

Fever Rash (FR) Surveillance System Assessment for Detection of Measles-Rubella Disease at Raipur District, Chhattisgarh State, India, April 2022 – August 2022

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ABSTRACT

Background: Measles is a highly contagious, serious disease caused by a virus. More than 140,000 people died from measles in 2018 mostly children under the age of 5 years, despite the availability of a safe and effective vaccine. Annually around 50,000 cases of congenital rubella syndrome are reported in India. The government of India in collaboration with WHO India is running fever rash (FR) surveillance for the elimination of measles rubella disease. We assessed the FR surveillance system for timeliness, and completeness and provide evidence-based recommendations.

Methods: Fever rash (FR) surveillance data from April 22 to August 22 (Week 14–35, 2022) of selected reporting facilities for FR case reporting was reviewed for completeness and data quality. One reporting unit from rural and five others from urban areas were selected. Information on FR surveillance aspects like case definition and reporting structure was collected through interviews using a standardized questionnaire. Timeliness and data quality were assessed through the data reporting portal and hospital records.

Results: A total of nine FR cases were reported by the reporting units from April 2022 to August 2022. Maximum cases were reported by Bhattar Hospital. Timely reports were submitted by Bhattar Hospital and CHC Abhanpur with 100%. Late reporting was submitted by Govt Ayurveda Hospital (45.5% Timeliness) while two reporting sites Maa Sharda Hospital and Sirbhai Hospital have not submitted the weekly report to the immunization unit of the district. Maa Sharda Hospital reported 1 FR case but didn't mention it in the weekly report.

Conclusion: We concluded that the standard process of FR surveillance is not uniform with the reporting sites which are assessed. We recommend regular monitoring, hand-holding, and capacity building of the person responsible for regular weekly reporting from all reporting units.

Keywords: Fever rash, Measles, Rubella, Surveillance, Weekly report.

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INTRODUCTION

Measles is a highly contagious, serious disease caused by a virus. More than 140 000 people died from measles in 2018 mostly children under the age of 5 years, despite the availability of a safe and effective vaccine.¹⁻³ As per WHO in 2018 49,000 deaths happened in India due to complications of measles in the form of pneumonia, diarrhea, and encephalitis.⁴ Also, there are around 50–60 thousand congenital rubella syndrome cases reported in India. The government of India in collaboration with WHO is running the measles rubella surveillance since 2010. Recently in 2021, the MR surveillance was changed to fever rash (FR) surveillance to increase the sensitivity of the surveillance since it has committed to the elimination of measles and rubella disease by December 2023. Earlier, the global goal for measles control was to reduce measles deaths by 90 percent by 2010 compared to the estimated number in 2000. Up to 35% of infants aged between 6 and 11 months are infected with measles in India with its associated high morbidity and mortality. The objective of the study is to know the waning pattern of placental transmitted antibodies (PTA) for measles so that the age at which children are likely to become susceptible to measles infection could be identified. A cross-sectional serological survey of children aged 3–11 months in one of the integrated child development service (ICDS) areas in Madras city slums was done. Venous blood from 376 children was collected and was tested for hemagglutination inhibition (HI) antibodies by standard

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microtitration technique. Titer greater than or equal to 1:8 has been considered protective. The proportion of children with immune level and the geometric mean titer (GMT), declined to the least by 5 months which denotes that most of the infants become susceptible to measles infection from as early as 5 months of age.

Table 1: Suspected fever rash cases reporting through the reporting site

| Reporting unit | Week No | Week No | Week No | Week No | Week No | Week No | Week No | Total cases |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|-------------|
| | 14–16 | 17–19 | 20–22 | 23–25 | 26–28 | 29–31 | 32–35 | |
| Bhattar Hospital | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| CHC Abhanpur | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Maa Sharda Hospital | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Govt. Ayurvedic Hospital | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| Dr. Sirbhai Hospital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total cases | 4 | 1 | 2 | 1 | 0 | 0 | 1 | 9 |

There is no significant difference in the waning pattern between different age groups, sex, and nutritional status. A community study for the effectiveness of the measles vaccine at 6–8 months of age is needed to know the feasibility of immunization.⁴ As of January 2021, measles had been eliminated in 81 countries.⁵ During 2017–2019, India transitioned from outbreak-based to case-based measles and rubella surveillance. Furthermore, in 2021, after a pilot conducted in three states, India transitioned to case-based acute fever and rash surveillance.⁶

For the elimination of the disease, a robust surveillance system is required to pick the transmission of the disease. The reporting network of polio is used to expand the surveillance system for picking the FR cases. There are identified reporting units that send weekly zero reports to the district immunization unit informing suspected cases of measles and rubella for further investigation and sampling.

