The cost-effectiveness of rubella vaccination among women in Maharashtra

Policy Brief

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Recommendations

- *The Measles & Rubella (MR) vaccination among the women of reproductive age group with high fertility rate (i.e., 20-39 years) is cost saving option*
- *MR vaccine could be made available easily at various health facilities.*
- *Awareness among women's regarding CRS will encourage them to take the MR vaccination in the health facilitates.*
- *One-time vaccination would help to reduce CRS cases among children and Rubella infection among women considerably.*

Summary:

Rubella is a highly contagious disease caused by Rubella virus. It is a leading cause of vaccine-preventable birth defects i.e. congenital rubella syndrome (CRS). The policy question for conducting rubella vaccination among women of reproductive age group (20-39 years) in Maharashtra is addressed in this brief. Health technology assessment tools were used to address this question by using decision tree analysis.

A cohort of women with high fertility rate (i.e. age group 20-39 years) in Maharashtra was study. population. Considering all the available parameters from secondary literature for Rubella, study revealed that 563 CRS cases can be prevented if cohort of the women got vaccinated. Vaccination of the study cohort by Measles & Rubella vaccination, ₹ 39,01,601/- can be saved per CRS case averted. The total QALY gained by vaccination of the women cohort will be 1,44,374 and ICER would be -15,213.18 cost per QALY gained. Even if most important parameters in sensitivity analysis are varied, the vaccination strategy remains to be cost effective approach. As the vaccination coverage reduces, the number of CRS cases increases and the cost saved per CRS cases decreases, But even with lower vaccination coverage, the intervention "Rubella vaccination" remains to be cost saving.

Rubella

Highly **contagious** disease

The **vaccination** has been demonstrated as the **successful approach** and strategy to control and eliminate rubella.

CRS rate was observed in between **0.6 and 2.2 per 1000 live births** before universal vaccination in developed countries and it is also similar to developing countries.

In pregnant woman, it can cause organ abnormalities, **hearing impairments, eye and heart defects, thyroid dysfunction, diabetes, autism in child upon delivery**

WHO recommendations

Catch-up campaign

- Vaccination at high coverage
- To young children (1–4 years)
- Rubella and CRS will be eliminated approximately 10–20 years

Follow-up campaigns

- Vaccination at high coverage
- To young children (1–4 years)
- Rubella and CRS will be eliminated in approximately 20–30 years

Speed-up campaign

- Vaccination at high coverage
- To young children, adolescents and adults (for example, people aged 1–39 years)
- Rubella and CRS will be eliminated approximately within 10 years

India has adopted the goal of measles elimination and rubella/CRS control by 2020 along with other countries of WHO South-East Asia Region.

Completed 2017-2019

- Measles and Rubella Supplementary Immunization catch-up campaign (MR-SIA) has been conducted in 33 states in India

Completed 2018

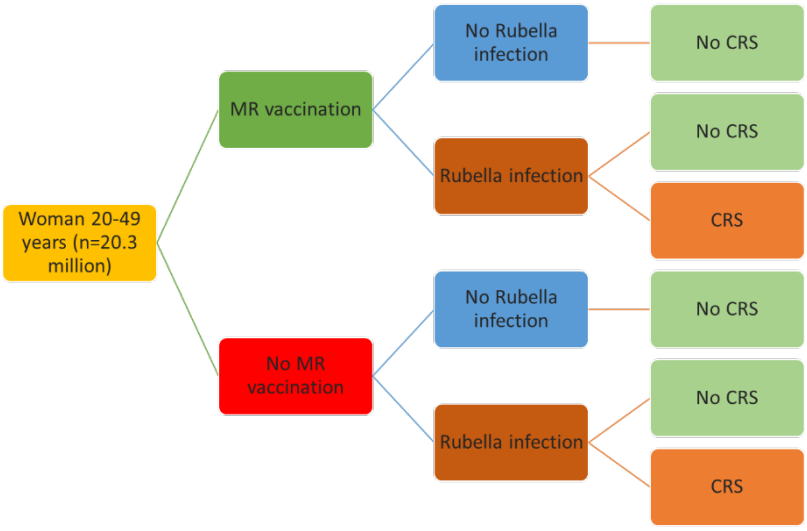
- Measles and Rubella vaccine (MR vaccine) was introduced in routine immunization as the first and second doses across the country

Next Target

- Catch-up campaign

Approach to cost effectiveness:

Decision analytic model was implemented to evaluate cost effectiveness of speed up campaign strategy of rubella vaccination among reproductive age group women (20-39 years) in Maharashtra.

