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Journal watch

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ABSTRACT

The COVID-19 pandemic has had a significant impact on routine vaccination rates around the world. According to the WHO and UNICEF, more than 23 million children missed their routine vaccination doses in 2020. This is a major setback for global health, as it puts children at risk of preventable diseases such as diphtheria, pertussis, tetanus, polio and measles.

Keywords: Measles, COVID-19, Mission Indradhanush, MMR vaccination, Measles case-fatality ratios

WHY DISCUSS THIS?

The COVID-19 pandemic has had a significant impact on routine vaccination rates around the world. According to the World Health Organization (WHO) and United Nations International Children's Education Fund (UNICEF), more than 23 million children missed their routine vaccination doses in 2020. This is a major setback for global health, as it puts children at risk of preventable diseases such as diphtheria, pertussis, tetanus, polio and measles.

The disruption in vaccination rates is due to a number of factors, including:

- Decreased access to health-care services due to lockdowns and social distancing measures
- Increased fear and anxiety about COVID-19, which has led some parents to delay or forgo vaccination
- Misinformation about the safety and effectiveness of vaccines.

The WHO and UNICEF have warned that the COVID-19 pandemic could lead to a resurgence of vaccine-preventable diseases (VPDs). This is a serious threat to global health and it is important to take steps to ensure that children continue to receive the vaccinations they need.

Some of the steps that can be taken to address the decline in vaccination rates include:

- Increasing access to health-care services, especially in low-income countries
- Addressing misinformation about vaccines
- Educating parents about the importance of vaccination
- Providing financial incentives for vaccination

It is important to remember that vaccines are safe and effective and they are one of the most important tools, we have to protect children from preventable diseases. We must do everything, we can to ensure that children continue to receive the vaccinations they need, even during the COVID-19 pandemic.

India, along with other South Asian countries, has set a goal of eliminating measles and controlling rubella by 2020. However, the COVID-19 pandemic has disrupted vaccination

campaigns around the world and this has increased the risk of measles outbreaks.

According to the 'UNICEF, 23 million children will have missed out on a basic childhood vaccine in 2020. This is the highest number of children to miss out on vaccines since 2009.

In India, the Brihanmumbai Municipal Corporation has revealed that 19,894 children had missed their measles-rubella (MR) vaccine doses and measles-mumps-rubella doses, which were supposed to be taken at 9 and 15 months after birth, respectively.

Measles is an endemic disease in India and it can lead to serious morbidity and mortality. In addition to India, the re-emergence of diseases such as polio and measles has been reported from Pakistan and other countries.

This highlights the importance of enhancing vaccination coverage for VPDs. In India, the government has launched the Intensified Mission Indradhanush 3.0, which aims to reach unvaccinated children and achieve measles and rubella elimination.

However, more needs to be done to ensure that all children have access to vaccines. Routine measles vaccination campaigns need to be enhanced on a massive scale at the Indian and global levels to safeguard the health and lives of children.

Source: Summan A, Nandi A, Shet A, Laxminarayan R. (2023). The effect of the COVID-19 pandemic on routine childhood immunisation coverage and timeliness in India: retrospective analysis of the National Family Health Survey of 2019–2021 data. The Lancet Regional Health South-east Asia**,** 8, 100099. https://doi.org/10.1016/j.lansea.2022.100099

The COVID-19 pandemic has had a significant impact on routine immunisation in India. A study using data from 'India's National Family Health Survey 2019–2021 found that immunisation coverage was lower in COVID-affected children as compared with unaffected children, ranging from 2% lower for Bacillus Calmette-Guérin and hepatitis B birth dose to 9% for diphtheria, pertussis and tetanus (DPT), third dose and 10% for polio3. There was no significant difference in measles first dose coverage. Coverage reduction was greater for vaccines doses given in later age groups. The rate of timely receipt of polio and DPT vaccine doses was 3–5% lower among COVID-affected children relative to unaffected children. Among population subgroups, COVID-affected male children and those from rural areas experienced the highest reduction in vaccine coverage.

