



Public health concern-driven insights and response of low- and middle-income nations to the World health Organization call for cervical cancer risk eradication

Sejuti Reza ^{a,1}, Ramisa Anjum ^a, Rubaiyat Zahan Khandoker ^b, Saimur Rahman Khan ^a,
Md. Rabiul Islam ^{c,2}, Syed Masudur Rahman Dewan ^{d,3,*}

^a Department of Pharmacy, School of Medicine, University of Asia Pacific, Green Road, Dhaka 1205, Bangladesh

^b Department of Pharmaceutical Sciences, North South University, Bashundhara, Dhaka 1229, Bangladesh

^c School of Pharmacy, BRAC University, Merul Badda, Dhaka 1212, Bangladesh

^d Department of Pharmacy, School of Life Sciences, United International University, United City, Madani Avenue, Badda, Dhaka 1212, Bangladesh

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ABSTRACT

The heart shattering impact afflicted by the notorious cervical cancer is rising rapidly as it emerges as the second most prevalent cancer among women in the developing countries. There was an anticipated 604,127 observed reports and 341,831 fatalities reported worldwide in 2020. The mortality rate was 7.2 deaths per 100,000 women-years, while the age-standardized incidence rate was 13.3 cases per 100,000 women annually. In less developed countries, the accountability was around 87–90% of mortality and roughly 84% of newly diagnosed cases. Resource limitations, inadequate public awareness, and late-stage diagnosis aggravate the complications of cancer mitigation in these regions, compared to the higher income nations. While primary and secondary interventions come off as an enticing solution, international collaborations and the integration of technology also emerge as promising avenues for enhancing cancer care accessibility. This study aims to assess the progress of developing countries in meeting the World Health Organization's mandate to eliminate cervical cancer by scrutinizing the prevalence of cervical cancer incidence and mortality rates, evaluating the impact and execution of HPV vaccination initiatives, and analyzing proposals for cervical cancer eradication within these nations, our objective is to accelerate advancements towards the ultimate goal of eradicating cervical cancer.

1. Background

Cervical cancer (CC) is a notorious form of cancer which initiates at a cellular level within the cervix and develops gradually. Anatomically, the cervix is known as the constricted and lower section of the uterus and is connected to the birth canal (vagina) (National Cancer Institute, 2023).

Among the female population, cervical cancer is the fourth prevalent cancer and stands as the primary cause of female fatalities in developing nations. (Giannella et al., 2022). Annually there are over 500,000 new instances of cervical cancer emergence, causing greater than 250,000 deaths worldwide (Sung et al., 2021). The primary reason behind

cervical cancer occurrence is often a continuous infection of the human papillomavirus (HPV) obtained through sexual contact (Golfetto et al., 2018). Between ninety and one hundred percent of cervical cancer cases in females, particularly those under the age of thirty-five, are attributed to HPV (Bruni et al., 2016).

The World Health Organization (WHO) advocated in 2018 for the global eradication of cervical cancer as a public health issue, as a result of the positive outcomes that were observed in effective prevention and treatment measures (World Health Organization, 2020). The WHO suggests an intermediate 90–70–90 objective, sometimes referred to as the “triple-intervention” method, to accomplish the goal. The strategy mainly focuses on the 90 % vaccination of girls by 15 years of age,

* Corresponding author.

E-mail address: gobeshok.d@gmail.com (S.M.R. Dewan).

¹ ORCID: 0009-0000-5140-875X.

² ORCID: 0000-0003-2820-3144.

³ ORCID: 0000-0003-1443-7150.

screening 70 % of women with a high-performance test by age 35 and again by 45, and curing 90 % of women with cervical illness (World Health Organization, 2020).

The condition poses a significant global public health challenge, especially impacting numerous low-income and middle-income countries (LMICs) (Singh et al., 2023). However, low- and middle-income countries (LMICs) have a far longer timescale for eliminating cervical cancer (Brisson et al., 2020). The present increasing burden of disease is one reason for this extended timeline. LMICs account for more than 80 % of incidences of cervical cancer (Simms et al., 2019), where the death rate from cervical cancer, age-standardized, is at least six times greater than in high-income nations (Vaccarella, Laversanne, Ferlay, & Bray, 2017).

The effectiveness of established therapeutic approaches, like immunization against the most carcinogenic strains of the human papilloma virus (HPV), which is the primary risk factor for cervical cancer, along with screening methods, especially those utilizing HPV-based techniques, renders cervical cancer largely avoidable (Arbyn & Xu, 2018; Bouvard et al., 2021). Out of the 118 million women vaccinated against HPV by 2016, only 1.4 million (1 %) lived in low- and middle-income countries (LMICs) (Bruni et al., 2016). This difference shows that not many people can easily get help to prevent or treat cervical cancer because there are not enough tools, technical knowledge, and resources available (Vaccarella et al., 2017). This study aims to evaluate how well developing countries are doing in responding to the WHO’s call to eradicate cervical cancer by focusing on (1) prevalence of cervical cancer incidence and mortality rates within developing countries, and (2) impact and implementation of HPV vaccination programs, and (3) consideration of proposals in the developing countries to eradicate cervical cancer. The goal is to speed up progress towards getting rid of cervical cancer.

2. Impact of cervical cancer on developing countries

A predicted 604 127 case of cervical cancer and 341 831 fatalities

have been recorded internationally during 2020; the age-standardized incidence was 13.3 cases per 100,000 women-years and the rate of death was 7.2 deaths per 100,000 women-years (Singh et al., 2023).

Cervical cancer is most prevalent and deadly in low- and middle-income countries. These traits, which characterize the majority of developing countries, have led to the identification of a relationship between the occurrence of cervical cancer and the socioeconomic status of a country and its people. Cervical cancer incidence is significantly influenced by geographic location; the greatest incidence rates are found in low-income nations (Swanson et al., 2018). In the year 2024, countries are grouped based on how much money each person makes on average. If a country’s average income per person is \$1,135 or less, it’s considered a low-income country. If the average income is between \$1,136 and \$4,465, it is a lower middle-income country (The World Bank, 2024).