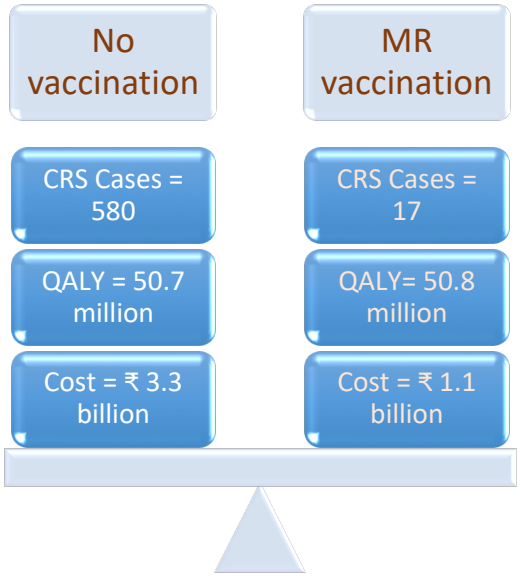


The decision tree analysis started with the decision regarding whether to give MR vaccination to women of reproductive age group (20-39 years). The number of CRS cases averted in both branches of decision tree were analyzed by passing cohort of women of age group 20-39 years from Maharashtra population through decision tree model. The cost required for MR vaccination of the study population/target population and lifetime treatment of CRS was taken from published literature. The cost effectiveness was analyzed based on CRS cases averted in each branch.

Results:

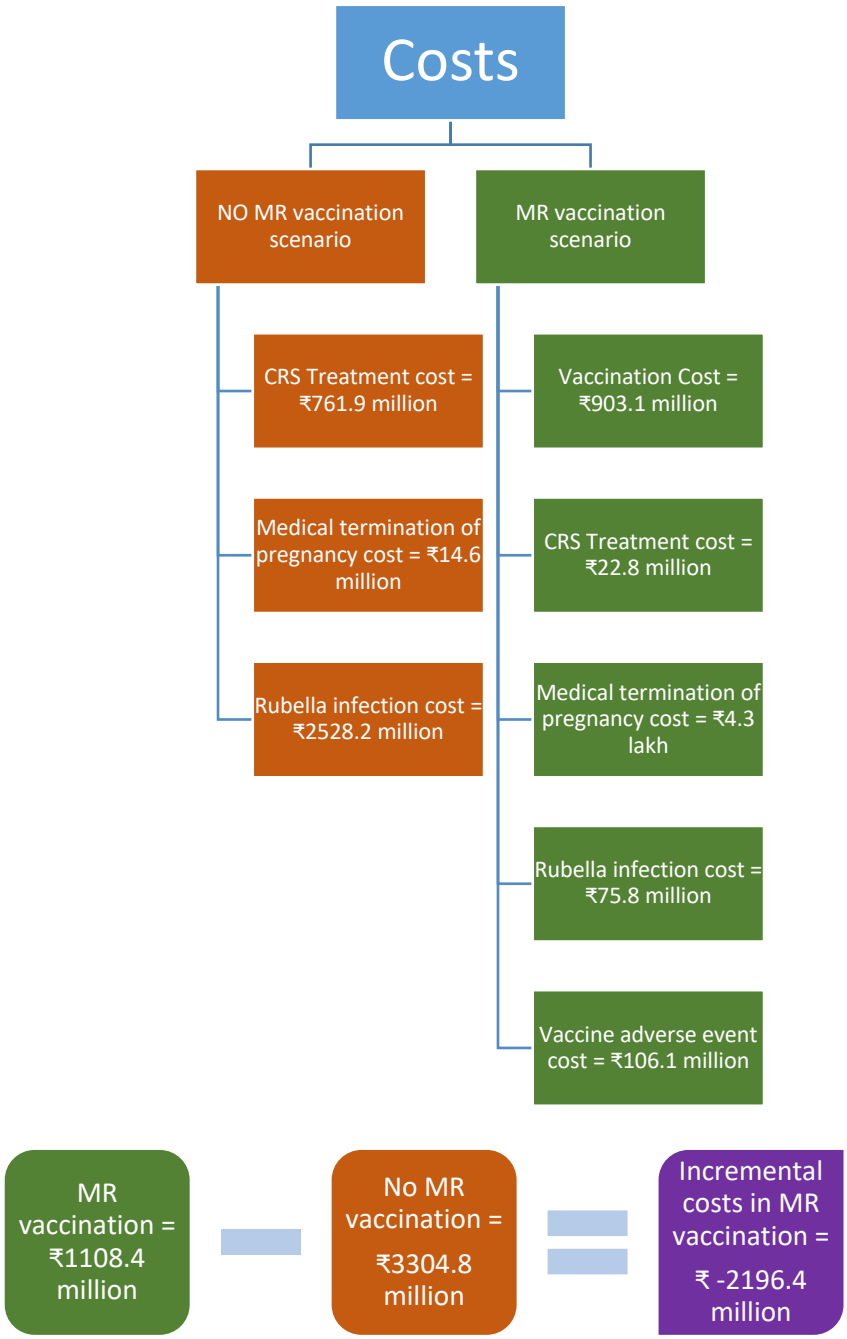
Results of deterministic decision analytical model

