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EVALUATION OF MEASLES AND RUBELLA SURVEILLANCE IN TAMIL NADU DURING JAN 2023-DEC 2023.

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ABSTRACT

INTRODUCTION : As India progresses towards elimination of Measles and Rubella (MR), a sensitive case-based MR surveillance system is essential to monitor and sustain progress towards elimination of MR. To achieve the Immunization Agenda 2030 and accomplish Measles elimination, monitoring the performance indicators of MR surveillance becomes imperative. The objective of this study is to evaluate Measles and Rubella Surveillance in Tamil Nadu during Jan 2023-Dec 2023.

METHODS : This is a retrospective observational study conducted using secondary data on MR surveillance. All the Fever Rash (FR)/suspected MR cases reported in VSIMS - Vaccine Preventable Diseases Surveillance Information Management System portal during the period Jan 2023 to Dec 2023 is taken for the study. All the key performance indicators were compared with Measles and Rubella Surveillance Field guide 2020 guidelines released by Ministry of Health and Family Welfare, Government of India.

RESULTS : Of the 6,588 FR cases reported in VSIMS portal, timely case investigation were done for 96.91% of the cases. Adequacy of serological sample collection is 99.73%. There is a substantial delay in timely laboratory reporting. All the outbreaks have been investigated. NMNR discard rate for Tamil Nadu for the year 2023 was 6.13/10,00,000 population.

CONCLUSION : All the outbreaks flagged were investigated and final classification completed. Non-Measles and Non-Rubella Discard rate is well above the target set by MoHFW. Overall, Tamil Nadu's performance in MR Surveillance aligns well with the established guidelines, demonstrating significant progress toward measles elimination.

KEYWORDS : Surveillance, Measles, Rubella, VSIMS, Vaccine Preventable Diseases

INTRODUCTION

Measles is one of the world's most contagious diseases¹ with basic Reproduction Number (R_0) range of 12-18, which means that each person with Measles would, on average, infect 12-18 other people in a totally susceptible population². It has an increased risk of severe complications or death among children aged less than five years of age. Rubella infection occurring during early pregnancy might result in Congenital Rubella Syndrome (CRS). However, both these diseases are preventable and can be eliminated through effective vaccination practices.¹

India introduced the first dose of Measles-Containing Vaccine (MCV1) in the Routine Immunization (RI) programme in 1985 and a second dose of Measles Containing Vaccine (MCV2) was introduced into the RI schedule in 2010. Rubella-containing vaccine (RCV) was introduced in RI as MRCV1 and MRCV2 in 2017. In 2018-2019, India achieved an MRCV1 coverage of 85% and an MRCV2 coverage of 71%. In addition, Measles and Rubella Supplementary Immunization activity (MR-SIA) catch-up campaign was implemented since 2017.¹

To accelerate progress, the GoI started Mission

Indradhanush, the flagship Routine Immunization campaign of the Union Ministry of Health and Family Welfare in 2014, and Intensified Mission Indradhanush in 2017. The recent Intensified Mission Indradhanush (IMI 5.0) specially focussed on Measles and Rubella, under the theme "A big leap towards measles and Rubella Elimination". Between 2017 and March 2023, over 348 million children have been vaccinated through nationwide Measles-Rubella vaccination campaign. Measles cases dropped from 10.4 to 4 cases per million population, by 62% between 2017 and 2021, and Rubella cases dropped from 2.3 to 1.2 cases per million population, by 48%.³

Under the Universal Immunization Programme (UIP), Government of Tamil Nadu provides 11 Vaccines to children and pregnant mothers against the 12 Vaccine Preventable Diseases, namely, Poliomyelitis, Diphtheria,



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Pertussis, Tetanus, Measles, Rubella, Tuberculosis, Hepatitis B, Hemophilus Influenza type B (Hib), Rotavirus, Pneumococcal and Japanese Encephalitis, the latter being given in 14 selected endemic districts.⁴

In spite of effective immunisation services, Vaccine Preventable Diseases (VPDs) may occur. Surveillance for VPDs form part of wider infectious public health surveillance and is the key focus for achieving strategic priority in Immunisation Agenda 2030.⁵ Currently, Six Vaccine Preventable Diseases namely, Poliomyelitis, Measles, Rubella, Diphtheria, Pertussis and Neonatal Tetanus are under Surveillance in the state of Tamil Nadu.