The new identified cases of cervical cancer vary in range within different countries in the lower-middle income economies, with an age-standardized incidence rates (ASIR) ranging as high as 84.5/100000 in Eswatini (84.5), to over 50/100000 in Zambia (65.5), Tanzania (62.5), Zimbabwe (61.7), Lesotho (56.8), Comoros (56), Guinea (50.1) to ASIR less than 5/100000 in Tunisia (4.6), Lebanon (3.4), Egypt, Arab Rep. (2.9), Jordan (2.9), Iran (2.3) (Fig. 1; Table 1).

The death rates vary in range within different countries in the low-income economies of the developing nations with an age-standardized mortality rates (ASMR) ranging over 30/100000 in Malawi (51.5), Uganda (41.4), Mozambique(38.7), Burundi (38.5), Gambia (33.9), Liberia (30.8), Guinea-Bissau (30.3) to less than 10/100000 in Korea Democratic People’s Republic (6.5), Niger (8.4), Afghanistan (7.6), Sudan (6.2), Syrian Arab Republic (1.90 and Yemen having the lowest ASMR of 1.8/100000 women-years (Table 2; Fig. 2).

For the creation of a more comprehensive assessment of the impact caused by this illness, we have used the GLOBOCAN estimates (International Agency for Research on Cancer, 2020) and a novel research work from the Lancet Global Health (Singh et al., 2023). We have divided nations in low income and low middle income range, classifying

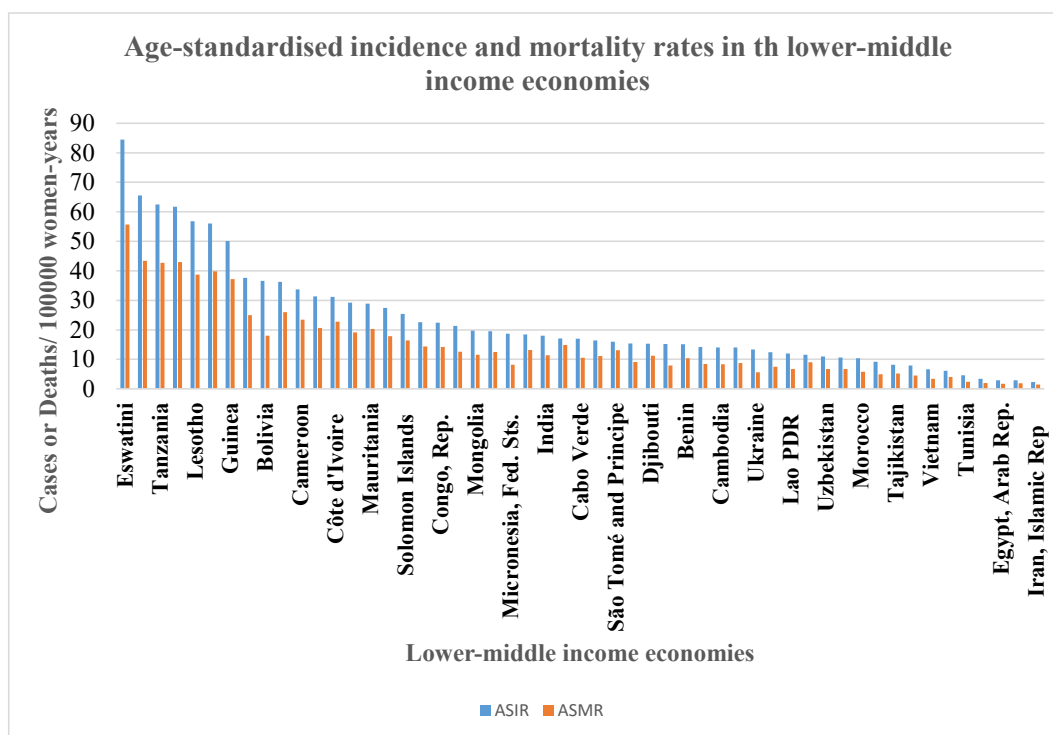


Fig. 1. World –age-standardized rates of incidence and mortality cases of cervical cancer per 100,000 women-years, in low-middle income economies, estimates from 2020, ranked in decreasing order of incidence.

Source: IARC GLOBOCAN (International Agency for Research on Cancer, 2020).

Table 1
Impact of cervical cancer in lower-middle income economies 2020.

Country	Incidence Number	ASIR	Mortality Number	ASMR
Algeria	1663	7.9	930	4.5
Angola	3195	37.6	1 949	25
Bangladesh	8268	10.6	4 971	6.7
Benin	560	15.1	368	10.4
Bhutan	47	14.2	27	8.4
Bolivia	1985	36.6	1 054	18
Cabo Verde	46	17	27	10.5
Cambodia	1135	14	643	8.3
Cameroon	2770	33.7	1 787	23.4
Comoros	167	56	109	39.8
Congo, Rep.	350	22.4	214	14.2
Côte d'Ivoire	2067	31.2	1 417	22.8
Djibouti	63	15.3	44	11.2
Egypt, Arab Rep.	1 320	2.9	744	17.8
Eswatini	341	84.5	214	55.7
Ghana	2 797	27.4	1 699	17.8
Guinea	2 068	50.1	1 463	37.2
Haiti	588	11.6	439	9
Honduras	858	19.5	518	12.5
India	123 907	18	77 348	11.4
Iran, Islamic Republic	1 056	2.3	644	1.5
Jordan	115	2.9	71	1.9
Kenya	5 236	31.3	3 211	20.6
Kiribati				
Kyrgyz Republic	498	15.4	286	9.1
Lao PDR	371	12	191	6.7
Lebanon	124	3.4	73	2
Lesotho	541	56.8	362	38.7
Mauritania	428	28.9	286	20.3
Micronesia, Fed. Sts.	53	18.7	24	8.2
Mongolia	334	19.7	182	11.6
Morocco	2 165	10.4	1 199	5.8
Myanmar	7 129	22.6	4 497	14.4
Nepal	2 244	16.4	1 493	11.1
Nicaragua	719	21.3	413	12.6
Nigeria	12 075	18.4	7 968	13.2
Pakistan	5 008	6.1	3 197	4
Papua New Guinea	1 077	29.2	650	19.1
Philippines	7 897	15.2	4 052	7.9
Samoa	10	12.4	6	7.5
São Tomé and Príncipe	13	16	10	13.1
Senegal	1 937	36.3	1 312	26
Solomon Islands	65	25.4	40	16.4
Sri Lanka	1 407	9.2	780	4.9
Tajikistan	322	8.2	190	5.2
Tanzania	10 241	62.5	6 525	42.7
Timor-Leste	65	14	39	8.8
Tunisia	342	4.6	185	2.4
Ukraine	604 127	13.3	2 089	5.6
Uzbekistan	1 887	11	1 103	6.7
Vanuatu	22	17.1	19	14.9
Vietnam	4 132	6.6	2 223	3.4
Zambia	3 161	65.5	1 904	43.4
Zimbabwe	3 043	61.7	1 976	43

