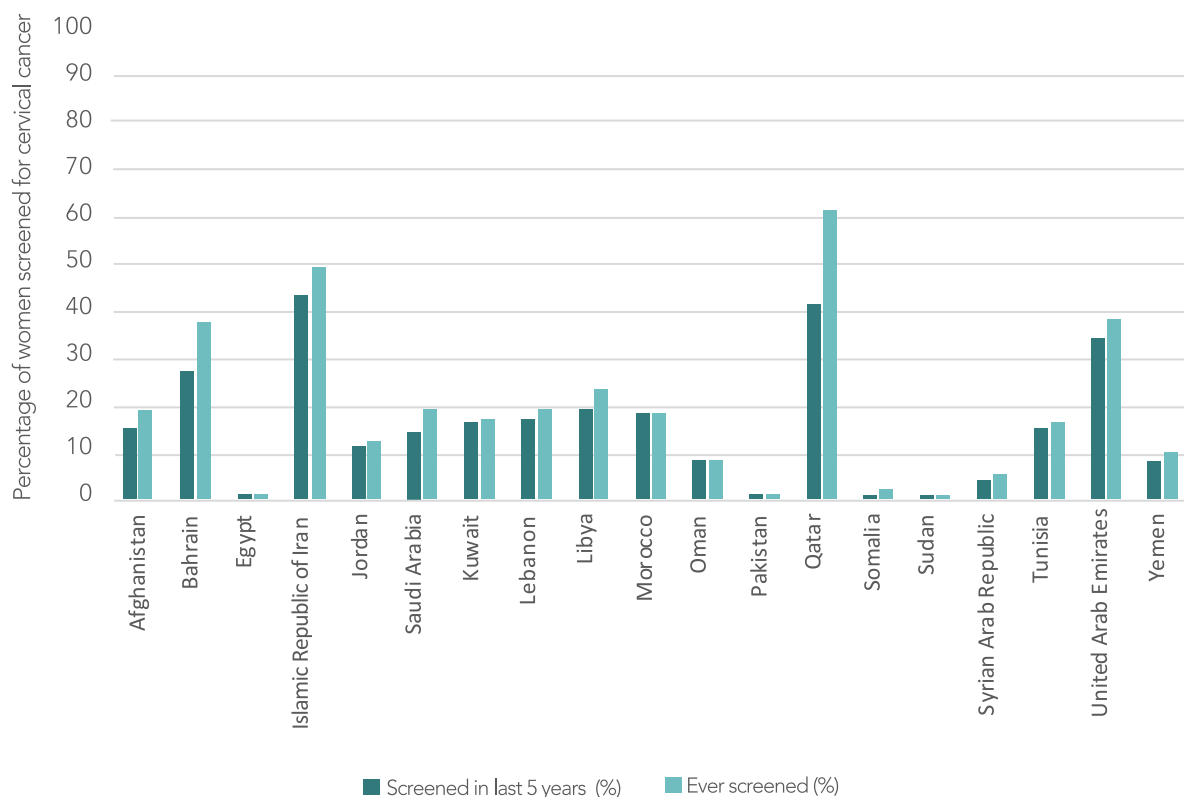
testing. Three countries (Afghanistan, Lebanon and Pakistan) had decided not to implement HPV DNA testing, and a decision had not been made in the remaining countries/territories (Table 1).

A lack of screening programme infrastructure and the cost of HPV tests were cited most frequently as the primary issues preventing the introduction of HPV screening. The most commonly cited barriers to implementing HPV testing are outlined in Table 3.

### 3.3.3. Perceived acceptability of self-collection

Self-collection for cervical screening is where a woman collects her own vaginal swab, rather than undergoing a pelvic examination with a speculum and having

**Fig 3. Secondary prevention: women screened for cervical cancer across the Eastern Mediterranean Region, 2019**



Data source: WHO cervical cancer country profiles, 2019 (7).  
No data available for the occupied Palestinian territory.

**Table 3. Barriers to the introduction of HPV testing**

| Barriers (Screening)                                                                      | Percentage |
|-------------------------------------------------------------------------------------------|------------|
| Lack of existing screening programme infrastructure                                       | 70%        |
| Cost of HPV tests                                                                         | 65%        |
| Lack of understanding of need for screening by women/community                            | 60%        |
| Lack of clinical staff/health service availability for screening, diagnosis and treatment | 55%        |
| Belief there is insufficient burden of disease to justify screening                       | 55%        |
| Lack of laboratory capacity to process HPV tests                                          | 45%        |
| Lack of knowledge about/experience using primary HPV screening                            | 45%        |
| Health care professionals may be resistant to changing method of screening                | 35%        |
| Lack of political will                                                                    | 35%        |
| Lack of acceptability of provider-collected screening test to women                       | 30%        |

a cervical sample collected by a health care provider. This method of sample collection has been demonstrated to be as sensitive as a clinician-collected sample when a PCR-based HPV test is used (32). Rapidly emerging evidence from a wide range of settings demonstrates that self-collection is highly acceptable to women who use it (33). A 2021 systematic review highlighted that the majority of women prefer self-collection due to increased

confidentiality, privacy, convenience and practicality. It removes embarrassment, is less invasive and creates a sense of autonomy (33).

The survey also sought to understand how stakeholders perceived the likely acceptability of self-collection for women and health care professionals in their country. The results are summarized in **Table 4**.

**Table 4. Anticipated acceptability of self-collection**

| Perceived self-collect attitude |                       | Count | Percentage |
|---------------------------------|-----------------------|-------|------------|
| Women                           | Very unacceptable     | 2     | 10%        |
|                                 | Somewhat unacceptable | 5     | 25%        |
|                                 | Somewhat acceptable   | 10    | 50%        |
|                                 | Highly acceptable     | 2     | 10%        |
|                                 | Don't know            | 1     | 5%         |
| Practitioners                   | Very unacceptable     | 1     | 5%         |
|                                 | Somewhat unacceptable | 3     | 15%        |
|                                 | Somewhat acceptable   | 11    | 55%        |
|                                 | Highly acceptable     | 5     | 25%        |

Two countries (Morocco and Saudi Arabia) reported pilot studies of self-collection. Morocco referred to a study conducted in 2018 with 200 women, where 83% of participants agreed to self-collection as the cervical cancer screening option.

### 3.4 Treatment

Most Member States surveyed could not estimate what proportion of women diagnosed with invasive cervical cancer receive treatment and care in their country.

According to the survey, most countries/territories of the Region only have access to treatment in selected tertiary centres, with the minority of countries stating that treatment was widely available. Most had surgery available in the public sector. Notably, only three countries/territories had radiotherapy and palliative care widely available in the public sector. Four countries/territories had no radiotherapy at all, and five could not offer palliative care to their population in the public sector. The results are summarized in **Table 5**.

Barriers to achieving the 90% treatment target are shown in **Table 6**. The most common barriers identified were that women do not know where to seek care, a lack of clear referral pathways, and a current lack of radiotherapy and palliative care services, including the provision of essential medicines such as chemotherapeutic agents and opioids. Practical barriers, including geographic and cost barriers, and a lack of primary care expertise, were all frequently cited.

### 3.5 Monitoring and surveillance

Cancer registries are critical for providing the accurate data needed to inform responsive policies. When asked what barriers would impact the ability to scale

up interventions to meet WHO targets for 2030, 40.0% (8 out of 20) of respondents stated that they would require “more information about the burden of cervical cancer in our country” (see **Table 7**, page 30). Half (4 out of 8) of these countries are of low-income status.

Comments from respondents surrounding data quality highlight the lack of access to an accurate cancer registry within some Member States. One respondent, in reference to their country’s ability to scale up interventions, stated that “National data [is] necessary to advocate for the elimination strategy”, which is emphasized in statements from a different respondent conveying there is “no data on [real] prevalence of cervical cancer [in the] country.” These comments address the difficulty in determining the burden of disease in countries without access to cancer registries, and the need for better data collection pathways to facilitate advocacy to generate the requisite political commitment for cervical cancer elimination.

Member States with a cancer registry also stated that they faced limitations surrounding data quality and use. One country highlighted that despite having a cancer registry, there has been an “Absence of national cancer registry analyses since 2018” and that “available data is not reflecting the real burden and extent of cervical cancer nationally”. This was echoed by another respondent affirming that there is a “Lack of updated database on [the] prevalence and burden of cervical cancer at national level.” This is an indication that cancer registries may not necessarily reflect the current burden of cervical cancer in certain countries and territories.



**Table 5. Access to services in public sector**

| Public sector   | Widely available | Only in selected tertiary centres | Not available |
|-----------------|------------------|-----------------------------------|---------------|
| Surgery         | 30% (6)          | 65% (13)                          | 5% (1)        |
| Chemotherapy    | 25% (5)          | 65% (13)                          | 10% (2)       |
| Radiotherapy    | 15% (3)          | 65% (13)                          | 20% (4)       |
| Palliative care | 15% (3)          | 60% (12)                          | 25% (5)       |

**Table 6. Barriers to scaling up treatment services to achieve the 90% treatment target**

| Barriers to scaling up treatment services                                                                   | Percentage |
|-------------------------------------------------------------------------------------------------------------|------------|
| Women do not know where or how to seek care                                                                 | 65%        |
| Lack of clear referral pathways                                                                             | 55%        |
| Practical barriers prevent women from attending for treatment e.g. distance to services, need for childcare | 50%        |
| Lack of primary care capacity/expertise in supporting women with cervical cancer                            | 50%        |
| Lack of availability of radiotherapy                                                                        | 45%        |
| Lack of availability of palliative care essential medicines e.g. opiates                                    | 45%        |
| Cost of treatment (financial barriers)                                                                      | 45%        |
| Lack of availability of palliative care services                                                            | 40%        |
| Fear/refusal of treatment                                                                                   | 40%        |
| Stigmatization of cervical cancer diagnosis                                                                 | 30%        |
| Lack of availability of chemotherapy                                                                        | 25%        |
| Lack of availability of surgery                                                                             | 20%        |
| Lack of laboratory capacity to support cancer diagnosis                                                     | 20%        |

## 4. Strategic actions to progress toward the elimination targets

This strategy sets out a series of strategic actions to guide Member States of the Eastern Mediterranean Region to progress towards the elimination of cervical cancer and to reduce the unnecessary suffering of women. An important goal of this strategy is to mobilize support from political and civil society partners, with the hope of creating momentum and building optimism in the Region that cervical cancer can be eliminated as a public health problem.

In 2019, as part of the consultation on the global elimination strategy, participants from the Region outlined several key considerations for inclusion in the final strategy to ensure successful implementation. These have also been considered in the development of this regional strategy. The overarching considerations at that time were to:

- highlight the integration and alignment of cervical cancer programmes as part of the national cancer strategy and overarching national health policies to ensure effective integration and to avoid the establishment of vertical programmes;
- present a clear method and rationale for choosing the specified overarching target;
- include a stronger emphasis and guidance on the communication components of the three streams of

work (particularly important for HPV vaccination);

- reflect the recommended accelerators for each stream of work through a health systems lens, following a set sequence by health system building block;
- present the elimination targets in relative rather than absolute terms.

The latter recommendation arose from the concern that countries in the Region already below the global target, according to their local incidence data, should not feel that there is no need to commit to improving cervical cancer prevention and control. Moreover, this aligns with other WHO NCD control targets which are stated in relative terms. It was noted that a reduction from the 2018 global age-adjusted incidence rate of 13.1 per 100 000 to 4 per 100 000 women equates to a 70% relative reduction.

The strategy must account for the fact that there is great cultural, religious, geographic and economic diversity in the Eastern Mediterranean Region. The strategic actions outlined here also recognize that Member States are at different stages of progress in eliminating cervical cancer, and have different health systems, priorities and resources. In addition, there is great diversity in cervical cancer control measures, incidence, mortality and morbidity. According to available estimates, 10 of 22 countries/territories have an incidence rate already below the elimination target. Meanwhile, the findings from the survey, as well as IARC grading of data quality, indicate that the vast majority of countries in the Region do not have access to up-to-date and reliable cervical cancer data, which might result in an underestimation of the real incidence rates.