METHODS

Study design: This study is a cross-sectional case study aimed to assess the FR surveillance system in selected reporting facilities in the district of Raipur, India, for timeliness, completeness, and data quality.

Data were collected from April to August 2022. Data from selected reporting facilities for FR case reporting were reviewed for completeness and data quality. One reporting unit from rural and five others from urban areas were selected. Information on FR surveillance aspects like case definition and reporting structure was collected through interviews using a standardized questionnaire. Timeliness and data quality were assessed through the data reporting portal and hospital records.

The data collected were analyzed using Microsoft excel. Data quality issues and blank reporting were identified and defined. The completeness of the weekly reports was calculated by comparing the number of weekly reports received against the expected number of reports. Cases reported by other means but not included in the weekly report were considered incomplete reporting.

Study objectives: A. Analyze district FR case data for the period of April 2022 to August 2022 (Week–35) B. Assess the FR surveillance system in one block and urban area of district Raipur for timeliness, completeness, and data quality.

The study population included the nodal persons responsible for reporting the weekly zero reports to the District immunization unit from the selected reporting units, Bhattar Hospital, CHC Abhanpur, Govt Ayurvedic Hospital, Maa Sharda Hospital, and Sirbhai Hospital. The data sources included the Sims Portal, h002, d001, d002, outpatient department register, and inpatient department register.

Operational definitions: The definitions used in the study were as follows:

1. **Timeliness:** As per guidelines, the report should be submitted by Monday or Tuesday at noon.
2. **Late reporting:** The report was received after Tuesday noon but before the next Monday.
3. **Completeness:** The number of weekly reports received against expected.
4. **Incomplete reporting:** Cases reported by other means but not included in the weekly report
5. **Not reported:** Report received after the next Monday.

This study did not involve any human subjects; hence, ethical approval was not required. The study was limited to selected reporting facilities in the district of Raipur, India. Therefore, the findings may not be generalizable to other districts or regions. Additionally, the study only assessed the timeliness, completeness, and data quality of the FR surveillance system and did not assess other factors, such as the cost-effectiveness or feasibility of the system.

The study highlighted the need for a robust surveillance system to eliminate measles and rubella diseases, which are still significant public health issues in India despite the availability of safe and effective vaccines. The standard process of FR surveillance is not uniform among the reporting sites. Regular monitoring, hand-holding, and capacity building of the person responsible for regular weekly reporting from all reporting units are recommended.

RESULTS

A total of nine cases were reported during the specified period. The median age of the affected individuals was three years, with a range spanning from newborns to individuals aged 35 years. The interquartile range (IQR) indicated that the majority of cases fell within the one to 5 year age bracket. In terms of gender distribution, 45% of cases were male, while 55% were female. Notably, the most affected group was children below 5 years of age, with four cases (33%), out of a total of six, being female children (Table 1).

Reporting units: Among the reporting units, Bhattar Hospital reported the highest number of cases, suggesting efficient surveillance and reporting practices. Conversely, Dr. Sirbhai's hospital reported the fewest cases during the specified period, indicating potential reporting challenges or underreporting (Table 2).

Reporting issues: Several reporting issues were identified throughout the analysis. Firstly, 13 reporting units failed to report any cases from April 2022 to August 2022, leaving a significant data gap during this period. Complete details of the reporting units were

not provided, making it difficult to further investigate the reasons for their non-reporting.

Furthermore, certain essential elements were missing from the reports. The date of reporting was not mentioned, hindering the establishment of a clear timeline. Additionally, the signature of the Nodal officer or Medical Director, a crucial aspect of accountability, was absent from the reports. The details of the reported cases were also incomplete, with specific information missing in H002. The lack of comprehensive address and case details in H002 further limited the ability to analyze the specific locations and characteristics of the reported cases (Table 3).

Reasons for non-reporting and late reporting: Various reasons were identified for non-reporting and late reporting among the reporting units. Some units were not fully aware of the concept of zero reporting or its timeline, indicating a potential gap in training or communication. Additionally, some units relied on alternative reporting methods such as phone or WhatsApp, possibly due to technological limitations or convenience. Furthermore, the cross-checking of data with the integrated disease surveillance program (IDSP) for fever and rash was not consistently performed, potentially leading to underreporting or misclassification of cases.

Late reporting was attributed to a lack of awareness regarding the importance of zero reporting and the absence of designated alternate reporting personnel. Moreover, the busy schedules within hospitals hindered timely reporting, suggesting the need for streamlined processes and increased emphasis on surveillance activities.