ASIR, Age-standardized incidence rate (per 100,000 women-year); ASMR, Age-standardized mortality rate (per 100,000 women-year) due to cervical cancer; computed with the help of standard world population as a reference; Congo, Rep., Republic of the Congo; Egypt, Arab Rep, Arab Republic of Egypt; Lao PDR, Lao People's Democratic Republic, Micronesia, Fed. Sts. Federated States of Micronesia.

of provinces in accordance with income range by the World Bank ([The World Bank, 2024](#)).

3. Cervical cancer diagnosis and prevention

3.1. Screening

Roughly about one-half of the cases arise in people who have

Table 2
Impact of cervical cancer in lower –income economies 2020.

Country	Incidence	ASIR	Mortality	ASMR
Afghanistan	1 200	10.4	823	7.6
Burkina Faso	1 132	18.2	839	14.3
Burundi	1 581	49.3	1 126	38.5
Central African Republic	297	21.8	223	17.1
Chad	890	20.2	650	16
Congo, Dem. Rep	7 772	31.9	5 548	23.7
Eritrea	178	15.3	130	11.4
Ethiopia	7 445	21.5	5 338	16
Gambia	286	42.9	199	33.9
Guinea-Bissau	239	39.6	172	30.3
Korea, Dem. People's Rep	1 970	11.2	1 128	6.5
Liberia	656	40.8	469	30.8
Madagascar	3 763	41.2	2 460	29
Malawi	4 145	67.9	2 905	51.5
Mali	1 934	36.4	1 406	28.3
Mozambique	5 325	50.2	3 850	38.7
Niger	622	10.4	475	8.4
Rwanda	1 229	28.2	829	20.1
Sierra Leone	504	21.2	367	16.4
Somalia	1 055	25.1	812	20.2
South Sudan	711	20.5	529	16
Sudan	1 227	8.7	828	6.2
Syrian Arab Republic	215	2.8	137	1.9
Togo	455	19.1	309	13.8
Uganda	6 959	56.2	4 607	41.4
Yemen, Rep.	225	2.5	153	1.8

ASIR, Age-standardized incidence rate (per 100,000 women-year); ASMR, Age-standardized mortality rate (per 100,000 women-year) due to cervical cancer; computed with the help of standard world population as a reference; Congo, Dem. Rep, Democratic Republic of the Congo; Korea, Dem. People's Rep, Democratic People's Republic of Korea; Yemen, Rep, People's Democratic Republic of Yemen.

undergone insufficient screening, ([Benard et al., 2021](#)) and the rate of cervical cancer screening in LMIC's is about 20 % in comparison the high-income countries which is about 60 % ([Brisson et al., 2020](#); [Gakidou, Nordhagen, & Obermeyer, 2008](#)). The human papillomavirus (HPV) is the main reason of over 90 % of cervical carcinomas. Adequate screening and treatment of cervical precancers can minimize the life time risk to less than 0.5 % ([Perkins, Wentzensen, Guido, & Schiffman, 2023](#)), however only individuals who remain asymptomatic should be ruled out for screening. Fourteen low- and middle-income nations have tested over a million women for cervical cancer via an integrated prevention campaign. These countries worked with United, the Clinton Health Access Initiative, and other global health groups to implement this approach. WHO techniques were used to fund national preventative activities. HPV testing is more accurate than visual cervix inspection and may be used in these programs to identify cervical cancer ([Reza, Dewan, Islam, & Shahriar, 2024](#)).

Significant variants associated with the rise of cervical cancer includes HPV positivity, HPV genotype, and cytological changes correlated with HPV-related cell transformation ([Demarco et al., 2022](#)). Nevertheless, recent trend assessments suggest that in nations with efficiently structured cytology-based screening initiatives, the rates of cervical cancer incidence have either plateaued or are on the rise ([Arbyn et al., 2020](#); [Castanon & Sasieni, 2018](#); [McDonald, Qendri, Berkhof, de Melker, & Bogaards, 2017](#)). This trend can be elucidated by an increased exposure to greater exposure to cancer-causing strains of the human papillomavirus (HPV), inadequate screening rates, notable among woman in their teens, and the shortcomings that come with cytology-based screening ([Arbyn et al., 2020](#)).

