

Draft: Global strategy towards eliminating cervical cancer as a public health problem

DRAFT: 16 December 2019

“Through cost-effective, evidence-based interventions, including human papillomavirus vaccination of girls, screening and treatment of precancerous lesions, and improving access to diagnosis and treatment of invasive cancers, we can eliminate cervical cancer as a public health problem and make it a disease of the past.”

Dr Tedros Adhanom Ghebreyesus, Director-General, World Health Organization

Foreword

The success of the drive to eliminate cervical cancer depends on political will, country-led action and investments, and global solidarity, as well as sustainable and adaptable partnerships. Member States have committed to the attainment of Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs), leaving no one behind. Eliminating cervical cancer as a public health problem is part of honouring this commitment and the many others related to tackling inequities and upholding the right of women and adolescent girls to health throughout their lives, including their sexual and reproductive health.

We have the knowledge and the tools to stop women from suffering and dying from this preventable disease. The time is now—for all Member States and development partners to rally behind this strategy to eliminate cervical cancer as a public health problem.

Together, we can make history – it is within our reach!

DRAFT

Contents

Foreword	1
Acronyms and abbreviations	3
Highlights	5
Summary graphic	6
1 Background	7
2. Context	9
3 Understanding the global burden of cervical cancer: a manifestation of inequality	10
4. The current status of cervical cancer control	13
5 The path to eliminating cervical cancer	15
6 Strategic actions to achieve the 2030 targets	19
7 Health system enablers	29
8 Partnerships, advocacy and communication	27
9 Surveillance, Monitoring and evaluation	31
Annex 1. Costing, financing and investment case	35

DRAFT

Acronyms and abbreviations

AIDS	Acquired immunodeficiency syndrome
ASR	Age Standardised Rate (Incidence)
CCEMC	Cervical Cancer Elimination Modelling Consortium
FIGO	Fédération Internationale de Gynécologie et d'Obstétrique
GLOBOCAN	Global Cancer Observatory
GPW	General Programme of Work
HIV	Human immunodeficiency virus
HPV	Human papillomavirus
LMICs	Low- and middle-income countries
PBCRs	Population-based cancer registries
SDGs	Sustainable Development Goals
TNM	Tumour Node Metastasis
UHC	Universal Health Coverage
UN	United Nations
UNAIDS	The Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
VIA	Visual inspection with acetic acid
WHO	World Health Organization

BACKGROUND

Why is a global strategy needed?

Cervical cancer is a preventable disease. It is also curable if detected early and adequately treated. Yet it remains one of most common cancers and the cause of cancer-related death in women across the globe. Over the next 12 years (2018 to 2030) the annual number of new cases of cervical cancer is expected to increase from 570,000 to 700,000. During that same period the annual number of deaths will increase from 311,000 to 400,000. More than 85% of those affected are young, poor, undereducated women of colour who live in the world's poorest countries. Many are also mothers of young children whose survival is subsequently truncated by the premature death of their mothers.¹

Few diseases reflect global inequities as much as cancer of the cervix. In low- and middle-income countries (LMICs) its incidence is nearly twice as high, and its death rates three times as high, compared with high income countries (HICs).

Proven and cost-effective measures for eliminating cervical cancer exist, but to date have not been widely implemented in regions of the world where the disease burden is highest. To be optimally effective these measures must be scaled to national levels and delivered using health service platforms that are sensitive to women's needs, their social circumstances, and the personal, cultural, social, structural and economic barriers hindering their access to health services. Health services that are integrated, people-centred, and that respect and uphold women's rights and dignity are vital.

While urgent and bold action is needed to scale up and sustain the implementation of the evidenced-based interventions (HPV vaccination, cervical cancer screening, management of detected disease) for eliminating cervical cancer as a public health problem, such action must be strategic in nature. This global strategy to eliminate cervical cancer proposes:

- a vision of a world where cervical cancer is eliminated as a public health problem
- a threshold of 4 per 100,000 women-year for elimination as a public health problem
- the following 90–70–90 targets that need to be met by 2030 for countries to be on the path towards cervical cancer elimination
 - 90% of girls fully vaccinated with the HPV vaccine by age 15.
 - 70% of women are screened with a high-performance test by 35 and 45 years of age.
 - 90% of women identified with cervical disease receive treatment (90% of women with pre-cancer treated; 90% of women with invasive cancer managed).
- a mathematical model that illustrates the following interim benefits of achieving the 90–70–90 targets by 2030 in low and lower middle-income countries

- median cervical cancer incidence rate is projected to fall 10% by 2030, 70% by 2045 and more than 90% by 2120, averting more than 70 million new cases of cervical cancer.
- cumulative number of cervical cancer deaths averted will be approximately 2 million by 2040, 4.5 million by 2050, 39 million by 2100 and 62 million by 2120.

The global strategy to eliminate cervical cancer as a public health problem will require (1) political support from international and local leaders; (2) coordinated cooperation among multisectoral partners; (3) broad support for equitable access in the context of UHC; (4) effective approaches towards resource mobilization; (5) health system strengthening; and (6) vigorous health promotion at all levels. The intersectionality of gender and health must stand as a strategic centrepiece of interventions.

The strategy must also be open to the exploration and exploitation of new ideas and opportunities, including advances in new medicines, vaccines, diagnostics, and treatment modalities. It must embrace innovative service delivery models and computerized data and information systems, together with new and expanded training methods (e.g., virtual-reality simulation enhanced training), and population scale-up interventions (e.g., cervical cancer ‘screen and treat’ campaigns, surgical camps, etc.) to achieve targets. Management science and modern forms of communications technology must be integrated in all aspects of service delivery. The market must be reshaped to eliminate cost as a barrier to prevention and treatment in the world’s poorest countries.

The moment has arrived for an ambitious, concerted and inclusive strategy to accelerate eliminating cervical cancer as a public health problem. Elimination is within the reach of all countries. We know what works. The technology and tools exist. We know that prevention and early diagnosis and treatment are highly cost-effective. The current focus on UHC demonstrated at the United Nations General Assembly (UNGA) convened in September 2019 offers a unique opportunity for countries to strengthen interventions for the management of invasive cervical cancer.²

Half-measures and incremental approaches will not suffice. It is time to implement at scale, worldwide. A disease that now stands as one of the world’s greatest public health failures can be eliminated.

CONTEXT

This is the first global health strategy for the elimination of a cancer as a public health problem. It builds on the World Health Organization Director-General's May 2018 call to action, which argued for renewed political will to realize elimination and called for all stakeholders to unite behind this common goal.³ The global effort is aligned with human rights instruments upholding health as a human right,⁴ as well as the 2030 Agenda for Sustainable Development and its overarching principle of leaving no one behind. The effort supports attaining several SDGs and targets (Box 1)⁵ and is a component of the United Nations Secretary-General's Global Strategy for Women's, Children's and Adolescents' Health (2016–2030).

Box 1. Eliminating cervical cancer contributes to several SDGs and targets

SDG 1: No poverty.

SDG 3: Good health and well-being.

SDG 3.4: By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being.

SDG 3.7: By 2030, ensure universal access to sexual and reproductive health care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.

SDG 3.8: Achieve universal health coverage, including financial risk protection, access to quality essential health care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.

SDG 5: Gender equality.

SDG 10: Reduce inequalities.

WHO's Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 identifies HPV vaccination and cervical cancer screening and treatment as best buys.⁶ They are included in WHO's list of interventions recommended for inclusion in Member State national health plans.

In addition, the 2016 United Nations High-Level Political Declaration on ending the AIDS epidemic by 2030⁷ emphasizes the need for integrated services to address coinfections and comorbidities, including cervical cancer prevention, screening and treatment, as well as other sexually transmitted infections, to guarantee the sustainability of HIV prevention, treatment, care and support services.

THE GLOBAL BURDEN OF CERVICAL CANCER

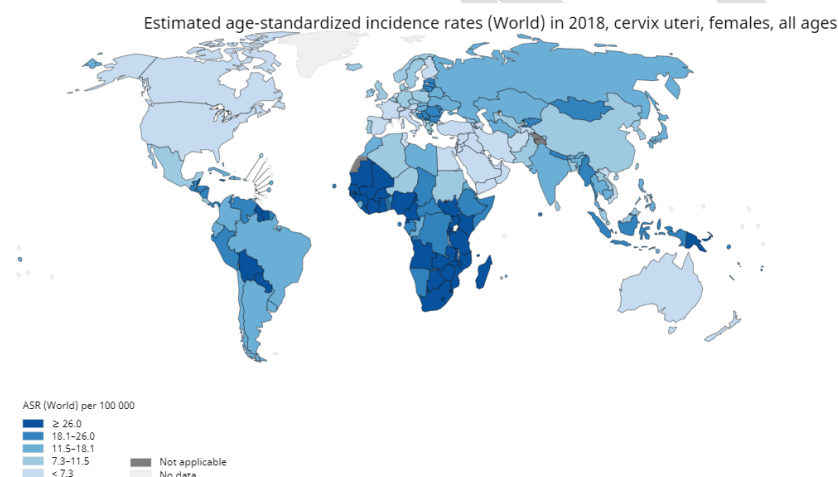
Understanding the global burden of cervical cancer: a manifestation of inequality

Cervical cancer incidence and mortality

Cervical cancer is the fourth most common cancer among women globally, with an estimated 570,000 new cases in 2018.⁸ All countries are affected, but the incidence is higher in low- and middle-income countries (Figure 1). Age-standardized incidence rates vary from 75 per 100,000 women in the highest-risk countries to fewer than 10 per 100,000 women in the lowest-risk countries.⁹

Today, nearly 90% of the 311,000 deaths worldwide in 2018 occurred in LMICs (Figure 2). Further, the proportion of women with cervical cancer who die from the disease is greater than 60% in many LMICs, which is more than twice the number in many HICs, where it is as low as 30%.¹⁰

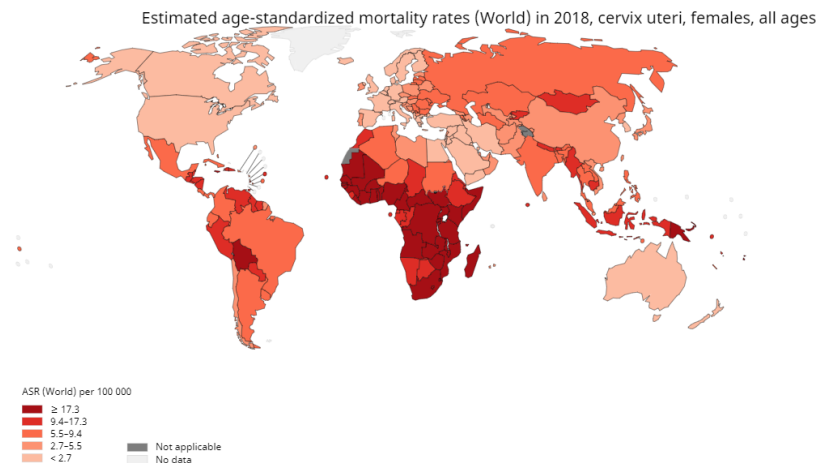
Figure 1. Estimated age-standardized cervical cancer incidence, 2018



Source: IARC GLOBOCAN 2018.

