

**Factors Influencing Coverage of Measles-Rubella Vaccination among Children
aged less than 5 Years in Sirsi village, Jaipur, Rajasthan**

**A Capstone project submitted to
IIHMR University
in partial fulfilment of the requirements for
the award of the degree of
Master of Public Health (Implementation Science)**

by

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Background

Vaccination programs play a crucial role in preventing the spread of infectious diseases and reducing morbidity and mortality rates among children worldwide. Measles and rubella are two such vaccine-preventable diseases that continue to pose significant public health challenges in many parts of the world, including India. Despite the availability of safe and effective vaccines, the coverage of measles-rubella vaccination remains suboptimal, leading to outbreaks and a significant burden on healthcare systems.

The study conducted by Dr. S.K Singh and team (August 2018) shows measles outbreak occurring in different districts of Rajasthan, a state located in the northwestern part of India (1). The capital city, Jaipur, is densely populated and home to various communities, including the rural village of Sirsi. Sirsi is a medium size village located in Amber Tehsil of Jaipur district, Rajasthan. It comes under Sirsi Panchayath. It is 16 KM from state capital Jaipur. The Sirsi village has population of 1476 of which 761 are males while 715 are females as per Population Census 2011 (2). Sirsi village has lower literacy rate compared to Rajasthan. In 2011, literacy rate of Sirsi village was 65.98 % compared to 66.11 % of Rajasthan. In Sirsi Male literacy stands at 81.82 % while female literacy rate was 49.10 %. Understanding the factors influencing coverage is essential for designing targeted interventions to improve vaccination rates and protect vulnerable populations.



Fig.1.Sirsi CHC, Jaipur, Rajasthan

Several studies have explored the factors influencing vaccination coverage in India, highlighting various determinants such as socioeconomic status, parental education, awareness, and accessibility to vaccination services (3), (4). However, no research specifically investigated the factors affecting the coverage of measles-rubella vaccination in the context of Sirsi Village, Jaipur. This study aims to address this research gap by examining the factors influencing the uptake of measles-rubella vaccination among children aged less than 5 years in Sirsi Village.

By identifying and understanding the underlying factors that hinder vaccination coverage in this specific setting, policymakers, healthcare providers, and community stakeholders can develop targeted strategies to enhance vaccination rates and ultimately contribute to the control and elimination of measles and rubella in the region.

Overall, this study seeks to shed light on the factors influencing the coverage of measles-rubella vaccination in Sirsi Village, Jaipur, Rajasthan, and provide valuable insights for the development of evidence-based interventions to improve vaccination uptake among young children in this population.

