



BUSINESS CASE FOR INVESTING INTO RUBELLA VIRUS RELATED VACCINATION

THIS EXECUTIVE SUMMARY HAS TWO SECTIONS: OVERALL FINDINGS AT A GLOBAL LEVEL, AND INDIA-RELATED INFORMATION.

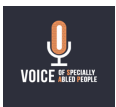
Worldwide Findings

Background

- Voice of Specially Abled People is a global advocacy organization in the disability sector. To strengthen the advocacy, it also conducts detailed research of available data and analyzes this data to present findings to policymakers and decision makers to serve the disability sector.
- Viruses such as rubella and measles are responsible for birth defects, disabilities among children. Rubella virus infection for a woman during childbearing age (up to 49 years old) can lead to the birth of a child with disabilities. As per WHO/GAVI, an estimated 110,000 children per year were born with disabilities due to rubella virus in recent years. (source)
- The MMR (measles, mumps, and rubella viruses) vaccine was created in 1971, yet countries did not start reporting any vaccination rates until 1980. As of 2019, per WHO, the average global coverage for rubella vaccination is estimated to be 71% (source)
- Many countries have achieved 90%+ vaccination rates for newborn babies to protect against rubella virus. However, large populations of women in their childbearing years (12-49 years old) are not vaccinated against rubella, hence Supplemental Immunization Activities (SIAs) need to be the focus for every nation. This will ensure reduction of possibilities of children born with disabilities by implementing catchup immunization.
- Measles virus also can cause disability in a child. The probability is much lower than rubella virus; however, the number of cases reported is very high. Even in 2019, the world reported over 528,000 cases.
- In the United States, the MMR vaccine costs roughly USD \$21 as per CDC. In developing countries, the average cost for the MMR vaccine is USD \$5. The cost to administer a supplemental vaccine is assumed to be around double that of regular vaccination at USD \$10.
- The research paper analyzed the data from WHO, UNICEF, and other sources to develop a business case for nations to invest in Rubella containing vaccines (MMR, MMRV, MR, etc.) for not only newborn children, but also for women of childbearing age as part of SIA.

Data Collection Method

- To calculate the average vaccination rate for the entire world, we had to look at vaccination rates under a specific antigen, namely MCV1 or RCV1.
 - a. If a country provides the MMR, MR, or MMRV vaccines in a given year, we use the vaccination rate reported under the MCV1 category from the WHO/UNICEF databases.



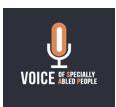
- b. If a country only provides the rubella vaccine separately in a given year, we use the vaccination rate reported under RCV1 category from the WHO/UNICEF databases.
 - c. If a country provides neither of the vaccines (MMR, MR, MMRV, or rubella), then we do not include the country in the dataset.
- The world did not start to seriously report under the RCV1 category until 1998; countries did report under the MCV1 category starting in 1980, along with other antigens.
 - Some countries, such as Japan, use the MR vaccine rather than the MMR or MMRV vaccine because of the skepticism around the relationship between these vaccines and autism, although many research papers suggest that there is neither a causal or correlational relationship between the two.
 - In our dataset, we have data for 150 countries; some countries provide a combination of the vaccines we are interested in. For instance, the United States provides the MMR and MMRV vaccines.
 - The WHO reports that a rubella vaccine exists in 173 countries as of 2019. (source)
 - We've found certain discrepancies in the data being reported by WHO and UNICEF, and the research should be carried out to explain the data discrepancies. Although we have found anomalies in the data being reported by countries to these organizations, we suggest a need for improvement of reporting consistency among nations.
 - If there was a discrepancy in the data between UNICEF and WHO, we have assumed that the minimum vaccination rate of the two is the true vaccination rate for a given year.

Business Case

- Parameters Considered in our Data Modeling: Female population since 1980, birth Rate since 1980, Infant Mortality Rate since 1980, Immunization coverage for rubella since 1980 from WHO and UNICEF, Top manufacturers of MMR/MR and their pricings, Purchasing Power Parity (PPP) data and recent currency exchange rates with the United States as a basis to create cost projections, and The conservative healthcare and other related costs in the United States is assumed to be USD \$500,000.
- To create the business case, we compare the cost of maintaining current routine vaccination costs (immunization for newborn babies) and supporting the country's specially abled population, with the cost of improving the routine vaccination rates to 100% and implementing a one-time catchup program under SIA (targeting the women in their childbearing years who have not been vaccinated, ages 1-49, so that no newborn children have a possibility of getting a disability through rubella)

Key Findings

- a. The number of women in the best case catchup population is 917 million women
 - i. For the whole world, the approximate one-time catchup cost to vaccinate all of these women against rubella will be \$10 billion. This is to achieve the goal of having no child born with disabilities due to the rubella virus. This is only 0.01% of the world's GDP (2019: USD \$87.55 trillion).
- b. The number of women in the worst case catchup population is 2.4 billion women.



