

Clinical and Economic Impact of Maternal Vaccination with Bivalent Respiratory Syncytial Virus Prefusion F (RSVpreF) Vaccine in Peru

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OBJECTIVE

- Respiratory syncytial virus (RSV) infection is a leading cause of hospitalization for acute respiratory infections in infants.^{1,2}
- The bivalent RSVpreF vaccine is approved for use among pregnant individuals in Peru for the prevention of infant RSV illness.³
- This study estimated the clinical and economic impact of a year-round RSVpreF maternal vaccination program in Peru.

METHODS

Overview

- A cohort-based Markov model was used to project the clinical and economic outcomes of RSV infection among infants in Peru, with and without RSVpreF vaccination over a lifetime horizon.
- Clinical outcomes of interest were medically-attended RSV cases stratified by care setting (i.e., hospital [H], emergency department [ED], physician's office [PO]), deaths due to RSV (among hospitalized infants) in the first year of life, life years (LYs), and quality-adjusted life years (QALYs).
- Economic outcomes included direct medical care, indirect, and intervention costs (RSVpreF vaccine cost and administration cost).

Model Parameters

- The number of pregnant women (n = 417,409) and infants (n = 422,000) per year were obtained from the Peruvian Ministry of Health.⁴
- RSV-H and RSV-ED rates were derived using official data from the Peruvian Ministry of Health, National Health Superintendence, and Social Health Insurance.⁵ RSV-PO rates were assumed to be the same as RSV-ED rates, validated by clinical experts.
- Monthly distribution of RSV encounters per care setting was based on Ministry of Health data validated by Peruvian clinical experts.⁶
- General infant mortality and case fatality rates for hospitalized infants were obtained from the Peruvian Ministry of Health.^{7,8}
- Vaccine effectiveness was based on the MATISSE trial.⁹ A duration of 6 months of effectiveness was considered, with the effectiveness waning linearly to 0% by 9 months of age.
- An uptake rate of 50% was considered for the RSVpreF maternal vaccination, based on the uptake of maternal Tetanus, diphtheria, and pertussis (Tdap) vaccine in Peru.¹⁰ The vaccine administration window was assumed to be 32-36 weeks of gestation.¹¹
- All costs were reported in 2025 US dollars (US\$) and Peruvian Sol (S/). Direct costs of RSV-H, RSV-ED, and RSV-PO were estimated to be US\$3,022.00 (S/11,308.83), US\$141.00 (S/527.65), and US\$141.00 (S/527.65), respectively, based on Peruvian Ministry of Health data (RSV-PO cost was assumed to be same as ED cost).^{12,13} The cost of the maternal vaccine was assumed US\$49.00 (S/183.37), in line with the Pan American Health Organization (PAHO) list price for eligible countries.¹⁴ The administration cost of the vaccine was assumed to be US\$4.00 (S/14.97) based on information provided by local experts.
- Workforce participation rates and wage data for the calculation of indirect costs were obtained from Peruvian government sources.^{15,16} Caregiver work loss days and travel costs per episode were sourced from published articles.^{17,18,19}
- General population utility values for the Peruvian population (≥ 1 year of age) were estimated from published data.²⁰ A utility estimate of 1.0 was assumed for infants without RSV.
- Published RSV-related disutility values were applied (RSV-H = 0.0157, RSV-ED = 0.0061, RSV-PO = 0.0061).²¹

Analyses

- For the base analysis, an annual discount rate of 3% was applied to both future costs and outcomes, and model time horizon of lifetime (up to 99 years) was considered.
- Scenario analyses tested alternative inputs/settings including different vaccine uptake rates, vaccine administration windows, and seasonal vaccination strategy.