Program design and service delivery

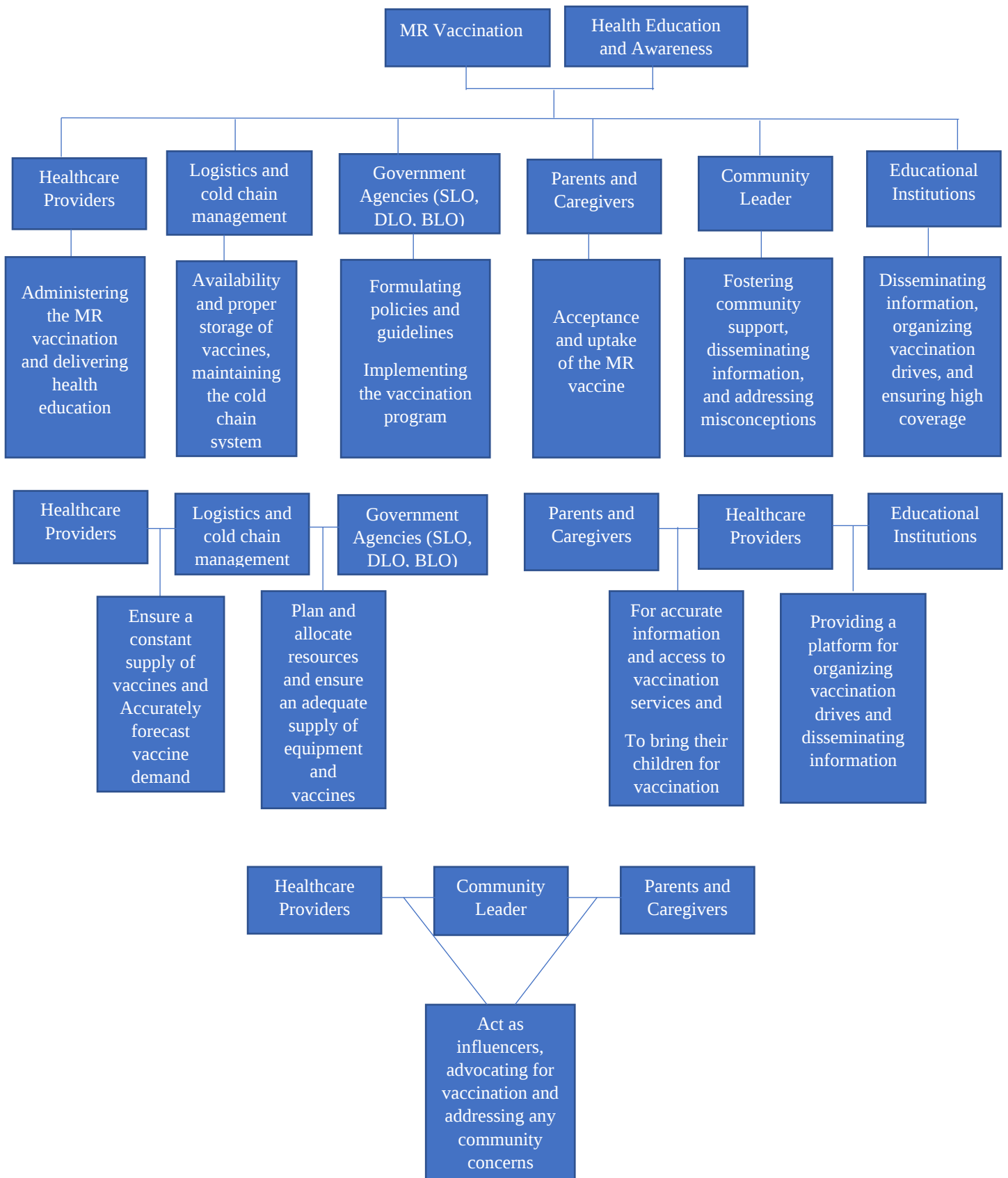


Fig.2. Schematic Illustration depicting Program design and service delivery.

Capstone Work area

Objectives:

1. To assess the prevalence of MR vaccine coverage
2. To study the factors influencing the uptake of MR vaccine among children aged less than five years.

Study Design:

The study has adopted the Mixed-Methods approach using the combination of quantitative and qualitative research methods to gather a holistic understanding of the factors influencing MR vaccination coverage.

In-order to achieve the above objectives an attempt has been made to gather data on the proportion of children aged less than five years who have received the MR vaccine in Sirsi village.

The various factors such as socioeconomic status, parental education, awareness about the vaccine, accessibility to vaccination services, cultural beliefs, and any barriers or challenges faced by the community were assessed by adopting multiple qualitative methods. The methods used for data collection are surveys, personal interviews, focus group discussions and records/reports review of secondary data.

The findings and recommendations will provide a basis for evidence-based interventions to improve vaccination rates, protect vulnerable populations, and ultimately contribute to the control and elimination of measles and rubella in the region.

Study Area:

Sirsi Community Health Centre, Jaipur, Rajasthan.

Data Collection

Quantitative:

Developed a structured questionnaire to collect quantitative data from parents/caregivers of children aged less than 5 years. Assessed the vaccination status of children through data collected from Sirsi

CHC and determined the coverage rate. Assessed the level of awareness and knowledge about MR vaccination among parents/caregivers and also identified specific challenges and enablers influencing vaccination coverage through a survey/structured questionnaire.

Qualitative:

In-depth Interviews and Focus Group Discussions (FGDs): Conducted qualitative interviews with a subset of parents/caregivers, healthcare providers (Doctor, ANM, and ASHAs). Explored in-depth perspectives, experiences, and perceptions related to MR vaccination. Gathered insights on challenges, enablers, and possible solutions to improve coverage.

Field visit documentation: Sirsi Community Health Center

Activity Description:

The Sirsi Community Health Center (CHC)'s operations and services were observed and documented during the field visit. The purpose of the visit was to learn more about the healthcare infrastructure, service delivery and healthcare providers' community engagement efforts in the context of the measles-rubella vaccination program.

Key Activities Conducted:

Arrival and Introduction: We introduced ourselves to the healthcare staff and explained the visit's purpose when we arrived at the Sirsi CHC. We were granted permission to observe and record the center's various activities.

Infrastructure and Facilities Assessment: The CHC's infrastructure and facilities were assessed. This included assessing the facilities for cold chain storage, vaccination rooms, waiting areas, examination rooms, and sanitation arrangements. Any observations regarding the facilities' adequateness or improvement were noted.

Service Delivery Observation: We observed the process of providing services, particularly the measles-rubella vaccination services. In order to ensure that standard operating procedures and infection control practices were followed, we documented the process from vaccination registration to administration. We also looked at whether or not the necessary equipment, like vials, syringes, and personal protective equipment (PPE), was available and used.

Interactions with Healthcare Providers: We discussed with Doctor, ANMs, and ASHAs, as well as conducted informal interviews. We inquired about their experiences administering the measles-rubella vaccine as well as their roles and responsibilities. Regarding challenges encountered, followed best practices, and any suggestions for service delivery enhancement were sought.



Fig.3. Interaction with Senior Medical Officer of CHC.

Cold Chain Management Assessment:

The cold chain management system was thoroughly evaluated. This required examining the data recording procedures, cold storage equipment (refrigerators, freezers), and temperature monitoring devices. Additionally, we examined the procedures for managing vaccine stocks, including vaccine receipt, storage, and transport protocols.



Fig.4. Cold Chain Management in CHC

Community Engagement Initiatives:

We documented any community engagement initiatives undertaken by the CHC related to the measles-rubella vaccination program. This included health education sessions, awareness campaigns, involvement of community leaders, and strategies to address vaccine hesitancy or misconceptions.

Data Collection and Documentation: Relevant data and information were collected during the visit, including photographs (with consent), and notes on observations, challenges, and successes. We ensured that all collected data adhered to ethical standards and maintained the privacy and confidentiality of patients and healthcare providers.