This strategy represents a commitment by all countries and territories of the Eastern Mediterranean to reduce the burden of suffering caused by cervical cancer through improving prevention (vaccination and screening), early detection (screening and diagnosis) and treatment.

All countries and territories of the Region will strive to:

- reach and maintain an incidence rate below the elimination target of less than 4 per 100 000
- reduce the mortality to incidence ratio for cervical cancer.

Member States whose routine data suggest that they are already below the elimination target will equally commit to reducing the mortality to incidence ratio through early detection and to alleviate the suffering often experienced with delayed diagnosis, while continuing to strengthen cancer registries.

Member States may choose to adopt a relative reduction incidence target in their national strategies should current data suggest that they are below the global elimination target.

For all Member States, the importance of continuing to strengthen cancer registries and building systems to monitor progress towards meeting the targets will be a critical part of this strategy.

Underpinning the strategy are the 90-70-90 targets for 2030, which are:

- 90% of girls are fully vaccinated with HPV vaccine by 15 years of age;
- 70% of women are screened using a high-performance test by 35 years of age and again by 45 years of age;
- 90% of women with pre-cancer are treated and 90% of women with invasive cancer are managed.

Across the Eastern Mediterranean Region, there are major challenges in reaching the WHO interim 2030 targets to achieve the elimination of cervical cancer as a public health problem. A lack of infrastructure in many settings, lack of population awareness of prevention, screening and treatment, perceived vaccine hesitancy, a lack of universal health coverage (UHC), and low public acceptability of HPV exposure and cancer diagnosis will all challenge progress.

The strategy leverages the cervical cancer elimination agenda as an opportunity to strengthen health systems to ensure women and girls have access to integrated preventive health care, to ensure cancer care services and data systems are strengthened, and to build capacity in the provision of palliative and supportive care for all people in the Region. Other major elements in this strategy include addressing the potentially growing vaccination hesitancy, mitigating the

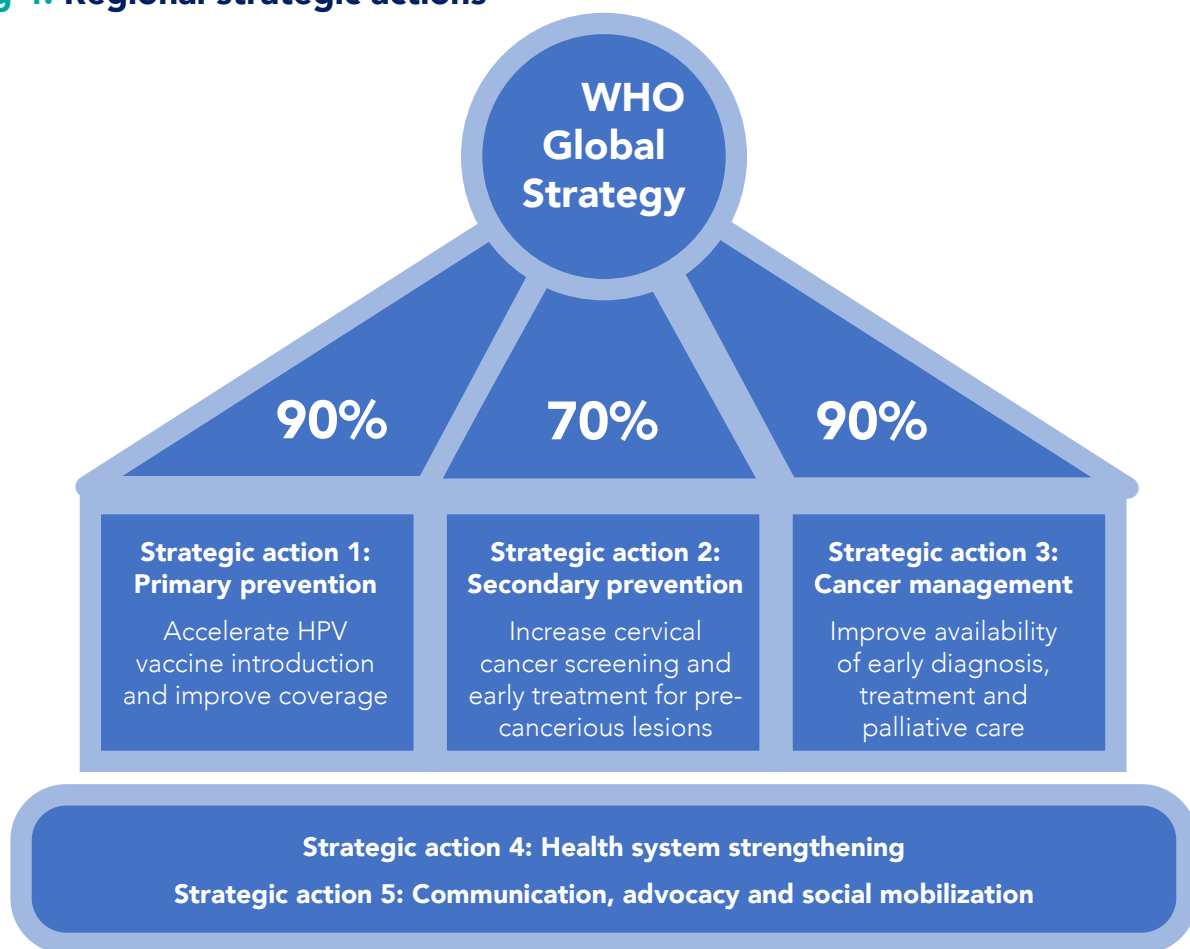
evident stigma associated with HPV and cervical cancer, and a continued focus on health equity.

The strategy outlines five strategic actions for the Region (Fig. 4). Three of these actions respond to the three pillars of WHO's global elimination strategy (2), with an additional two actions that acknowledge the regional context regarding health systems strengthening, and communication, advocacy and social mobilization.

- **Strategic action 1:** To strengthen primary prevention by accelerating HPV vaccine introduction and improving coverage.
- **Strategic action 2:** To improve cervical screening and pre-cancer treatment.

- **Strategic action 3:** To reduce the burden of suffering caused by cervical cancer by improving the availability of early diagnosis, treatment, rehabilitation and palliative care services.
- **Strategic action 4:** To strengthen health systems to ensure integrated, efficient and equitable delivery of high-quality services across the vaccination, screening and treatment pillars, and appropriate and effective monitoring and evaluation systems.
- **Strategic action 5:** To improve communication, advocacy and social mobilization to counter vaccine hesitancy, increase awareness of prevention and treatment, and improve social acceptability of HPV infection and cervical cancer diagnosis.

**Fig 4. Regional strategic actions**



For each of these five strategic actions, this strategy outlines a series of specific actions to facilitate progress on achieving the WHO interim targets set out in the global elimination strategy.

#### 4.1 Strategic action 1: To strengthen primary prevention by accelerating HPV vaccine introduction and improving coverage

This strategic action can be achieved by adopting and implementing the WHO recommendation that at least 90% of girls be vaccinated against HPV at age 9–14 years.

##### 4.1.1. WHO guidelines

There are three prophylactic HPV vaccines currently available globally that are highly effective at preventing infection with HPV types 16 and 18, as well as pre-cancerous cervical lesions caused by these virus types. At the population level, HPV vaccination has been shown to reduce the circulation of high-risk HPV types, reduce the incidence of high-

grade cervical abnormalities, and prevent cervical cancer (36). Importantly, there is comprehensive and reassuring data on the safety profiles of all three vaccines. WHO recommends that these vaccines are targeted towards girls aged 9–14 years, with an initial multi-age catch-up programme provided whenever feasible (37). HPV vaccination should be implemented as part of a coordinated and comprehensive approach to eliminating cervical cancer, as it does not protect against all types of HPV. It also has a limited impact for women older than the vaccine target age groups.

##### 4.1.1.1 Sustainable vaccine supply and financing

Vaccine cost and the cost-effectiveness of vaccination programmes in the context of an apparently low burden of disease, were cited as common barriers to planning and implementation in the Region. In most countries and territories, substantial political will and adequate public funding are required to introduce HPV vaccination at a scale required to achieve the WHO targets.

| WHO guidelines (28)                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Target age group</b>                      | <b>Primary target:</b> Girls aged 9–14 years                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Dose schedule</b>                         | <p><b>Two-dose schedule.</b> The current evidence supports the recommendation that a two-dose schedule be used in the primary target group from 9 years of age and for all older age groups for which HPV vaccines are licensed. The minimum interval between first and second dose is 6 months.</p> <p>There is no maximum recommended interval between doses and longer intervals – up to 3 or 5 years – can be considered if useful from a programme perspective.</p> <p><b>Alternative single-dose schedule.</b> A single-dose schedule can be used in girls and boys aged 9–20 years. Single-dose regimen has a comparative efficacy and period of protection to two-dose regimen.</p> |
| <b>Immunocompromised and/or HIV-infected</b> | Should receive at least two HPV vaccine doses (minimum 6 months interval) and, where possible, three doses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Seven countries of the Region (Afghanistan, Djibouti, Pakistan, Somalia, Sudan, Syrian Arab Republic and Yemen) are eligible to receive support from Gavi, the Vaccine Alliance. At this time, Gavi supplies first-generation vaccines, which protect against the most oncogenic HPV types 16 and 18, with some cross protection against other oncogenic types. One of these vaccines also provides protection against genital warts, caused by HPV types 6 and 11. While Gavi may support vaccine supply chains, it does not typically support in-country vaccine delivery costs except for a vaccine introduction grant, which is also a significant barrier given the concern that the consulted stakeholders raised regarding a lack of vaccine delivery infrastructure and experience.

While, to date, Gavi has supported low-income and lower-middle income countries in the provision of vaccines, there is an emerging recognition that the cost of the HPV vaccine remains a significant barrier, even for middle-income countries that either no longer receive Gavi support or were never eligible. A document describing Gavi's renewed vision (still under discussion) indicates the development of a new approach to support middle-income countries which includes a focus on political will-building, addressing specific country needs through targeted technical assistance, and through resourcing an innovative facility for pooled procurement.

A 2019 global market study by WHO, through its Market Information for Access to Vaccines (MI4A) project, has provided confidence that the global supply of HPV vaccine will meet the increased demand, with increased production capacity and emerging HPV vaccine manufacturers including for nonavalent vaccines (38).

#### 4.1.1.2 Emerging evidence on the efficacy of single-dose vaccines

SAGE has reviewed the evidence on the efficacy of a single-dose HPV vaccine and has concluded that it is comparable to a two-dose schedule (28). In April 2022, SAGE recommended to WHO that the dose schedule for the HPV vaccination be updated as follows:

- one- or two-dose schedule for primary target of girls aged 9–14;
- one- or two-dose schedule for young women aged 15–20;
- two doses with a 6-month interval for women aged older than 21;
- immunocompromised and/or those women living with HIV should still receive three doses if feasible.

WHO's position paper on HPV vaccines, issued in December 2022, reaffirms adoption of the SAGE recommendations (28).

A single-dose regimen will increase the feasibility for Member States to implement HPV vaccination. A one-dose schedule would alleviate many barriers identified by Member States, including cost and concerns about girls being lost to follow-up before the second dose. A one-dose strategy will also likely require less infrastructure and facilitate greater reach of girls at the appropriate age. If countries have hesitations around possible stigma in implementing a single-sex programme for girls, a single-dose strategy may also facilitate an affordable both-sex vaccination programme.

#### 4.1.2 Actions to achieve the goals

These recommended actions align with the global strategy and specifically respond to barriers raised during the consultation.

