

THE EXISTENCE OF HPV VACCINATION PROGRAM AND ITS RELEVANCE IN THE PREVENTION OF CERVICAL CANCER IN RUSSIAN FEDERATION, BRAZIL, INDIA, JAPAN, CHINA, MALAYSIA, NIGERIA AND SWITZERLAND

Nascimento dos Santos L. A. P, Poh Omasyarifa Binti Jamal²

^{1,2} Kursk State Medical University, Department of Obstetrics and Gynaecology

Abstract:

Background: Cervical cancer remains a significant health concern globally. The introduction of the Human Papilloma Virus (HPV) vaccine and the Papanicolaou smear (Pap smear) screening test have contributed to reducing cervical cancer morbidity and mortality. This study aims to evaluate the impact of these preventive measures on cervical cancer mortality rates in eight countries: Russia, Nigeria, India, China, Japan, Switzerland, Brazil, and Malaysia.

Methods: We conducted a systematic review and meta-analysis using data from the World Health Organization (WHO), United Nations, World Bank, International Agency for Research on Cancer (IARC), and other sources for 2019 and 2020. Mortality rates, HPV vaccination programs, screening usage, and cervical cancer risk among females aged 0-74 years were analyzed and compared.

Results: China reported the highest number of cervical cancer deaths (51,600), but Brazil had the highest mortality rate (1.56%). The lowest mortality rate was observed in Switzerland (0.30%).

HPV vaccination was included in the national schedule for Japan, Switzerland, Brazil, and

Malaysia. Screening for cervical cancer was implemented in all eight countries, with Russia and Switzerland having the highest frequency (8:10 each) and India having the least (<1:10).

Conclusion: The combination of HPV vaccination programs and active screening is the most effective measure for preventing cervical cancer mortality, as demonstrated by Switzerland.

However, the importance of screening cannot be understated, as seen in Russia, where screening alone plays a significant role in cervical cancer prevention. Further efforts should focus on integrating both preventive strategies to reduce the global burden of cervical cancer.

Relevance. In 2006, the Food and Drug Administration approved the first preventive Human Papilloma Virus (HPV) vaccine [18] and by the second quarter of 2007 it had been approved in 80 countries [17]. The Papanicolaou smear, a routine screening test for cancer of the uterine cervix, was reported in 1928, and its efficacy was proved by 1941. Since then, it has been used worldwide as a clinical tool for the early detection of cancer [19]. Combination of HPV vaccination and Pap smear screening programs was shown to be cost effective to prevent cervical cancer [12]. It has been 99 years in combine since the existence of the two, how does it reflects on today's cervical cancer mortality rate.

Aim – To analyze and systematically review the approach applied by Russian Federation, Nigeria, India, China, Japan, Switzerland, Brazil and Malaysia in regard to prevention of cervical cancer and the impact on the mortality rate.

Materials and methods. Databases of different registries with respect to HPV and HPV inoculation affect in Russia, Nigeria, India, China, Japan, Switzerland, Brazil and Malaysia from Multidisciplinary Advanced Distributing Organized, distributed writing and official reports by the World Wellbeing Organization (WHO) [11,14] the Joined together Countries, The World Bank, Worldwide Office for Inquire about on Cancer IARC's Globocan, Cancer Rate in Five Landmasses and Catalan Organized of Oncology, of the year 2019 and 2020 [12]. Actualities and data that

determined from the efficient survey and meta-analysis analyzed and calculated the mortality rate, accessibility of HPV immunization program, usage of screening, recognizing aggregate hazard of cervical cancer between the age 0-74 a long time ancient and comparing it between the specified nations. (Table 1).

Table 1 –Comparison of cervical cancer morbidity and mortality rate

	Russi a	Nigeri a	India	China	Japan	Switze rland	Brazil	Malay sia
Total population female, (2019)	78.270 .000	99.130 .000	656.30 0.000	698.20 0.000	64.910 .000	4.331.0 00	107.30 0.000	15.530 .000
Crude cervical cancer incidence per 100 000 women (2020):	19,6	11,9	18,7	15,6	19,8	5,4	16,4	11,1
Age-standardized cervical cancer incidence per 100 000 women (2020):	14,1	18,4	18	10,7	15,2	3,4	12,7	10,2
Total death, female (2019) *b	906.00 0	763.00 0	4.191.0 00	4.134.0 00	655.00 0	35.500	608.00 0	76.800
Cervical cancer deaths (2019) *a	7400	10600	45300	51600	3800	110	9500	1000
Cumulative risk of cervical cancer, ages 0-74 (2020)	1,40%	1,90%	2%	1,10%	1,40%	0,3%	1,30%	1,10%

Cervical cancer mortality-to-incidence ratio (2020): (Rates per 100,000 women per year)	0,49	0,66	0,62	0,54	0,33	0,42	0,52	0,57
Population-based cancer registry exists (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Included in national vaccination schedule	No	No	No	No	Yes	Yes	Yes	Yes
Screening for Cervical Cancer last 5 years	8:10	1:10	<1:10	2:10	6:10	8:10	4:10	4:10
Mortality rate *a/*b	0,81%	1,38%	1,08%	1,24%	0,58%	0,30%	1,56%	1,30%
Cervical cancer mortality-to-incidence ratio (2020)	0,49	0,66	0,62	0,54	0,33	0,42	0,52	0,57

Results. China showed the highest number of death in cervical cancer, which is 51600 [2], however its only accumulated to 1,24% mortality rate. Whilst Brazil showed 9500 death [1] which accumulated to 1,56% mortality rate and became as the highest among the eight countries. The lowest mortality rate is Switzerland 110 (0,30%) [8]. The second highest after Brazil is Nigeria 10600 (1,38%) [8], followed by Malaysia 1000 (1,30%) [6], China, India 45300 (1,08%) [4], Russia 7400 (0,81%) [8], and Japan 3800 (0,58%) [5].