Fig.5. Collecting data, (Interviewing Caregivers)

Wrap-up and Gratitude: At the end of the visit, we expressed gratitude to the healthcare providers for their cooperation and willingness to share information. We emphasized the importance of their efforts in ensuring successful vaccination coverage and control of measles and rubella in the community.

Overall, the field visit to Sirsi Community Health Center provided valuable insights into

the infrastructure, service delivery, cold chain management, and community engagement initiatives associated with the measles-rubella vaccination program. The documented findings will contribute to a better understanding of the strengths and areas for improvement in the program implementation at the CHC level.

Service Statistics

Table 1. Service statistics

CHILD Immunization	April 2020 – March 2021 (Target 605)	April 2021 – March 2022 (Target 567)	April 2022 – March 2023 (Target 690)
MR – First dose	494	406	354
MR – Second dose	478	438	293

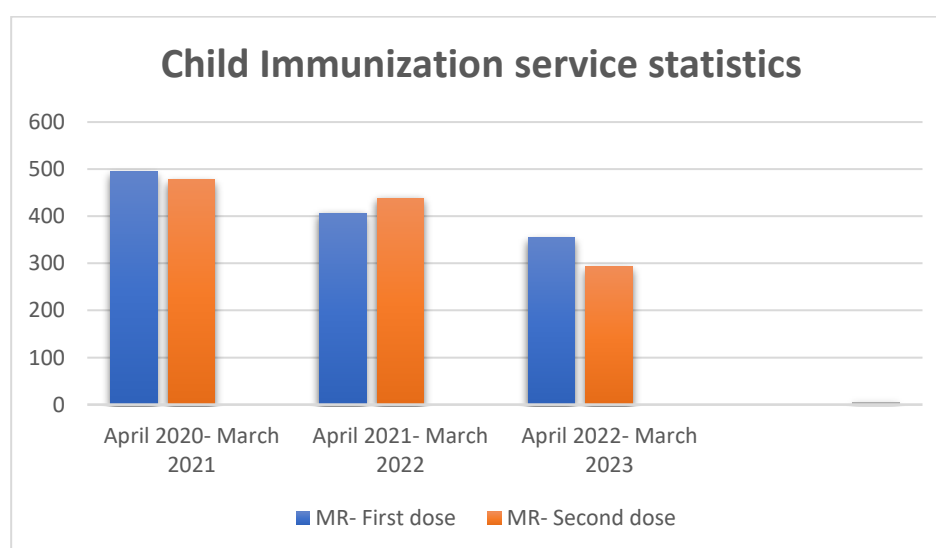


Fig. 6. Child Immunization service statistics.

Based on the above data, here is a description of the performance of the measles-rubella vaccination program.

From April 2020 - March 2021, the program achieved a vaccination coverage rate of approximately 81.65% for the first dose of MR vaccine (494 out of 605). However, there is a gap of 111 children between the target and the number of children vaccinated with the first dose. For the second dose of MR vaccine, the program achieved a coverage rate of approximately 78.84% (478 out of 605). Similar to the first dose, there is a gap of 127 children between the target and the number of children vaccinated with the second dose.

From April 2021 - March 2022, during this period, the program achieved a vaccination coverage rate of approximately 71.61% for the first dose of MR vaccine (406 out of 567). There is a gap of 161 children between the target and the number of children vaccinated with the first dose. For the second dose of MR vaccine, the program achieved a coverage rate of approximately 77.22% (438 out of 567). There is a gap of 129 children between the target and the number of children vaccinated with the second dose.

From April 2022 - March 2023, in this period, the program achieved a vaccination coverage rate of approximately 51.30% for the first dose of MR vaccine (354 out of 690). There is a significant gap of 336 children between the target and the number of children vaccinated with the first dose. For



Fig.7. Routine Immunization

the second dose of MR vaccine, the program achieved a coverage rate of approximately 42.46% (293 out of 690). There is a gap of 397 between the number of children who received the second dose and the target.

The program's overall performance varies across the various time periods. Between April 2020 and March 2021, coverage rates for the first and second doses of the MR vaccine are fairly high, but there are gaps between the target and the number of vaccinated

children. Lower coverage rates and larger gaps are seen in the subsequent periods (April 2021-March 2022 and April 2022-March 2023), indicating potential challenges to achieving the set targets. The reasons for this gap need to be looked into, and they could be things like inaccurate data entry, incomplete reporting, or difficulties reaching the intended audience.