Analysis shows that the vaccination in this cohort will reduce the total number of rubella infections to 2,508 among which the CRS cases would be 17 suggesting reduction of 563 cases. As a result, we can state that one CRS case would be prevented for every 23,860 women vaccinated. The reduced burden of CRS among the new-borns gains overall 1,44,374 QALY because of MR vaccination among eligible study population. This indirectly suggests an increase of 256 QALY per rubella case averted.



Cost-Effectiveness: MR Vaccination in the cohort of women of age group 20-39 years in Maharashtra would save ₹15,213/- per QALY gained. Similarly, ₹ 39,01,601/- would be saved per CRS cases averted due to MR vaccination of the study cohort.

Costs of MR Vaccination and CRS Treatment in Different Arms of the Cost-Effectiveness Model



Budget Impact: One time total cost of MR vaccination campaign (Speed up campaign) for the cohort of women of age group 20-39 years in Maharashtra is about ₹1,00,93,04,128/- which includes vaccination cost (₹90,31,58,213/-) and vaccine adverse event cost with minor reactions & home care (₹10,61,45,915/-) which is 0.51% of total health budget of Maharashtra (year 2022-2023). However, accounting the total cost (cost for CRS treatment, rubella infection, MTP, vaccination cost including adverse event), ₹ 2,19,63,80,382/- would be saved in lifetime horizon due to MR vaccination, which amounts to 1.1% of total state health budget 2022-23 in Maharashtra.

Sensitivity analysis suggests that the ICER for QALY gained is most sensitive to MTCT, life expectancy at birth, expected CRS+ Rubella cost and the QoL of rubella

Key Findings

- Rubella Vaccination will reduce the total number of rubella infections to 2,508, in turn reducing the CRS cases from 580 to just 17.
- It will increase of 256 QALY per rubella case averted.
- MR Vaccination in the cohort of women of age group 20-39 years in Maharashtra would save ₹15,213/- per QALY gained and an amount of ₹ 39,01,601/- would be saved per CRS cases averted due to MR vaccination of the study cohort.
- 1.1% of total state health budget 2022-23 in Maharashtra i.e. ₹ 2,19,63,80,382/- could be saved in lifetime horizon due to MR vaccination.

Conclusion

- The MR vaccination among the women of age group 20-39 years in Maharashtra would be a cost saving strategy.
- The cost burden of CRS will be huge if the MR vaccination intervention will not be implemented.
- The MR vaccination among the high reproductive rate group women will assure a major step toward Rubella elimination.