

Rapid scale-up of HPV vaccine and screening could prevent up to 13 million cases of cervical cancer by 2050

February 20 2019

Cervical cancer could be eliminated as a public health problem in most countries by the end of the century by rapid expansion of existing interventions, according to a modelling study published in *The Lancet Oncology* journal.

The estimates, which are the first of their kind at a global-scale, indicate that combining high uptake of the human papillomavirus (HPV) vaccine and high HPV-based cervical screening rates in all countries from 2020 onwards could prevent up to 13.4 million cases of cervical [cancer](#) within 50 years (by 2069), and the average rate of annual cases across all countries could fall to less than 4 cases per 100,000 women by the end of the century—which is a potential threshold for considering cervical cancer to be eliminated as a major [public health problem](#).

Under a more gradual scale-up scenario, cervical cancer elimination is expected in countries with very high and high levels of development by the end of the century, but average rates would remain above the threshold in countries with medium (4.4 cases per 100,000) and low (14 per 100,000) levels of development.

Without expanding current prevention programmes, however, the study predicts that 44.4 million cervical cancer cases would be diagnosed over the next 50 years—rising from 600,000 in 2020 to 1.3 million in 2069 due to population growth and ageing.

In May, 2018, the Director General of WHO called for coordinated action globally to eliminate this highly preventable cancer. The findings from this study have helped inform initial discussions of elimination targets as part of the development of the WHO strategy, and future modelling studies will support the development of the final goals and targets for cervical cancer elimination.

WHO has called for urgent action to scale up implementation of proven measures towards achieving the elimination of cervical cancer as a global public health problem (including vaccination against HPV, screening and treatment of pre-cancer, early detection and prompt treatment of early invasive cancers and palliative care). A draft global strategy to accelerate cervical cancer elimination, with goals and targets for the period 2020-2030, will be considered at the World Health Assembly in 2020.

"Despite the enormity of the problem, our findings suggest that global elimination is within reach with tools that are already available, provided that both high coverage of HPV vaccination and cervical screening can be achieved", says Professor Karen Canfell from the Cancer Council New South Wales, Sydney, Australia who led the study.

"More than two thirds of cases prevented would be in countries with low and medium levels of human development like India, Nigeria, and Malawi, where there has so far been limited access to HPV vaccination or cervical screening. The WHO call-to-action provides an enormous opportunity to increase the level of investment in proven cervical cancer interventions in the world's poorest countries. Failure to adopt these interventions will lead to millions of avoidable premature deaths."

Cervical cancer is the fourth most common cancer in women, with an estimated 570,000 new cases diagnosed worldwide in 2018, of which around 85% occur in less developed regions. HPV, a group of more than 150 viruses, is responsible for the majority of cervical cancers. Proven

methods are available to screen for and treat cervical pre-cancers, and broad-spectrum HPV vaccines can potentially prevent up to 84-90% of cervical cancers.

Nevertheless, large disparities exist in cervical screening and HPV vaccination coverage between countries. In low- and middle-income countries (LMICs), overall screening rates in 2008 were as low as 19%, compared to 63% in high-income regions; whilst by 2014 less than 3% of females aged 10-20 years in LMICs received the full course of HPV vaccination in 2014, compared to over a third in high-income countries.

The authors analysed high-quality registry data from the International Agency for Research on Cancer to predict future trends in cervical cancer if further action is not taken. They then used a [dynamic model](#) to calculate the impact of scaling up HPV vaccination and cervical screening on the cervical cancer burden globally, and in 181 countries of all levels of development, between 2020 and the end of the century.

The modelling focused on the deployment of vaccination and screening in low- and medium- income countries rather than detailed modelling of all the more recent improvements in countries with high levels of development, which may have underestimated timing to elimination in individual countries with high levels of development.

The researchers also predicted the earliest date when rates of cervical cancer might fall enough to achieve elimination (considering a possible elimination threshold of less than 4 cases per 100,000 individuals). The average worldwide age-standardised rate of cervical cancer in 2012 was 12 per 100,000.

Results showed that rapid vaccination scale-up to 80-100% coverage globally by 2020 using a broad-spectrum HPV vaccine could prevent 6.7-7.7 million cases—but more than half of these would be averted

after 2060.

If, in addition, cervical screening were scaled-up to high coverage by 2020 (with all women offered screening twice in their lifetime and 70% coverage globally), this could prevent an additional 5.7-5.8 million cases of cervical cancer in the next 50 years, and substantially speed up elimination.

Such efforts could result in [cervical cancer](#) being eliminated as a public health problem, with average rates across countries falling to less than 4 cases per 100,000 by 2055-59 in countries with very high levels of development (including the USA, Finland, the UK and Canada); 2065-69 for countries with high levels of development (including Mexico, Brazil, and China); 2070-79 for countries with medium levels of development (including India, Vietnam, and the Philippines); and 2090-2100 onwards for countries with low levels of development (such as Ethiopia, Haiti, and Papua New Guinea).

However, rates of less than 4 cases per 100,000 would not be achieved by the end of the century in all individual countries in Africa (eg, Kenya, Tanzania, and Uganda) even if high coverage vaccination and twice lifetime cervical screening could be achieved by 2020.

The authors note several limitations, including that their predictions are constrained by a lack of high-quality cancer incidence data over time, particularly in developing countries. They also note that the model assumed lifetime duration of vaccine protection and did not fully account for geographical differences in sexual behaviour, which might affect the accuracy of the estimates. They also assumed in their rapid scale-up scenarios that very high global vaccination coverage rates (of 80% or higher) would be achievable worldwide—but successfully providing two doses of the HPV vaccine with appropriate spacing is likely to be challenging, particularly in less developed regions. Finally,

the rapid scale-up scenario examined in the study did not account for cultural, logistical, and financial barriers to scaling up screening in low-resource settings.

More information: Kate T Simms 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). [DOI: 10.1016/S1470-2045\(18\)30836-2](https://doi.org/10.1016/S1470-2045(18)30836-2)

Provided by Lancet

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