3.2. Vaccination as a preventive measure

In stark contrast to the high-income countries (HICs), less than 30 % of low- and middle-income countries (LMICs) have implemented the HPV vaccination program ([Duncan, Harris, Skyers, Bailey, & Figueroa,](#)

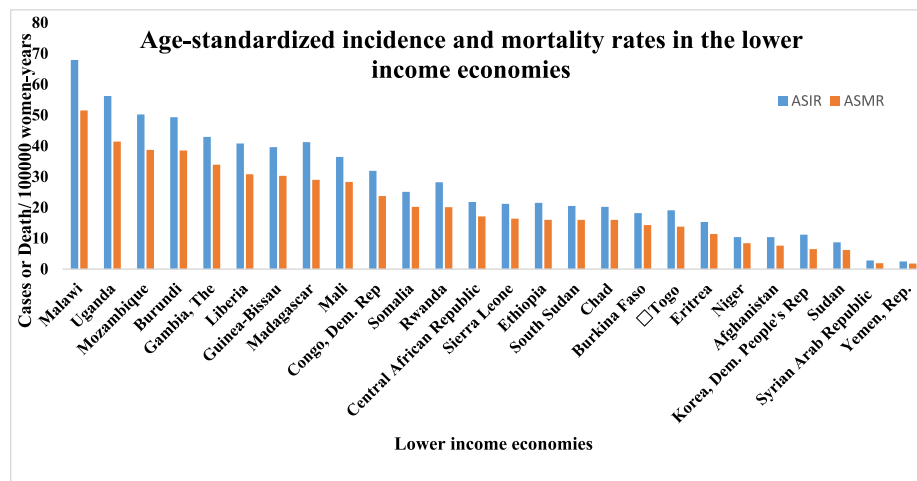


Fig. 2. World –age-standardized rates of incidence and mortality cases of cervical cancer per 100,000 women-years, in lower income economies, estimates from 2020, ranked in decreasing order of incidence.

Source: IARC GLOBOCAN ([International Agency for Research on Cancer, 2020](https://gco.iarc.fr/)).

2021). Only around 3 % of adolescents received the HPV vaccination, and approximately 44 % of women underwent cervical cancer screening (Duncan et al., 2021).

A recommendation by WHO suggested inclusion of HPV vaccination be implemented into national immunization schedules targeting girls between the ages 9 to 14 as their primary recipients and women aged 15 as the secondary targets (“Human papillomavirus vaccines: WHO position paper, May, 2017-Recommendations,” 2017; World Health Organization. Electronic address, 2017). The WHO indicated that the optimal age range for HPV vaccination is 9 to 14 years old, as this is when girls are not sexually active. Young women should adhere to the national immunization schedules before having sex as they are affordable and will significantly lower the death rate linked to HPV (Reynales-Shigematsu, Rodrigues, & Lazcano-Ponce, 2009). The HPV vaccine is inexpensively accessible in many countries. Ninety-six nations presently include the HPV vaccine in their national immunization programs (Haddison, Tambasho, Kouamen, & Ngwafor, 2021). However, LMICs are not making the progress towards reducing the incidence of cervical cancer that was anticipated. Some of the factors contributing to this include the slow spread of the HPV vaccine, low rates of screening and early detection of cervical cancer, restricted access to comprehensive cancer therapy, high costs, challenges in successfully obtaining HPV vaccine target individuals, cultural concerns regarding the vaccine, ignorance of cervical cancer and its connection to HPV infection, concerns about the safety and fertility of HPV vaccination in the future, negative histories of prior vaccinations for other illnesses, and political issues. Less than 30 % of low- and middle-income countries (LMICs) have an HPV vaccination plan in place, in contrast to high-income countries (HICs) (Duncan et al., 2021), while 44 % of women had their cervical cancer screened, just around 3 % of teenagers had an HPV vaccine.

Many low- and middle-income countries (LMICs) have implemented an HPV vaccination regimen consisting of two doses administered six months apart. Nonetheless, certain countries such as Gambia, Lao People’s Democratic Republic, Senegal, Solomon Islands, Zimbabwe, and Zambia opt for a 12-month interval between the initial and subsequent doses. By mid-2020, 56 LMICs, representing 41 % of all LMICs, had commenced national HPV vaccine programs, receiving approval from Gavi starting May 2020, contingent upon resource availability. Every month, more nations are implementing similar immunization programs. New agreements for HPV vaccinations have safeguarded millions of girls against cervical cancer in poor nations. 2013 (Tsu, LaMontagne, Atuhebe, Bloem, & Ndiaye, 2021). It has been found that, in the majority of LMICs till the end of the century, a high range HPV vaccine in girls can

prevent cervical cancer (Brisson et al., 2020). However, without additional efforts to improve vaccination rates, an estimated 44.4 million cases of cervical cancer will be diagnosed globally between 2020 and 2069, with nearly two-thirds of these cases occurring in countries with low Human Development Indices (Simms et al., 2019). As a whole, the prompt and precise integration and execution of HPV vaccination within national initiatives represent a critical stride towards eradicating HPV-induced cancers and related ailments. While recent advancements in this domain show promise, they remain accompanied by obstacles.

However, the advancement of LMIC toward decreasing the load of cervical cancer is prolonged (Duncan et al., 2021). This is because of several reasons, like slow HPV vaccination rollout, low screening rates for cervical cancer, limited access to cancer treatment, cost issues, difficulty reaching people for HPV vaccination, cultural concerns about the HPV vaccine, lack of awareness about cervical cancer and HPV, worries about HPV vaccine safety and fertility, past negative experiences with vaccinations, and political issues (Ebrahimi et al., 2023).

Significant global dedication will be necessary to meet the WHO’s objectives for triple interventions, especially in nations facing the greatest burden of cervical cancer, where the expansion of vaccination and screening services is urgently imperative (Brisson et al., 2020).

3.3. Cost effective strategies for cervical cancer prevention

Despite it being a preventable health issue, cervical cancer still emerges as a threat being the second most prevalent cancer among women in developing nations. While typically diagnosed in women between ages 35–50, the infection actually occurs decades earlier (Prendiville, 2006). In consideration of the issue at hand, several cost-effective strategies have been proposed.