#### 4.1.2.1 Service delivery

- Evaluate the existing vaccine delivery infrastructure, noting the investments that have occurred in the context of the COVID-19 pandemic. This evaluation should include a review of quality control systems and innovative vaccine delivery mechanisms (i.e. community visits, community health workers).
- Evaluate the feasibility of a multi-age cohort catch-up programme, using a single-dose vaccine strategy.
- Evaluate the feasibility of including HPV vaccination where other vaccines (e.g. diphtheria and tetanus) or other adolescent health interventions are being delivered, especially where a single-dose HPV vaccination strategy is being considered/implemented.
- Review existing vaccination programmes in the Region and similar resource settings to gain an understanding of what works effectively and how HPV vaccination can be integrated.
- Plan or strengthen the implementation of a national HPV vaccination programme that reaches target age groups through schools, community and adolescent health services.
- Assess the capacity of education systems to facilitate a school-based programme.
- Consult with all stakeholders and engage professional and community champions, including nongovernmental organizations, women's associations, religious and community leaders, and professional societies (e.g., obstetrics and gynaecology, family health, gynaecological oncology).
- Review, develop and implement tailored community-based approaches to vaccinate hard-to-reach girls and young women (such as those not in school), including engagement with mothers.
- Conduct focused qualitative research to explore population awareness of vaccination programmes and existing barriers and enablers to receiving the vaccine.
- Address vaccine hesitancy (including reviewing and adapting successful strategies used for COVID-19 vaccines) and improve acceptability through the strategies outlined in section 4.5.2.1.
- Ensure a proactive communication strategy is prepared to respond to reports of adverse events following immunization.

#### 4.1.2.2 Health workforce

- Educate and build awareness among health care workers and all health care professionals of the benefits of vaccination for all girls. This activity should start prior to vaccine roll-out, emphasizing the evidence base relating to cancer prevention and vaccine safety.
- Build the capacity of the workforce to proactively engage girls and parents in HPV vaccination programmes ensuring they are aware of government support for the programme.

#### 4.1.2.3 Health information systems

- Develop routine monitoring systems and registries to track vaccine coverage and equity: review and leverage existing health information systems at all levels, including primary health care.

- Develop systems to ensure monitoring and reporting of adverse events following immunization.
- Develop and regularly report against outcome indicators, such as:
  - programme *reach*: number (and percentage of age-eligible population by geographical area) of girls who are fully vaccinated by age 15 years (WHO 2030 targets: 90%);
  - programme *equity*: variation in reach outcome measures by education level, employment status, urban versus rural/remote community.

#### 4.1.2.4 Financing

- For countries questioning the affordability of HPV vaccines, it is important that affordability/localized investment cases are regularly developed and reviewed, since HPV vaccination has been found to be cost-effective in almost all settings, including in low- and middle-income countries, and it is likely to become more affordable in the near future, especially if local/regional manufacturing occurs and data collection improves, which may increase the measured burden of disease (39–42). Consider pooled procurement arrangements across the Region.
- Eligible countries should be encouraged to engage with Gavi.
- Middle-income countries should maintain engagement with Gavi/UNICEF to understand emerging initiatives for support.
- High-income countries should immediately start nationwide implementation of HPV vaccination using viable platforms that

facilitate vaccine delivery within the recommended age bracket (i.e. in schools).

- Adopt WHO recommendations regarding single-dose vaccines.
- Review the available vaccines and select one that suits the country's needs in terms of cost and dose requirements. Consider costs and reach of school compared to community-based vaccination strategies.

## 4.2 Strategic action 2: To improve cervical screening and pre-cancer treatment

This strategic action can be achieved by adopting and implementing the WHO recommendation that at least 70% of women should be screened by ages 35 and 45, and 90% offered effective treatment for pre-cancer lesions.

### 4.2.1 WHO guidelines

Effective screening and early detection of HPV and cervical lesions allows for earlier and more cost-effective treatment to prevent the development of cervical cancer (34). This leads to a reduction in suffering, morbidity and mortality associated with cervical cancer, while avoiding significant and unnecessary health system costs and burdens. To achieve accurate and reliable results and optimal outcomes, programmes should be implemented at a population level utilizing the highest quality and standards of testing and pre-cancer treatment. As outlined in WHO's global strategy, screening without access to treatment is unethical (2). Therefore, strategic action 2 relies on the success of the recommended actions in section 4.2.2, particularly tertiary prevention.



| WHO guidelines (34)        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Screening test</b>      | <p>HPV DNA detection as the primary screening test rather than cytology or VIA.</p> <p>Either clinician-collected or self-collected samples are appropriate.</p> <ul style="list-style-type: none"> <li>• In settings where cytology is established and quality assured, WHO recommends that this continue until HPV DNA testing is established.</li> <li>• A more rapid transition from VIA testing is recommended due to the inherent issues associated with achieving consistent quality and performance.</li> <li>• This recommendation is consistent for the general population and women living with HIV.</li> </ul> |
| <b>Screening algorithm</b> | <p>Screen and treat OR screen, triage and treat.</p> <p>Screen, triage and treat for women living with HIV.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Screening intervals</b> | <p>With a high-performing HPV test:</p> <ul style="list-style-type: none"> <li>• every 5–10 years (or at least twice in a lifetime by 35 years and 45 years);</li> <li>• every 3–5 years for women living with HIV.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Screening age</b>       | <p>From 30 years.</p> <p>From 25 years for women living with HIV.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

In addition to their role in supporting day-to-day data management, screening registers play an important role in running an effective national screening programme and have two major functions. First, as a safety net by supporting health care staff in identifying and contacting women who have not presented for scheduled follow-up review and/or treatment. Through this process, high rates of follow-up assessment and treatment can be achieved among participants in whom HPV is detected. Participants can also be recalled for rescreening at the agreed interval. Second, screening registers can provide real-time programme management data for monitoring, reporting and quality improvement on screening participation by geographical location and sociodemographic characteristics, HPV positivity, and treatment rates.

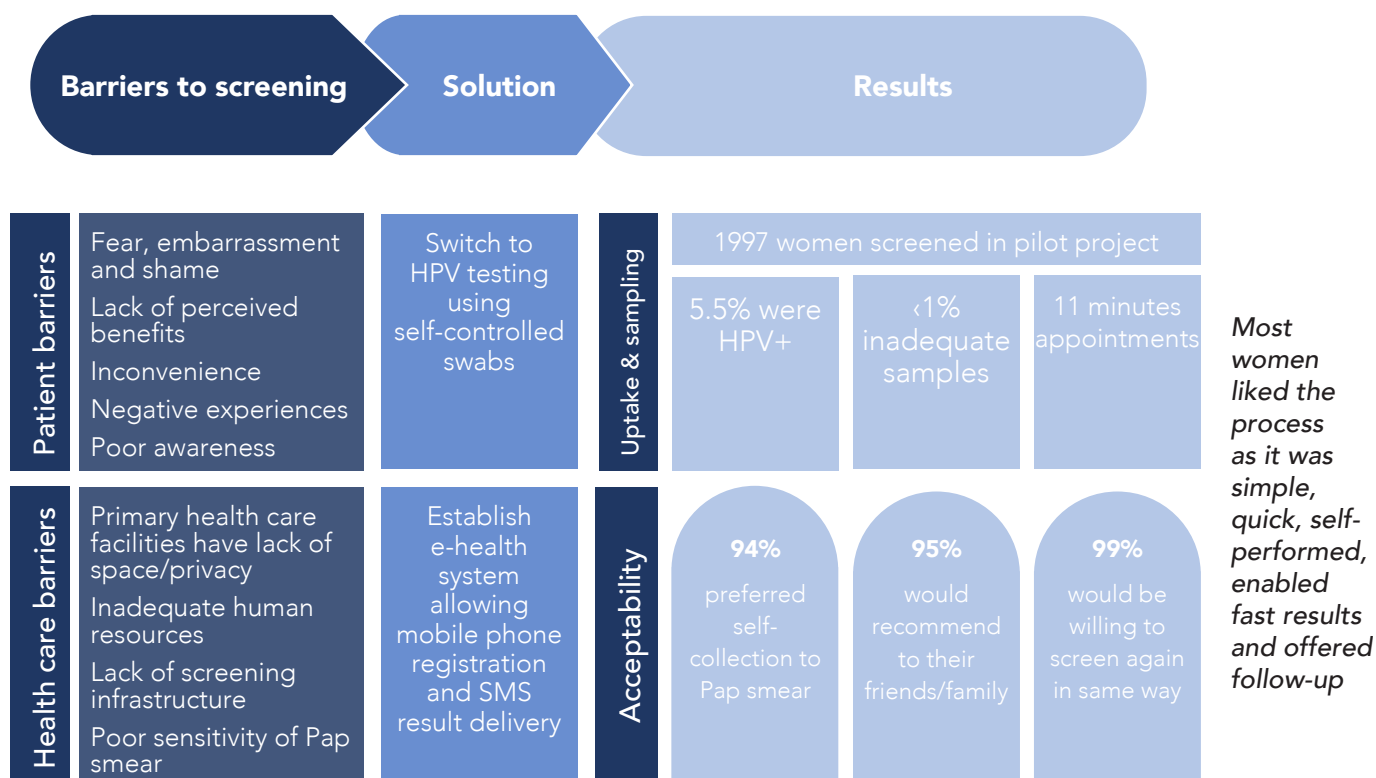
Importantly, WHO has highlighted that self-collected or clinician-collected

samples are both appropriate for use with HPV tests. HPV testing with self-collection mitigates well-described health system and patient barriers to screening. A case-study from Malaysia, presented in **Fig. 5**, highlights the successful implementation of this model (43).

**4.2.2 Actions to achieve the goals**

As highlighted in the survey findings, the biggest barriers for Member States of the Region to implement an effective and national screening programme were a lack of existing infrastructure, the cost of HPV tests, a lack of population-level understanding about the need to test, lack of clinically trained staff and a perception that the burden of disease was insufficient to justify a national screening programme. In countries dealing with conflict, prioritizing cancer screening and treatment services may be especially challenging, and international partnerships may initially be required to establish such services. Conflict can also

**Fig 5. Project ROSE: removing obstacles to cervical screening in Malaysia (43)**



disrupt planned or existing services, and services may not be able to resume until the post-conflict rebuilding of health systems occurs (44). A 2020 systematic review of the impact of conflict on cancer found that more research is required to inform the development of basic cancer care packages and post-conflict cancer control planning and development strategies (45).

#### 4.2.2.1 Service delivery

- Review national screening protocols, programmes and models of care, and align them with the 2021 WHO guidelines on screening and treatment.
- Evaluate current national and subnational screening programmes, identify their strengths, and articulate areas for improvement.
- Evaluate existing laboratory and screening infrastructure, noting the

investments that have occurred in this context because of the COVID-19 pandemic. This evaluation should include a review of quality assurance systems and innovative results delivery methods (e.g. SMS result provision).

- Review capacity to implement screen and treat, or screen, triage and treat models of care, with a focus on reducing time to treatment and maximizing adherence to treatment (note that for women living with HIV, a screen, triage and treat model of care is recommended).
- Ensure referral pathways are in place to allow timely treatment for pre-cancers for women who have had HPV detected.
- Focus on building public and clinical awareness of the benefits of screening and early treatment.

- Promote the integration of cervical screening services, including treatment of pre-cancer, into primary health care and into HIV treatment services for women living with HIV.
- Conduct qualitative research to further understand women's awareness of and attitudes to screening services, and to understand barriers to accessing care, to ensure services can be adapted to meet the needs of the population.
- Investigate the possibility of innovative approaches to screening, including the use of self-collection. In doing this, consider how to harness the community health workforce to contribute to the screening infrastructure. Extend activity to consider tailoring service models to under-screened groups.
- Strengthen the integration of cervical screening services with services predominantly attended by women, including antenatal services and other family health services.
- Investigate opportunities to promote or offer screening services to mothers at the time of adolescent vaccination.
- Expand the role of community health workers to promote and educate women about the potential for self-collection, if Member States choose to adopt this.
- For countries where VIA exists, optimize VIA capacity to facilitate timely referral pathways for the treatment of pre-cancer while building workforce capacity for assessment and treatment once HPV testing is introduced.