Among the eight countries reviewed, only Japan [6, 9, 16], Switzerland [9], Brazil [1, 2, 10] and Malaysia [6] have included HPV vaccination in their national schedule. Screening for cervical

cancer for the last five years has been implied in all the eight countries. Russia and Switzerland 8:10 each [9, 10] marked as the most frequent, followed by Japan 6:10 [5], Brazil and Malaysia 4:10 each [1, 5], China 2:10 [2], Nigeria 1:10 [6], and India at the least <1:10 [3].

Conclusion: Combination of HPV vaccination program and active screening are the most effective measures to prevent cervical cancer mortality as shown by Switzerland. However, it is unveiled that HPV vaccination program does not replace the importance of screening as shown by Russian Federation results that screening alone still prevail to have a significant role in prevention of cervical cancer.

Reference

1. Bruni L, Albero G, Serrano B et al. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Brazil. Summary Report 17 June 2019. Available from: https://hpcvcentre.net/statistics/reports/BRA_FS.pdf?t=1611434617252
2. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Brazil. Summary Report 22 October 2021. [Date Accessed]
3. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in China. Summary Report 22 October 2021. [Date Accessed]
4. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in India. Summary Report 22 October 2021. [Date Accessed]
5. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Japan. Summary Report 22 October 2021. [Date Accessed]

6. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Malaysia. Summary Report 22 October 2021. [Date Accessed]
7. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Nigeria. Summary Report 22 October 2021. [Date Accessed]
8. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Russian Federation. Summary Report 22 October 2021. [Date Accessed]
9. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Switzerland. Summary Report 22 October 2021. [Date Accessed]
10. Colpani V, Soares Falcetta F, Bacelo Bidinotto A, Kops NL, Falavigna M, Serpa Hammes L, Schwartz Benzaken A, Kalume Maranhão AG, Domingues CMAS, Wendland EM. Prevalence of human papillomavirus (HPV) in Brazil: A systematic review and meta-analysis. PLoS One. 2020 Feb 21;15(2):e0229154. doi: 10.1371/journal.pone.0229154. PMID: 32084177; PMCID: PMC7034815.
11. Global strategy to accelerate the elimination of cervical cancer as a public health problem. Geneva: World Health Organization; 2020 (<https://www.who.int/publications/i/item/9789240014107>).
12. Khuraseva A.B., Omasyarifa B.J.P., Fercila Mun Sook Yee, Risk Factors Of Hpv-Caused Cervical Cancer in Malaysia, Science and Education [Text]: materials of the XII international

research and practice conference, Munich, July 1st – 2nd, 2016 / publishing office Vela Verlag Waldkraiburg – Munich – Germany, 2016 – 205p. ISBN 978-3-946227-09-0

13. Lei J, Ploner A, Elfström KM, Wang J, Roth A, Fang F, Sundström K, Dillner J, Sparén P. HPV Vaccination and the Risk of Invasive Cervical Cancer. *N Engl J Med.* 2020 Oct 1;383(14):1340-1348. doi: 10.1056/NEJMoa1917338. PMID: 32997908.

14. Singh D, Vignat J, Lorenzoni V, Eslahi M, Ginsburg O, Lauby-Secretan B, Arbyn M, Basu P, Bray F, Vaccarella S. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. *Lancet Glob Health.* 2023 Feb;11(2):e197-e206. doi: 10.1016/S2214-109X(22)00501-0. Epub 2022 Dec 14. PMID: 36528031; PMCID: PMC9848409.

15. WHO guidelines for screening and treatment of precancerous lesions for cervical cancer prevention. Geneva: World Health Organization; 2013 (https://www.who.int/reproductivehealth/publications/cancers/screening_and_treatment_of_precancerous_lesions/en/).

16. Yagi A, Ueda Y, Kakuda M, Nakagawa S, Hiramatsu K, Miyoshi A, Kobayashi E, Kimura T, Kurosawa M, Yamaguchi M, Adachi S, Kudo R, Sekine M, Suzuki Y, Sukegawa A, Ikeda S, Miyagi E, Enomoto T, Kimura T. Cervical Cancer Protection in Japan: Where Are We? *Vaccines (Basel).* 2021 Nov 1;9(11):1263. doi: 10.3390/vaccines9111263. PMID: 34835194; PMCID: PMC8619953.

17. "Merck Reports Double-Digit Earnings-Per-Share Growth for Second Quarter 2007" (Press release). Archived from the original on 12 October 2007. Retrieved 16 October 2019.

18. https://en.wikipedia.org/wiki/HPV_vaccine#History

19. Vilos GA. The history of the Papanicolaou smear and the odyssey of George and Andromache Papanicolaou. *Obstet Gynecol.* 1998 Mar;91(3):479-83. doi: 10.1016/s0029-7844(97)00695-9. PMID: 9491881.202