The global burden of cervical cancer is projected to continue to increase, rising to nearly 700,000 cases and 400,000 deaths in 2030, with analogous increases anticipated in future years.¹¹ This represents a 21% increase in the number of cases and a 27% increase in the number of deaths over just the 12-year period. Most of these increases will be in women in LMICs, reflecting the severity of the global divide in cervical cancer morbidity and mortality.

Figure 2. Estimated age-standardized cervical cancer mortality, 2018



Source: IARC GLOBOCAN 2018.

HPV and cervical cancer

The primary cause of precancerous and cancerous cervical lesions is infection with a high-risk or oncogenic HPV type.¹² HPV is a group of viruses that are extremely common worldwide—there are more than 100 types, of which at least 14 cause cancer. A subset of HPV types is responsible for virtually all cases of cervical cancer. HPV 16 and 18, which together are responsible for approximately 70% of cervical cancer world-wide, are the most oncogenic types. Cervical HPV is the most common sexually transmitted infection. The pathogenesis of cervical cancer is the same worldwide. The higher rates of cervical cancer incidence and mortality in LMICs are not attributable to differences in cervical infection with oncogenic HPV types. Instead, they are mainly attributable to the relative lack of high-quality cervical cancer screening and lack of widespread high-quality treatment of invasive cervical cancer in LMICs. Infection with certain HPV types also causes a proportion of cancers of the anus, vulva, vagina, penis and oropharynx, which are preventable using primary prevention strategies similar to those for cervical cancer.¹³

HIV and cervical cancer

Cervical cancer is the most common cancer among women living with HIV. Compared with women who are HIV negative, women living with HIV have a risk several times higher of persistent HPV infection, are six times as likely to develop cervical cancer¹⁴ and are more likely to develop it at a younger age.^{15,16} In some countries with high HIV prevalence, more than 50% of cervical cancer cases occur in women living with HIV.

Despite the gains in prolonged life expectancy associated with access to HIV care and treatment in countries worst hit by the HIV epidemic, cervical cancer in women living with HIV has not received the attention and resources that are needed to address its prevention and treatment. WHO recommends that women living with HIV be screened as soon as they are diagnosed with HIV (regardless of age); however, screening coverage has often been low. Reaching vulnerable women at high risk of developing cervical cancer and acquiring HIV infection will need prioritization of integrated preventive, screening and treatment services for both diseases to increase efficiencies and maximize impact.

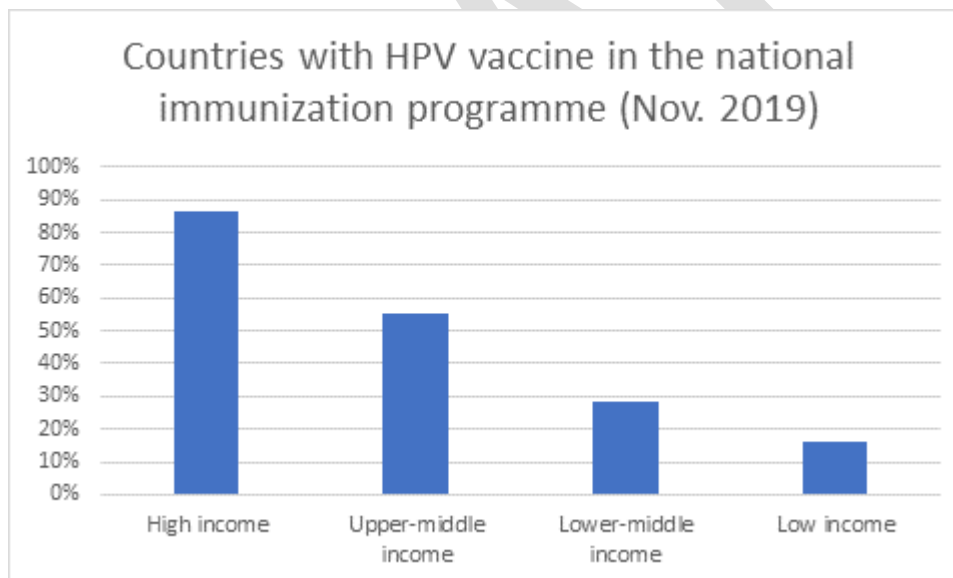
CURRENT STATUS OF CERVICAL CANCER CONTROL INTERVENTIONS

Access to HPV vaccines, screening and treatment

Between 2006, when the first HPV vaccine was licensed, and 2017, more than 100 million adolescent girls worldwide received at least one HPV vaccine dose, 95% of which were in high-income countries.¹⁷ Access to HPV vaccination is improving and in 2019, more than 65% of the girls being vaccinated each year globally are living in LMICs (Source: WHO Department of IVB database, 2019).

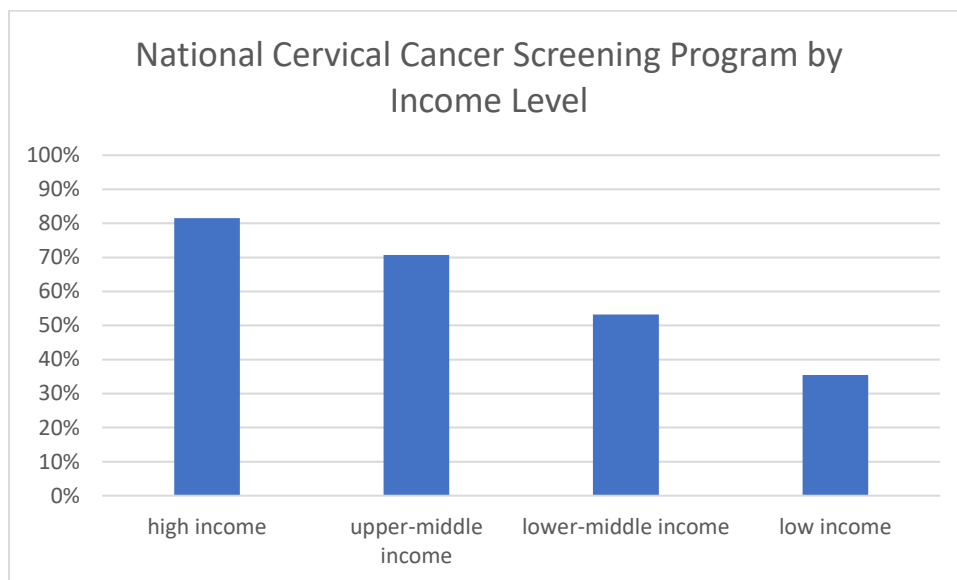
Today less than 18% of low-income and less than 30% of lower-middle-income countries have introduced the HPV vaccine into their national immunization schedules, while more than 85% of high-income countries have done so (Figure 3). Similar trends are observed in the establishment of cervical cancer screening programmes when examining countries based on income level (Figure 4).

Figure 3. Percentage of countries with HPV vaccine in the national immunization schedule, by World Bank income group 2019



Source: WHO data, IVB 2019

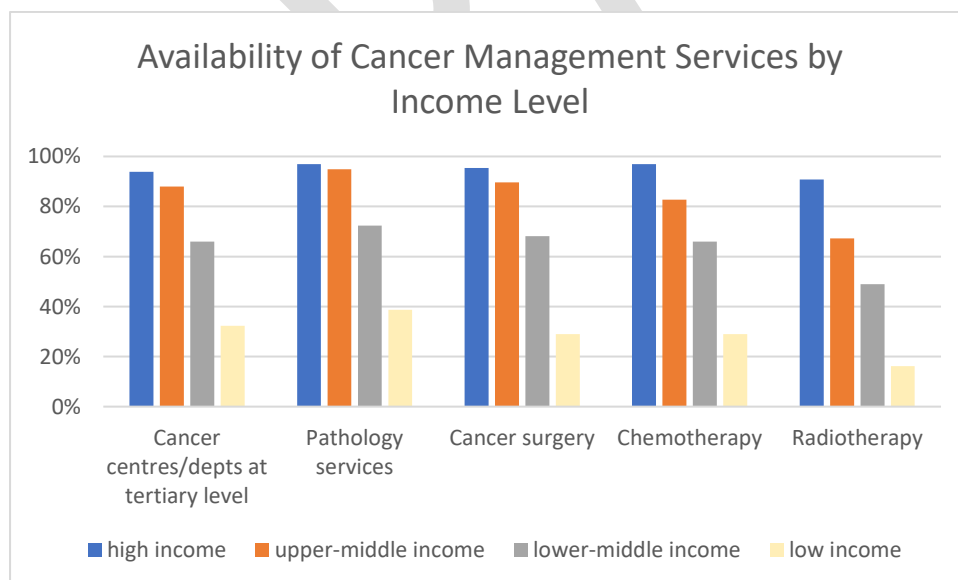
Figure 4. Percentage of countries with a cervical cancer screening programme. by World Bank income group 2019



Source: WHO Country Capacity Survey 2019

The disparities among countries in the availability of cancer management services are similarly striking (Figure 5).¹⁸ Nearly 30% of low-income countries reported having pathology, cancer surgery, chemotherapy and radiotherapy generally available in the public sector, compared with under 90% in HICs.