#### 4.2.2.3 Health information systems

#### 4.2.2.2 Health workforce

- Ensure that data capture systems, such as screening registers, are sufficient to follow women through the screening and treatment continuum and to monitor screening participation and adherence to treatment.
- Establish clear and transparent governance and regulation over screening and related data that are part of health information systems, providing clarity about this data and its purpose to participants and to partners such as government, nongovernmental organizations, and public and private health services and providers.
- Monitor equity of service delivery for all populations within countries and territories of the Region.
- Ensure the existence of a robust quality assurance system that mandates the collection of data using WHO-recommended key performance indicators, comparing performance with accepted standards, and taking corrective actions to address the deficiencies.
- Develop and regularly report against outcome indicators, such as:
  - programme reach: number (and percentage of age-eligible
- Build the capacity of the clinical workforce to ensure services are of high quality, free of judgement and support access to evidence-based care.
- Build the capacity and available resources for community health workers to support women in whom HPV, pre-cancer or cancer is detected who may need additional support in navigating treatment services, or who may have additional psychosocial needs.

population by geographical area) of women who have an HPV test and receive their test result (WHO 2030 target: 70%);

- programme effectiveness: number (and percentage by geographical area) of HPV-positive women who complete same-day thermal ablation or attend for gynaecology review (WHO 2030 target: 90%);
- programme equity: variation in reach and effectiveness outcome measures by education level, employment status, urban versus rural/remote community.
- Develop and regularly report against process indicators such as:
  - turnaround times from self-collection to receipt of HPV test result, and from screen positive to follow-up and treatment;
  - follow-up rate at 6–12 months for HPV-positive women.

facilitate early implementation and pilot projects (e.g. employee health programmes).

- To ensure an affordable and sustainable supply of HPV tests and treatment devices:
  - standardize procurement of WHO pre-qualified HPV tests where possible, potentially facilitating bulk-buy arrangements;
  - reserve more expensive, pre-qualified point of care tests for use in conjunction with same-day treatment; typically, this would be in smaller remote communities;
  - engage with Unitaid for optimal pricing of pre-qualified HPV tests and thermo-coagulation equipment at best available prices.

#### 4.2.2.4 Governance and financing

- Keep abreast of emerging technology to align with the rapidly evolving landscape and the potential for adoption of regional procurement strategies (43,46).
- Where possible, leverage public–private partnerships and corporate philanthropy and goodwill to

### 4.3 Strategic action 3: To reduce the burden of suffering caused by cervical cancer by improving the availability of early diagnosis, treatment, rehabilitation and palliative care services

This strategic action can be achieved by adopting and implementing the WHO recommendation that 90% of women with pre-cancer are treated and 90% of women with invasive cancer are managed.

#### 4.3.1 WHO guidelines

##### WHO guidelines (47)

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Treatment</b>       | <p>National evidence-based guidelines should be used to select the stage-appropriate treatment modality or combination of treatment modalities.</p> <ul style="list-style-type: none"><li>• Surgery – primary modality for early-stage cervical cancer. May also be appropriate for recurrent disease or when used for palliative intent. The extent of surgery should be based on disease stage, intent for fertility preservation, and the patient's health status. Some patients may also require adjuvant radiotherapy and/or chemotherapy.</li><li>• Radiotherapy – primary curative modality for women who are not candidates for surgery. The type of radiotherapy (external beam radiation therapy or brachytherapy) should be based on disease stage and both types are required for curative treatment.</li><li>• Systemic treatment – chemotherapy is typically administered alongside radiotherapy rather than by itself. It may also be administered after surgery (adjuvant chemotherapy). Neoadjuvant chemotherapy and surgery may be administered where radiotherapy is unavailable, or resections of large early-stage cervical lesions are unable to be completed.</li></ul> <p>Individualized treatment plans should be developed and discussed at a multidisciplinary team meeting.</p> |
| <b>Rehabilitation</b>  | <p>Survivorship care should continue for at least five years after curative treatment (unless there is a recurrence). It may be implemented in the household, primary, secondary or tertiary care levels and includes:</p> <ul style="list-style-type: none"><li>• managing the physical and psychosocial effects of treatment;</li><li>• managing chronic conditions;</li><li>• promoting health;</li><li>• providing surveillance for new and recurrent cancers.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Palliative care</b> | <p>Palliative care should be integrated into the cervical cancer diagnosis and treatment pathway. The essential package of palliative care for cervical cancer (EPPCCC) (48) should be applied by health care workers, with additional measures implemented to reduce suffering where necessary. Palliative care for cervical cancer should:</p> <ul style="list-style-type: none"><li>• relieve symptoms;</li><li>• support social well-being by mitigating the effects of poverty, stigma and isolation;</li><li>• use culturally appropriate and compassionate communication;</li><li>• include care planning and coordination.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

### **4.3.2 WHO recommendations**

If diagnosed in the early stages, most cases of cervical cancer can be treated with curable intent using surgery or radiotherapy. Within the global strategy, WHO encourages all countries to build their surgical capacity, improve access to radiotherapy and chemotherapy services, and importantly, expand and integrate palliative care services to alleviate suffering (47). The global strategy sets a target of 90% of women with pre-cancer are treated and 90% of women diagnosed with invasive cancer are managed appropriately.

The EPPCCC has been developed to meet the needs of women suffering from cervical cancer (48). This has been adapted from the essential package of palliative care developed by the Lancet Commission on Palliative Care and Pain Relief (49) and WHO's essential package of palliative care for primary health care (50). This package consists of a set of interventions, medicines, simple equipment and social supports, and serves as a guide for Member States as they build their capacity to provide palliative care (50).

### **4.3.3 Actions to achieve the goals**

It is understood that cervical cancer management does not occur in isolation and efforts to improve access to treatment will occur within existing cancer management services. It is also important to note that any strengthening of treatment services will also benefit patients suffering from other cancers and other end-of-life conditions that require palliative care. There is an opportunity to use the cervical cancer elimination agenda to improve access to much needed services for other cancers.

The consultation revealed that less than one third of Member States of the Region have widely available treatment services, with only 15% having palliative care widely available. Most stakeholders could not estimate the proportion of women in their country diagnosed with cancer who receive appropriate treatment. Almost a third of responding countries and territories had no palliative care services at all. Innovative solutions are required, such as community outreach models, as exist in Qatar. The programme in Qatar targets family members of patients, providing them with training for both psychological and technical support. Such a programme builds community capacity beyond cervical cancer.

The major barriers to reaching and reporting on WHO targets for appropriate treatment were the fact that women did not know how to seek care, a lack of clear referral pathways, lack of radiotherapy and palliative care services, a lack of essential medicines, cost and geographical barriers, and limited primary care capacity to provide information and support for treatment options. Fear of cancer treatment and the societal strain of cervical cancer diagnosis were also noted as substantial barriers. Countries dealing with conflict or post-conflict situations will need to overcome significant resource and infrastructure challenges to develop and implement basic cancer care packages (44,51,52).

#### **4.3.3.1 Service delivery**

- Review, update and/or develop best practice protocols to align with current WHO frameworks (47) to ensure appropriate diagnosis, treatment and supportive care are available for women diagnosed with cervical cancer.
- Clearly define optimal referral pathways.

- Support the provision of multimodal imaging to aid with staging (e.g. ultrasound and intravenous pyelography) and image-guided procedures for advanced cervical cancer (47).
- Promote establishment and scaling-up of face-to-face or virtual multidisciplinary tumour boards.
- Promote the development of end-of-life care plans, including appropriate and best practice pain relief. Enable home-based care where appropriate, including providing education and support to family and community members.
- Promote and enable adequate psychological support for all women and families, particularly in relation to palliative care.
- Ensure integration of palliative care knowledge, expertise and services into primary health care and multidisciplinary care.
- Ensure equitable access and financial protection for surgery, chemotherapy, radiotherapy and palliative care (e.g. through national health insurance schemes).
- Further develop in- and outpatient care infrastructure in gynaecology and gynaecological oncology.
- Harness community health workers to assist women in their navigation of the health service.
- Conduct qualitative research to further understand women's awareness of services, and barriers and enablers to seeking care.

#### 4.3.3.2 Health workforce

- Build the capacity of the primary care workforce to facilitate a diagnosis

of cervical cancer, and to support women's access into the tertiary health sector and post-diagnosis care including, where needed, compassionate end-of-life care.

- Review workforce capacity and develop plans for bridging gaps within the national medical education system. Invest in building radiology, surgical, oncology and palliative care capacity.
- Strengthen ability to retain workforce through innovative funding models and provision of professional development opportunities.
- Strengthen workforce capacity to provide palliative care services in the home, potentially through community-based cadres.
- Build the capacity of the clinical workforce through education and awareness, both clinical and compassionate, to ensure services are free of judgement and support access to evidence-based care. A more informed workforce would be beneficial for raising public awareness and reducing pervasive stigma.
- Establish partnerships with international professional societies to develop capacity and ensure up-to-date knowledge on surgical, systemic and radiotherapeutic treatment of invasive cervical cancer.

#### 4.3.3.3 Health information systems

- Continue to strengthen cancer registration systems to inform burden of disease estimates relating to cancer incidence, mortality, stage at diagnosis and survival:
  - review availability and quality of required data and consider whether data currently collected in disparate health information systems can be amalgamated;

- integration of UHC and a national unique patient identifier are strong steps to providing robust and comprehensive registries; a universal patient identifier can aid integration of data to monitor uptake of treatment and outcomes.
- Develop and regularly report on outcome and process indicators, such as:
  - programme *reach*: number (and percentage of age-eligible population by geographical area) of HPV-positive women who receive the recommended follow-up; number of women with invasive cervical cancer who receive optimal care in optimal time (WHO 2030 target: 90% of women with invasive cervical cancer are appropriately treated);
  - programme *effectiveness*: number (and percentage by geographical area) of women with invasive cervical cancer who receive EPPCCC package; consider recording patient-reported outcomes;
  - programme *equity*: variation in reach and effectiveness outcome measures by education level, employment status, and urban versus rural/remote community;
  - cancer incidence, mortality, stage at diagnosis, survival and mortality to incidence ratio.

#### 4.3.3.4 Access to essential medicines and medical devices

- Ensure the access and supply of quality-assured medicines and medical devices for cancer treatment and diagnosis:
  - work with regional partners to consider models of local

and regional production or procurement;

- consider how to engage and educate private providers, regulators and other stakeholders on the need to make essential medicines and medical devices available and affordable to patients, including the de-stigmatization of opioid use for cancer care.
- Review the regulatory frameworks within each country to ensure a continued and adequate supply of essential medicines such as opioids, and the procurement, maintenance and regulation of medical devices for cervical cancer diagnosis and treatment.

#### 4.3.3.5 Financing

- Consider how integration of palliative care into primary health care and multidisciplinary care can reduce the costs of accessing these services.
- Consider options to remove the financial burden of treatment.
- Include cervical cancer treatment services in UHC priority benefit packages.

### 4.4 Strategic action 4: To strengthen health systems to ensure integrated, efficient and equitable delivery of high-quality services across the vaccination, screening and treatment pillars, and appropriate and effective monitoring and evaluation systems

This strategic action can be achieved by strengthening models of care by building capacity of health workforce, improving



access to medicines and diagnostics, and enhancing health information systems, thus ensuring integration of cervical cancer programmes into universal health coverage schemes.