3.3.1. Role of HPV vaccination on developing countries

Among the several risk factors that can manifest this condition, Human papillomavirus (HPV) is one of main causes for cervical cancer and to eliminate this virus and prevent future cases it is imperative that the individuals at risk be vaccinated. Three vaccines, specifically Cervix (manufactured by GlaxoSmithKline in the United Kingdom), the pioneer vaccine Gardasil, and Gardasil9 (developed by Merck in Pennsylvania, USA), have been created to mitigate the risk of cancers associated with HPV-16 and –18. Cervix and the initial iteration of the HPV vaccine, Gardasil, exhibit efficacy in preventing approximately 70–84 % of cervical cancers. The subsequent advanced nine-valent HPV vaccine, Gardasil 9 (produced by Merck), demonstrates the capability to avert around 90 % of HPV infections (Haq, Kouriba, Aïssatou, & Pant,

2020). However, the cost and availability of the HPV vaccine poses significant challenges for developing nations as a whole. A graph with strong, comprehensive data is given below to show the coverage percentage (Figs. 3-5) reveal significant variations among underdeveloped countries.

3.3.2. Following the five “I” framework

3.3.2.1. Innovation. LICs/LMICs face challenges to manage funds to receive two courses of a comparatively costly vaccine, and facilitate tracking and follow-up to ensure good coverage of the second dose, especially for the population of girls ages 9–14 (“[Human papillomavirus vaccines: WHO position paper, May, 2017-Recommendations](#),” 2017). It is imperative to bring an innovative approach not only in production of vaccines but also in the markets, as well as in dosing and schedules for the vaccine.

After considering the benefits of a two-dose schedule in terms of programmatic effectiveness and cost savings, the WHO updated its recommendation in 2014 for immunocompetent teenagers (9–14 years old) based on findings that post-vaccination antibody levels were not inferior with two doses compared to three doses. A three-dose regimen was the first licensing format for vaccines (Organization, 2014). Those 15 or older and HIV positive should take three doses over six months. Modelling studies utilizing data from high-income countries (HICs) offer numerous vaccine methods to eradicate certain kinds of HPV and cervical cancer, some of which screen older women for the virus. Current multi-dose regimens are expensive and difficult to deliver, particularly for LMICs (Hall et al., 2019). HPV vaccination was included in the national immunization schedule of 79.1 % of HICs in November 2019, but just 23.5 % of low-income and 23.4 % of lower-middle income countries (Gallagher, LaMontagne, & Watson-Jones, 2018). Observational studies suggest that a single HPV vaccination may prevent vaccine-type HPV infection (Whitworth et al., 2020).

A single-dose HPV vaccination strategy might reduce vaccine supply costs and simplify distribution in many LMICs. A recent comprehensive study found that one HPV vaccination dose may protect against HPV infection and accompanying clinical disease. The reviewers were national immunization programs members (Toh et al., 2015). Two- or three-dose plans were more effective than one. Due to research restrictions, reduced-dose regimens may have had the largest impact on effectiveness estimates (Stanley & Dull, 2018).

In correlation to this the strength and sustainability of healthcare systems can be further enhanced through the cervical cancer elimination programs. By implementing these initiatives, along with keeping focus on cervical screening, the potential to complement or leverage existing HIV services elevates, as women undergoing antiretroviral therapy attend regular refill appointments.

3.3.2.2. Investment. Meeting the goals to eliminate cervical cancer requires a significant increase in global health investments and a reconsideration of spending priorities. Although reproductive, maternal, newborn, and services catering to child care receive substantial attention, only a minimal 2 % of Development Assistance for Health is allotted to address cancers and other non-communicable diseases, despite their accounting for greater than 60 % of the worldwide impact caused by the disease (“[Financing Global Health](#),” 2018).

It is critical to make the connection between global expenditure and the very advantageous approaches to support adolescent and school health through specialized platforms. It highlights the benefits not just for governments but also for its partner organizations that work with it to integrate the introduction of the HPV vaccination with larger-scale health and youth development initiatives, broadening its scope.

3.3.2.3. Integration. To achieve the World Health Organization’s 90 % coverage goal, there are many strategies to combine HPV vaccination

with adolescent health outreach activities. It has the potential to reduce the total cost of pre-cancer screenings and other services, as well as the cost of providing vaccines at the required doses. Young women and their families may benefit from it, and it’s efficient too. Demand for it is rising (Levin et al., 2013).

In order to complement the Human Papillomavirus (HPV) vaccine, the WHO has endorsed a variety of brief health interventions for teenagers based on scientific evidence. In Cameroon, there has been an observation of intergenerational advertising of screening for this cancer (Ogembo et al., 2014).

To increase the effectiveness of HPV vaccine integration initiatives, it is essential to enhance cooperation and collaborative movements in global plans and endorsements. By exchanging ideas and information, administrators, technological partners, and financial institutions may improve the coordination framework they’re working to establish, resulting in more cohesive and efficient operating plans for all funders.

3.3.2.4. Information. In low-resource settings, it is difficult to develop effective methods for giving HPV vaccinations because of a dearth of trustworthy data from low- and middle-income countries (LICs and LMICs) (Gallagher et al., 2017).

Gathering increasingly precise data in public and educational contexts for micro-planning and progress assessments, as well as deciphering eligible groups, has become an absolute need, necessitating the use of more massively scaled data systems (Gallagher et al., 2018).

Investing in staff training in educational and healthcare institutes can strongly improve information systems and can further enhance data to fit the eligibility criteria. In certain contexts, employing an age-based strategy may prove useful, through categorizing by date of births.