Number of Immunization sessions

April 2020 – March 2021							
Camp	Type - A	Type - B	Type - C	Type - D			Total
Immunization sessions planned	4	3	0	0			7
Immunization sessions held	4	3	0	0			7
No. of Immunization sessions where ASHAs were present	7						
AEFI							
No. of cases of AEFI - Abscess	0						
April 2021 – March 2022							
Camp	Type - A	Type - B	Type - C	Type - D			Total
Immunization sessions planned	4	4	0	0			8
Immunization sessions held	4	4	0	0			8
No. of Immunization sessions where ASHAs were present	6						
AEFI							
No. of cases of AEFI - Abscess	0						
April 2022 – March 2023							
Camp	Type - A	Type - B	Type - C	Type – D			Total
				A	B	C	
Immunization sessions planned	0	0	0	5	11	0	16
Immunization sessions held	0	0	0	5	3	0	8
No. of Immunization sessions where ASHAs were present	7						
AEFI							
No. of cases of AEFI - Abscess	0						

Table 2. Service Statistics (Type – A: in the Center, Type – B: in Anganwadi, Type – C: in the schools/other areas, Type – D: in the remote areas)

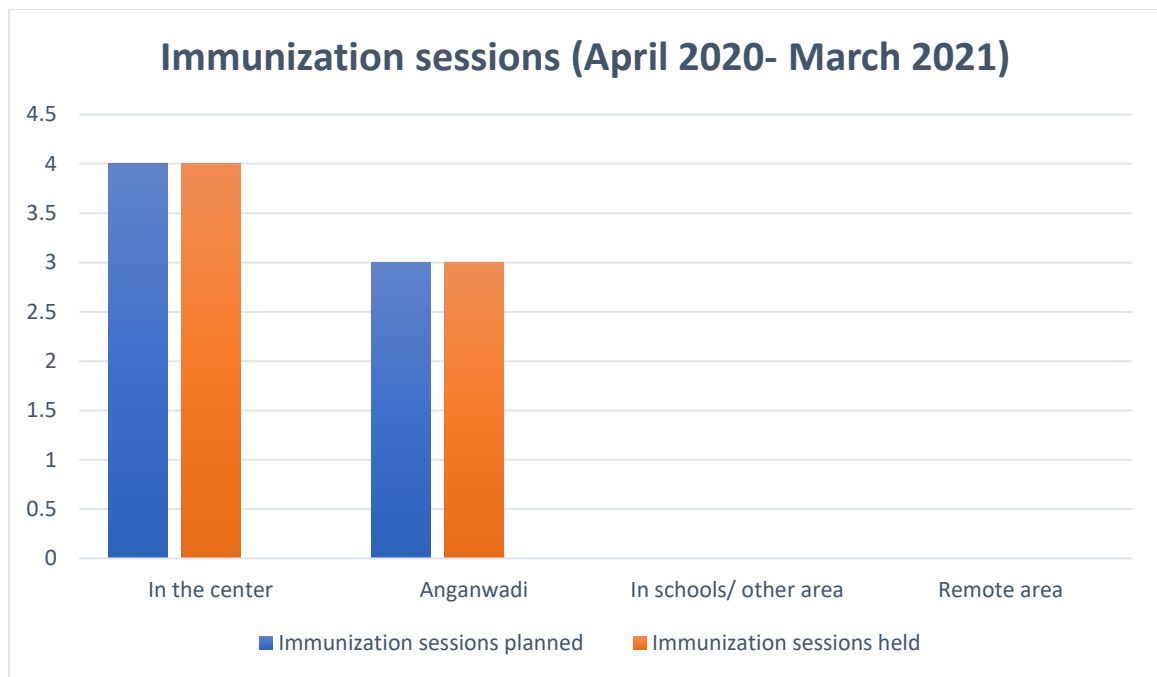


Fig.8. Immunization sessions (April 2020- March 2021)

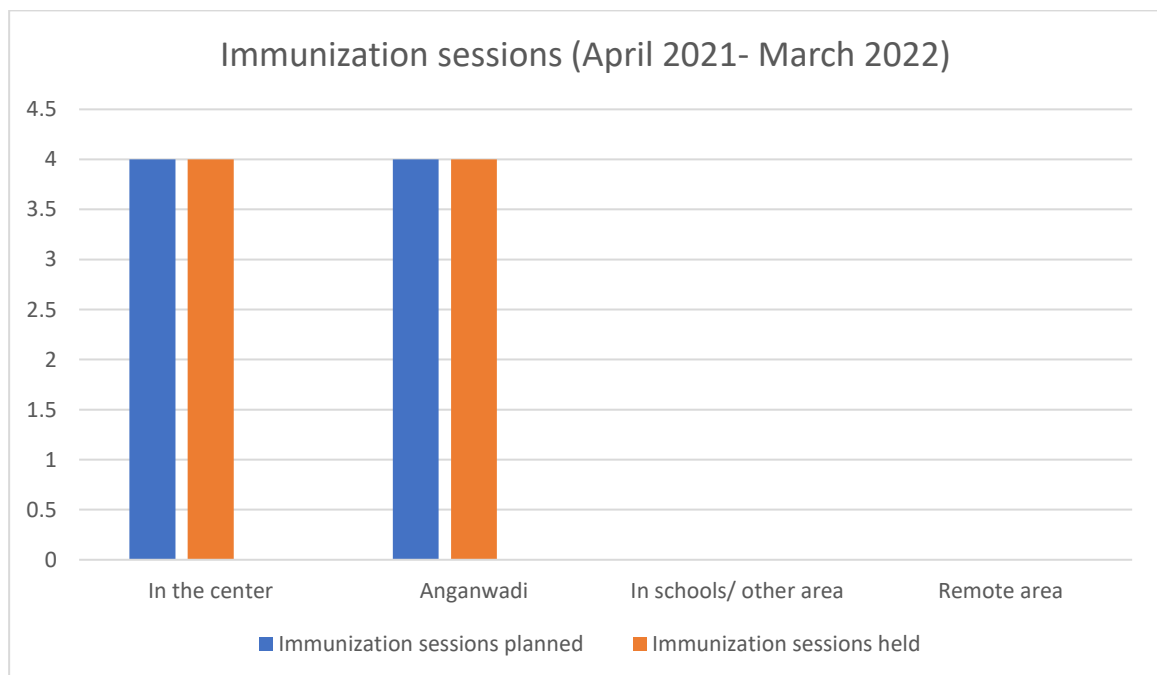


Fig.9. Immunization sessions (April 2021- March 2022)