#### **4.4.1 WHO recommendations**

The *WHO framework for strengthening and scaling-up services for the management of invasive cervical cancer* (47) outlines recommendations for health systems strengthening in the context of cervical cancer across all three streams of work. The framework refers to a cycle of three core areas: assessment and planning; monitoring and evaluation; and, implementation and scale-up. Assessment and planning include governance, situation analysis and optimizing service delivery. Monitoring and evaluation include quality improvement and population/facility-level monitoring. Implementation and scale-up include developing guidelines for cervical cancer management, ensuring a strong workforce, ensuring access to medicines and devices, stable funding/access to financial support, and surveillance and information systems (47).

Importantly, recommendations in the WHO framework (47) rely on or contribute to improvements in other health areas which may be considered of higher priority to the individual countries and territories. It is therefore important that the recommended actions listed below are considered as actions to strengthen not only cervical cancer prevention and control but the entire health system.

#### **4.4.2 Actions to achieve the goals**

The availability of evidence-based national guidelines and protocols developed with the collaboration of all stakeholders is imperative for the delivery of high-quality cervical cancer care (47). For optimal outcomes, the development,

implementation and monitoring of these guidelines need to be systematically embedded and relevant to the country context (47). Responses from the consultation suggest varying stages of development and uptake of national cancer prevention and control guidelines in the Region. All countries with existing guidelines stated they had plans to include progression to the cervical cancer elimination targets in future versions of cancer prevention guidelines. However, 10 out of 20 respondents stated there are no existing national guidelines, with seven of these stating they are planning or currently developing such resources (see **Table 1**).

Models of governance also need to be highly context-specific and should be developed with input from existing programmes such as cancer control, reproductive health, immunization or NCD services. This is particularly important for low-income countries or countries with limited resources. During the consultation, the top three barriers to scale-up included: a) lack of resources or capacity; b) cervical cancer not being seen as high priority; and c) the COVID-19 pandemic taking priority (**Table 7**). Enhanced governance, including delineation of responsibilities and processes, will ensure actions to improve cervical cancer management are prioritized.

Although the prioritization of COVID-19 was noted as a barrier to scaling up the progression towards cervical cancer elimination, the pandemic may also have created opportunities that can be capitalized upon. New and scaled-up infrastructure to support both vaccination and molecular testing is likely to have occurred across the Region.

Survey respondents highlighted gaps in the availability of treatment and palliative

**Table 7. Barriers to scaling up cervical cancer prevention services**

| Barriers to scaling up cervical cancer prevention services           | Percentage |
|----------------------------------------------------------------------|------------|
| Lack of resources or capacity                                        | 60%        |
| Not seen as a high priority                                          | 60%        |
| The COVID-19 pandemic is taking priority                             | 45%        |
| Need more information about burden of cervical cancer in our country | 40%        |
| Need more information about the WHO strategy                         | 35%        |
| Lack of political will                                               | 35%        |
| Lack technical expertise and support                                 | 35%        |
| Other barriers or issues                                             | 25%        |
| None of the above                                                    | 10%        |

care, with most stakeholders reporting gaps in both public and private sectors for radiotherapy and palliative care. Equitable access, financial protection and the regulation of private and public sectors should be prioritized at the national level.

#### 4.4.2.1 Service delivery

- Establish clear referral pathways, with targets to reduce delays to diagnosis and treatment.
- Ensure engagement of the private sector in best practice service provision.
- Support multidisciplinary collaboration across the Region with representatives from Member States, other health programmes (HIV/AIDS, NCDs, gynaecology/women's health, adolescent health, cancer control, immunization), health economists, academia, patient advocates and nongovernmental organizations.
- Include interventions for HPV prevention and treatment of pre-cancer and cancer in national health insurance systems, to assure access to care for all women in need without catastrophic health expenditures.

#### 4.4.2.2 Health workforce

- Increase focus on the role and capacity of primary care providers in national cervical cancer control programmes.
- Support health workforce capacity by identifying areas of need and creating an optimal distribution of skilled workers to support the delivery of new and ongoing HPV vaccination, cervical screening, treatment and palliative care programmes.
- Develop plans for bridging identified workforce gaps within the national medical education system.
- Ensure ongoing capacity-building and adaptability for new vaccination, screening and treatment options.

#### 4.4.2.3 Health information systems

- Evaluate or develop methods of data collection, collation and reporting that are tailored to the local health infrastructure, explicitly considering governance and data-sharing agreements for national datasets and the development of registries.
- Review or develop minimum datasets that collect incidence, diagnosis, staging, treatment and mortality data.

- Establish or strengthen population-based cancer registries to collect timely and accurate data.
- Establish or strengthen screening registers to monitor the participation of women through the screening pathway and facilitate the follow-up of women who have been lost to follow-up prior to the management of pre-cancerous lesions.
- Develop national targets and indicators to monitor progress towards elimination and help to advocate for further action.
- Develop and implement regular reporting mechanisms of progress towards national targets and indicators.
- Aim to develop capacity to monitor equity of vaccination, screening participation and cancer outcomes.
- Engage with the IARC Regional Hub for Cancer Registration in Northern Africa, Central and Western Asia to access mortality data and other data sources (53).
- Aligning with the 2019 *Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region (54)*, develop country-specific research plans to address priorities specific to the elimination of cervical cancer.
- Consider regional partnerships for local manufacturing or procurement to reduce costs and improve access.
- Consider working with private providers to develop national public-private partnership consortiums for the procurement and maintenance of affordable health technologies.

#### 4.4.2.5 Governance and financing

- Review, update and/or develop national cervical cancer policies based on best available evidence, the regional cancer control framework (54) and the WHO *Global strategy to accelerate the elimination of cervical cancer as a public health problem (2)*.
- Ensure that guidelines/policies explicitly outline governance, responsibilities and processes.
- Realign national cervical cancer programme targets and plans with the 90-70-90 WHO interim targets to reflect regional and global objectives for cervical cancer elimination.
- Leverage globally available cost-effectiveness tools and modelling to regularly review cost-effectiveness and affordability, given the projected reduction in costs of vaccination and HPV testing, emerging single-dose vaccination policy and potential revisions to Member State estimates of disease burden over time as data collection improves.
- Review and ensure alignment of national programmes toward evidence-based high-quality, person-centred care from prevention to palliation.
- Strengthen managerial structures and delineate responsibilities and processes to ensure consistent implementation, monitoring and attainment of WHO interim targets.

#### 4.4.2.4 Access to essential medicines and technologies

- Improve or maintain access to essential vaccines, tests, devices and medicines (including opioids for palliation) to ensure core services and essential medicines and devices are available to reach the 90-70-90 WHO interim targets.

- Strengthen public/private sector relationships and potential for bridging gaps in systems, particularly in the cancer treatment pillar, where appropriate.
- Ensure financial protection from catastrophic costs of cancer diagnosis.
- Establish governance mechanisms to support coordination of the referral system, with targets to reduce delays to diagnosis and treatment.
- Include cervical cancer prevention and management services in UHC priority benefit packages.
- Ensure ongoing capacity-building and adaptability for new vaccination, screening and treatment options.

#### **4.5 Strategic action 5: To improve communication, advocacy and social mobilization to counter vaccine hesitancy, increase awareness of prevention and treatment, and to improve acceptability of diagnosis**

This strategic action can be achieved by driving public and political support for the elimination goals, informing about prevention, screening and treatment programmes, and improving social acceptance of HPV infection and cervical cancer.

A strong theme emerging from the consultation was a concern that vaccine hesitancy, driven both by societal stigma against HPV and concerns about vaccine safety, was a potential barrier to the successful implementation of vaccination programmes. Negative perceptions of a cervical cancer diagnosis were also raised as a barrier to treatment programmes, as was the fact that women do not know how or where to access treatment.

Addressing vaccine hesitancy and ensuring tailored communication efforts to increase acceptability is a critical element for countries and territories of the Region to progress toward the elimination targets. A comprehensive understanding of the drivers of vaccine hesitancy in each Member State is essential.

In addition to these barriers to achieving the elimination targets, stakeholders also perceived varying levels of support from different sectors in their country, as summarized in **Table 8**.

Within the peer-reviewed research, a number of studies have been done across the Region that assess knowledge, acceptability and awareness of cervical cancer prevention initiatives among women, parents and health care providers. Most studies have found low knowledge of HPV and the HPV vaccine within countries of the Region (55–59); however, support for HPV vaccination among women was often high (60–62). Most women wanted more information about HPV vaccination and screening options (62–65), noting that screening uptake in the Region has consistently been reported to be low (66,67). Fear and embarrassment were often cited as barriers to seeking treatment (65,68).

Many research studies have identified a need to improve knowledge and/or attitudes among health care professionals to advocate for cervical cancer prevention (69). For example, research among obstetricians and gynaecologists in one country demonstrated suboptimal knowledge of cervical cancer, with less than half reporting that they had performed a Pap smear, and less than half prescribing the HPV vaccine for their patients (70). Similarly, in another study, one third of female gynaecologists had never performed a Pap smear themselves (71).

**Table 8. Member States perceived support for elimination targets**

| Support              | Yes (%) | No (%) | Unsure (%) |
|----------------------|---------|--------|------------|
| Political support    | 13 (65) | 3 (15) | 4 (20)     |
| Stakeholder support* | 16 (80) | 3 (15) | 1 (5)      |
| Public support       | 6 (30)  | 7 (35) | 7 (35)     |

\* Clinicians, societies, nongovernmental organizations.

#### 4.5.1 WHO recommendations

The global strategy to accelerate the elimination of cervical cancer outlines communication and advocacy strategies at various points across the strategic actions, as well as specific recommendations across partnerships, multisectoral collaboration, advocacy and communication.

#### 4.5.2 Actions to achieve the goals

Communication, advocacy and education campaigns will need to be developed at the country level and will need to address the diversity of the population in countries and territories of the Region.

##### 4.5.2.1 Address vaccine hesitancy

- Align communication approach to the WHO HPV vaccine communication: special considerations for a unique vaccine, 2016 update (72).
- Prior to the roll-out of HPV vaccination programmes, engage with the community and faith leaders, seeking pro-active endorsement of the vaccine programme. Proactively provide education and awareness to key allies/stakeholders, such as health care professionals, the education sector and the media.
- Create community demand for the HPV vaccine (using a rights-based approach) through advocacy and identification of champions. Integrate with other advocacy programmes, where appropriate.

- Develop evidence-based information to overcome vaccine hesitancy and counter misinformation, based on local contexts.
- Ensure campaigns consider decision-makers within households and that messages are delivered equitably.
- Information should address specific hesitancy about safety concerns and improve public acceptability of HPV infection and cervical cancer diagnosis.
- Prepare proactive responses and protocols to address misinformation, including having expert spokespeople available to counter the anti-vaccine movement.
- Develop rapid response strategies to counter vaccine misinformation.
- Align with existing vaccination programmes and communication strategies, including learning from the COVID-19 vaccination roll-out (e.g. be innovative, proactive and prepared to communicate the importance of HPV vaccine).

##### 4.5.2.2 Improve public acceptance of HPV infection and cervical cancer

- Develop culturally appropriate and context-specific information about the elimination strategy, cervical cancer and HPV to increase participation in vaccination and screening programmes and to encourage early presentation

by women experiencing symptoms of cervical cancer. Information may be provided in settings relating to adolescent and reproductive health, as well as in the context of primary health care and population health activities.

- Develop and/or improve culturally appropriate educational and communication strategies to improve public perceptions of HPV and cervical cancer, especially towards young girls who receive the vaccination.
- Collaborate with civil society and nongovernmental organizations to deliver education and messages about HPV and cervical cancer to improve public understanding and perspectives.

#### **4.5.2.3 Improve knowledge and capability for cervical cancer prevention among health care providers**

- Leverage findings from research programmes in the Region to develop targeted advocacy and communication campaigns aiming to improve knowledge of the elimination strategy and the benefits and timing of vaccination and screening.
- Educate health care providers to destigmatize HPV and cervical cancer and to become effective communicators and advocates for elimination, including encouraging their proactive engagement of women and girls in preventive activities.