RESULTS

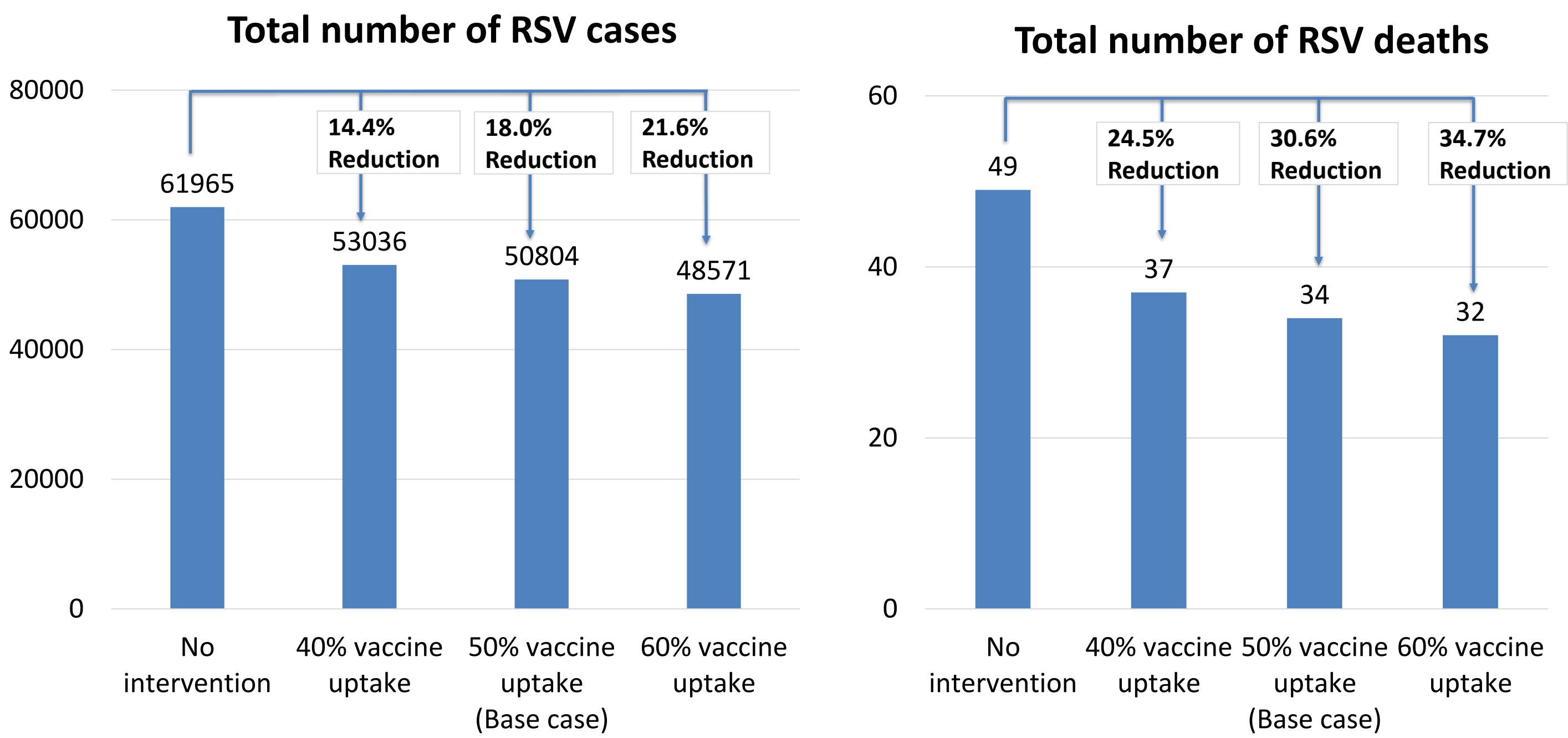
- Maternal RSVpreF vaccination was projected to prevent a total of 11,162 RSV cases and 14 RSV-related deaths among infants in the first year of life compared to no vaccination.
- Maternal RSVpreF vaccination would result in a savings of US\$6.91 million (S/25.85 million) in medical care costs coupled with a gain of 500 QALYs compared to no vaccination.
- Additionally, nearly US\$1 million (S/3.6 million) in indirect costs were estimated to be saved by RSVpreF *versus* no vaccination.
- Maternal vaccination with RSVpreF would be a cost-effective strategy *versus* no vaccination with the corresponding incremental cost effectiveness ratio (ICER) of US\$5,901 (S/22,082) to US\$7,830 (S/29,300) per QALY gained, under societal and healthcare perspectives, respectively, below the 1x gross domestic product (GDP) per capita in Peru US\$7,907(S/29,601) [Table 1].

Table 1: Base case analysis results

	Maternal RSV Vaccination	No Vaccination	Difference
Clinical outcomes			
No. of cases – RSV H	6,024	7,920	-1,897
No. of cases – RSV ED	22,418	27,063	-4,645
No. of cases – RSV PO	22,362	26,982	-4,620
No. of RSV-related deaths	34	49	-14
Life years (discounted)	12,835,662	12,835,225	437
QALYs (discounted)	12,196,006	12,195,506	500
Economic outcomes (in millions US\$ [S/])			
Medical care	23.92 [89.51]	30.83 [115.36]	-6.91 [-25.85]
Intervention costs	10.82 [40.50]	0	10.82 [40.50]
Total direct costs	34.74 [130.01]	30.83 [115.36]	3.91 [14.64]
Total indirect costs	3.52 [13.16]	4.48 [16.77]	-0.96 [-3.61]
Total costs (direct + indirect)	38.26 [143.17]	35.31 [132.13]	2.95 [11.04]
ICER, cost per QALY gained (US\$ [S/] / QALY)			
Healthcare perspective			7,830 [29,300]
Societal perspective			5,901 [22,082]

- All evaluated scenarios demonstrated the cost-effectiveness of RSVpreF maternal vaccination.
- Scenario analysis on uptake rates for maternal vaccination shown in **Figure 1** depict its expected public health impact on the burden of RSV infant cases, showing a substantial decrease in total RSV medically-attended cases and RSV-related deaths among infants with the increase of the maternal vaccine uptake.

Figure 1: Clinical outcomes across different maternal vaccine uptake levels



CONCLUSION

- A year-round maternal RSV vaccination (RSVpreF) program in Peru would be cost-effective from both the healthcare and societal perspectives.**
- Maternal RSVpreF vaccination would substantially reduce the number of medically-attended RSV cases among infants, thereby alleviating the economic burden associated with RSV.**

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