These findings suggest that the COVID-19 pandemic has led to a decline in routine immunisation coverage in India. This is a concerning trend, as it could lead to an increase in the incidence of VPDs. It is important to take steps to address this decline, such as increasing access to immunisation services, educating parents about the importance of vaccination and addressing misinformation about vaccines.

Source: Verma SK, Shah D, Singh A, Singh PK, Das S, Gupta P. (2023). Immunogenicity of measles-rubella vaccine administered under India's Universal Immunisation Programme in the context of measles-rubella elimination goal: A longitudinal study. *The Indian Journal of Medical Research*, 10.4103/ijmr.IJMR_4113_20. Advance online publication. https://doi.org/10.4103/ijmr.IJMR_4113_20

The MR vaccine is a live, attenuated vaccine that protects against measles and rubella. It is recommended that two doses of the MR vaccine be given, with the first dose given at 12–15 months of age and the second dose given at 4–6 years of age.

A study was conducted in India to assess the immunogenicity of the MR vaccine when given below 1 year of age. The study enrolled 100 healthy infants who were given the MR vaccine at 9–12 months of age. Blood samples were collected 4–6 weeks after each dose of the vaccine to measure antibody levels against measles and rubella.

The results of the study showed that the MR vaccine was highly effective in inducing seroprotection against measles and rubella. The seroprotection rate against rubella was 97.5% after the first dose and 100% after the second dose. The seroprotection rate against measles was 88.7% after the first dose and 100% after the second dose.

The study also found that the second dose of the MR vaccine resulted in a significant increase in antibody levels against measles and rubella. This suggests that two doses of the MR vaccine are necessary to provide optimal protection against these diseases.

The results of this study support the present MR vaccination strategy in India, which recommends two doses of the vaccine, with the first dose given to infants below 1 year of age.

Source: Pustake MV, Padhyegurjar MS, Mehkarkar NS, Padhyegurjar S. (2022). Measles elimination by 2020 – Current status and future challenges in India. *Indian Journal of Public Health*, 66(1), 71–73. https://doi.org/10.4103/ijph.ijph_963_21

According to the WHO, only 83% of children in India are fully vaccinated against measles. This is well below the 95% coverage rate that is needed to achieve measles elimination.

Another factor that has contributed to 'India's inability to eliminate measles is the COVID-19 pandemic. The pandemic has disrupted vaccination services and it has also led to a decrease in public trust in vaccines. As a result, many parents have been hesitant to get their children vaccinated against measles.

To achieve measles elimination, India will need to address these challenges. This will require increasing vaccination coverage, strengthening routine immunisation activities and increasing public trust in vaccines. In addition, India may

need to consider new and innovative ways to deliver measles vaccines, such as the Measles-Micro-Array-Patches. These patches are a new type of vaccine delivery system that is being developed and they have the potential to be a game-changer in the fight against measles.

Source: Sharma D, Sangal L, Vijay N, Nalavade U, Krishnasamy K, Pawar S, Kaur H, Narayan J, Rane S, Narkar M, Arumugam R, Dhanagaran D, Sugunan AP, Balakrishnan A, Joseph B, Turuk J, Sabat J, Sahoo P, Barde P, Sahare L, Gupta N. (2022). Expansion of the measles and rubella laboratory network, India. *Bulletin of the World Health Organization*, *100*(4), 247–255. https://doi.org/10.2471/BLT.21.286999

India and the WHO collaborated to expand 'India's measles and rubella laboratory network by integrating new laboratories. The Indian Council of Medical Research and WHO identified suitable laboratories based on their geographical location, willingness, preparedness, past performance and adherence to national quality control and quality assurance mechanisms.

The 10-step scheme began with training on measles and rubella diagnostic assays, followed by testing of both measles and rubella serology and molecular unknown panels, cross-verification with reference laboratories and the WHO on-site accreditation.