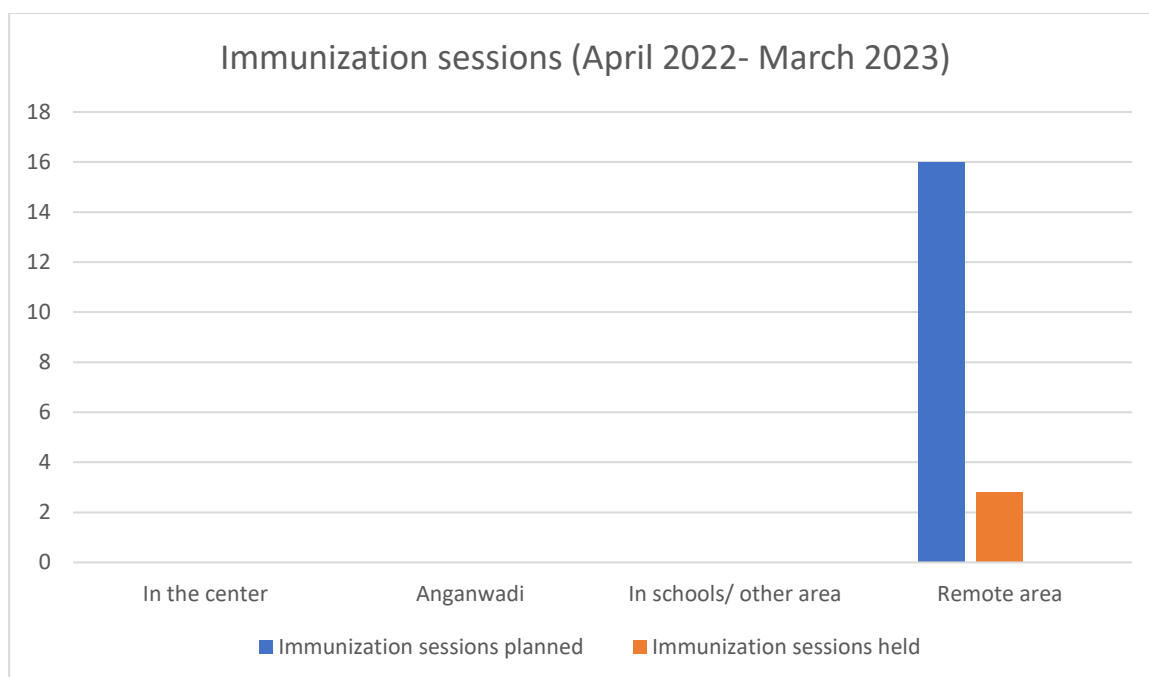


Fig. 10. Immunization sessions (April 2022- March 2023)

Based on the above data, here is a description of the performance of the MR immunization program.

From April 2020 - March 2021, during this period, the program demonstrated good performance in terms of planning and holding immunization sessions at the Sirsi Community Health Center and Anganwadi Center. All the planned sessions were successfully held, ASHAs were present in all immunization sessions held, indicating effective program management and coordination. However, there were no immunization sessions planned or held in schools or other areas and in remote area, which may indicate a gap in reaching children in those settings. The absence of adverse events following immunization- Abscess indicates the safety and quality of the vaccination program during this period.

From April 2021 - March 2022, during this period, the program continued to perform well at the Sirsi Community Health Center and Anganwadi Center, with all planned immunization sessions being held as per schedule but ASHAs were present only in 6 sessions out of 8 immunization sessions held. Similar to the previous period, no immunization sessions were planned or held in schools or other areas and in the remote area, indicating a need to address this gap in reaching children in those settings. The absence of adverse events following immunization- Abscess reinforces the program's commitment to ensuring the safety and quality of immunization services.



Fig.11. Immunization session in Sirsi CHC.

Type D means “in the remote area”, it is further classified into A,B,C (A: in the center, B: in Anganwadi center, and C: in schools /other areas). From April 2022 to March 2023, immunization session is neither planned nor held in the Sirsi community health center, Anganwadi center and in the schools or other area. In remote area, five immunization sessions planned and held as per planned in the center of remote area. 11 sessions planned in the Anganwadi center of remote area but only 3 immunization sessions held. Immunization sessions neither planned nor held in the schools or other areas of remote area. ASHAs

were present only in 7 immunization sessions out of 8 immunization sessions held and zero number of cases of adverse event following immunization- Abscess reaffirms the program's focus on maintaining high standards of safety and quality.

Overall, the program demonstrated effective performance in planning and holding immunization sessions at the Sirsi Community Health Center and Anganwadi Center. However, there is room for improvement in reaching children in schools, other areas, and remote areas. Strengthening the program's reach, particularly in underserved settings, and ensuring consistent planning and implementation of immunization sessions can contribute to improved performance and higher vaccination coverage rates.