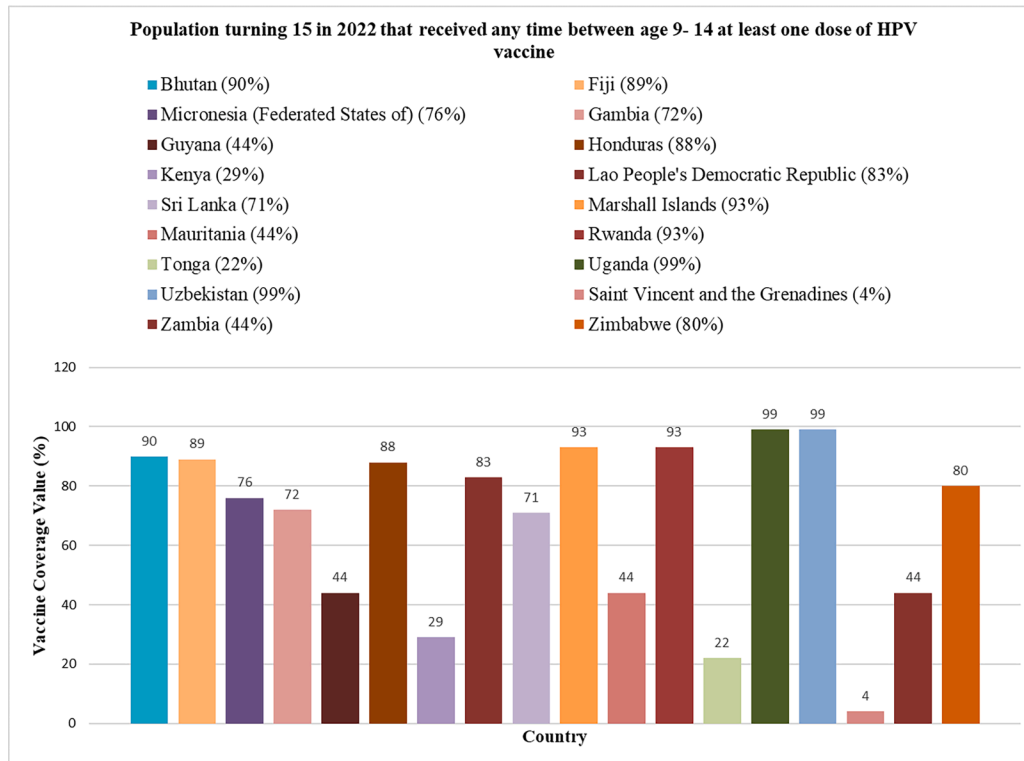
It is also necessary to keep track of adolescent girls not attending educational institutes and monitor their vaccine coverage as these girls are more susceptible to health issues. Zambia applies an online digital recording equipment in identifying and monitoring vaccinated girls, classified by mode of delivery and age in order to configure vaccine rate of coverage, incidence rate along with number of drop out adolescent girls (Waheed et al., 2023). With the application of such technological measures other LICs and LMICs can also figure out cost effective ways to eradicate this dangerous condition.

3.3.2.5. Influence (Advocacy, Communication, and Partnerships). Expanding HPV vaccine coverage to reach the WHO 2030 goal of 90 % requires using different strategies at all levels. It is essential to ensure advocacy, communication and partnerships to tackle challenges related to demand, awareness and compliance of screening and vaccines.

Attempts to obliterate cervical cancer, as a public concern, globally have garnered a substantial attraction, with various sponsors from international health agencies and philanthropic organizations. It is crucial to advocate vaccination with an increment in funds, considering the \$3 billion aid over a decade for LICs and LMICs for further successful outcomes. In recent years, there has been significant progress in persuading high-ranking officials in nations to establish exceptional HPV vaccination initiatives. During the 2020 Gavi replenishment conference, notable vaccine manufacturers made a commitment to prioritise the provision of a sustainable vaccine supply for LICs (Gavi | [The Vaccine Alliance](#), 2023). Effective communication plays a critical role in promoting progress in reproductive health interventions for adolescent females. Effective collaboration among partners is critical for the successful dissemination of the HPV vaccine and dispelling any misunderstandings that may exist regarding its use in LMICs and LICs (Wittet et al., 2017).

This can be accomplished further through partnerships with Gavi and the collection of funds to provide these nations with technical assistance in an effort to implement and sustainably achieve equitable Human Papillomavirus (HPV) vaccination coverage.

A



B

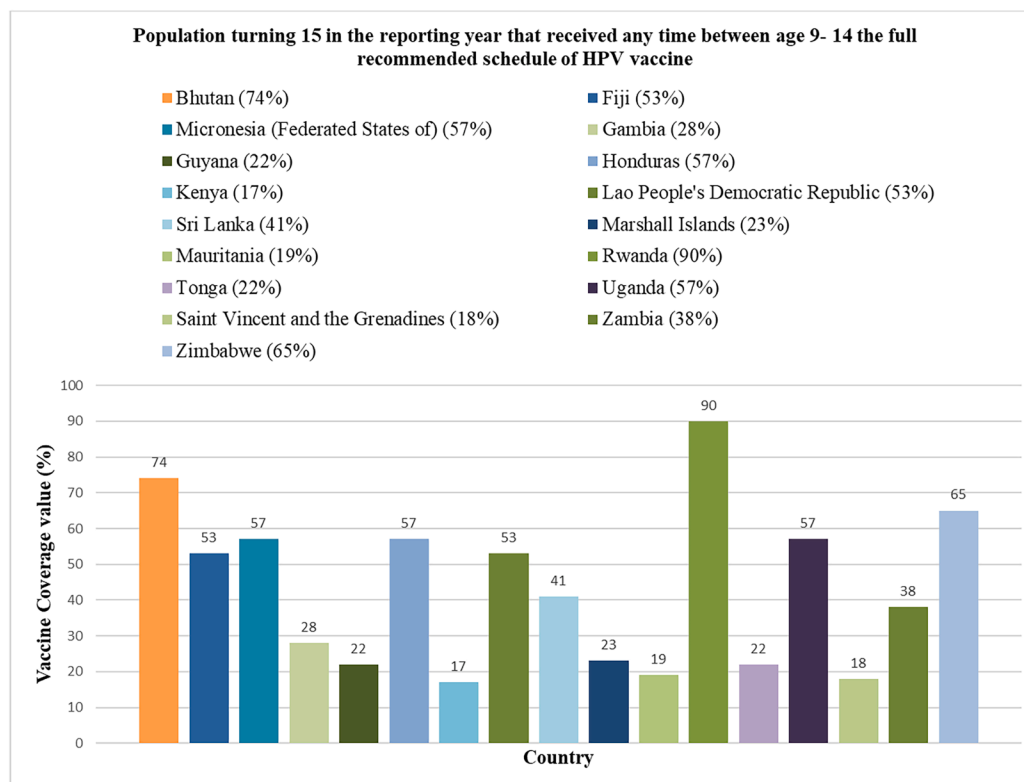


Fig. 3. A. Estimations for 2022 of the HPV vaccine coverage for women receiving at least one dose between ages 9–14 in developing countries (alphabetized by country). B. Estimations for 2022 of the HPV vaccine coverage for women receiving the full recommended dose between ages 9–14 in developing countries (alphabetized by country).