Figure 5. Percentage of countries with generally available cancer diagnosis and treatment services in the public sector, by World Bank income group, 2019



Source: WHO Country Capacity Survey 2019

THE PATH TO ELIMINATING CERVICAL CANCER

The path to ELIMINATING cervical cancer

The huge burden of cervical cancer-related mortality is a consequence of decades of neglect by the global health community. However, with the recent rise in global advocacy for women's health, commercial availability of prophylactic vaccines, low-cost approaches to screening and treating cervical cancer precursors, development of resource-appropriate management guidelines, novel approaches to surgical training, and initiatives to increase global access to anti-cancer drugs, the script can be rewritten.

What is needed to clear the path to cervical cancer elimination are bold strategic actions designed to: improve community awareness; rapidly expand workforce capacity; strengthen health systems; shape the market to lower the prices of life-saving products; accelerate the introduction of affordable technology into screening and treatment algorithms; and nationally scale organized, population-based prevention and treatment platforms. To ensure optimal effectiveness, the strategic actions must be developed in concert with frontline healthcare policy makers and providers, advocates, and the women themselves.

Principles and elimination goal

The term “elimination as a public health problem” is defined as achieving the measurable global targets set by the World Health Organization for a specific disease, based on population data. To determine the threshold for eliminating cervical cancer as a public health problem, WHO evaluated the epidemiologic data and the distribution of incidence rate across countries,¹⁹ considered established definitions of rare cancers²⁰ and conducted an expert consultation in 2018–2019. To eliminate cervical cancer as a public health problem globally, all countries must work towards an incidence below 4 per 100,000 women. To achieve that goal, high coverage targets for HPV vaccination, screening and treatment of pre-cancerous lesions, and management of cancer, must be reached by 2030 and maintained at this high level for decades (Box 3).

All recommended interventions, services and policies are evidence-based and should be delivered in the context of national efforts to achieve universal health coverage (UHC), focusing on primary health care, the public health approach,²¹ the life-course approach to health²² and integrated people-centred health services.²³

The elimination threshold is achievable in the vast majority of countries, including the 78 low- and middle-income countries with the highest burdens of disease.²⁴ Once elimination is reached, interventions must be sustained to keep incidence rates below the threshold and to maintain low mortality. More ground-breaking technology, effective interventions and sound practices are needed to be able to further reduce the incidence of cervical cancer.

Interim targets on the path towards elimination (90-70-90)

As countries seek solutions to the barriers to vaccine uptake (low acceptability, high cost, insufficient programme infrastructure, the growing anti-vaccine movement), women previously infected with oncogenic HPV will continue to be at risk for cervical cancer and its sequelae. Therefore, improving access to secondary and tertiary prevention interventions must remain a key priority of the global strategy to eliminate cervical cancer. The business-as-usual trajectory is unacceptable as every year more and more women will suffer and die of a preventable condition.

Box 2 presents a set of targets or milestones for 2030 based on the principles and strategy for elimination.

Box 2. The 2030 targets towards elimination of cervical cancer

Meeting the following 90-70-90 targets by 2030 will put all countries on the path to elimination: ²⁵
- 90% of girls fully vaccinated ²⁶ with HPV vaccine by 15 years of age.
- 70% of women screened using a high-performance test, ²⁷ by 35 and 45 ²⁸ years of age.
- 90% of women identified with cervical disease are treated: ²⁵
o 90% of women with pre-cancer treated.
o 90% of women with invasive cancer managed.

Why the 90-70-90 targets are key to success

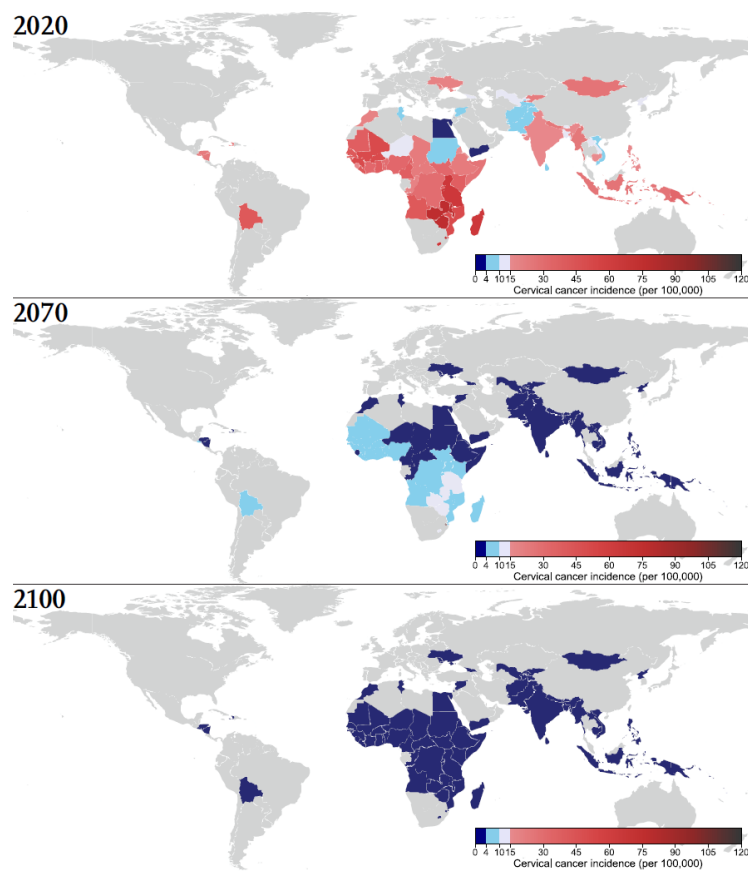
For maximum impact, interventions to meet the three targets must be implemented simultaneously and at scale.

Implementing all three pillars of the strategy will contribute to the immediate and accelerated reduction in mortality rates that result from the treatment of invasive cervical cancers; the decreased incidence rates that gradually occur as a result of wide-scale implementation of population-based screen and treat services; while vaccination against HPV offers protection against cervical cancer for girls and future generations.²⁹

Impact of achieving the 2030 targets on incidence and mortality in high-burden countries

WHO modelled the health and socioeconomic impacts of achieving the 90-70-90 targets by 2030 in 78 LMICs (see Annex 1 for details of the modelling). The current heterogeneity in incidence between countries will lead to ongoing variations in cervical cancer incidence and the timeframe to reach elimination (Figure 6).

Figure 6. Age-standardized cervical cancer incidence rate in 78 LMICs in 2020, 2070 and 2100 after implementation of the elimination strategy



Source: Brisson, Kim, Canfell et al. Cervical cancer in 78 low and lower- middle income countries: comparative modelling of the impact of vaccination and screening. Forthcoming in *The Lancet*.

Achieving the 90-70-90 targets by 2030 would mean that the median cervical cancer incidence rate would fall by 10%, 70% and 90% by 2030, 2045 and 2120, respectively, resulting in 70 million cases averted (Figure 7). Correspondingly, the cumulative number of cervical cancer deaths averted will be approximately 2 million, 4.5 million and 62 million by 2040, 2050 and 2120, respectively (Figure 8). Because high HIV prevalence settings currently have some of the highest cervical cancer rates, greater effort may be needed to achieve elimination in those settings.

Figure 7. Cervical cancer incidence rate and cervical cancer case projections in 78 LMICs, 2020–2120, elimination strategy vs status quo

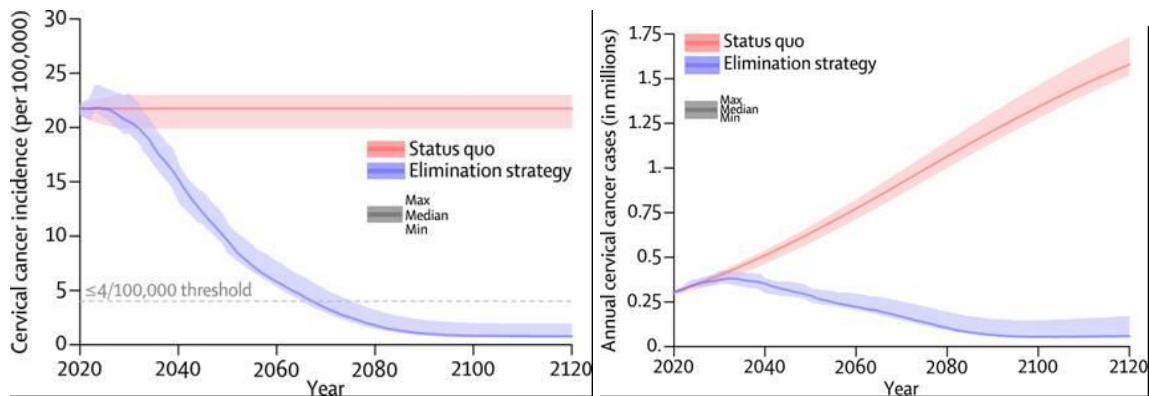
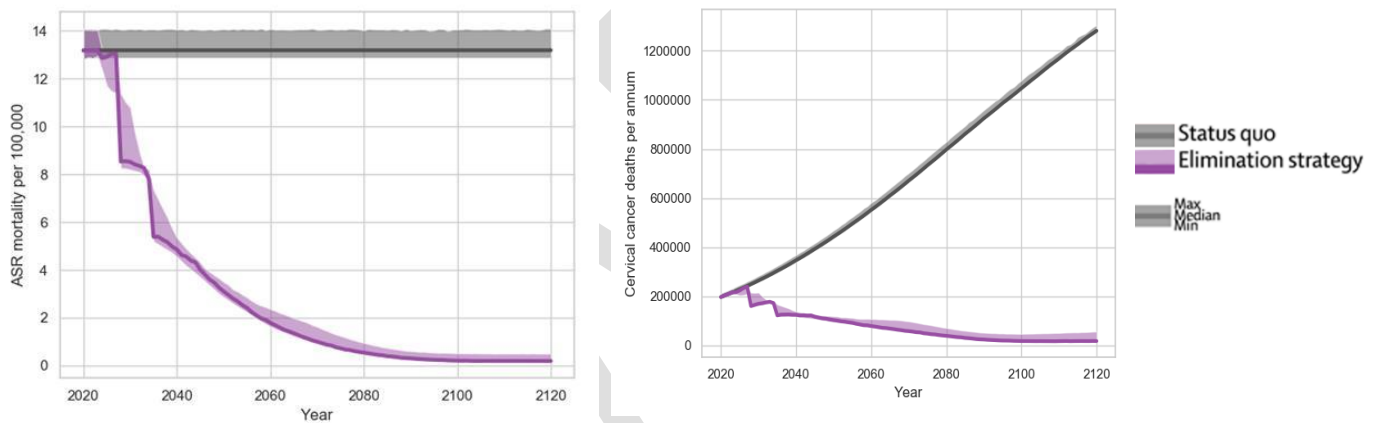


