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**Original Research Article**

# A Cross-Sectional Study to Assess the Coverage and Determinants of the Measles-Rubella Vaccination Campaign in an Urban Field Practice Area

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**Abstract:**

**Background:** Measles and rubella are highly contagious viral diseases preventable through vaccination. Achieving and sustaining high coverage through mass campaigns is critical for disease elimination. The present study aimed to estimate the coverage of the Measles-Rubella (MR) vaccination campaign and identify reasons for non-vaccination among children in an urban field practice area.

**Objectives:** To estimate the coverage of the Measles-Rubella (MR) vaccination campaign among children aged 9 months to 15 years in the urban field practice area. Additionally, to identify the reasons for non-immunization in this population.

**Methods:** A community-based cross-sectional study was conducted from Jan 2023 to December 2023 in the urban field practice area of the Department of Community Medicine, Sheikh Bhikhari Medical College, Hazaribagh, Jharkhand. A total of 80 children aged 9 months to 15 years were selected through simple random sampling. Data were collected using a pre-tested semi-structured questionnaire administered to caregivers, and analyzed using SPSS version 25.

**Results:** The overall MR vaccination coverage was 70%. Male children had higher coverage (76.5%) compared to females (65.2%). Schools served as the primary site of immunization (64.3%), with school teachers being the main source of campaign awareness (35%). The major reasons for non-vaccination included illness on the day of vaccination (33.3%) and lack of awareness (29.2%). Only minor adverse events were reported post-vaccination.

**Conclusion:** The study revealed suboptimal MR vaccine coverage, emphasizing the need for enhanced awareness, gender-equitable outreach, and targeted follow-up strategies to bridge immunization gaps.

**Keywords:** Adverse effects, Awareness, Coverage, Immunization, Measles-Rubella.

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## Introduction

Measles and rubella are very contagious viral infections that affect humans and continue to be a significant public health problem worldwide [2]. Measles and rubella are both vaccine-preventable diseases, which remain endemic in many areas of the world, highlighting the challenges of reaching and sustaining satisfactory immunization coverage. Measles is a highly infectious paramyxovirus that infects the respiratory epithelial cells [1] causing measles and severe complications, including pneumonia, encephalitis, and death, particularly among malnourished children or infants and children with immunosuppression [1]. Rubella is generally a mild illness among children, but for pregnant women, rubella is serious as it may result in miscarriage or congenital rubella syndrome (CRS), which may cause serious birth defects including deafness, blindness, and heart problems [2].

To successfully eradicate measles and rubella, the World Health Organization (WHO) recommends reaching and sustaining at least 95% immunization coverage through routine immunization and supplementary immunization activities (SIAs) [2, 3]. In India, the Ministry of Health and Family Welfare (MoHFW) initiated the Measles-Rubella (MR) vaccination campaign in January–February 2017, which sought to vaccinate all children from 9 months to less than 15 years [4]. This is an integral part of the India's strategy to achieve measles elimination and rubella/congenital rubella syndrome (CRS) control by 2020. While the MR vaccination campaign has

been implemented across the country, there are concerns about the actual coverage and estimated vaccination levels, especially in urban settings and among deprived populations. There are various determinants of immunization uptake that may account for inequities such as sociodemographic, knowledge, logistical and safety considerations [5]. Post-campaign coverage monitoring and evaluation is essential in determining the unvaccinated population to inform future vaccination strategies.

Past seroprevalence studies have shown that coverage levels between 90% and 95% are necessary to eliminate transmission of both measles and rubella viruses [6]. However, the metrics on a national level often hide the disparities at the local level, and field-based assessments are necessary to fundamentally understand the problem. Urban field practice areas, with their populations and their diverse socioeconomic backgrounds are critical places for field assessments. They are a small snapshot for public health professionals to assess the coverage of their outreach efforts and the impediments for achieving full vaccine uptake. With this in mind, the present study was conducted to estimate the coverage of the Measles-Rubella vaccination campaign in the urban field practice area of Sheikh Bhikhari Medical College, Hazaribagh, Jharkhand, and to explore the reasons for non-immunization of children who missed vaccination during this campaign. The data will provide a very important clue to the coverage gaps and to the reasons for missed vaccination opportunities, as well as the appropriate evidence-based recommendations to improve the design and application of any future immunization endeavour.