Factors Associated with the MR vaccine uptake

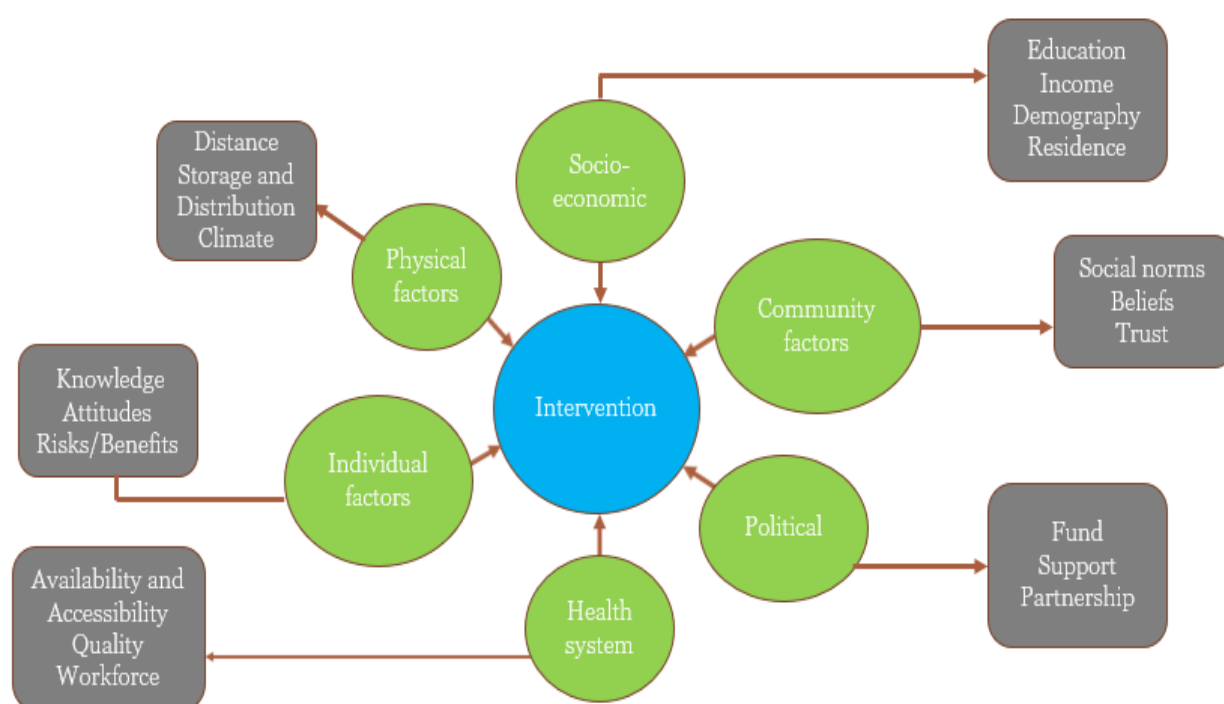


Fig.12. Factors Associated with the MR vaccine uptake.