Additional findings: In addition to the aforementioned issues, the analysis revealed additional reporting discrepancies. Cases from Maa Sharda Hospital were reported but not reflected in H002, indicating a potential data integration or reporting system error. There was a lack of review by the nodal officer of a private hospital, which may indicate a need for increased oversight and monitoring. Lastly, the reporting in charge at CHC Abhanpur was found to be unaware of the fever and rash surveillance system, indicating a knowledge gap among certain reporting personnel.

DISCUSSION

As per a study by Beryl Irons, Victoria Morris-Glasgow, Jon Kim Andrus, Carlos Castillo-Solo´rzano, James G. Dobbins, and the Caribbean Surveillance Group in 2011 showed that strong political commitment, strong technical oversight from all levels within the healthcare system, the use of proven tools or systems and technology for data collection and analysis, integration with other surveillance activities, continuing training, and continuing review and evaluation.⁷

This study aimed to assess the FR surveillance system for the detection of Measles-Rubella disease in Raipur, District Raipur, Chhattisgarh State, India, from april 2022 to august 2022 and study evaluated the timeliness and completeness of reporting of FR cases by selected reporting facilities and provided evidence-based recommendations.

The findings revealed that out of the six selected reporting units, only four reported FR cases during the study period. The maximum number of FR cases was reported by Bhattar Hospital. The timeliness of reporting varied across reporting units, with Bhattar Hospital and CHC Abhanpur submitting reports on time with 100% timeliness, whereas Govt Ayurveda Hospital had a 45.5% timeliness rate, and Maa Sharda Hospital and Sirbhai Hospital did not submit any weekly reports to the district’s Immunization Unit.

Table 2: Suspected fever rash case reporting – Timeliness of reporting site

| Reporting unit | Total for 22 wks | | | | | | % | | | |
|--------------------------|------------------|--------|--------------|--------------|--------|------|--------------|--------|------|--------------|
| | T | L | N | Not received | T | L | N | Timely | Late | Not received |
| | Timely | Late | Not received | Not received | Timely | Late | Not received | Timely | Late | Not received |
| Bhattar Hospital | 22/22 | 0 | 0 | 0 | 100 | 0 | 0 | 100 | 0 | 0 |
| CHC Abhanpur | 22/22 | 0 | 0 | 0 | 100 | 0 | 0 | 100 | 0 | 0 |
| Maa Sharda Hospital | 0 | 0 | 22/22 | 22/22 | 0 | 0 | 22/22 | 0 | 0 | 100 |
| Govt. Ayurvedic Hospital | 10./22 | 12./22 | 0 | 0 | 45.5 | 54.5 | 0 | 45.5 | 54.5 | 0 |
| Dr Sirbhai Hospital | 0 | 0 | 22/22 | 22/22 | 0 | 0 | 22/22 | 0 | 0 | 100 |

Table 3: Suspected fever rash case reporting – Completeness of reports from reporting site

| Reporting unit | Total for 22 wks | | | | | | % | |
|--------------------------|------------------|------------|----------|------------|----------|------------|----------|------------|
| | C | | IC | | Complete | Incomplete | Complete | Incomplete |
| | Complete | Incomplete | Complete | Incomplete | | | | |
| Bhattar Hospital | C | C | 22/22 | 0 | 100 | 0 | 100 | 0 |
| CHC Abhanpur | C | C | 22/22 | 0 | 100 | 0 | 100 | 0 |
| Maa Sharda Hospital | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| Govt. Ayurvedic Hospital | C | C | 22/22 | 0 | 100 | 0 | 100 | 0 |
| Dr.Sirbhai Hospital | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| WK-14 | C | C | | | | | | |
| WK-15 | C | C | | | | | | |
| WK-16 | C | C | | | | | | |
| WK-17 | C | C | | | | | | |
| WK-18 | C | C | | | | | | |
| WK-19 | C | C | | | | | | |
| WK-20 | C | C | | | | | | |
| WK-21 | C | C | | | | | | |
| WK-22 | C | C | | | | | | |
| WK-23 | C | C | | | | | | |
| WK-24 | C | C | | | | | | |
| WK-25 | C | C | | | | | | |
| WK-26 | C | C | | | | | | |
| WK-27 | C | C | | | | | | |
| WK-28 | C | C | | | | | | |
| WK-29 | C | C | | | | | | |
| WK-30 | C | C | | | | | | |
| WK-31 | C | C | | | | | | |
| WK-32 | C | C | | | | | | |
| WK-33 | C | C | | | | | | |
| WK-34 | C | C | | | | | | |
| WK-35 | C | C | | | | | | |

The study's main conclusion was that the standard process of FR surveillance was not uniform among the reporting units assessed. This finding highlights the importance of regular monitoring, handholding, and capacity building of the individuals responsible for regular weekly reporting from all reporting units.