#### **4.5.2.4 Advocacy**

- Ensure advocacy efforts at all levels including government, civil society and the public:
  - engage with women and girls using a rights-based approach;

- develop a step-by-step action plan to engage key decision-makers and create political will;
- identify local champions for the elimination effort;
- consider public–private partnerships and corporate philanthropy to garner support for elimination;
- leverage other cancer prevention and women’s health programmes and initiatives;
- include the disenfranchised and under-vaccinated.

- Engage decision-makers to ensure national policies set out relevant and specific targets for vaccination, cervical screening and treatment.
- Employ social mobilization as a strategy to increase vaccination acceptance and uptake of screening and improve attitudes towards HPV infection and cervical cancer diagnosis; emphasize that vaccination is the long-term strategy to prevent cancer.
- Embrace the potential contribution of survivorship programmes and the voice of survivors in contributing to increased awareness and support for strategic actions.
- Share findings, success stories and experiences across the Region as countries are at different stages of implementation and can learn from each other.

#### **4.5.2.5 Health literacy**

- Implement education about rights, informed consent and gender sensitivity; consider schools as an entry point to reach girls and parents.

- Implement education about the signs and symptoms of cervical cancer to ensure early diagnosis.
- Raise awareness of preventive services and treatment for pre-cancerous abnormalities.
- Ensure that health communications and programmes are gender-sensitive.
- Communicate agreed referral pathways and means to access vaccination, screening and treatment services clearly to providers and throughout the community.
- Consider the development of plain language resources for wide distribution in health settings and the community.
- Implement innovative communication activities using a range of mediums (e.g., messaging, traditional and social media, community message boards) and tailored context-specific communication (i.e. language, dialect, gender-specific) to increase awareness at scale.
- Engage expert clinicians, patient advocates, cervical cancer survivors, opinion leaders, and traditional and faith leaders (multisectoral, including non-majority religions) as spokespeople for awareness-raising campaigns.

#### **4.5.2.6 Campaigns**

- Develop targeted campaigns to raise awareness of HPV vaccination and cervical screening; messaging that cervical cancer is preventable and curable.

## 5. Implementation

Successful implementation of the regional strategy will be reliant on a strong commitment by Member States. Its implementation will further advance adolescent girls' and women's right to health through access to high-quality and equitable health services. The strategy serves as an advocacy tool to mobilize political will, motivate civil society and engage the general population in the elimination of cervical cancer.

The actions in this strategy should be seen as an opportunity to strengthen overall cancer care systems and national networks. The cross-cutting nature of the initiatives can contribute to improving the overall integration of services and improving the health of the population in the Region.

Investment from Member States in the planning and implementation of systems and programmes will facilitate progress toward the elimination targets. Coordination between countries to realize efficiencies in procurement will contribute to sustainable financing.

Country-level engagement will be critical to tailoring the actions in this strategy to suit the needs of each context. Each country/territory will need to develop/review its national strategy, as part of the national cancer plan, alongside a context-specific implementation plan that draws upon the strategic actions outlined in the regional strategy. The country-specific implementation plans need to acknowledge the infrastructure and resources available in that setting. This will help to overcome the local individual and structural barriers that may deprive adolescent girls and women, especially those that are under-screened and/or

have limited access to HPV vaccination, screening and treatment (73). Appropriate governance and leadership structures in each country/territory will be essential to the organization of these activities.

Cervical cancer is unique as it is an NCD caused by an infectious agent. This can be challenging to manage in siloed health system structures, as successful control requires collaboration across groups in the health system, at all levels, that may not have previously worked together. However, as the only cancer almost entirely caused by an infectious agent, it is the first cancer that the global community has attempted to eliminate. As it is the right of all women of the Region to reproductive health, they themselves, their families and communities deserve our collective best efforts to unite behind this common goal.

### 5.1 Leveraging and strengthening partnerships

Strong continued engagement and partnership will be needed with the key stakeholders involved in guiding and facilitating the global strategy to eliminate cervical cancer as a public health problem, including WHO, United Nations agencies such as UNICEF, the United Nations Population Fund (UNFPA), International Atomic Energy Agency (IAEA) and IARC, and organizations that influence and shape commercial markets producing vaccines and screening and treatment technologies (Gavi, Unitaid and PATH). Similar partnerships need to be fostered at regional and country levels. Continued engagement with nongovernmental organizations will help to support the implementation of this regional strategy.

Multisectoral collaboration within and between countries, drawing on the strengths of government and civil society,



will serve to build momentum and allow partners and stakeholders to productively contribute. As noted by the regional representatives in previous consultations, coordination of the elimination strategy with other programmes including immunization, adolescent health, school health, sexual and reproductive health, and cancer control programmes is essential to avoid the establishment of vertical siloed systems.

## 5.2 Resource mobilization

A number of strategies have been proposed throughout this document to assist in the mobilization of resources, as highlighted below.

- Reducing existent stigma and discrimination associated with HPV infection and cervical cancer, and continuous advocacy to highlight the importance of cervical cancer elimination. Wide engagement with government, religious organizations and leaders, academic institutions, civil society, international nongovernmental organizations and professional societies is critical and needs to be harnessed to support these activities.
- Maximizing regional and public–private partnerships to enable the efficient price negotiation of essential vaccines, technologies and medicines.
- Using the cervical cancer elimination agenda to strengthen national and regional capacity to monitor, diagnose, treat and support people living with all cancers, which will contribute to reducing growing global inequity associated with cancer mortality. This collective benefit should be leveraged to advocate for resource commitments to achieve the elimination of cervical cancer.

## 6. Monitoring and evaluation

Implementation plans should include consideration of monitoring and evaluation of national progress towards the 2030 interim scale-up targets and, in the longer term, the impact of the elimination efforts. All countries and territories should be able to monitor cervical cancer incidence and mortality through appropriate investments in cancer registry and death registration systems. This will ensure that they can assess their ongoing status in relation to the elimination threshold and monitor their mortality to incidence ratio.

A matrix for guiding monitoring and evaluation plans across the three pillars of elimination is provided in **Table 9**. It includes both outcome and process indicators, as well as indicators related to reach, effectiveness and equity. Indicators that all countries/territories should be able to monitor are noted as “Essential”. Indicators labelled as “Recommended” are those recommended for monitoring by all countries/territories as soon as is feasible. Indicators designated as “For consideration” are those to be included where resources allow.

**Table 9. Monitoring and evaluation matrix for countries/territories of the Eastern Mediterranean Region**

| Target                                                     | Indicator                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Source                                                                                                                                                                                                                                                     |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Less than 4 cervical cancer cases per 100 000 women</b> | <b>Essential: National cancer incidence per year</b>                                                                                                                                                                                                                                                                                                                                                                                                           | Cancer registry (for countries with minimal/no registry infrastructure, this is a priority area for development as part of the strategy; interim measures such as systematic surveys of hospital facilities or records could be used as a temporary proxy) |
|                                                            | Recommended: Cancer incidence by subnational geographic area, cervical cancer type, age, ethnicity<br><br><i>For consideration: Cancer incidence by stage</i>                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                            |
| <b>Reduction in mortality to incidence ratio</b>           | <b>Essential: Cervical cancer mortality per year, national cancer incidence per year</b>                                                                                                                                                                                                                                                                                                                                                                       | Cancer registry                                                                                                                                                                                                                                            |
|                                                            | Recommended: Cervical cancer survival by type, cervical cancer mortality by type, age, subnational geographical area, ethnicity<br><br><i>For consideration: Cervical cancer survival by stage</i>                                                                                                                                                                                                                                                             | Death registry<br><br>(For countries with minimal/no registry infrastructure, this is a priority area for development as part of the strategy)                                                                                                             |
| <b>90% of girls fully vaccinated by age 15</b>             | <b>Essential: National vaccination coverage in girls by number of doses by age 15</b>                                                                                                                                                                                                                                                                                                                                                                          | National vaccination register (where a registry is not yet in place, aggregated local data records can be used or at a minimum coverage surveys)                                                                                                           |
|                                                            | <b>Essential: adverse events following immunization (AEFI) monitoring as per WHO standards (74)</b>                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                            |
|                                                            | Recommended: Vaccination coverage by sex and by number of doses by age 15, by subnational area, ethnicity/religion, vaccine type, if applicable<br><br><i>For consideration: Vaccination coverage by parent's education level, employment status</i><br><br><i>For consideration: HPV prevalence surveys (such surveys are NOT a prerequisite for implementation and monitoring of HPV vaccine programmes, as per WHO position paper on HPV vaccines) (37)</i> | Linked to other national datasets or targeted coverage survey with additional demographic variables collected<br><br>AEFI monitored through dedicated database                                                                                             |

**Table 9. Monitoring and evaluation matrix for countries/territories of the Eastern Mediterranean Region (continued)**

| Target                                                      | Indicator                                                                                                                                                                                  | Source                                                                                                                                     |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>70% of women screened by age 35, and again by age 45</b> | <b>Essential: National screening coverage by age 35 (1 x) and by age 45 (1 x and 2 x)</b>                                                                                                  | Screening register (where a registry is not yet in place, aggregated local data records can be used or at a minimum participation surveys) |
|                                                             | Recommended: Screening coverage by subnational area, age, ethnicity/religion, marital status, HIV status, by nationally recommended screening interval, and screening type (if applicable) |                                                                                                                                            |
|                                                             | Recommended: Proportion of women screened who are screen positive (i.e. HPV-positive once HPV screening introduced)                                                                        |                                                                                                                                            |
|                                                             | Recommended: Proportion of women screened who receive their HPV result                                                                                                                     |                                                                                                                                            |
|                                                             | Recommended: Proportion of screen positive women who attend follow-up                                                                                                                      |                                                                                                                                            |
|                                                             | <i>For consideration: Screening coverage by education level, employment status</i>                                                                                                         |                                                                                                                                            |
|                                                             | <i>For consideration: Proportion of women screen positive by subnational area, age, ethnicity/religion, marital status, HIV status, screening type if applicable</i>                       |                                                                                                                                            |
| <b>90% of women identified with pre-cancer treated</b>      | <b>Essential: Proportion of women with cervical pre-cancer (or screen positive in screen and treat programmes) diagnosed who receive treatment</b>                                         | Screening register (where a registry is not yet in place, aggregated local data records can be used or at a minimum clinic surveys)        |
|                                                             | Recommended: Treatment coverage by subnational area, age, ethnicity/religion, marital status                                                                                               |                                                                                                                                            |
|                                                             | <i>For consideration: Treatment coverage by education level, employment status</i>                                                                                                         |                                                                                                                                            |
|                                                             | <i>For consideration: Proportion of women screened who receive their HPV result by subnational area, age, ethnicity/religion, marital status, HIV status</i>                               |                                                                                                                                            |
|                                                             | <i>For consideration: Proportion of screen positive women who attend follow up by subnational area, age, ethnicity/religion, marital status, HIV status</i>                                |                                                                                                                                            |

**Table 9. Monitoring and evaluation matrix for countries/territories of the Eastern Mediterranean Region (concluded)**

| Target                                                                                                                                                                                                                 | Indicator                                                                                                                                                                                                               | Source                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>90% of women identified with cervical cancer treated</b>                                                                                                                                                            | <b>Essential: Proportion of women with cervical cancer who receive treatment</b>                                                                                                                                        | Patient referral and tracking systems (where a system is not in place, information may be recorded in cancer registry and mapped against standard of care pathways). |
|                                                                                                                                                                                                                        | Recommended: Proportion of women with cervical cancer who receive optimal treatment                                                                                                                                     |                                                                                                                                                                      |
|                                                                                                                                                                                                                        | Recommended: Proportion of women with cervical cancer satisfied with their care                                                                                                                                         | Patient satisfaction surveys                                                                                                                                         |
|                                                                                                                                                                                                                        | Recommended: Proportion of women with cervical cancer requiring palliative care services who can access it                                                                                                              |                                                                                                                                                                      |
|                                                                                                                                                                                                                        | Recommended: Timeliness of treatment (median time from diagnosis to treatment)                                                                                                                                          |                                                                                                                                                                      |
|                                                                                                                                                                                                                        | <i>For consideration: Proportion of women with cervical cancer who receive treatment by stage, type of treatment, subnational area, age, ethnicity/religion, marital status, education level, employment status</i>     |                                                                                                                                                                      |
|                                                                                                                                                                                                                        | <i>For consideration: Proportion of women with cervical cancer satisfied with their care by stage, type of treatment, subnational area, age, ethnicity/religion, marital status, education level, employment status</i> |                                                                                                                                                                      |
| <i>For consideration: Proportion of women with cervical cancer requiring palliative care able to access it by stage, subnational area, age, ethnicity/religion, marital status, education level, employment status</i> |                                                                                                                                                                                                                         |                                                                                                                                                                      |
| <i>For consideration: Timeliness of treatment by stage, type of treatment, type of provider (public or private) subnational area, age, ethnicity/religion, marital status, education level, employment status</i>      |                                                                                                                                                                                                                         |                                                                                                                                                                      |

*Essential: Essential for all countries and territories to monitor.*

*Recommended: Recommended for all countries and territories to monitor as soon as feasible.*

*For consideration: For consideration in countries and territories where resources are available.*

Evaluation of national-level implementation activities – in order to ensure that implementation is successfully delivering the required strategic actions – may wish to draw upon established implementation science methods and frameworks (75,76). Training resources are also available to support evaluators in strengthening the implementation research and evaluation capacity within their setting (77).