Initially, Measles and Rubella (MR) Surveillance in India was pioneered as laboratory supported outbreak-based surveillance in 2005 starting with one state, Tamil Nadu. It was eventually expanded to all states in a phased manner by 2015. Since 2016, MR Surveillance has transitioned from being laboratory-based surveillance to WHO laboratory supported MR case-based surveillance starting in Karnataka, and then expanded to all states by 2019.⁶

As India progresses towards elimination of Measles and Rubella, a sensitive case-based MR surveillance system is essential to monitor and sustain progress towards elimination of MR. The goal of MR case-based surveillance is to detect, investigate and classify all suspected cases and subsequently respond to confirmed outbreaks. A suspected Measles / Fever with Rash case is any person with fever and maculopapular rash or any person in whom, the clinician or health worker suspects Measles. A suspected Rubella / Fever with Rash case is a patient with fever and maculopapular (non-vesicular) rash, or in whom a healthcare worker suspects Rubella. A healthcare worker should suspect Rubella when a patient presents with the following: fever, maculopapular rash and cervical or suboccipital or postauricular adenopathy or arthralgia/ arthritis. For case confirmation, laboratory testing is done at an accredited laboratory within the Global Measles and Rubella Laboratory Network.⁶

VPD surveillance system in India encompasses more than 45,000 Reporting Sites (RS). The RS network includes Reporting Units (RU) and Informer Units (IU). All RUs are required to report suspected Measles cases or suspected Measles deaths immediately. In addition, all RUs are required to send weekly reports including nil reports with details of cases reported in the past one week to the District Health Officer, who also functions as District Immunization Officer. Informer Units (IU) such as hospitals and clinics with single practitioners, facilities with traditional healers or faith healers that are likely to encounter suspected Measles

cases should also report cases to the DIO/SMO, but are not mandated to send weekly reports⁶. Currently, there are approximately 1,308 RUs functional in Tamil Nadu. VPD surveillance is supported by World Health Organization. All the VPD cases are updated in VSIMS - Vaccine Preventable Diseases Surveillance Information Management System.

Immunisation Agenda 2030 envisions a world where everyone, everywhere, at every age, fully benefits from vaccines to improve health and well-being. One of the strategic priority goals of Immunization agenda 2030 is to ensure timely, well-organized response to outbreaks of epidemic prone vaccine preventable diseases.⁵ Thus, in order to achieve the Immunization Agenda 2030 and accomplish Measles elimination, monitoring the performance indicators of MR surveillance becomes imperative. Hence, this study is attempted to evaluate Measles and Rubella Surveillance in Tamil Nadu during Jan 2023-Dec 2023.

METHODS

This is a retrospective observational study conducted using secondary data on MR surveillance. All the suspected MR cases reported in VSIMS - Vaccine Preventable Diseases Surveillance Information Management System portal during the period Jan 2023 to Dec 2023 has been taken for the study.

A data extraction sheet containing details on date of onset of symptoms, notification, investigation, date and number of sample collection, transport of samples, receipt of samples, reporting of results, flagging of Outbreak, preliminary search, Active Case Search (ACS), outcome and follow up was used.

The data was extracted and analysed in Microsoft Excel. Qualitative variables are expressed as proportions. All the key performance indicators were compared with Measles and Rubella Surveillance Field Guide 2020 released by Ministry of Health and Family Welfare (MoHFW), Government of India.

RESULTS

In the VSIMS portal, for the year 2023, 6,588 Fever Rash (FR)/suspect cases were reported in Tamil Nadu.

a. Timeliness of case investigation: Of the 6,588 FR cases reported, most of the cases were reported by Government PHCs and health set ups. 176 (2.67%) cases are reported from Private Health facilities. All the reported cases were investigated and updated in VSIMS. Among the cases investigated, 6,385 (96.91%) cases were investigated within 48 hours of notification.

b. Adequacy of serological sample collection: Since clinical diagnosis alone is insufficient to confirm Measles and Rubella infection, the role of laboratory in diagnosis is crucial as we progress towards Measles and Rubella elimination. The common investigation used to confirm the diagnosis of MR is to test for the presence of IgM antibodies in serum. A single blood specimen is sufficient to confirm or discard suspected cases. MoHFW recommends collecting blood sample to test for IgM within 28 days of rash onset. Among the 6,588 FR cases, blood sample was collected within 28 days of onset of rash in 6,568 (99.69%) cases. This is above the required target of 80% serum sample collection. (Table 1)