Figure 8. Cervical cancer mortality rate and cervical cancer death projections in 78 LMICs, 2020–2120, elimination strategy vs status quo



The investment case for eliminating cervical cancer in high-burden countries

Investing in the interventions to meet the 90-70-90 targets offers immense economic and societal benefits. An estimated US\$ 3.20 will be returned to the economy for every dollar invested through 2050, owing to increases in women’s workforce participation, rising to US\$ 26.00 when societal benefits are incorporated.³⁰

It is estimated that about 250,000 women will remain productive members of the workforce, adding an estimated US\$ 28 billion to the world’s economy: US\$ 700 million directly through increased workforce participation and almost US\$ 27.3 billion through the indirect socioeconomic benefits of good health. High socioeconomic benefits would accrue if the 78 LMICs achieve the 90-70-90 targets by 2030, by mobilising and spending the estimated US\$ 10.5 billion needed to scale up cervical cancer prevention and treatment interventions between 2018 and 2030.³⁰

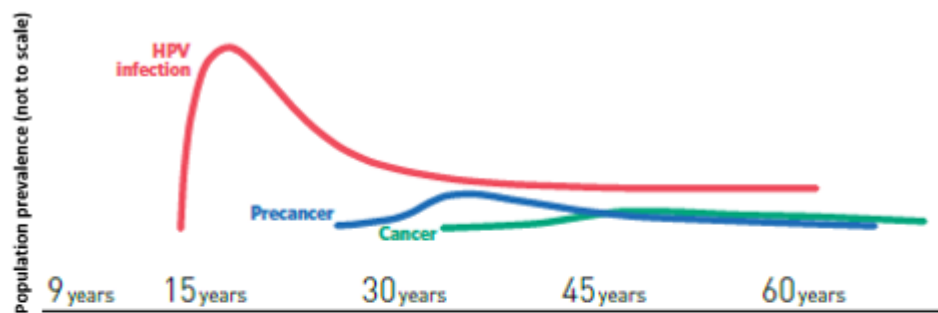
STRATEGIC ACTIONS TO ACHIEVE TARGETS

Strategic actions to achieve the 2030 targets

Strategic actions to achieve the 90-70-90 targets should be pursued within the framework of a national policy to eliminate cervical cancer. Scale-up should be incorporated into countries' national strategic health plans to reach UHC. High-level political commitment and stewardship should drive and guide implementation, supported by collaborative partnerships.

Each of the evidence-based interventions for cervical cancer elimination has its own set of requirements for implementation, and each pose unique challenges. Biomedical and clinical interventions alone will not be sufficient for reaching the targets, as many of the implementation challenges are related to healthcare system weaknesses that commonly plague LMICs where disease burden is the highest. Strategic actions must be customized by each country to take into consideration its unique structural deficiencies, level of readiness to implement, as well as the other barriers to care (e.g., sociocultural, gender, myths and misconceptions about the disease and its prevention and treatment) that drive cervical cancer incidence, morbidity and mortality. Approaches to scaling up interventions in urban settings may differ from those in remote and rural areas. Inequities in health outcomes among vulnerable or underserved populations, including women with HIV, call for tailored approaches.

The global elimination strategy calls for governments to work with the private sector and civil society, and for meaningful engagement with and empowerment of affected populations. Private sector efficiencies in management can be leveraged to improve work flow and output in the public sector. Civil society can advocate for accessible, affordable, acceptable health products and services and can increase awareness of cervical cancer prevention and control within their communities, especially those at high risk for the disease. Cervical cancer survivors can serve as advocates for educating women and girls about the benefits of vaccination, screening and treatment and for overcoming stigma. WHO recommends a life-course approach to a comprehensive strategy for cervical cancer elimination to ensure that lifetime benefits are maintained (Figure 9).



PRIMARY PREVENTION	SECONDARY PREVENTION	TERTIARY PREVENTION
<p>Girls 9-14 years</p> <ul style="list-style-type: none"> • HPV vaccination <p>Girls and boys, as appropriate</p> <ul style="list-style-type: none"> • Health information and warnings about tobacco use • Sexuality education tailored to age & culture • Condom promotion/ provision for those engaged in sexual activity • Male circumcision 	<p>Women >30 years of age</p> <ul style="list-style-type: none"> • Screening with a high-performance test equivalent or better than HPV test • Followed by immediate treatment or as quickly as possible, of pre-cancer lesions 	<p>All women as needed</p> <p>Treatment of invasive cancer at any age</p> <ul style="list-style-type: none"> • Surgery • Radiotherapy • Chemotherapy • Palliative care

Figure 9. The life-course approach to cervical cancer interventions

Primary prevention: HPV vaccination

Vaccination of adolescent girls is the most effective long-term intervention for reducing the risk of developing cervical cancer. Current WHO guidelines recommend two vaccine doses for young adolescent girls between 9 and 14 years of age. The high long-term benefit of HPV vaccination makes it important to initiate and sustain this approach in all countries. Data suggesting protection after a single dose have led to trials that will provide evidence for future schedule optimization.^{31,32} There is also evidence that HPV vaccination leads to herd immunity protection in unvaccinated individuals, further enhancing protective effect for the community.

HPV vaccine coverage is inequitably distributed across geography and income with higher income countries achieving higher vaccine coverage. High vaccine prices coupled with recent supply challenges,³³ have significantly constrained the ability of many countries to introduce the HPV vaccine into national immunization programmes and to ensure sustainability of current programmes. To ensure high levels of acceptance and sustained coverage, the introduction of HPV vaccination programmes must be accompanied by strong communication strategies for advocacy and social mobilization to affirm the efficacy, safety and benefits of the vaccine. Tailored strategies to address the rising anti-vaccine movement are essential.

In addition to HPV vaccination, a comprehensive prevention strategy must include age-appropriate information on sexual and reproductive health, safer sexual practices such as delaying sexual debut, decreasing the number of sexual partners, condom use, male circumcision where appropriate and cessation of tobacco use. Concerted efforts to promote health lifestyles among the youth (boys and girls) are critical for a healthier population for sustainable development.

Strategic actions to achieve 90% coverage of HPV vaccination

Secure sufficient and affordable HPV vaccines. A concerted effort will be needed between partners and the private sector to overcome vaccine supply constraints. Additionally, through appropriate market-shaping interventions, more affordable prices can be achieved while still ensuring a healthy HPV vaccines market.

Increase the quality and coverage of vaccination. Increasing the coverage of HPV vaccination will require efficient and sustainable multisectoral delivery platforms (such as school immunization programmes) and innovative community-based approaches to reach vulnerable populations (such as adolescent girls who are not in school). Monitoring systems or registers should track and improve coverage and quality.

Improve communication and social mobilization. As HPV vaccination programmes are introduced and expanded, they will need nationwide, evidence-based communication and social mobilization efforts. Understanding the social, cultural, societal and other barriers that may affect the acceptance and uptake of the vaccine will be critical. Some communities will need extra engagement to overcome vaccine hesitancy and counter misinformation.

Innovation to improve efficiency of vaccine delivery. National guidelines, policies and strategies should be updated as new evidence and innovations become available on better and more efficient approaches to HPV vaccination.

Secondary prevention: screening and treating precancerous lesions

The principal goal of secondary prevention is to reduce cervical cancer incidence and mortality by identifying and treating women with precancerous lesions. Cytology-based screening has been successfully used to achieve these goals when implemented as part of national programmes with high coverage and in settings where resources exist for patient follow up, additional diagnostic tests (colposcopy, pathology), and disease management. In LMICs cytology-based programmes have been difficult to implement, and where they have been implemented screening coverage is low. Visual inspection of the cervix with acetic acid (VIA), followed by treatment (screen and treat), is an alternative approach to secondary prevention in resource-constrained settings.

HPV testing also offers superior specificity and its strong negative predictive value means women who test negative only need to be re-tested after a minimum interval of five years. Providing women with the option of self-sampling contributes to acceptability and facilitates access. Existing technological platforms that are being used in countries to test for HIV, TB and other infections can also be used for HPV testing, enabling rapid scale up. Because of its high level of performance countries should ideally transition to HPV testing as the primary method of screening for cervical cancer. Evidenced-based strategies for the evaluation and management of women who test HPV positive are available.

Cervical cancer screening will require a matching increase in capacity for treatment of the detected lesions, as screening women without access to treatment is unethical. WHO treatment guidelines were recently expanded to include thermal ablation as a therapeutic modality for women who have precancerous lesions eligible for ablation.³⁴

Market-shaping initiatives to secure affordable high-quality diagnostics and related supplies will be prioritized. Research on artificial intelligence-based diagnostic technology and simple hand-held devices for ablative therapy offer immense opportunities and move the world closer to the vision of cervical cancer elimination.³⁵

Strategic actions to achieve 70% coverage for screening and 90% treatment of precancerous lesions

Understand barriers to accessing services and create an enabling environment: A robust understanding of the social, cultural, societal and structural barriers to the uptake of services is critical. Such knowledge will inform the development of context-specific and culturally appropriate demand-creation strategies as well the design of acceptable, accessible service delivery platforms. Local communities, especially women, must be engaged and empowered to lead the development of these critical programmes, serve as allies, counter misinformation or stigma and support those needing more complex treatment. Increasing health literacy, knowledge of rights and cervical cancer prevention and control will help to mobilize, empower and engage communities and civil society, and women in their diversity.