Conceptual Framework

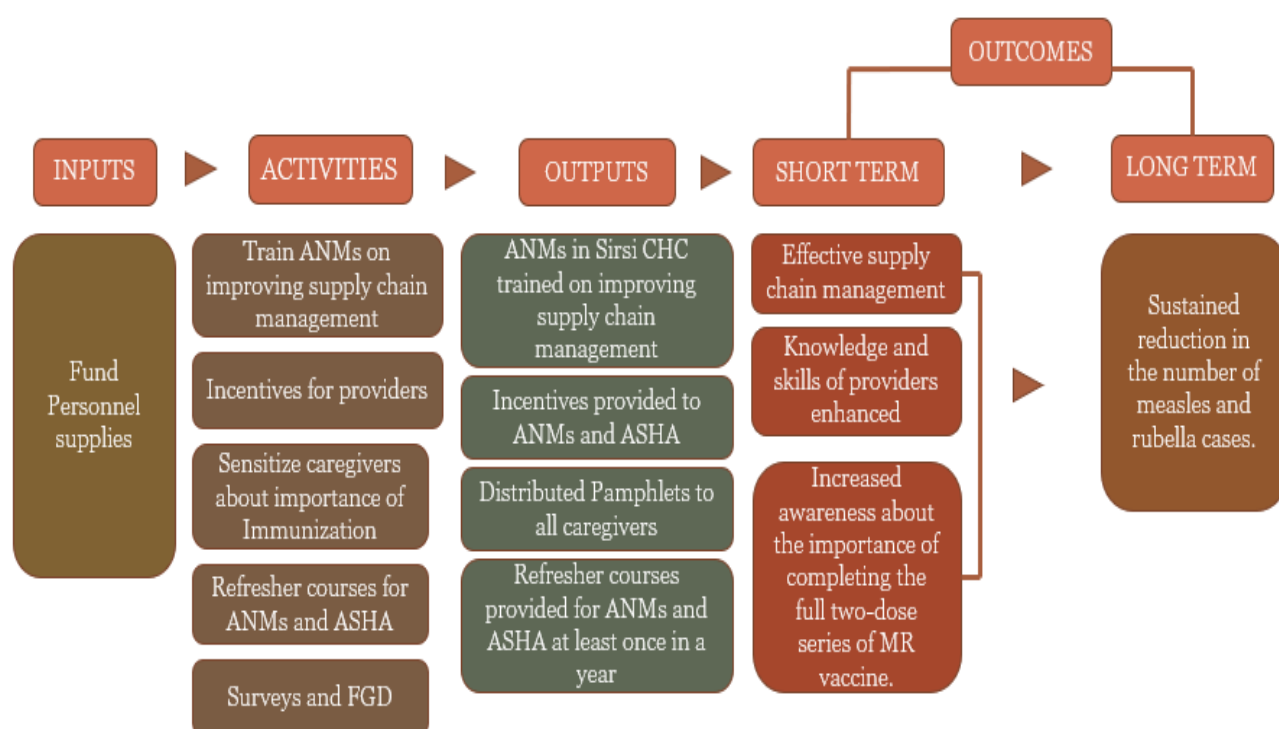


Fig.13. Conceptual Framework.

Synthesis Sheet

Based on the field interactions with Provider/ frontline workers

Challenges
Vaccine delivery to remote areas due to limited transportation options, incentives not provided on time/ very low incentives, extreme weather conditions.
Workload and time constraints, workload due to shortage of staff, this leads to limited interactions time with each patient or caregiver, hindering effective counselling, education and addressing individual concerns
Challenges in vaccine stock management, as there are more beneficiaries (people coming from different districts and villages) than the exact Sirsi village population. RCHO (Reproductive Child Health Officer) raise question.
Enablers
Training and Capacity building, in terms of cold chain management and data management and reporting
Supportive supervision
Community engagement and mobilization
Access to information and resources
Recognition and motivation

Based on the field interactions with Parents/ Caregivers

Challenges
Limited awareness about the importance of vaccination, the recommended immunization schedule can hinder caregivers from seeking vaccination services for their children.
Accessibility to vaccination centers, especially for families living in remote areas, can be challenging. Limited transportation options, long distances to healthcare facilities, and lack of nearby vaccination sites can make it difficult for parents/caregivers to access vaccination services.
Busy schedules, work commitments, and other family responsibilities make it difficult for parents or caregivers to find time to bring their children for vaccination.
Enablers
Accessible and Convenient Vaccination Services
Clear and Effective Communication
Community Engagement and Education
Vaccine Reminders and Outreach

Results

The socio-economic status of the caregivers was identified as a significant barrier to vaccination coverage. Limited financial resources, lack of awareness about the importance of vaccination, and competing priorities were identified as key factors contributing to low coverage rates. Addressing socio-economic disparities and implementing targeted interventions to reach disadvantaged populations will be crucial in improving vaccination coverage.

Additionally, logistical challenges, such as limited transportation options, were identified as barriers to vaccine delivery, particularly in remote areas. Strengthening the healthcare infrastructure, establishing mobile vaccine delivery units, and collaborating with local authorities and community leaders are essential for overcoming these challenges and ensuring vaccine access to all children, regardless of their geographical location.

The study also highlighted the importance of timely and adequate incentives for healthcare providers and community volunteers. Delayed or insufficient incentives can demotivate frontline workers and impact the quality and coverage of vaccination services. Therefore, it is crucial to establish a streamlined system for providing incentives and recognize the valuable contributions of healthcare providers and volunteers.

Findings

Table 3. Findings (Problems, Possible solutions with feasibility grades)

Problems	Possible Solutions	Feasibility	Priority
Insufficient healthcare infrastructure, there is no proper vaccination room/unit, no proper waiting area, shortage of staff, and limited resources.	• Improve and expand healthcare infrastructure, with proper vaccination room and waiting area and ensuring adequate staffing. • Provide necessary resources, especially cold storage equipment, to enhance service delivery. • Conduct training programs for healthcare providers especially on cold chain management, and communication skills.	Medium	High
Reaching remote areas of Sirsi Village poses challenges due to geographical barriers, poor transportation infrastructure, and limited healthcare facilities.	• Establish mobile vaccination clinics to reach remote areas. • Conduct regular outreach programs in collaboration with community-based organizations and local authorities to increase vaccination coverage in hard-to-reach areas. • Coordinate with transportation services to facilitate the movement of mobile clinics.	High	Medium
Maintaining the cold chain for the storage and transportation of vaccines is crucial for their efficacy. Challenges such as insufficient cold storage equipment, and inadequate training in cold chain management.	• Upgrade cold storage facilities, including refrigerators and freezers. • Train healthcare staff on cold chain management protocols, temperature monitoring, and vaccine stock management. • Implement a robust monitoring system to regularly assess the temperature integrity of the cold chain and take immediate corrective actions if deviations occur.	High	High
Outdated data collection and reporting systems which can impact data quality, Insufficient training and support for healthcare providers.	• Refresher training sessions can help maintain data collection skills, ensuring data quality, and using standardized reporting formats. • Invest in digital solutions and technologies that facilitate real-time data collection, analysis, and reporting. • Conduct regular data quality assessments and audits to identify and address data integrity issues.	High	Medium

Recommendations

Mobile vaccine clinics should be organized in schools and other remote areas of the community to improve access to vaccines. These clinics can provide MR vaccines, along with other routine childhood vaccines.