Table 1: Adequacy of sample collection among the eligible suspect cases,

MR Surveillance, Tamil Nadu, Jan 2023-Dec 2023

Sample to be collected	Time between onset of rash and notification	Eligible suspect cases	Performance of TN	Target set by MoHFW
Serum (To confirm the infection)	Within 28 days	All FR cases reported (N=6588)	6,568 (99.73%)	>80%
Throat swab (Necessary for genomic characterization) (OR)	Within 7 days	All FR cases in the interval of 7 days between onset of rash and notification, (N=6137)	5,236 (85.32%)	-
Nasopharyngeal swab (Necessary for genomic characterization)	Within 7 days	All FR cases in the interval of 7 days between onset of rash and notification, (N=6137)	24 (0.39%)	-

c. Adequacy of Virological sample collection: While blood samples are sufficient to confirm or discard the suspected cases, conducting genotyping characterization of these viruses is also necessary to analyze the transmission chains. Therefore, clinical specimens such as throat swab and nasopharyngeal swab need to be collected from sporadic cases and also from suspected outbreaks. MoHFW recommends that throat swab or nasopharyngeal swab be collected within 7 days of onset of rash. Among the 6,588 FR cases, 6,137 (93.15%) cases were in the interval of 7 days between onset of rash and notification. Among these cases within the 7 days interval, throat swab has been collected in 5,236 (85.32%) cases and Nasopharyngeal Swab has been collected in 24 (0.39%) cases. (Table 1)

d. Timeliness of specimen transport and laboratory reporting: Out of 6,588 FR cases, blood sample has been collected for a total of 6,571 (99.74%) of FR cases with 3 cases sample taken after 28 days. Of these, 6,019 (91.6%) samples have been received in lab and the status of the remaining 552 (8.4%) samples are not updated in the portal at the time of evaluation. Out of 6,019 samples received, 5,999 (99.67%) samples were received in good condition.

All the samples collected has to be received in the

WHO accredited lab within 5 days of collection. Out of 6,571 blood samples collected, with 6,019 samples received in lab, about 5,416 (89.52%) samples have been received in lab within 5 days of collection.

From the time of receipt of blood sample in laboratory, reporting of the result should be done within 4 days. Of the 6,019 samples received in laboratory, results were reported within 4 days of receipt for 2673 (44.41%) of samples. Target for the timeliness in laboratory reporting is 80% according to MoHFW. However, this shows that around 35% gap in timeliness of laboratory reporting (Table 2).

Table 2: Timeliness of specimen transport and laboratory reporting of

suspect MR cases, Tamil Nadu, Jan 2023-Dec 2023

Sample transport/Lab Reporting	Timeline	Eligible denominator	Performance	Target set by MoHFW
Serology Specimen Transport	Samples to be received in laboratory within 5 days of collection	6,571 blood specimens collected	5416 (89.52%)	>80%
Serology specimen laboratory reporting	Results to be reported within 4 days of samples received	6,019 samples received in lab	2,673 (44.41%)	>80%

e. Outbreak investigation: Suspected Measles outbreak is to be flagged with an outbreak ID when there are a) five or more suspected Measles cases in the past 4 consecutive weeks in a block or in an urban ward or planning unit or b) five or more suspected cases in an area bordering multiple contiguous blocks/urban wards/planning units in the past 4 consecutive weeks or c) one or more suspected Measles death/s in a block or in an urban ward/planning unit⁶. Totally, 172 outbreak IDs have been generated. All the outbreaks have been investigated, which meets the 100% target for Outbreak investigation according to MoHFW Surveillance guidelines. Preliminary search is conducted to ascertain if the cases fit into suspected Measles case definition, clustering of suspected cases in the past 4 weeks in the affected area or if there is any Measles related death. Preliminary search must be initiated within 72 hours of flagging an outbreak. Out of the 172 flagged outbreaks, result of preliminary search warranted house-to-house search for 7 Outbreak IDs. All the 7 outbreaks have been classified as Measles outbreaks.

f. Classification of cases: Regarding the classification of 6,588 FR cases, status of 665 (10.09%) cases were pending and the remaining 5,923 (89.91%) cases has been updated. Among these classified FR cases, 4,705 (79.44%) cases have been discarded as they did not meet the lab confirmed or clinical compatible case criteria. Laboratory confirmed Measles cases were 1,137 (19.19%), 65 cases (1.1%) were lab confirmed Rubella cases and Clinically compatible Measles were 16

cases (0.27%) (Fig.1). Target Non- Measles and Non-Rubella (NMNR) Discard rate is ≥ 2 per 1,00,000 total population. NMNR discard rate for Tamil Nadu for the year 2023 was 6.13/1,00,000 population which is above the target.