Integrate screening and treatment services into the primary care package. Services integrated into existing sexual and reproductive health services, HIV care and treatment clinics, ante-natal care, well-women clinics and school-based health outreach are points of entry for reaching women and girls. People-centred referral mechanisms should minimize inconvenience to patients and reduce opportunity costs.

Promote a screen-and-treat approach. Countries will need to expand the number of facilities where a single-visit screen-and-treat approach could be implemented. Single-visit screen-and-treat approaches will not be feasible everywhere; however, it should be promoted and implemented as appropriate.

Ensure an affordable supply of quality-assured high-performance screening tests and treatment devices. Prompt registration and market shaping for cervical cancer diagnostics and treatment devices will lead to improved access and affordability. WHO will strengthen prequalification capacity, as appropriate, to remain abreast of emerging technologies. Post-market surveillance for all medical devices, including in vitro diagnostics, will ensure that safety monitoring is in place as programmes scale up.

Strengthen laboratory capacity and Quality Assurance (QA) programmes. Efficient, integrated networks of laboratory services will maximize the impact of limited human and financial resources. Strong QA programmes are critical to ensure that services meet the requisite standards. Training and supervision must be an integral component of service delivery.

Invasive cancer treatment and palliative care

Timely assessment and referral of women with suspected or confirmed cervical cancer are crucial for saving lives and preventing disability. Comprehensive management of invasive cervical cancer requires well-equipped, appropriately qualified health providers and access to surgical, radiotherapy and chemotherapy services.

Management of each case follows staging of the disease. The International Federation of Gynaecology and Obstetrics (FIGO)³⁶ and TNM³⁷ staging guidelines are available and treatment is based on adequate staging. Early stage cervical cancer is highly treatable, by surgery and/or radiotherapy, which can result in long-term survival and/or cure.³⁸ The five-year survival rate for early stage cancer is more than 80% in countries where timely diagnosis and high-quality treatment are available. Surgery and radiotherapy, with or without chemotherapy, are among the cost-effective interventions WHO recommends for early-stage cervical cancer.³⁹ Even some locally advanced cervical cancers are curable with high-quality radiotherapy and chemotherapy.⁴⁰

Palliative care should be integrated into the treatment plan and provided throughout the course of the disease.⁴¹ In addition to managing pain and other distressing symptoms, palliative care should encompass psychosocial and spiritual care for women and their families. Currently, very few LMICs have palliative programmes in place. Countries are encouraged to expand the availability of palliative services, which could readily be extended to other forms of advanced cancers and to non-malignant debilitating disease.

Strategic actions to achieve 90% treatment and care for cervical cancer cases

Implement cervical cancer management guidelines. Developing and implementing national cervical cancer management guidelines, adapted to the national context, is key to ensuring high-quality care.⁴²

Establish referral pathways and people-centred linkages throughout the continuum of care. Streamlining care pathways and referral networks linking all levels of care will ensure timely management of patients.

Strengthen pathology services. Access to high-quality pathology services is crucial for management of invasive cancer. The development of regional pathology centres, making use of affordable telepathology platforms, is possible for countries without the capacity to interpret samples. Where telepathology networks are already being used for complex cases, they could be used for routine ones.⁴³

Expand surgical capacity. Cervical cancer can often be cured by surgery alone, if diagnosed and treated in its early stages. However, of the cancer patients who live in the world's poorest countries, less than 5% have access to safe, effective and timely cancer surgery.⁴⁴ In HICs the predominant model of postgraduate surgical oncology education consists of multi-year specialty training within accredited programmes, supported by experienced board-certified oncologic surgeons and a sophisticated, highly functional surgical infrastructure, i.e., readily available anaesthetic services, intensive care units, ubiquitous blood banking, and modern

laboratory platforms. In most LMICs the healthcare providers performing oncologic procedures are generalists (general surgeons, gynaecologists, general practitioners, medical officers) without formal, certified subspecialty training, who provide cancer care out of necessity. Novel attempts to scale surgical capacity in these environments using focused, competency-based training⁴⁵ and North-South twinning partnerships have met with success and should be expanded.

Improve access to radiotherapy and chemotherapy. Most cancers in LMICs present at stages that require radiation, so sustainable capacity for curative radiation therapy (external beam and brachytherapy) is critical.

Strengthen and integrate palliative care services. Treatment plans should incorporate not only end-of-life care and pain relief for patients but also psychological support, family support and other services from the outset. Where possible, home-based models of palliative care should be integrated into primary health care.

Optimize health workforce competencies throughout the continuum of care. A strategy for long-term national health workforce education and training, recruitment and retention is key to ensuring sustainable multidisciplinary team-based care. The WHO Global Strategy on Human Resources for Health: Workforce 2030⁴⁶ provides a blueprint for countries to address workforce challenges. In addition, a wide range of Regional Observatories on Human Resources in Health Systems provide valuable resources for planning and policy development. More options include twinning programmes, regional training hubs located in centres of excellence, tele-mentoring,⁴⁷ e-learning,⁴⁸ mobile learning, and low-cost virtual reality surgical simulation.⁴⁹ Remote training may be appropriate for areas such as surgery, radiology, pathology and patient consultation.

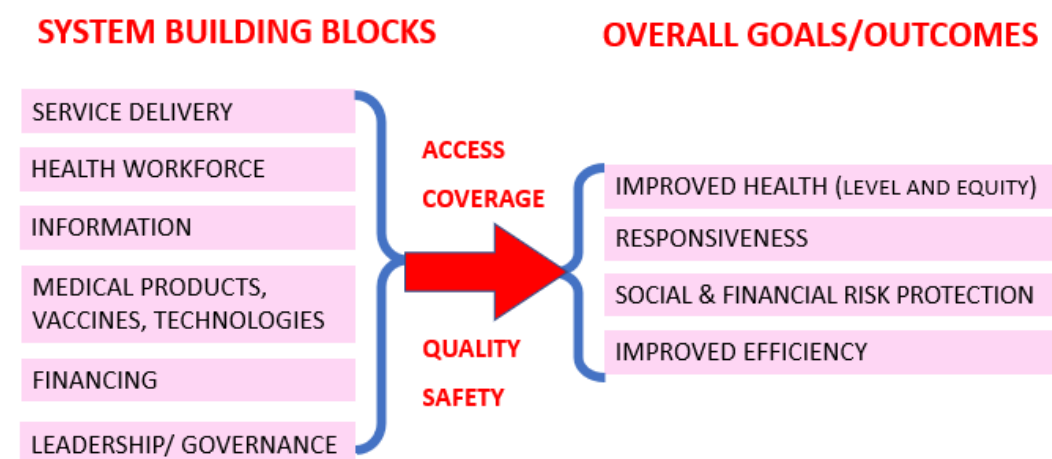
Reduce cancer stigma. Patient awareness, health literacy and education initiatives, especially through survivor groups, contribute to addressing stigma associated with cancer. Such programmes are best developed locally, tailored to the sociocultural context of affected communities and engaging sexual and reproductive health and rights advocates.

THE HEALTH SYSTEM ENABLERS

Strengthening the health system enablers

A primary health care (PHC) approach is the most effective way to sustainably solve today's health and health system challenges and is fundamental to achieving the shared global goals of UHC and the health-related SDGs. There is a renewed commitment to PHC as the pathway for all countries working towards UHC. The Global Conference on Primary Health Care in October 2018⁵⁰ and the High-Level Meeting on UHC at the UN General Assembly in September 2019 reaffirmed the world's commitments expressed in the Declaration of Alma-Ata of 1978 and the 2030 Agenda for Sustainable Development.

The WHO Health System



Cervical cancer programmes should be situated within a holistic health systems approach that is people-centric and responsive to the needs of women across the life course. While primary care should remain the preferred entry point for cervical cancer prevention interventions, service structures need to accommodate women presenting at any point in the system. Such efforts should be mutually reinforcing and facilitate the integration of cervical cancer services with other specific programmes. For example, within the health sector, interventions should transcend common dividing lines – between immunization programmes, adolescent health services, HIV and sexual and reproductive health services, communicable diseases and noncommunicable diseases, including cancer prevention and control.

Priority actions to strengthen health systems

Reinforce PHC oriented models of care: Country programmes should reinforce the drive towards models of care that promote high-quality people-centred primary care throughout the life course.

Invest in the primary health care workforce: Sufficient health workforce with optimal skills mix who are competent and equitably distributed can support the delivery of new cervical cancer prevention and treatment as well as palliative services.

Improved access to medicines and other health product: Availability and affordability of appropriate, safe, effective, quality medicines and other health products, are central to the elimination targets.

Engagement with private-sector providers: Sound partnerships between public- and private-sector providers for the delivery of integrated health services are required to ensure depth of coverage and affordable access to all.

Universal health coverage and protection from catastrophic costs: Cervical cancer programmes must be fully integrated into UHC. Sustainable financing should be secured through domestic resource mobilization, efficiencies in the health system and ensuring user fees are not imposed on the poorest, thereby safeguarding their financial protection. Health financing and protection systems, and care delivered closer to where women live and work, are core to achieving elimination.

Innovation and digital technologies for health: Use of digital technologies for health can facilitate access to cervical cancer services, improve effectiveness and efficiency, and promote accountability.

Systems for improving the quality of health care: Systems at the local, subnational and national levels to continuously assess and improve the quality of integrated health services are important.

Data systems, monitoring and evaluation: Monitoring and evaluation through well-functioning health information systems that generate reliable data on progress towards cervical cancer elimination can support improved decision-making and learning by local, national and global actors.