Increase the number and frequency of immunization sessions in Sirsi village to ensure convenient access for parents and caregivers and also extending the working hours of vaccination centers to accommodate working parents and caregivers who may find it challenging to visit during regular hours.

Involve parents and caregivers in decision-making processes, such as through parent advisory committees or community feedback mechanisms, to increase their sense of ownership and participation in the program.

Healthcare infrastructure in the community should be strengthened in terms of upgrading waiting areas, vaccination room. Ensure the availability of essential medical equipment and supplies for effective healthcare service delivery.

Provide on-job training and capacity-building sessions to healthcare providers on the importance of accurate and comprehensive reporting, on proper data entry procedures, use of standardized formats, cold chain management and also emphasizing the significance of effective communication with parents and caregivers to address their concerns and misconceptions.

Use data analysis to identify areas with low coverage rates and develop strategies to specifically target those areas and also conduct regular data audits to identify any gaps or inconsistencies in reporting and take corrective actions as needed.

Strengthen coordination and collaboration among different stakeholders, including government agencies, healthcare providers, and schools and educational institutions, to ensure a comprehensive and integrated approach in reaching the target population.

Ensure that incentives for healthcare providers and community volunteers involved in vaccine delivery are provided in a timely manner and recognize and appreciate the contribution of healthcare providers and community volunteers publicly, acknowledging their dedication and commitment.

Implement a robust monitoring and evaluation system to track vaccination coverage rates in real-time. Regularly assess the vaccination coverage rates and identify any gaps or barriers. Use this data to inform targeted interventions and adjust strategies to improve coverage.

Conclusion

Improving measles-rubella vaccination coverage among children aged less than 5 years in Sirsi Village, Jaipur, Rajasthan, requires a multifaceted approach. This includes addressing socio-



Fig.14. RI session in Sirsi CHC

economic disparities, enhancing knowledge and awareness among caregivers, strengthening the healthcare infrastructure, ensuring timely vaccine delivery to remote areas, and providing adequate incentives and support to healthcare providers. By implementing these recommendations, we can strive towards achieving higher vaccination coverage rates, ultimately protecting the health and well-being of the children in Sirsi Village.

Ethical Considerations

We sought ethical clearance and permission to conduct the study from the IIHMR University before proceeding to the study site. Prior to the commencement of the study, informed consent was obtained from all participants, specifically the parents or caregivers of children who were to be vaccinated. They were provided with comprehensive information about the purpose, procedures, potential risks, and benefits of the study.

Participants were informed of their right to refuse participation or withdraw their consent at any time without any consequences. The confidentiality of all participant's personal information was strictly maintained throughout the project. Data collected during the program were stored securely to ensure privacy and prevent unauthorized access. Only authorized personnel had access to the data.

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Annexure I

Vaccine	When to give	Dose	Route	Site
For infants				
Measles/ MR 1 st Dose	9 completed months- 12 months. (Can be given till 5 years of age)	0.5 ml	Sub-cutaneous	Right upper arm
For children				
Measles/ MR 2 nd Dose	16- 24 months	0.5 ml	Sub- cutaneous	Right upper arm

Community Interaction – Mothers of children reporting to immunization clinic/ OPD

Age of child (Months)	1	2	3
Age of caregiver Gender	M ☒ F ☐	M ☒ F ☐	M ☒ F ☐
क्या आपके बच्चे को अब तक के सभी टीके लगे हैं? / Is your child immunized with all the vaccines up to date?	1.5 years at age, till now received all vaccine.	Katik. (Gardasil) - 5 years Yes.	1 and half years (Vishar). Till now yes.
आपका घर यहाँ से कितना दूर पड़ता है? / How far is your house from here?	2 km	4 km.	almost 1 km.
<i>Educational level of caregiver -</i> आपके विचार में टीकों को लगाने के क्या फायदे हैं? / What are the benefits of getting vaccinated in your opinion?	Increase / boost immunity. Protect from disease.	Protect from disease. Boost immunity.	Increase immunity. Protect from disease.
क्या टीकाकरण के फायदों के बारे में आपको किसी ने समझाया? यदि हाँ तो किस तरह? जरा विस्तार में बताये। / Did anyone explain to you about the benefits of	She knows by herself.	know herself.	told by mother to have about the benefits.

→ Increase & caregiver/occupation -

R1

vaccination? If yes how? Please tell in detail.			
आपको अपने इलाज में जॉय या दवा में कोई दिक्कत हुई? / Have you had a problem with your test or medicine?	हाँ ☐ नहीं ☐ No.	हाँ ☐ नहीं ☐ No.	हाँ ☐ नहीं ☐ No, problem.
आपको बच्चे के टीकाकरण में कभी कोई समस्या महसूस हुई? यदि हाँ तो थोड़ा विस्तार से बताएं। / Have you ever experienced any problem with vaccination of your child? If yes, then explain in detail.	No.	only fever.	No.
आपके अनुसार अस्पताल की सुविधा और क्या सुधार होना चाहिए? / What else should be improved in the hospital facility according to you?	No, improvement	No, improvement required.	No, pediatric doctor, 3-4 km long to other hospital.

Annexures III