A community-based, cross-sectional method of data collection was used to capture information from children 9 months to 15 years using a structured questionnaire. The study not only provides a snapshot of the coverage for vaccines after a significant national campaign but also enhances community awareness, health communication, and service delivery points (schools and anganwadis) associated with immunization uptake. The findings will contribute to discussions about implementation at the policy level to improve reach and effect on future mass vaccination campaigns, contributing to India's goal of measles elimination and controlling rubella.

## Methodology

**Study Design:** A community-based cross-sectional study was conducted to assess the coverage of the Measles-Rubella (MR) vaccination campaign and identify the factors contributing to non-immunization among children in the urban field practice area.

**Study Duration:** The study was conducted over a period of 12 months from Jan 2023 to December 2023

**Study Area:** The study was carried out in the urban field practice area under the Department of Community Medicine, Sheikh Bhikhari Medical College, Hazaribagh, Jharkhand, India. This area serves a diverse urban population and functions as a teaching and service delivery hub for community health interventions.

**Study Population:** The study population included children aged 9 months to 15 completed years residing in the designated urban field practice area during the time of the MR vaccination campaign.

**Sample Size:** A total of 80 children were included in the study. The sample size was determined based on feasibility, expected coverage from previous regional studies, and resource availability. The sampling aimed to ensure adequate representation across age and gender categories.

**Sampling Technique:** A simple random sampling method was used to select households from the urban field practice area. From each selected household, one eligible child was chosen randomly for participation in the study. If a household had more than one eligible child, only one was included to prevent clustering.

### Eligibility Criteria

### Inclusion Criteria

- Children aged 9 months to 15 completed years as of the date of data collection.
- Residents of the study area for at least 6 months prior to the survey.
- Parents or legal guardians willing to give informed written consent for participation.

### Exclusion Criteria

- Children with medical contraindications to vaccination.
- Families unwilling to participate or provide consent.
- Temporary residents and visitors in the household.

### Data Collection Tools

A pre-tested, semi-structured questionnaire was used for data collection. It was administered to parents or caregivers through face-to-face interviews. The questionnaire included sections on:

- Socio-demographic details
- History of MR vaccination (verified through immunization card when available)
- Source of information about the campaign
- Place of vaccination
- Reasons for non-vaccination (if applicable)
- Occurrence of any adverse events following immunization

**Data Collection Procedure:** Trained field investigators conducted household visits to administer the questionnaire. Immunization cards were reviewed for verification where available. For children without documentation, caregiver recall was used.

**Data Analysis:** Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics such as frequencies and percentages were used to summarize the data. Associations between categorical variables (e.g., gender and vaccination status) were tested using the Chi-square test, with $p < 0.05$ considered statistically significant.

**Results**

This section outlines the key results obtained from the study, including the age and gender distribution of participants, MR vaccination coverage, the role of various information sources and immunization sites, reasons for non-vaccination, and reported adverse events following immunization.

Table 1 presents the age-wise distribution of the 80 study participants. The largest proportion of children, accounting for 37.5% (n = 30), belonged to the 6–10 years age group, followed by 35% (n = 28) in the 9 months to 5 years age group. The remaining 27.5% (n = 22) were in the 11–15 years age group. This distribution indicates that the majority of the study population consisted of children in the lower and middle childhood age range, suggesting effective representation across all eligible age groups for the Measles-Rubella vaccination campaign.

**Table 1: Age-wise Distribution of Study Participants (n = 80)**

| Age Group (years) | Number of Children | Percentage (%) |
|---|---|---|
| 9 months – 5 years | 28 | 35 |
| 6 – 10 years | 30 | 37.5 |
| 11 – 15 years | 22 | 27.5 |
| **Total** | **80** | **100** |

Table 2 illustrates the gender-wise distribution of MR vaccination status among the study participants. Out of the total 80 children, 56 (70%) were vaccinated, while 24 (30%) were not. Among male children (n = 34), 26 (76.5%) received the MR vaccine, whereas 8 (23.5%) were not vaccinated. In comparison, out of 46 female children, 30 (65.2%) were vaccinated and 16 (34.8%) were not. Although overall vaccination coverage was higher among males than females, the data indicate a gender disparity in immunization uptake, with female children having a notably lower vaccination rate. This suggests the need for targeted awareness and intervention strategies to address potential gender-based barriers to immunization.