After extensive training, technical support, funding and monitoring, all six selected laboratories attained passing scores of 90.0% or more in serological and molecular proficiency testing of measles and rubella. Since 2018, the laboratories have been a part of India's measles and rubella network. Within 12 months of independent reporting, the six laboratories have tested 2,287 serum samples and 701 throat or nasopharyngeal swabs or urine samples.

The process strengthened and expanded the network. This proficient laboratory network has helped India scale up serological and molecular testing of measles and rubella while ensuring high-quality testing. The collaborative model developed by the Indian government and the WHO can be implemented by other countries to expand laboratory networks for surveillance of measles and rubella as well as other infectious diseases.

Source: Murugan R, VanderEnde K, Dhawan V, Haldar P, Chatterjee S, Sharma D, Dzeyie KA, Pattabhiramaiah SB, Khanal S, Sangal L, Bahl S, Tanwar SSS, Morales M, Kassem AM. (2022). Progress Toward Measles and Rubella Elimination - India, 2005-2021. *MMWR. Morbidity and Mortality Weekly Report*, 71(50), 1569–1575. https://doi.org/10.15585/mmwr.mm7150a1

India adopted the goal of measles and rubella elimination by 2023 in 2019. To achieve this goal, India adopted a national strategic plan for measles and rubella elimination, introduced rubella-containing vaccine (RCV) into the routine immunisation programme, launched a nationwide MR supplementary immunisation activity (SIA) catch-up campaign, transitioned from outbreak-based surveillance to case-based acute fever and rash surveillance and more than doubled the number of laboratories in the MR network, from 13 to 27.

India has made substantial progress toward measles and rubella elimination. Coverage with the first dose of a measles-containing vaccine (MCV) administered through routine immunisation increased from 68% to 89% between 2005 and 2021. Coverage with a second MCV dose (MCV2) increased from 27% to 82% between 2011 and 2021. Coverage with a first dose of RCV (RCV1) increased from 6% to 89% between 2017 and 2021. More than 324 million children received a measles- and RCV during MR SIAs completed in 34 (94%) of 36 states and union territories (states) during 2017–2019. Annual measles incidence decreased 62% from 10.4 to 4.0 cases/1 million population and rubella incidence decreased 48% from 2.3 to 1.2 cases/1 million population between 2017 and 2021.

Despite these gains, India still faces challenges in achieving measles and rubella elimination by 2023. These challenges include:

- Inadequate vaccination coverage in some parts of the country, particularly among children from marginalised groups
- Weak surveillance systems that make it difficult to identify and respond to outbreaks quickly
- Misinformation about the safety and effectiveness of vaccines, which can lead parents to delay or forgo vaccination.

To overcome these challenges, India needs to:

- Increase vaccination coverage in all parts of the country, particularly among children from marginalised groups
- Strengthen surveillance systems to identify and respond to outbreaks quickly
- Address misinformation about vaccines to increase public trust in vaccination.

With these efforts, India can achieve its goal of measles and rubella elimination by 2023.

Source: Maskari ZA, Tai AA, Kindi HA, Busaidi AA, Mammari KA, Shukri IA, Hashami HA, Maskari NA, Waili BA. (2023). Health care-associated measles outbreak in paediatric wards in a tertiary care hospital: Challenges and Swiss cheese model enforcement for patient safety. *American Journal of Infection Control*, S0196-6553(23)00080-9. Advance online publication. https://doi.org/10.1016/j.ajic.2023.02.011

In countries where measles is rare, transmission in health-care facilities has been a key factor in amplifying outbreaks.

A study was conducted in a hospital in India to describe the transmission of measles among unvaccinated children in the paediatric service. The study found that the outbreak extended

from 9 December 2019 to 24 January 2019, and resulted in 110 exposed individuals (85 health care workers (HCWs) and 25 patients). Eleven (44%) children exposed were vaccinated, 14 (56%) were not yet vaccinated and the measles status of 10 (11.8%) HCWs was not known at the time of the outbreak. Two infants acquired measles in the hospital and both required ICU care. Three infants and one HCW received immunoglobulin. The phylogenetic tree of the matrix and fusion genes, non-coding region sequencing, confirmed that all three cases had 100% identical measles strain.