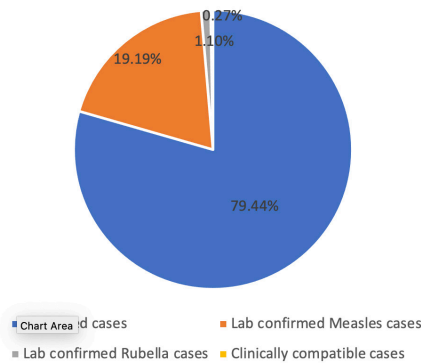


Fig 1 : Adequacy of sample collection among the eligible suspect cases,

MR Surveillance, Tamil Nadu, Jan 2023-Dec 2023

g.30 day follow up: Thirty-day follow-up examination is recommended for lab confirmed cases, epidemiologically linked cases, clinically compatible cases and case results showing equivocal. In this list, lab confirmed Measles, lab confirmed Rubella and clinically compatible Measles cases together contributed to 1218 cases. Among them, follow-up was done in 1,170 (96.1%) cases. Among the 65 lab confirmed Rubella cases, 1 was a pregnant woman. No congenital defects were reported in the newborn.

DISCUSSION

About 6,588 reported cases were analyzed. Immediate reporting/notification of the suspect cases is recommended to initiate further course of action, like sample collection, flagging outbreaks, conducting preliminary search and active case search. Type of clinical specimen depends on the interval between date of onset of rash and notification. Most of the cases were notified by Government health systems. This has to be further strengthened including performance of private sector RUs as Measles and Rubella elimination will require efforts from all sectors.¹

Timeliness of sample collection within 28 days for serology and sample transport within 5 days of collection are in line with Surveillance guidelines. However, there is a difference between the number of samples collected and samples received in laboratory, that is the status of 8.4% the sample collected are not updated in the portal at the time of evaluation.

Timeliness of laboratory reporting of the result is only 44.41% and there is a gap is approximately 35% gap in comparison to 80% set by Surveillance Guidelines, that is time between the receipt of blood sample and result reported

by the WHO accredited laboratory should be within 4 days. Therefore, DIOs, District Epidemiologists, and laboratories need to be sensitized on the importance of timely lab reporting. Additionally, the underlying factors causing delays in reporting should be investigated.

Outbreak investigation is essential to contain the spread of this highly contagious disease. All the outbreaks need to be flagged and preliminary investigation to be conducted within 72 hours of flagging an outbreak. Out the 172 flagged outbreaks, result of preliminary search warranted house-to-house search for 7 Outbreak IDs. All the 7 outbreaks have been classified as Measles outbreaks. These Outbreak Response activities are vital as it will help to contain this outbreak and prevent further outbreaks.

In 2018, India's Non-Measles Non-Rubella (NMNR) discard rate, a key measure of surveillance sensitivity, was 0.6 per 100,000 population, far below the global standard of 2.0 per 100,000 population. However, with consistent efforts, the NMNR discard rate of the country during 2023 was 5.61⁸, while the NMNR discard rate of Tamil Nadu during 2023 is 6.13/1,00,000 population, which is above the national level.

Tamil Nadu is performing fairly aligned with the MR surveillance guidelines by MoHFW, thus paving way for achieving the strategic priority of Immunization agenda 2030.

CONCLUSION

This study offers an evaluation of key performance indicators in Measles Rubella surveillance, providing insights into the effectiveness of the surveillance system. From the analysis, it is noted that all the reported FR/Suspected MR cases were appropriately investigated. Over 90% of the cases were investigated in a timely manner and collection and transport of samples to WHO accredited laboratory is also functioning effectively. However, timely reporting of the results from the laboratory, will help in enforcing the public health measures. All the outbreaks flagged were investigated and final classification completed. Non-Measles and Non-Rubella (NMNR) Discard rate exceeds the target set by MoHFW. In accordance with the surveillance guidelines, pregnant woman who was found positive for Rubella has been followed up for congenital defects in the newborn. Overall, the performance of Tamil Nadu in MR surveillance aligns well with MR Surveillance guidelines, indicating good progress towards Measles elimination.

However, gaps identified, in particular, less reporting from private health facilities, status of samples between collection and receipt in laboratory not updated in , samples

not received in good condition in laboratory and delayed reporting from laboratory need to be further investigated to strengthen the surveillance system in ensuring the nation's progress towards Measles elimination.

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DECLARATION OF INTEREST

The authors declare no conflict of interest

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