**Table 2: Gender wise Distribution of Study Participants (n = 80)**

| Gender | Vaccinated | Not Vaccinated | Total |
|---|---|---|---|
| Male | 26 | 8 | 34 |
| Female | 30 | 16 | 46 |
| **Total** | **56** | **24** | **80** |

Table 3 shows the distribution of vaccinated children based on the place of immunization. Among the 56 children who received the MR vaccine, the majority—36 children (64.3%)—were immunized at school, highlighting the pivotal role of educational institutions in vaccination outreach. This was followed by 12 children (21.4%) vaccinated at Anganwadi centers, and 6 children (10.7%) at government hospitals. A small fraction, 2 children (3.6%), received the vaccine at private healthcare facilities. These findings underscore the importance of schools and community-based centers like Anganwadis in achieving high vaccination coverage through accessible and organized immunization services.

**Table 3: Distribution Based on Place of Immunization (n = 56)**

| Place of Immunization | Number of Children | Percentage (%) |
|---|---|---|
| School | 36 | 64.3 |
| Anganwadi | 12 | 21.4 |
| Government Hospital | 6 | 10.7 |
| Private Facility | 2 | 3.6 |
| **Total** | **56** | **100** |

Table 4 highlights the sources of information about the MR vaccination campaign among the 80 respondents. The most common source was school teachers, reported by 28 respondents (35%),

followed by Anganwadi workers (20%) and health workers such as ANMs or ASHAs (12.5%). Media sources, including TV, radio, or newspapers, accounted for 10% of the information dissemination, while 7.5% of respondents received information through neighbors or relatives. Notably, 12 respondents (15%) reported receiving no information about the campaign at all. These findings indicate that while educational and community institutions played a significant role in spreading awareness, gaps in communication remain, emphasizing the need for more comprehensive and inclusive outreach strategies.

**Table 4: Source of Information Regarding MR Vaccination Campaign (n = 80)**

| Source of Information | Number of Respondents | Percentage (%) |
|---|---|---|
| School Teacher | 28 | 35 |
| Anganwadi Worker | 16 | 20 |
| Health Worker (ANM/ASHA) | 10 | 12.5 |
| Media (TV/Radio/Newspaper) | 8 | 10 |
| Neighbors/Relatives | 6 | 7.5 |
| No Information Received | 12 | 15 |
| **Total** | **80** | **100** |

Table 5 outlines the reasons for non-vaccination among the 24 children who missed the MR vaccine. The most commonly reported reason was that the child was ill on the day of vaccination, accounting for 8 cases (33.3%). This was followed by lack of awareness about the campaign in 7 children (29.2%) and being out of station or traveling in 4 cases (16.7%). Fear of side effects was cited by 3 caregivers (12.5%), while 2 caregivers (8.3%) simply forgot about the vaccination session. These findings reveal that both health-related and informational barriers significantly contributed to non-vaccination, underscoring the need for enhanced communication, reminder systems, and flexible vaccination strategies to improve coverage.

**Table 5: Reasons for non-vaccination (n = 24)**

| Reason | Number of Children | Percentage (%) |
|---|---|---|
| Child was ill on vaccination day | 8 | 33.3 |
| Unaware of campaign | 7 | 29.2 |
| Out of station/traveling | 4 | 16.7 |
| Fear of side effects | 3 | 12.5 |
| Forgot about session | 2 | 8.3 |
| **Total** | **24** | **100** |

Table 6 presents data on adverse events following immunization (AEFI) among the 56 children who received the MR vaccine. The majority of vaccinated children (89.2%) did not experience any adverse effects, indicating a high level of vaccine safety. Mild adverse events were reported in a small number of cases, with fever being the most common (5.4%), followed by pain at the injection site (3.6%) and rash or itching (1.8%). These findings suggest that the MR vaccine was generally well-tolerated, and the reported side effects were minimal and self-limiting, which supports the continued promotion of the vaccine in public health campaigns.