The study found that the outbreak was caused by a number of factors, including:

- The presence of unvaccinated children in the hospital
- The failure of healthcare workers to follow infection control procedures
- The lack of a system in place to identify and isolate patients with measles.

The study's findings highlight the importance of vaccination and infection control in preventing the spread of measles in health-care settings. In countries where measles elimination goals are achieved, a multifaceted approach to prevent measles transmission in healthcare is vital to maintain patient safety.

The study's findings also suggest that the Swiss cheese model can be used to understand and prevent measles outbreaks in health-care settings. The Swiss cheese model is a metaphor that describes how multiple layers of protection can work together to prevent failures. In the context of measles outbreaks, the layers of protection include:

- Vaccination
- Infection control procedures
- A system in place to identify and isolate patients with measles.

If any one of these layers of protection fails, it can lead to an outbreak. However, if all of the layers of protection are in place, it is much less likely that an outbreak will occur.

Source: de Soarez PC, Martins Rozman L, Siraisi Fonseca T, Rodrigo Borsari P, Percio J, Guzmán Barrera LS, Christovam Sartori AM. (2023). The methodological quality of economic evaluations of measles outbreaks: A systematic review of cost-of-illness studies. *Vaccine*, *41*(7), 1319–1332. https://doi.org/10.1016/j.vaccine.2023.01.015

The authors found that the main cost components included in economic evaluations of measles outbreaks were outbreak response, personnel and productivity losses. Outbreak response costs included the costs of vaccination, contact tracing and hospitalisation. Personnel costs included the costs of healthcare workers, volunteers and other staff involved in the outbreak response. Productivity losses included the costs of lost productivity due to illness, quarantine and death.

The authors also found that the quality of costing methodology varied across studies. Some studies used a comprehensive costing methodology that included all relevant costs, while others used a more limited costing methodology that excluded some costs. The authors also found that some studies did not report the costing methodology they used, which made it difficult to assess the quality of their results.

The authors concluded that the quality of costing methodology, its transparency and accuracy are essential to the validity of economic evaluations of measles outbreaks. They also concluded that economic evaluations of measles outbreaks can be used to inform measles outbreak control strategies, with rapid and effective response.

Source: Sbarra AN, Mosser JF, Jit M, Ferrari M, Ramshaw RE, O'Connor P, Krause LK, Rogowski ELB, Portnoy A. (2023). Estimating national-level measles case-fatality ratios in low-income and middle-income countries: an updated systematic review and modelling study. *The Lancet Global Health*, 11(4), e516–e524. https://doi.org/10.1016/S2214-109X(23)00043-8

The authors of the article conducted a systematic review of the literature to identify all available primary data on measles cases and deaths in low- and middle-income countries (LMICs) from 1980 to 2020. They then used this data to develop a Bayesian meta-regression model to estimate measles case fatality Rates (CFRs) from 1990 to 2019 by location and age group.

The authors found that CFRs substantially decreased in both community-based and hospital-based settings between 1990 and 2019. For people aged 0–34 years, the mean CFR for 2019 was 1.32% (95% uncertainty interval 1.28–1.36) among community-based settings and 5.35% (5.08–5.64) among hospital-based settings. The authors also found that CFRs were highest among children under 1 year of age and decreased with age.

The authors concluded that although CFRs have declined between 1990 and 2019, there are still large heterogeneities across locations and ages. They also noted that one limitation of their study was that they were unable to assess measles CFR among particular populations, such as refugees and internally displaced people.

The 'authors' findings suggest that measles CFRs are declining in LMICs, but that there is still room for improvement. They also suggest that vaccination is the most effective way to reduce measles CFRs.

Source: Samieefar N, Mousavi S, Baghsheikhi H, Abdollahimajd F. (2023). Measles surveillance: Lessons from the COVID-19 pandemic. *Journal of Clinical Virology Plus*, *3*(2), 100141. https://doi.org/10.1016/j.jcvp.2023.100141

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