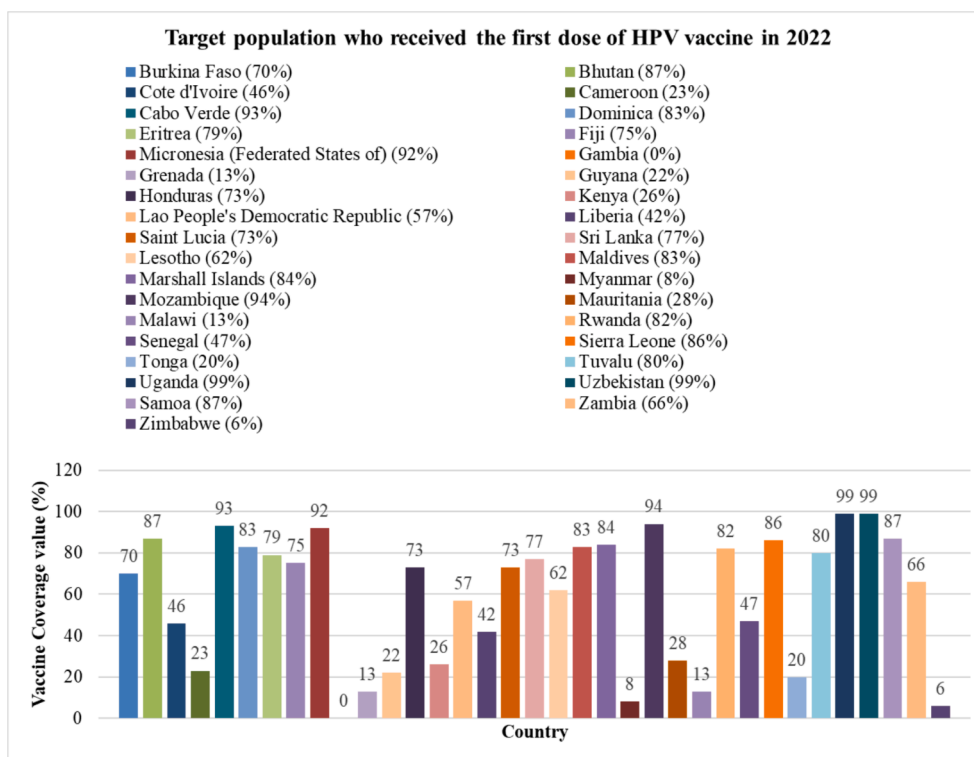


Fig. 4. Estimations for 2022 of the HPV vaccine coverage for adult women receiving only the first dose in developing countries (alphabetized by country).

4. Addressing the WHO's initiative for the eradication of cervical cancer

Recognizing the significant preventability of this medical condition and the profound impact it has on families and daily life, the WHO has initiated an appeal to all nations to eradicate it as a matter of public health, in light of the disease's elevated mortality rate and the profound suffering it inflicts.

In response to the solicitation, a global strategy to cease the growth of this condition, employing a main form of protection (vaccination) and a secondary defense (screening and treatment of cervical pre-cancers), was formulated and sanctioned by WHO Member States through the modified World Health Assembly process in 2020. By enforcing this strategy, over the next century, greater than 74 million instances would possibly be avoided, with 61 million of these attributed to vaccination alone (Kumar et al., 2021).

Moreover, the WHO Cervical Cancer Elimination Modelling Consortium (CCEMC) consequently suggests, if a 90 % coverage of HPV vaccination for girls (by 15 years of age) might be attained, coupled with a 70 % coverage of screening (twice in a lifetime with a highly sensitive test), followed by a 90 % adoption of medical care, by 2030, then it would be possible to wipe out this carcinoma altogether by 2100 (Arbyn et al., 2021).

5. Considerations of other proposal to eradicate cervical cancer

Embracing global strategies of WHO towards eliminating cervical cancer is paramount for developing countries as a whole. Therefore, it is vital to point out that expanding access to invasive cancer treatment might potentially save a lot of lives. Notwithstanding the poor vaccination and screening rates, there seems to be an encouraging progress and a reason for hope as other organizations and governments step up with reinforced actions and proposals to annihilate the affliction caused by this disease.

- i. The government of India assembled a substantial gathering to advance the initiative for cervical cancer screening and control. This significant step is outstanding for a nation contributing to 25 % of the worldwide fatalities attributed to cervical cancer.
- ii. Gavi, the Vaccine Alliance, has granted approval for provision the HPV vaccine support to several additional countries, including the densely populated nation of Indonesia.
- iii. A report of considerable insight has been produced by the Joint United Nations Program on HIV/AIDS (UNAIDS), which examines the intricate interrelationships between HPV, cervical cancer, and HIV.
- iv. Additionally, the 2016 UN General Assembly Political Declaration on HIV and AIDS advocated the incorporation of various services catering to both HIV and cervical cancer, highlighting a pivotal shift towards well-rounded healthcare.
- v. In 2017 annual Global AIDS Monitoring report (GAM), overseen by UNAIDS, implemented two novel indicators concerning HPV vaccination and cervical cancer screening specifically for the female species associated with HIV (Aranda et al., 2017).