**Table 6: Adverse Events Following Immunization (AEFI) (n = 56)**

| Reported AEFI | Number of Children | Percentage (%) |
|---|---|---|
| Fever | 3 | 5.4 |
| Pain at injection site | 2 | 3.6 |
| Rash/itching | 1 | 1.8 |
| None | 50 | 89.2 |
| **Total** | **56** | **100** |

## Discussion

The current study evaluated the coverage of the Measles-Rubella (MR) vaccination campaign and reasons for non-vaccination among children 9 months through 15 years of age in the urban field practice area of Sheikh Bhikhari Medical College, Hazaribagh, Jharkhand. The total MR vaccination coverage in this study was 70%, which is still far below the national target of achieving a 90-95% coverage necessary to eliminate measles and control rubella, as recommended by the World Health Organization (WHO) [3,4]. This study finds there is a considerable opportunity to enhance implementation and uptake of MR campaigns in urban areas.

In terms of gender, coverage was higher among male children (76.5%) than female children (65.2%). The significant variation in male and female MR vaccine uptake lends credence to previous findings by Scobie et al., (2015) in Jharkhand where gender differences of MR vaccine uptake were found, underscoring the influence of sociocultural norms and healthcare-seeking behavior that sometimes disempower female children. These patterns require the implementation of gender-sensitive strategies in public health campaigns.

Schools were the most effective total venue for vaccine delivery in this study accounting for 64.3% of vaccinations. This is consistent with the findings of Giri et al., (2011), who found that school-based mass MR vaccination campaigns were highly covered and had good community participation in Bhutan []. The campaign also utilized Anganwadi centers and government hospitals for its reach, however in lower proportions. This brings to light the work which needs to happen to strengthen multi-site immunization delivery systems for those participants who are not engaged with schools.

The majority of information was distributed via schoolteachers (35%) and the second highest proportion was Anganwadi workers (20%) and health workers (12.5%). However, 15% of respondents had no information at all about the campaign providing a possibility that this lack of information contributed to non-vaccination. In AILA- affected areas of West Bengal Dasgupta et al. (2010) also noted that gaps in information dissemination and lack of community health platform engagement were both contributing to lower coverage []. Therefore, it clear that improvements in communication strategies are required specifically with local opinion leaders, media, and community stakeholders, such as ASHAs and Anganwadi workers.

The most common excuses for not vaccinating were the child being sick on the day of vaccination (33.3%), unawareness (29.2%), and out of station (16.7%). These were also some of the reasons that were recorded in the post-campaign evaluations by Scobie et al. (2015) which reported unawareness of the campaign (69.4%) and travelling (5.4%) as major contributors to missed vaccinations in post-campaign evaluations done in Jharkhand [12]. These barriers can be modified through scheduling, pre-campaign awareness, and follow up for absences. The MR vaccine was well tolerated in this study, 10.8% of the vaccinated children experienced mild adverse events (fever, local pain, and rash). This observation supports the safety data from Giri et al. (2011) which reported only mild adverse events (fever, body ache and local pain) in their post-campaign analysis [10]. Thus, this data further supports that public reassurances about vaccination safety may act as a help to alleviate hesitations around vaccines.

In summary, this study showed a moderate campaign performance, and characterized the gaps identified, and how they could be addressed in the future. Future MR campaigns may want to focus more on under-served and school absentee children engagement, decreasing gender differences, and using more targeted, multi-pronged mechanisms for awareness and follow up to try and address universal engagement.

## Conclusion

This study's findings demonstrate that MR vaccination coverage remains below satisfactory levels in the urban field practice area of Sheikh Bhikhari Medical College, Hazaribagh, India, to achieve measles elimination and rubella control. The suboptimal rates of 70% highlight continued issues related to insufficient understanding, illnesses related to absenteeism and problems of gender assumptions associated with lack of applicable capacities to identify immunised children. Schools were identified as the setting of delivery, as they provided vaccine capacity; indeed, with school teacher's evidence of serving their primary source of information. The low frequency of AEFI reflects the safety of the vaccine. These findings highlight the need to strengthen community involvement, develop gender-equal strategies and improve communication to address barriers to immunisation.

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