# References

1. Resolution WHA73.2. Global strategy to accelerate the elimination of cervical cancer as a public health problem. In: Seventy-third World Health Assembly, Geneva, 18–19 May 2020. Resolutions and decisions, annexes. Geneva: World Health Organization; 2020 ([https://apps.who.int/gb/ebwha/pdf\\_files/WHA73/A73\\_R2-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/WHA73/A73_R2-en.pdf), accessed 13 December 2020).
2. Global strategy to accelerate the elimination of cervical cancer as a public health problem. Geneva: World Health Organization; 2020 (<https://www.who.int/publications/item/9789240014107>, accessed 13 December 2022).
3. Progress on the health-related Sustainable Development Goals and targets in the Eastern Mediterranean Region, 2020. Cairo: WHO Regional Office for the Eastern Mediterranean; 2022 (<https://apps.who.int/iris/handle/10665/361800>, accessed 13 December 2022).
4. Li N, Franceschi S, Howell-Jones R, Snijders PJ, Clifford GM. Human papillomavirus type distribution in 30,848 invasive cervical cancers worldwide: variation by geographical region, histological type and year of publication. *Int J Cancer*. 2011;128(4):927–35. doi:10.1002/ijc.25396.
5. Shoja Z, Farahmand M, Hosseini N, Jalilvand S. A meta-analysis on human papillomavirus type distribution among women with cervical neoplasia in the WHO Eastern Mediterranean Region. *Intervirology*. 2019;62(3):101–11. doi:10.1159/000502824.
6. Farahmand M, Shoja Z, Arashkia A, Salavatiha Z, Jalilvand S. Systematic review and meta-analysis of human papillomavirus prevalence and types among women with normal cervical cytology in the Eastern Mediterranean Region. *Future Virology*. 2019;14(11):761–77. doi:10.2217/fvl-2018-0052.
7. Noncommunicable disease surveillance, monitoring and reporting: cervical cancer country profiles [website]. Geneva: World Health Organization; 2022 (<https://www.who.int/teams/noncommunicable-diseases/surveillance/data/cervical-cancer-profiles>, accessed 13 December 2022).
8. Krakauer EL, Kwete X, Kane K, Afshan G, Bazzett-Matabele L, Bien-Aimé DDR et al. Cervical cancer-associated suffering: estimating the palliative care needs of a highly vulnerable population. *JCO Glob Oncol*. 2021;7:862–72. doi:10.1200/GO.21.00025.
9. Safaeian F, Ghaemimood S, El-Khatib Z, Enayati S, Mirkazemi R, Reeder B. Burden of cervical cancer in the Eastern Mediterranean Region during the years 2000 and 2017: retrospective data analysis of the Global Burden of Disease Study. *JMIR Public Health and Surveillance*. 2021;7(5):e22160. doi:10.2196/22160.
10. Acuti Martellucci C, Delsoz M, Qaderi S, Madadi S, Bhandari D, Ozaki A et al. Delay in diagnosis of cervical cancer in Afghanistan: a pilot cross-sectional survey. *Front Reprod Health*. 2021;3:783271. doi:10.3389/frph.2021.783271.
11. Al-Rayyan ES. Overview of the management of cervical cancer: a Jordanian experience. *Int J Recent Sci Res*. 2021;12(05):41670–4. doi: <http://dx.doi.org/10.24327/ijrsr.2021.1205.5938>.
12. Ouasmani F, Hanchi Z, Haddou Rahou B, Bekkali R, Ahid S, Mesfioui A. Determinants of patient delay in seeking diagnosis and treatment among Moroccan women with cervical cancer. *Obstet Gynecol Int*. 2016;4840762. doi:10.1155/2016/4840762.
13. Cervical cancer screening. IARC Handbooks of Cancer Prevention, volume 18. Lyon: International Agency for Research on Cancer; 2022: 1-456 (<https://publications.iarc.fr/604>, accessed August 2022).

14. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M et al. Cancer today: data visualization tools for exploring the global cancer burden in 2020 [website]. Lyon: International Agency for Research on Cancer; 2018 (<https://gco.iarc.fr/today/home>, accessed August 2022).
15. Cancer registration in the Region: implementation of CANREG4 in the Eastern Mediterranean Region [website]. Cairo: WHO Regional Office for the Eastern Mediterranean (<http://www.emro.who.int/noncommunicable-diseases/information-resources/cancer-registration.html>, accessed August 2022).
16. Hamadeh R, Al-Jawalehdh A, El-Awa F, Saeed K, Altahan F, Lodge M et al. Cancer prevention: modifiable risk factors. In: Cancer control: Eastern Mediterranean Region special report. Woodbridge: Global Health Dynamics; 2022 (<http://www.cancercontrol.info/wp-content/uploads/2022/05/19-chapter-2.pdf>, accessed 22 December 2022).
17. WHO global report on trends in prevalence of tobacco use 2000–2025, third edition. Geneva: World Health Organization; 2019 (<https://www.who.int/publications/i/item/who-global-report-on-trends-in-prevalence-of-tobacco-use-2000-2025-third-edition>, accessed August 2022).
18. Nagelhout G, Ebisch RM, Van Der Hel O, Meerkerk G-J, Magnée T, De Bruijn T et al. Is smoking an independent risk factor for developing cervical intra-epithelial neoplasia and cervical cancer? A systematic review and meta-analysis. *Expert Rev Anticancer Ther.* 2021;21(7):781–94. doi:10.1080/14737140.2021.1888719.
19. Su B, Qin W, Xue F, Wei X, Guan Q, Jiang W et al. The relation of passive smoking with cervical cancer: A systematic review and meta-analysis. *Medicine (Baltimore).* 2018;97(46):e13061. doi:10.1097/MD.00000000000013061.
20. Abraham AG, Strickler HD, Jing Y, Gange SJ, Sterling TR, Silverberg M et al. Invasive cervical cancer risk among HIV-infected women: a North American multi-cohort collaboration prospective study. *Journal of acquired immune deficiency syndromes. J Acquir Immune Defic Syndr.* 2013;62(4):405–13. doi:10.1097/QAI.0b013e31828177d7.
21. Stelzle D, Tanaka LF, Lee KK, Khalil AI, Baussano I, Shah AS et al. Estimates of the global burden of cervical cancer associated with HIV. *Lancet Glob Health.* 2021;9(2):e161–e169. doi:10.1016/S2214-109X(20)30459-9.
22. International Collaboration of Epidemiological Studies of Cervical Cancer, Appleby P, Beral V, Berrington de González A, Colin D, Franceschi S et al. Cervical cancer and hormonal contraceptives: collaborative reanalysis of individual data for 16,573 women with cervical cancer and 35,509 women without cervical cancer from 24 epidemiological studies. *Lancet.* 2007;370(9599):1609–21. doi:10.1016/S0140-6736(07)61684-5.
23. Tekalegn Y, Sahiledengle B, Woldeyohannes D, Atlaw D, Degno S, Desta F et al. High parity is associated with increased risk of cervical cancer: systematic review and meta-analysis of case–control studies. *Womens Health (Lond).* 2022;18:17455065221075904. doi:10.1177/17455065221075904.
24. Fertility rate, total (births per woman) [online database]. Washington, DC: World Bank Group; 2020 (<https://data.worldbank.org/indicator/SP.DYN.TFRT.IN>, accessed 27 May 2022).
25. Canfell K, Kim JJ, Brisson M, Keane A, Simms KT, Caruana M et al. Mortality impact of achieving WHO cervical cancer elimination targets: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *Lancet.* 2020;395(10224):591–603. doi:10.1016/S0140-6736(20)30157-4.
26. SDG target 3.4 non-communicable diseases and mental health [website]. Geneva: World Health Organization ([https://www.who.int/data/gho/data/themes/topics/sdg-target-3\\_4-noncommunicable-diseases-and-mental-health](https://www.who.int/data/gho/data/themes/topics/sdg-target-3_4-noncommunicable-diseases-and-mental-health), accessed August 2022).

27. WHO's strategy for the Eastern Mediterranean Region, 2020–2023: turning Vision 2023 into action. Cairo: WHO Regional Office for the Eastern Mediterranean; 2018 (<https://applications.emro.who.int/docs/EMRPUB-RDO-014-2019-EN.pdf?ua=1>, accessed 13 December 2022).
28. Human papillomavirus vaccines: WHO position paper (2022 update). *Weekly Epidemiological Record*. 2022;97(50):645–72 (<https://apps.who.int/iris/bitstream/handle/10665/365350/WER9750-eng-fre.pdf>, accessed 30 December 2022).
29. Jansen EE, Naber SK, Aitken CA, de Koning HJ, van Ballegooijen M, de Kok IM. Cost-effectiveness of HPV-based cervical screening based on first year results in the Netherlands: a modelling study. *BJOG*. 2021;128(3):573–82. doi:10.1111/1471-0528.16400.
30. Vale DB, Silva MT, Discacciati MG, Polegatto I, Teixeira JC, Zeferino LC. Is the HPV-test more cost-effective than cytology in cervical cancer screening? An economic analysis from a middle-income country. *PloS One*. 2021;16(5):e0251688. doi:10.1371/journal.pone.0251688.
31. Campos NG, Maza M, Alfaro K, Gage JC, Castle PE, Felix JC et al. The cost-effectiveness of implementing HPV testing for cervical cancer screening in El Salvador. *Int J Gynecol Obstet*. 2019;145(1):40–6. doi:10.1002/ijgo.12773.
32. Arbyn M, Smith SB, Temin S, Sultana F, Castle P. Detecting cervical precancer and reaching underscreened women by using HPV testing on self samples: updated meta-analyses. *BMJ*. 2018;363:k4823. doi:10.1136/bmj.k4823.
33. Camara H, Zhang Y, Lafferty L, Vallely AJ, Guy R, Kelly-Hanku A. Self-collection for HPV-based cervical screening: a qualitative evidence meta-synthesis. *BMC public health*. 2021;21(1):1–14. doi:10.1186/s12889-021-11554-6.
34. WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention. Geneva: World Health Organization; 2021 (<https://www.who.int/publications/i/item/9789240030824>, accessed 15 December 2022).
35. Yang DY, Bracken K. Update on the new 9-valent vaccine for human papillomavirus prevention. *Can Fam Physician*. 2016;62(5):399–402. PMID:27255620.
36. Lei J, Ploner A, Elfström KM, Wang J, Roth A, Fang F et al. HPV vaccination and the risk of invasive cervical cancer. *New Eng J Med*. 2020;383(14):1340–8. doi:10.1056/NEJMoa1917338.
37. Human papillomavirus vaccines: WHO position paper, May 2017. *Weekly Epidemiological Record*. 2017;92(19):241–68 (<https://www.who.int/publications/i/item/who-wer9219-241-268>, accessed 15 December 2022).
38. Global market study: HPV vaccines. Geneva: World Health Organization; 2019 (<https://apps.who.int/iris/handle/10665/311275>, accessed 15 December 2022).
39. Zhu K, Tian Y, Dong X, Akinwunmi BO, Zhang CJ, Huang J et al. The cost-effectiveness of bivalent, quadrivalent, and nine-valent HPV vaccination in Asia: a systematic review. *Arch Gynecol Obstet*. 2022;306(1):173–87. doi:10.1007/s00404-021-06309-y.
40. Silas OA, Achenbach CJ, Murphy RL, Hou L, Sagay SA, Banwat E et al. Cost effectiveness of human papilloma virus vaccination in low and middle income countries: a systematic review of literature. *Expert Rev Vaccines*. 2018;17(1):91–8. doi:10.1080/14760584.2018.1411195.
41. Mahumud RA, Alam K, Keramat SA, Ormsby GM, Dunn J, Gow J. Cost-effectiveness evaluations of the 9-Valent human papillomavirus (HPV) vaccine: evidence from a systematic review. *PloS One*. 2020;15(6):e0233499. doi:10.1371/journal.pone.0233499.
42. Anwari P, Debellut F, Vodicka E, Clark A, Farewar F, Zhwak ZA et al. Potential health impact and cost-effectiveness of bivalent human papillomavirus (HPV) vaccination in Afghanistan. *Vaccine*. 2020;38(6):1352–62. doi:10.1016/j.vaccine.2019.12.013.