Our rationale for conducting this analysis is to determine how far along the path to cervical cancer eradication developing nations are in fulfilling the WHO's goal, looking at things like cervical cancer incidence and mortality rates, how effective HPV vaccination programs have been, and what these countries will do to improve their healthcare systems and prepare for future updates to their healthcare policies. We can get closer to our ultimate aim of eliminating cervical cancer as this contain collection of data from low- and middle-income countries. Due to a lack of specific data from all LMICs, we were only able to cover a portion of the nations in our analysis of the HPV vaccine program or cancer screening, among other instances. As a result, we advocate conducting a global field assessment to include all locations where healthcare services are inadequate or in high-risk zones for disease susceptibility. At the same time, constructing a molecular-epidemiological database in each country to determine the right causes of disease development and thus developing timely healthcare policy

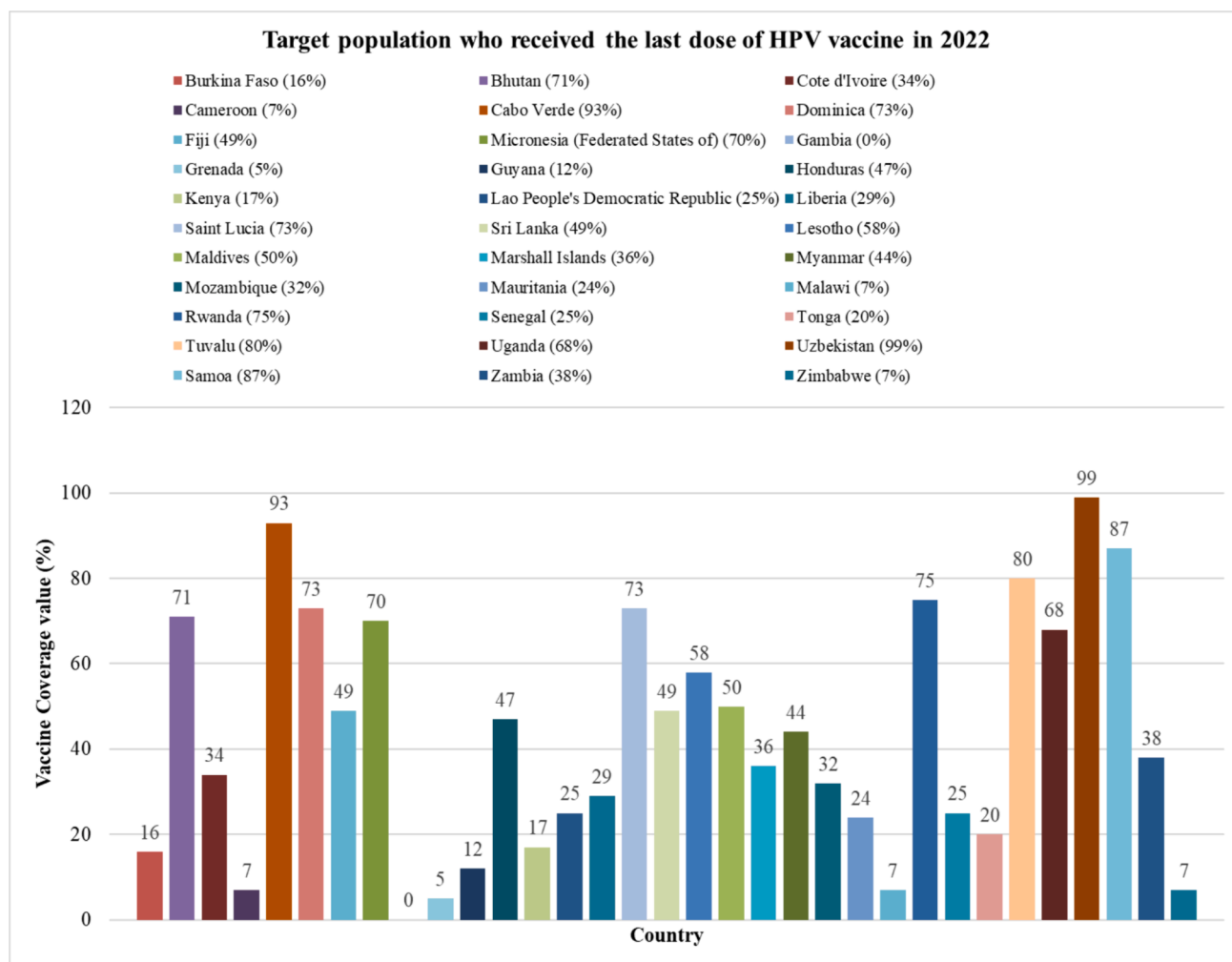


Fig. 5. Estimations for 2022 of the HPV vaccine coverage for adult women receiving only the last dose in developing countries (alphabetized by country). [Note: Source of HPV vaccine coverage in 2022 (Unicef, 2023); Source of LMIC and LICs in correlation to IDA and Blend (The World Bank, 2024)].

is strongly advised.

6. Conclusion

Developing countries shoulder a devastating burden in tackling cervical cancer due to their lack of resources and influence. An excellent chance to strengthen cancer prevention and improve collaboration seems to exist if these issues are addressed by focused interventions, international partnerships, and legislative reforms. This article provides valuable insights into the response of developing countries to the urgent call by the World Health Organization to eliminate cervical cancer through an examination of cervical cancer incidence and mortality rates, the impact and implementation of HPV vaccination programs, and the consideration of eradication proposals, this study highlights both progress and areas requiring attention. By accelerating efforts in these key areas, we can advance toward the shared goal of eradicating cervical cancer and ensuring a healthier future for all.

CRedit authorship contribution statement

Sejuti Reza: Writing – original draft, Conceptualization, Methodology. **Ramisa Anjum:** Writing – original draft, Visualization, Methodology, Conceptualization. **Rubaiyat Zahan Khandoker:** Writing – original draft, Visualization. **Saimur Rahman Khan:** Visualization. **Md. Rabiul Islam:** Writing – review & editing. **Syed Masudur Rahman Dewan:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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