PARTNERSHIPS, ADVOCACY AND COMMUNICATION

Multisectoral collaboration

Multisectoral collaboration is important “for mobilizing and sharing knowledge, expertise, technologies and financial resources to support the achievement of the SDGs in all countries”.⁵¹ Collaborations must allow multiple sectors to agree on and pursue a common vision through maximizing comparative advantages. Strong country leadership for and commitment to inclusive multisectoral collaboration⁵² will enable different arms of government (health, education, finance, labour) to work closely with women, communities, civil society, young people, the media, the private sector, development partners, health professional associations, patients’ groups and other stakeholders to achieve cervical cancer targets. Inclusive and strategic national, regional and global partnerships that extend beyond the health sector are needed to ensure the promotion of health and protection of human rights of women and girls.

At the regional level, North–South and South–South partnerships can be forged for knowledge exchange and skills building. Existing partnerships must be nurtured and strengthened. Civil society representation and partnership should be ensured in collaborative forums. The Global Action Plan for Healthy Lives and Wellbeing for All provides a sound platform to support country-led implementation of strategies to achieve SDG 3 and other health-related SDG targets.⁵³

Advocacy and communication

Successful implementation of this strategy depends on effective advocacy and communication. That includes helping secure political commitment and financing, mobilize communities, make information available about vaccine safety, address vaccine hesitancy, reduce stigma and increase the uptake of all interventions relating to cervical cancer prevention and care.

Comprehensive, robust and proactive advocacy and communications strategies can overcome the many challenges that impede access to and use of cervical cancer prevention and care. Such strategies should reflect national policy and be culturally appropriate and integrated in all levels of the health system.

Strategic use of social media platforms and other communication approaches should be deployed to increase access to information. WHO guidance on community mobilization, education and counselling for cervical cancer prevention and treatment⁵⁴ can be used to improve health literacy.

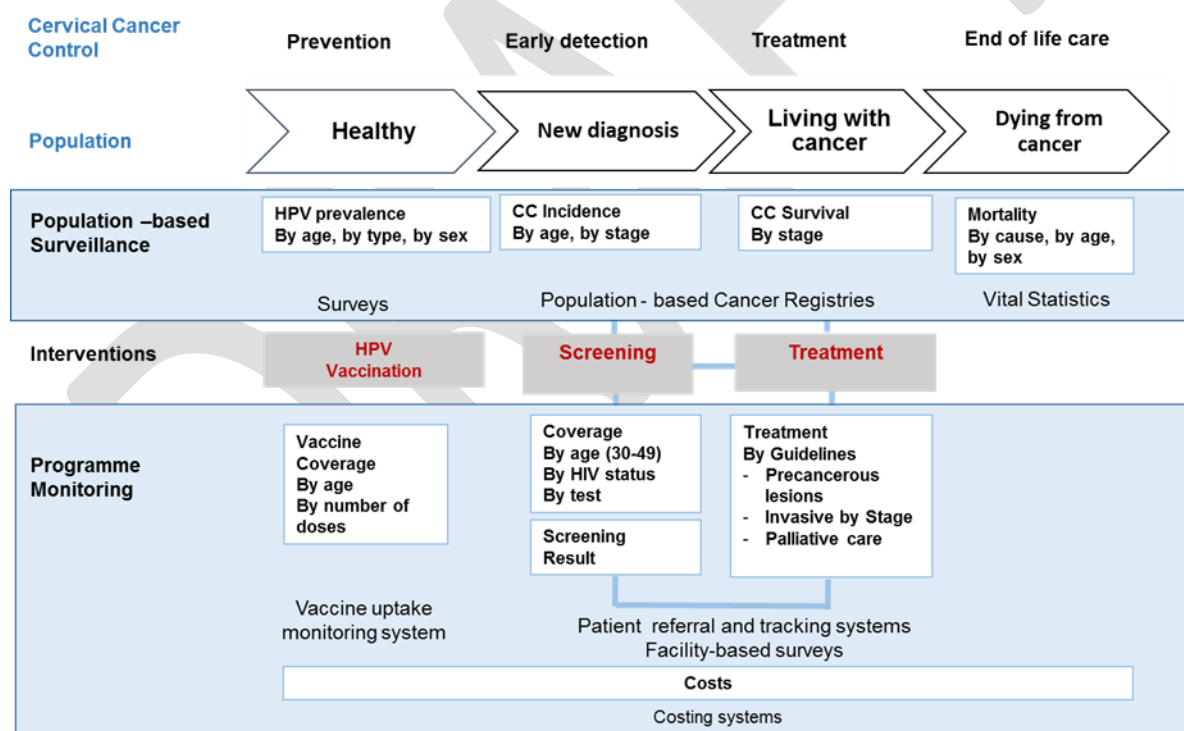
SURVEILLANCE, MONITORING AND EVALUATION

Critical strategies for surveillance and monitoring

The scale-up of cervical cancer prevention activities cannot proceed without the framework and tools to assess and evaluate progress towards cervical cancer elimination. It is fundamental that robust surveillance and monitoring systems are developed at the national or subnational level both to determine the baseline, and to monitor and evaluate the impact of the broad interventions and activities implemented as part of the cervical cancer elimination strategy.

Monitoring and evaluation also enables programme managers to identify the gaps and take specific actions to improve coverage, quality and outcomes. Figure 10 illustrates a framework for data collection and indicator development and the different strategies required to obtain such information, differentiating two major components: Population-based surveillance and Programme Monitoring

Fig 10. Surveillance and monitoring requirements for the elimination initiative



Population-based surveillance

At the population level, three key complementary measures are essential: (1) cervical cancer incidence (new cases of the disease); (2) cervical cancer survival (percentage of patients surviving *n* years after date of diagnosis); (3) mortality (number of cervical cancer deaths). These measures in addition to HPV prevalence (if the means to perform them are in place) are obtained via surveys, population-based cancer registries (PBCR) and vital statistics systems. To

assess whether cervical cancer is a local public health problem in the current year, or in the years ahead, requires an ongoing assessment of the magnitude of the cervical cancer burden using these metrics. The ultimate measure of elimination is the threshold incidence rate of 4 per 100,000 women, based on the incidence data calculated by PBCR.

Population-based cancer registries

PBCR are a continual system of data collection, storage, validation and analysis that permit the dissemination of incidence and survival for each of the major types of cancer, and by stage at diagnosis. They are an essential foundation in planning and evaluating cancer prevention activities, informing the planning of cancer services and benchmarking the effectiveness of cancer care delivery in different regions and countries through comparisons of the survival of cancer patients. As with any other public health surveillance strategy, the recording and reporting of data are undertaken in a standardised way to ensure maximum comparability.⁵⁵

Vital Registration

Cause-of-death data is a key indicator to evaluate cervical cancer mortality in a population. The evolution of cervical cancer mortality trends is relevant to monitor the effectiveness of the screening programmes. In countries where there is no nationwide death registration, governments should prioritize establishing vital registration, beginning in a well-defined geographic area or population. A well-functioning civil registration and vital statistics (CRVS) system registers all births and deaths, issues birth and death certificates, and compiles and disseminates vital statistics, including cause of death information. The number of deaths provides a measure of the outcome or impact of cancer.

Programme monitoring

Monitoring the elimination strategy implementation requires close assessment of the quality and coverage of the different prevention interventions. Vaccination coverage, screening coverage, quality of screening and diagnostic services and the extent of timely and effective treatment modalities will help monitor the effectiveness of programmes in achieving a reduction in the disease burden.

As illustrated in Figure 10, cervical cancer prevention programs present unique monitoring and evaluation challenges. Information systems need to span primary through to tertiary prevention measures, which require the recording and tracking of data on individual women across multiple touchpoints in the continuum of care. Countries are encouraged to use this monitoring and surveillance framework according to the recommended set of processes and outcome indicators. Overall, WHO recommends monitoring the following key indicators.⁵⁶

Performance indicators

- HPV vaccination coverage disaggregated by age at vaccination and the number of doses.
- Screening rate of the target population (women aged 30–49 years): Percentage of women aged 30–49 years who have been screened for the first time in the previous 12-month period.

- Positivity rate: Percentage of screened women aged 30–49 years with a positive screening test result in the previous 12-month period.
- Treatment rate: Percentage of screening test-positive women receiving treatment in the previous 12-month period.

Result indicator

- Coverage rate indicator: Percentage of women aged 30–49 years who have been screened with a high-performance test at least once between the ages of 30 and 49 years, and the percentage screened at least twice.

Impact indicator

- Cervical cancer age-specific incidence.
- Cervical cancer age-specific mortality

Strategic actions for Monitoring and Evaluation

Strengthen governance and accountability of cervical cancer related programmes and conduct regular reviews to help ensure that national strategies, plans, and resource allocations reflect actual country needs.

Set country-specific targets, milestones, and indicators for monitoring and evaluating the National Cervical Cancer Elimination Programme. This data should be used to regularly report on the impact of the various interventions being carried out in country and adjust program interventions as necessary.

Develop or improve population-based cancer registries to inform National Cervical Cancer Elimination Programmes and help track progress towards the goal of elimination.

Track patients throughout the continuum of services to ensure that women and girls in need are being successfully treated.

Work towards disaggregation of data by equity stratifiers to enable detection of differences across population segments and set equity-oriented targets.

Accountability for Impact.

WHO's 13th General Programme of Work (GPW) provides strategic vision for the work of WHO. This strategy covers six biennia. The cross-divisional nature of the strategy will enhance the provision of better aligned support for implementation. The GPW Impact Framework will strengthen accountability for impact.

WHO will work closely with its Member States to bring together different constituencies, sectors, relevant organisations and local implementing partners to ensure alignment and coordinated support. The Secretariat will continue to work closely with key partners including:

Multilateral and bilateral development agencies, foundations, philanthropies, civil society, private sector, the research community, academia, health professional associations and a wide range of non-State actors in official relations with WHO. Efforts to establish new, strategic and innovative partnerships to support and sustain implementation will be undertaken. Transparent accountability mechanisms will be put in place to bolster momentum and uphold responsibility.