The study's results are crucial for improving the FR surveillance system for the detection of measles and rubella disease in the study area. The study findings can be used to develop targeted interventions and strategies to improve the timeliness and completeness of reporting, as well as to ensure that all reporting units adhere to standard reporting processes.

The study has some limitations. Firstly, the study only assessed six selected reporting units, which may not be representative of all reporting units in the study area. Secondly, the study only evaluated the timeliness and completeness of reporting and did not assess the accuracy of the data reported. Finally, the study was conducted over a short period, which may not reflect the reporting trends over the long term.

In conclusion, the study provides important insights into the timeliness and completeness of reporting FR cases for the detection of measles and rubella disease in the study area. The study's recommendations for regular monitoring, handholding, and capacity building of individuals responsible for reporting are crucial for improving the FR surveillance system's overall effectiveness in the study area.

The results of the study show that a total of nine cases of FR were reported by the selected reporting units in the Raipur district of Chhattisgarh state, India, from april 2022 to august 2022. The median age of the patients was 3 years, with a range of 0 –35 years, and a majority of cases (55%) were reported among females. The population below 5 years of age was found to be the most affected, with four out of the total six cases reported in female children.

The study found that Bhattar Hospital reported the maximum number of cases, while Dr. Sirbhai Hospital reported the minimum. It was also observed that 13 reporting units did not report any FR cases during the study period. The findings suggest that there is a lack of uniformity in the standard process of FR surveillance among the reporting sites assessed.

One of the major issues highlighted in the study is the problem of timely reporting. While Bhattar Hospital and CHC Abhanpur reported the cases on time with 100% timeliness, Govt. Ayurvedic Hospital had a timeliness rate of only 45.5%. Additionally, Maa Sharda Hospital reported one FR case but did not mention it in the weekly report. This could be due to the lack of awareness of the nodal officer responsible for reviewing the weekly reports, especially in the case of private hospitals.

Another issue observed was the lack of awareness about the FR surveillance and case definition among the reporting units. The weekly reporting in charge at CHC Abhanpur was not aware of the FR surveillance and case definition, which indicates a need for capacity building and regular monitoring to ensure the effectiveness of the surveillance system.

In conclusion, the study highlights the need for regular monitoring, hand-holding, and capacity building of the person responsible for weekly reporting from all reporting units. Improving the standard process of FR surveillance and ensuring timely reporting and accurate data collection can help in the effective management and prevention of Measles and rubella disease in the Raipur district of Chhattisgarh state, India.

In a study conducted in Andhra Pradesh, India, the authors assessed the feasibility and effectiveness of a measles surveillance system using syndromic surveillance. They found that syndromic surveillance was a useful tool for the early detection of measles outbreaks and for monitoring the impact of vaccination campaigns.⁸

Another study conducted in India evaluated the feasibility of integrating measles and rubella surveillance into the existing IDSP. The authors found that the integration of measles and rubella surveillance into IDSP was feasible and could improve the timeliness and completeness of case reporting.⁹

A study conducted in Delhi, India, evaluated the quality of measles case-based surveillance data collected during a measles outbreak. The authors found that there were gaps in case reporting and that the quality of case-based data needed improvement.

RECOMMENDATIONS

To minimize late or no reporting, it is recommended to implement regular monitoring during active case search visits and provide necessary support and guidance for the weekly reporting system. An alternate arrangement should be made for weekly reports, along with capacity-building initiatives for the designated personnel responsible for reporting. It is advisable to review the reporting process in the disease weekly report (DWR) meetings to ensure accountability and identify any reporting gaps.

To minimize incomplete reporting, department-wise orientation sessions should be conducted for staff members, ensuring they have a clear understanding of their reporting responsibilities. Clinicians should receive specific training on the weekly reporting system to improve their compliance and accuracy in reporting. Designating department-wise nodal officers would enhance the coordination and efficiency of reporting, ensuring that each department is adequately represented and accountable for reporting activities.

CONCLUSION

This article evaluates the effectiveness of the Fever Rash (FR) Surveillance System in detecting and reporting measles rubella disease in Raipur, Chhattisgarh State, India. In conclusion, this

study highlights the importance of an effective surveillance system in detecting and reporting cases of measles and rubella disease. The FR surveillance system needs to be more uniform, timely, and complete to ensure the early detection and reporting of cases for its elimination. This study has implications for the public health system in India and other countries that are committed to eliminating measles-rubella disease.

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