India

- India currently has a vaccination rate of 95%
 - A. Prior to 2015, India was achieving very poor rubella vaccination rates.
 - B. Vaccination coverage timeline:
 - i. India reported a 1% vaccination rate in 1985; prior to 1985, India failed to report rubella vaccination rates
 - ii. Until 2015, India reported vaccination rates below 85%
 - iii. The longest, most recent streak of reporting vaccination rates below 60% was in the years between 1997-2003
 - iv. India has been doing very well for only 2018 and 2019, reporting 93% vaccination rates or above
- The most money India ever spent on immunization programs is \$0.39 per person, which happened in 2017. However, in this same year, India relied primarily on outside funding from organizations like GAVI.
 - A. India only covered 36% of the cost during this time.
 - B. In 2019, the Indian government fully funded immunization programs and supported \$0.21 per person
- Prior to 2012, India did not report rubella cases to the WHO

Business case

- With growing awareness of vaccination due to the COVID-19 virus, this is a great opportunity to add SIA vaccination as well at a marginal cost.
- 25% of the global catchup population belongs to India and as per WHO/GAVI, approximately 110k children are born with disabilities due to the rubella virus per year; thus, India potentially has a large proportion of these children.
- India's cost to support each specially abled person is estimated at USD \$182k.
- India will have to pay roughly \$2.3 billion USD now to implement SIA. This is only 0.08% of India's GDP (2019: approximately \$3 trillion).
- In just 10 years, India will spend over \$4.75 billion USD to support specially abled children if India is to maintain current vaccination rates.
- If India implements a SIA for the target population, which are women aged 1-49 years old that have not been previously vaccinated for rubella, and maintain a 100% vaccination rate, India will instead spend USD \$3.5 billion.
- In 10 years, India has the potential to save \$1.25 billion while also saving the lives of future new born babies by preventing CRS and disability.
- In 15 years, India will instead have the potential to save \$3 billion.

Recommendations

- With very conservative estimates also over 10 years, India will save spending \$4.75 billion or more by investing \$3.5 billion or less on the SIA program and increasing the rubella vaccination rate to 100%.
- Not only is this ethically responsible to save the sufferings of thousands of children with disabilities and their families, this is also financially viable.



ABOUT THE AUTHORS

Priscila Amorim, Maggie Siu, Viviana Michel, Paxton Bryant, Sharon Li, and Charlie Duarte are pursuing a Master's in Data Science at Northwestern University with a concentration in Data Engineering. Their goal is to utilize data science as a driving tool in social justice across every sector, including the disability, environmental, and racial justice sectors.

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WHY THIS MATTERS TO VOSAP

VOSAP's mission of Data driven Advocacy has been strengthened by collaboration with the Data Sciences Department of UC Berkeley. While Covid19 Vaccination drive is going on VOSAP wanted to find data on Vaccinization against Rubella Virus. Reason being, even after 50 years of vaccine invention to protect against Rubella Virus. 110 thousand children were born with disabilities as per GAVI report. Because of the Rubella virus infecting the pregnant woman, the sufferings and cost associated with maintaining the life of specially abled children is enormous. This research project provides inputs on the investments and associated returns for various countries which students of UC Berkeley collected and analyzed data available for UNICEF and WHO. VOSAP intends to present its findings to help ministers, policy makers and ambassadors to the UN of selected countries.

ABOUT VOICE OF SPECIALLY ABLED PEOPLE INC

Voice of Specially Abled People (VOSAP) is a global advocacy organization built on the principles of Empowerment of Specially Abled People. In Special Consultative Status with UN ECOSOC, VOSAP is working to create an Inclusive and Accessible world by accelerating implementation of UN Sustainable Development Goals (SDGs) and goals of UN CRPD (Convention on the Rights of Persons with Disabilities) treaty. In addition to enabling individuals with assistive devices, surgical interventions, scholarships etc, VOSAP has created innovative digital transformation tools to promote inclusion of Person with disabilities such as (a) Virtual Art Gallery on Disability to educate masses on disability and promote inclusion, (b) create crowdsource demand for accessibility of public places and create mass movement of virtually connected $\approx 10,000+$ volunteers/changemakers using VOSAP App.