Implementation will focus on strengthening existing programmes, closer collaboration with partners and UN agencies currently providing technical assistance for prevention, screening and treatment and management of cervical cancer.

Implementation

Once the strategy is endorsed by the World Health Assembly, the WHO Secretariat will support the development of monitoring and implementation frameworks.

Annex 1. Costing, financing and investment case

Estimating the economic impacts and implications of an accelerated strategy will help clarify the benefits and global investments required.

Costing national cervical cancer prevention and elimination plans

To bring LMICs on the pathway towards cervical cancer elimination, financial resources need to be frontloaded. An initial investment between 2020 and 2030 is necessary to start bending the incidence curves downward for cervical cancer. To mobilize resources to reach the 90-70-90 targets, WHO has in several countries assisted ministries of health to generate national costing plans for scaling up HPV vaccination, screening cervical cancer, treating precancer and managing invasive cervical cancer.⁵⁷

The cost projections involved consultation with and validation from multiple stakeholders, including members from academia, civil society, development partners and UN partners. They estimate the total cost of scaling up national plans by activity as well as the per service and per capita costs.

The cost of scaling up the interventions varies by country and depends on specific attributes, such as the existing health system infrastructure, the demographic and epidemiologic characteristics and the coverage goals in each country's national cervical cancer plan. Once completed, the cost projections can be to plan and operationalize a national cervical cancer prevention and elimination programme tailored to country needs. WHO will leverage these initial detailed costing case studies to develop global guidance for countries' resource mobilization efforts.

Global cost-effectiveness of elimination strategies

The WHO NCD Action Plan provides guidance on the cost-effectiveness of interventions to prevent and control NCDs.⁵⁸ HPV vaccination and cervical cancer screening and treatment were identified as best buys and thus already form part of WHO's recommended list of interventions for country implementation. To identify the value for money of different intervention scenarios, additional global cost-effectiveness analyses have been conducted for elimination trajectories.

Impact modelling has demonstrated that global elimination is possible within the next century, and the number of cervical cancer cases prevented can be substantial in the 78 low- and lower-middle-income countries studied (Section 2). But since countries face budget constraints, WHO assessed cost-effectiveness and resource use, building on the impact modelling.

Cost-effectiveness was estimated by comparing the cost, health and economic benefits of various intervention scenarios over time.

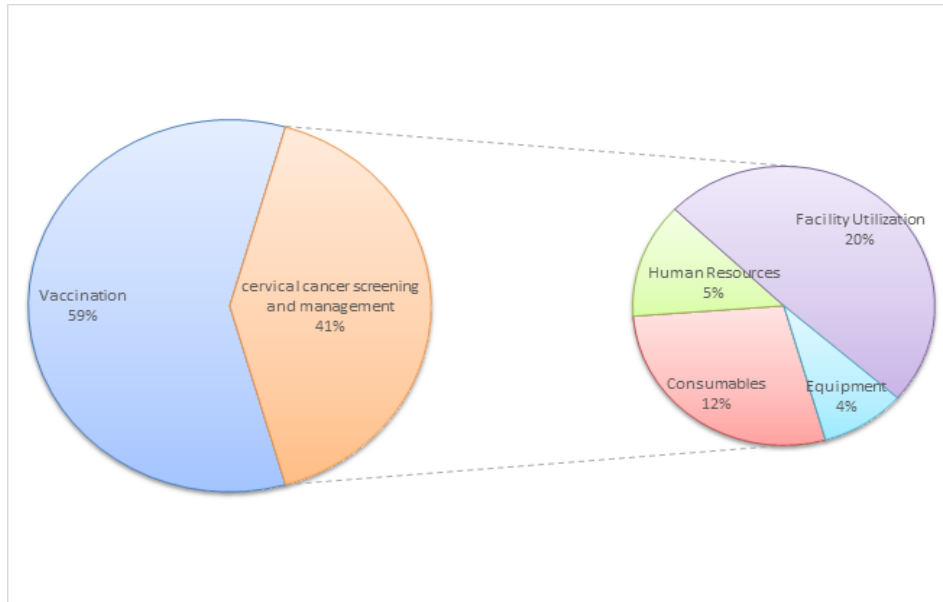
Using cost information to scale up interventions over the next 80 years (2020–2100), the same impact models were used to analyse cost-effectiveness analysis and determine that the 90-70-90 targets are the optimal strategy for eliminating cervical cancer in the 78 low- and middle-income countries. For 74 of those countries (95%), the elimination strategy was found to lead to elimination and be cost-effective over 2020–2120 for at least two of three models.

Investment case for cervical cancer elimination³⁰

Of the total US\$ 10.5 billion financing needs, 59% are for vaccination programmes, with 41% for cancer prevention programmes (Figure A1). By far the greatest need in cancer prevention programmes is related to health system strengthening, dominated by infrastructure needs. Consumables, largely consisting of pharmaceuticals and diagnostics, make up about a quarter

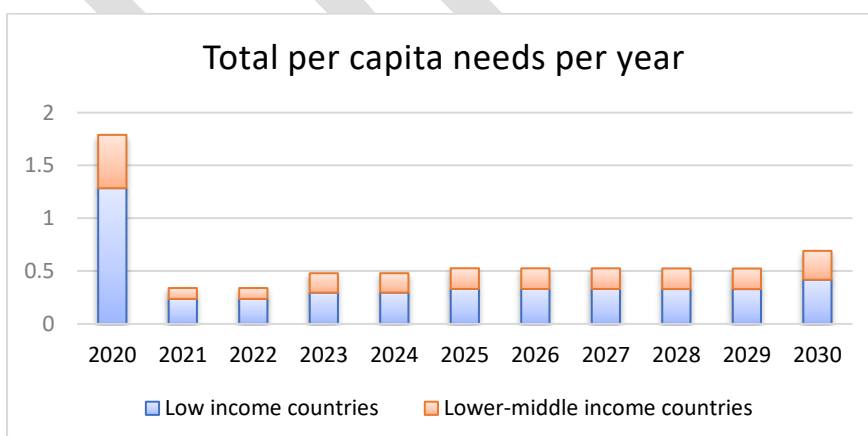
of the cancer prevention programme costs. The cost of care, including medication and pathology testing, should be covered by government expenditure—to ensure that the poorest women can access the services they need and to protect all citizens from the possibility of catastrophic expenditure from having to pay out-of-pocket for expensive treatment.

Figure A1. Breakdown of costs, 2019–2030 (total = US\$ 10.5 billion)



In low-income settings, where locally produced goods have the lowest price, but the current vaccination and treatment coverage is also lowest, an average of US\$ 0.40 per person per year is needed to finance elimination. And in lower-middle income countries US\$ 0.20 per person per year is needed. Dominating these costs is the first implementation year, when a catch-up cohort of 10 to 14-year olds is vaccinated. Costs drop in the second year but increase through 2030, as cancer prevention programme coverage increases, and vaccination costs change with cohort size (Figure A2).

Figure A2. Total annual per capita needs to finance the elimination of cervical cancer, 2020–2030



References:

- ¹ Mailhot et al. Estimating child mortality associated with maternal mortality from breast and cervical cancer. *Cancer*. 2019 Jan 1;125(1):109-117. doi: 10.1002/cncr.31780. Epub 2018 Nov
- ² Political declaration of the high-level meeting on universal health coverage. 2019. Resolution of the UN General Assembly. A/RES/74/2. Available online at: <https://undocs.org/en/A/RES/74/2>. Accessed on 12 Dec 2019
- ³ http://www.who.int/reproductivehealth/DG_Call-to-Action.pdf.
- ⁴ Sexual and reproductive health and rights. Report A/61/338. 2015. The Committee on Economic, Social and Cultural Rights and the Committee on the Elimination of Discrimination against Women (CEDAW), Office of the UN High Commissioner on Human Rights. Available at: <https://www.ohchr.org/EN/Issues/Women/WRGS/Pages/HealthRights.aspx>
- ⁵ UN General Assembly. Transforming our world: the 2030 Agenda for Sustainable Development. 2015. Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E.
- ⁶ WHO. Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020. Geneva: WHO.
- ⁷ A/RES/70/266. Political Declaration on HIV and AIDS: On the Fast Track to Accelerating the Fight against HIV and to Ending the AIDS Epidemic by 2030.
- ⁸ IARC and WHO. GLOBOCAN 2018: Estimated cancer incidence, mortality and prevalence worldwide in 2018. Cervical Cancer Fact Sheet. Available at: <https://gco.iarc.fr/today/data/factsheets/cancers/23-Cervix-Uteri-fact-sheet.pdf>.
- ⁹ IARC. Global Cancer Observatory (GLOBOCAN) 2018 Estimates. Available at: <http://gco.iarc.fr/>.
- ¹⁰ Bray, Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018 Nov;68(6):394-424. doi: 10.3322/caac.21492.
- ¹¹ IARC. Global Cancer Observatory (GLOBOCAN) Cancer Tomorrow 2018 Estimates. Available at: <http://gco.iarc.fr/tomorrow>.
- ¹² Wardak S. Human Papillomavirus (HPV) and cervical cancer. *Medycyna Doswiadczalna i Mikrobiologia*. 2016; 68:73.
- ¹³ de Martel C, Plummer M, Vignat J, Franceschi S. Worldwide burden of cancer attributable to HPV by site, country and HPV type. *Int J Cancer*. 2017;141(4):664–670. doi:10.1002/ijc.30716
- ¹⁴ Stelzle et al. In Review
- ¹⁵ Abraham A, D'Souza G, Jing Y, et al. Invasive cervical cancer risk among HIV-infected women: A North American multicohort collaboration prospective study. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2013; 62(4):405–413. Available at: <https://insights.ovid.com/jaids-acquired-immune-deficiency-syndromes/jaids/2013/04/010/invasive-cervical-cancer-risk-among-hiv-infected/6/00126334>.
- ¹⁶ Mohammed D, Shukla P, Babayants Y, Sison R, Slim J. Increased proportions of HIV-infected women met cervical cancer screening guideline in 2016. *Int J Womens Health*. 2018; 10: 83–87. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5818846/>.
- ¹⁷ Bruni L. Global vaccine uptake and projected cervical cancer disease reductions. *HPV World*. 2018; 1(24). https://www.hpvworld.com/media/29/media_section/4/1/441/18.pdf.
- ¹⁸ WHO. Assessing national capacity for the prevention and control of noncommunicable diseases: Report of the 2017 Global Survey. Geneva: WHO; 2017.
- ¹⁹ Simms KT, Steinberg J, Caruana M, Smith MA, Lew JB, Soerjomataram I, et al. Impact of scaled up human papillomavirus vaccination and cervical screening and the potential for global elimination of cervical cancer in 181 countries, 2020–99: a modelling study. *The Lancet Oncology*. 2019; 20(3):394–407.
- ²⁰ Gatta G, Capocaccia R, Botta L, Mallone S, De Angelis R, Ardanaz E, et al. Burden and centralised treatment in Europe of rare tumours: results of RARECAREnet—a population-based study. *The Lancet Oncology*. 2017; 18(8):1022–1039.