43. Woo Y. The feasibility and acceptability of self-sampling and HPV testing using Cepheid Xpert® HPV in a busy primary care facility. *J Virus Erad.* 2019;5(Suppl 1):10–1. PMID:30997147.
44. Wren SM, Wild H. Armed conflicts destroy civilian health systems: cancer screening in Ukraine the newest casualty of world conflict. *World J Surg.* 2022;46(10):2487–8. doi:10.1007/s00268-022-06700-z.
45. Jawad M, Millett C, Sullivan R, Alturki F, Roberts B, Vamos EP. The impact of armed conflict on cancer among civilian populations in low- and middle-income countries: a systematic review. *Ecancermedalscience.* 2020 May 8;14:1039. doi:10.3332/ecancer.2020.1039.
46. Unitaid. Screening and treatment of pre-cancerous lesions for secondary prevention of cervical cancer: technology landscape. Geneva: World Health Organization; 2019 ([https://unitaid.org/assets/Cervical\\_Cancer\\_Technology-landscape-2019.pdf](https://unitaid.org/assets/Cervical_Cancer_Technology-landscape-2019.pdf), accessed 15 December 2022).
47. WHO framework for strengthening and scaling-up services for the management of invasive cervical cancer. Geneva: World Health Organization; 2020 (<https://www.who.int/publications/i/item/9789240003231>, accessed 15 December 2022).
48. Krakauer EL, Kane K, Kwete X, Afshan G, Bazzett-Matabele L, Ruthnie Bien-Aimé DD et al. Essential package of palliative care for women with cervical cancer: responding to the suffering of a highly vulnerable population. *JCO Glob Oncol.* 2021;7:873–85. doi:10.1200/GO.21.00026.
49. Knaul FM, Farmer PE, Krakauer EL, De Lima L, Bhadelia A, Kwete XJ et al. Alleviating the access abyss in palliative care and pain relief—an imperative of universal health coverage: the Lancet Commission report. *Lancet.* 2018;391(10128):1391–454. doi:10.1016/S0140-6736(17)32513-8.
50. Integrating palliative care and symptom relief into paediatrics: a WHO guide for health care planners, implementers and managers. Geneva: World Health Organization; 2018 (<https://www.who.int/publications/i/item/integrating-palliative-care-and-symptom-relief-into-paediatrics>, accessed 15 December 2022).
51. Jawad M, Millett C, Sullivan R, Alturki F, Roberts B, Vamos EP. The impact of armed conflict on cancer among civilian populations in low- and middle-income countries: a systematic review. *Ecancermedalscience.* 2020;14:1039. doi:10.3332/ecancer.2020.1039.
52. Parham GP, Mathieu KM, YouYou TG, Hicks ML, Henry-Tillman R, Mutombo A et al. Establishing women’s cancer care services in a fragile, conflict and violence affected ecosystem in Africa. *Ecancermedalscience.* 2021;15:1231. doi:10.3332/ecancer.2021.1231.
53. Znaor A, Eser S, Anton-Culver H, Fadhil I, Ryzhov A, Silverman BG 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.
54. Framework for action on cancer prevention and control in the WHO Eastern Mediterranean Region: updated June 2019, based on resolution EM/RC64/R.2. Cairo: WHO Regional Office for the Eastern Mediterranean; 2019 (<https://apps.who.int/iris/handle/10665/351224>, accessed 15 December 2022).
55. Akkour K, Alghuson L, Benabdelkamel H, Alhalal H, Alayed N, AlQarni A et al. Cervical cancer and human papillomavirus awareness among women in Saudi Arabia. *Medicina (Kaunas).* 2021;57(12):1373. doi:10.3390/medicina57121373.
56. Zahid HM, Qarah AB, Alharbi AM, Alomar AE, Almubarak SA. Awareness and practices related to cervical cancer among females in Saudi Arabia. *Int J Environ Res Public Health.* 2022;19(3):1455. doi:10.3390/ijerph19031455.



57. Yacouti A, Elkhoudri N, El Got A, Benider A, Hadrya F, Baddou R et al. Awareness, attitudes and acceptability of the HPV vaccine among female university students in Morocco. *PloS One*. 2022;17(4):e0266081. doi:10.1371/journal.pone.0266081.
58. Al-Saadi AN, Al-Muqbal AH, Dawi E. Women's knowledge of cervical cancer: a cross-sectional study in Al Buraimi Governorate, Oman. *Sultan Qaboos Univ Med J*. 2021;21(3):450–6. doi:10.18295/squmj.4.2021.022.
59. Hendaus MA, Hassan M, Alsulaiti M, Mohamed T, Mohamed R, Yasrab D et al. Parents attitudes toward the human papilloma virus (HPV) vaccine: a new concept in the State of Qatar. *Journal of Family Medicine and Primary Care*. 2021;10(7):2488–93. doi:10.4103/jfmpc.jfmpc\_1122\_20.
60. Taebi M, Riazi H, Keshavarz Z, Afrakhteh M. Knowledge and attitude toward human papillomavirus and HPV vaccination in Iranian population: a systematic review. *Asian Pac J Cancer Prev*. 2019;20(7):1945–9. doi:10.31557/APJCP.2019.20.7.1945.
61. Selmouni F, Zidouh A, Nejjari C, Bekkali R. Acceptability of the human papilloma virus vaccine among Moroccan parents: a population-based cross-sectional study. *East Mediterr Health J*. 2015;21(8):555–63. doi:10.26719/2015.21.8.555.
62. Husain Y, Alalwan A, Al-Musawi Z, Abdulla G, Hasan K, Jassim G. Knowledge towards human papilloma virus (HPV) infection and attitude towards its vaccine in the Kingdom of Bahrain: cross-sectional study. *BMJ Open*. 2019;9(9):e031017. doi:10.1136/bmjopen-2019-031017.
63. Asali F, Abdel-Razeq R, Al-Thunaibat A, Okour A, Abu Mahfouz S, Abu Mahfouz I. Jordanian women's attitudes towards cervical cancer screening: has the pattern changed? *J Obstet Gynaecol*. 2020;40(4):564–8. doi:10.1080/01443615.2019.1635097.
64. Almehmadi MM, Salih MM, Al-Hazmi AS. Awareness of human papillomavirus infection complications, cervical cancer, and vaccine among the Saudi population: a cross-sectional survey. *Saudi Med J*. 2019;40(6):555–9. doi:10.15537/smj.2019.6.24208.
65. Jassim G, Obeid A, Al Nasheet HA. Knowledge, attitudes, and practices regarding cervical cancer and screening among women visiting primary health care centres in Bahrain. *BMC Public Health*. 2018;18(1):128. doi:10.1186/s12889-018-5023-7.
66. Al Yahyai T, Al Raisi M, Al Kindi R. Knowledge, attitudes, and practices regarding cervical cancer screening among Omani women attending primary healthcare centers in Oman: a cross-sectional survey. *Asian Pac J Cancer Prev*. 2021;22(3):775–83. doi:10.31557/APJCP.2021.22.3.775.
67. Alwahaibi N, Alsalami W, Alramadhani N, Alzaabi A. Factors influencing knowledge and practice regarding cervical cancer and pap smear testing among Omani women. *Asian Pac J Cancer Prev*. 2018;19(12):3367–74. doi:10.31557/APJCP.2018.19.12.3367.
68. Al-Azri MH, Al-Saidi M, Al-Mutairi E, Panchatcharam SM. Knowledge of risk factors, symptoms and barriers to seeking medical help for cervical cancer among Omani women attending Sultan Qaboos University Hospital. *Sultan Qaboos Univ Med J*. 2020;20(3):e301–e309. doi:10.18295/squmj.2020.20.03.009
69. Anfinan NM. Physician's knowledge and opinions on human papillomavirus vaccination: a cross-sectional study, Saudi Arabia. *BMC Health Services Res*. 2019;19(1):963. doi:10.1186/s12913-019-4756-z.
70. Mohamed ML, Tawfik AM, Mohammed GF, Elotla SF. Knowledge, attitude, and practice of cervical cancer screening, and HPV vaccination: a cross-sectional study among obstetricians and gynecologists in Egypt. *Matern Child Health J*. 2022;26(3):565–74. doi:10.1007/s10995-021-03352-8.

71. Neji OI, David NA, John EE. Knowledge, attitude and practice of cervical cancer screening among female students in tertiary institution in Calabar, Nigeria. *International Journal of Development Research*. 2019;9(01):25384–90 (<https://www.journalijdr.com/sites/default/files/issue-pdf/15030.pdf>).
72. HPV vaccine communication: special considerations for a unique vaccine, 2016 update. Geneva: World Health Organization; 2016 (<https://www.who.int/publications/i/item/WHO-IVB-16.02>, accessed 15 December 2022).
73. Perehudoff K, Vermandere H, Williams A, Bautista-Arredondo S, De Paepe E, Dias S et al. Universal cervical cancer control through a right to health lens: refocusing national policy and programmes on underserved women. *BMC Int Health Hum Rights*. 2020;20:21. doi:10.1186/s12914-020-00237-9.
74. Global manual on surveillance of adverse events following immunization. 2016 update. Geneva: World Health Organization; 2014 (<https://www.who.int/publications/i/item/10665206144>, accessed 15 December 2022).
75. World Health Organization, UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. Implementation research toolkit. Geneva: World Health Organization; 2014 (<https://apps.who.int/iris/handle/10665/110523>, accessed 15 December 2022).
76. A guide to implementation research in the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2016 (<https://apps.who.int/iris/handle/10665/252626>, accessed 15 December 2022).
77. TDR, United Nations Children's Fund, the United Nations Development Programme, the World Bank, World Health Organization. Massive open online course (MOOC) on implementation research: infectious diseases of poverty [website]. Geneva: World Health Organization; 2022 ([https://tdr.who.int/home/our-work/strengthening-research-capacity/massive-open-online-course-\(moo\)-on-implementation-research](https://tdr.who.int/home/our-work/strengthening-research-capacity/massive-open-online-course-(moo)-on-implementation-research), accessed 15 December 2022).