-
- ²¹ The core public health functions involve assessing and monitoring the health of specific most-affected populations to identify health threats and priorities, formulating public policies to solve identified health problems and priorities, ensuring that all populations have access to appropriate and cost-effective care and evaluating the effectiveness of that care.
- ²² WHO Bulletin. A life-course approach to health: Synergy with sustainable development goals. 2017. Available at: <http://dx.doi.org/10.2471/BLT.17.198358>.
- ²³ WHO Framework on integrated people-centred health services. Available at: <http://www.who.int/servicedeliverysafety/areas/people-centred-care/en/>.
- ²⁴ Brisson, Canfell, Kim et al. In Publication
- ²⁵ Canfell, Kim, Brisson et al. Mortality reductions and lives saved on the path to eliminating cervical cancer in 78 low and lower- middle income countries: comparative modeling of impact of achieving WHO targets for scaling up vaccination, cervical cancer screening and cancer treatment services. Forthcoming in *The Lancet*.
- ²⁶ In accordance with the latest recommendations.
- ²⁷ A high-performance test refers to a test which would have performance characteristics similar to or better than a HPV test. In future, however, new technologies may become available.
- ²⁸ Comprehensive cervical cancer control. A guide to essential practice. Chapter 3. 2014. WHO. Available at: https://apps.who.int/iris/bitstream/handle/10665/144785/9789241548953_eng.pdf;jsessionid=FA0F96A503CFCD640DB469C813969CD6?sequence=1.
- ²⁹ Vorsters A, Arbyn M, Baay M, Bosch X, de Sanjose S, Hanley S, et al. Overcoming barriers in HPV vaccination and screening programs. *Papillomavirus Res.* 2017 Dec; 4:45–53.
- ³⁰ Bertram et al. The investment case of the cervical cancer elimination strategy in low and lower-middle income countries. In publication
- ³¹ Brotherton JM, Budd A, Rompotis C, Bartlett N, Malloy NJ, Andersen RL, et al. Is one dose of human papillomavirus vaccine as effective as three? A national cohort analysis. *Papillomavirus Res.* 2019 Jul;8:100177.
- ³² Stanley M, Dull P. HPV single-dose vaccination: Impact potential, evidence base and further evaluation. *Vaccine.* 2018 Aug 6;36(32 Pt A):4759-4760.
- ³³ WHO. MI4A Global HPV Vaccine Market Study. Geneva: WHO; 2018. Available at: https://www.who.int/immunization/programmes_systems/procurement/v3p/platform/module2/WHO_HP_Vaccine_market_study_public_summary.pdf.
- ³⁴ World Health Organization. (2019). WHO guidelines for the use of thermal ablation for cervical pre-cancer lesions. World Health Organization. <https://apps.who.int/iris/handle/10665/329299>. License: CC BY-NC-SA 3.0 IGO
- ³⁵ For more information on the pipeline of technologies, see Unitaid, “Screening and Treatment of Pre-Cancerous Lesions for Secondary Prevention of Cervical Cancer: Technology Landscape.” May 2019. Available at https://unitaid.org/assets/Cervical_Cancer_Technology-landscape-2019.pdf.
- ³⁶ Bhatla, N., Berek, J.S., Cuello Fredes, M., Denny, L.A., Grenman, S., Karunaratne, K., Kehoe, S.T., Konishi, I., Olawaiye, A.B., Prat, J. and Sankaranarayanan, R. (2019), Revised FIGO staging for carcinoma of the cervix uteri. *Int J Gynecol Obstet*, 145: 129-135. doi:10.1002/ijgo.12749
- ³⁷ Histopathology of the uterine cervix - digital atlas. Classification TNM/FIGO. IARC. 2019. Available at the site: <https://screening.iarc.fr/atlasclassiftnm.php>
- ³⁸ Cohen, Cervical cancer. *Lancet.* 2019 Jan 12;393(10167):169-182. Doi: 10.1016/S0140-6736(18)32470-X
- ³⁹ Cohen PA, Jhingran A, Oaknin A, Denny L. Cervical cancer. *Lancet.* 2019 Jan 12;393(10167):169–182.
- ⁴⁰ Eifel. Pelvic irradiation with concurrent chemotherapy versus pelvic and para-aortic irradiation for high-risk cervical cancer: An update of Radiation Therapy Oncology Group Trial (RTOG) 90-01. *Journal of Clinical Oncology.* 2004; 22(5):872–880.
- ⁴¹ Palliative care. In *Comprehensive Cervical Cancer Control: A Guide to Essential Practice.* 2nd edition. 2014. Geneva, World Health Organization.

-
- ⁴² Chuang LT, Feldman S, Nakisige C, Temin S, Berek JS. Management and Care of Women With Invasive Cervical Cancer: ASCO Resource-Stratified Clinical Practice Guideline. *J Clin Oncol*. 2016;34(27):3354-3355. doi: 3310.1200/JCO.2016.3368.3789. Epub 2016 Jul 3355.
- ⁴³ Montgomery ND, Tomoka T, Krysiak R, Powers E, Mulenga M, Kampani C, Chimzimu F, Owino MK, Dhungel BM, Gopal S, Fedoriw Y. Practical Successes in Telepathology Experiences in Africa. *Clin Lab Med*. 2018 Mar;38(1):141-150. doi: 10.1016/j.cll.2017.10.011. Epub 2017 Dec 6. Review
- ⁴⁴ Sullivan R., Alatisse O., Anderson B., Audicio R., Autier P. Delivering safe and affordable cancer surgery to all. The lancet oncology commission on global cancer surgery. *Lancet Oncol*. 2015 Sep;16(11):1193–1224.
- ⁴⁵ Changule D, Rangeiro R, Daud S, et al IGCS gynecology oncology global curriculum and mentorship program in Mozambique: challenges and results of an overseas surgical training program *International Journal of Gynecologic Cancer* 2019;29:A41
- ⁴⁶ Global strategy on human resources for health: workforce 2030. 2016. World Health Organization. ISBN 9789241511131. Available at: https://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf?ua=1. Accessed on 12 Dec 2019
- ⁴⁷ Moretti Marques R, Salcedo MP, Callegaro Filho D, *et al* Telementoring in gynecologic oncology training: changing lives in Mozambique. *International Journal of Gynecologic Cancer*. Published Online First: 17 July 2019. doi: 10.1136/ijgc-2019-000653
- ⁴⁸ Connecting frontline providers in Africa with distant experts to improve patients' outcomes through Project ECHO: a successful experience in Cameroon. Fokom Domgue J, Baker E, Manjuh F, Lopez M, Welty T, Schmeler KM; Cameroon Cervical Cancer Prevention ECHO collaborative group. *Int J Gynecol Cancer*. 2019 May 21.
- ⁴⁹ Using Low-Cost Virtual Reality Simulation to Build Surgical Capacity for Cervical Cancer Treatment. Bing EG, Parham GP, Cuevas A, Fisher B, Skinner J, Mwanahamuntu M, Sullivan R. *J Glob Oncol*. 2019 May;5:1-7.
- ⁵⁰ World Health Organization and the United Nations Children's Fund (UNICEF), 2018. Declaration of Astana, Global conference on primary health care. Available at: <https://www.who.int/docs/default-source/primary-health/declaration/gcphc-declaration.pdf>. Accessed: Nov 2019
- ⁵¹ UNDESA. Partnerships for the Sustainable Development Goals. New York: United Nations; 2015.
- ⁵² Graham Wendy J, Kuruvilla Shyama, Hinton Rachael, Veitch Emma, Simpson Paul J. Multisectoral collaboration for health and sustainable development *BMJ* 2018; 363 :k4868
- ⁵³ WHO. Stronger collaboration, better health: global action plan for healthy lives and well-being for all. Strengthening collaboration among multilateral organizations to accelerate country progress on the health-related Sustainable Development Goals. Geneva: WHO; 2019.
- ⁵⁴ WHO. Comprehensive cervical cancer control. A guide to essential practice. Chapter 3. Geneva: WHO; 2014. Available at: https://apps.who.int/iris/bitstream/handle/10665/144785/9789241548953_eng.pdf;jsessionid=FA0F96A503CFCD640DB469C813969CD6?sequence=1.
- ⁵⁵ International Association of Cancer Registries (IACR, <http://www.iacr.com.fr>)
- ⁵⁶ Improving data for decision-making: a toolkit for cervical cancer prevention and control programmes. 2019. World Health Organization, United States Centers for Disease Control and Prevention, CDC Foundation, George W. Bush Institute
- ⁵⁷ WHO Cervical Cancer Prevention and Control Costing (C4P) tool - https://www.who.int/immunization/diseases/hpv/cervical_cancer_costing_tool/en/
- ⁵⁸ Global action plan for the prevention and control of noncommunicable diseases 2013-2020. WHO. 2013