

ORIGINAL ARTICLE

"REDUCING ZERO-DOSE CHILDREN": TAMIL NADU'S STRATEGIC EFFORTS IN STRENGTHENING IMMUNIZATION COVERAGE – A PROCESS DOCUMENTATION

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Immunization: A Key to Global Health and Development

Immunization is a well-established success story in global health, saving millions of lives each year. Vaccines play a crucial role in preventing and controlling numerous communicable diseases, leading to a significant reduction in mortality from infectious diseases. Beyond saving lives, vaccines prevent disabilities that can impair children's growth and cognitive development, ensuring that children not only survive but also thrive.

India's National Immunization Program (NIP) was first launched in 1978 as the Expanded Programme on Immunization (EPI), which initially introduced vaccines such as BCG, OPV, DPT, and typhoid-paratyphoid. In 1985, the EPI was renamed the Universal Immunization Programme (UIP). Initially, the program provided vaccines for six diseases (BCG, OPV, DPT, and measles). Over the years, new vaccines and antigens have been introduced. Currently, the UIP offers free immunization against 12 vaccine-preventable diseases.¹

Introduction of New Vaccines and Strengthened Initiatives

India has made impressive strides in vaccine introduction, particularly since 2015. Six new vaccines have been added to the UIP in a remarkably short span of time: Inactivated Polio Vaccine (IPV), Rotavirus Vaccine (RVV), Measles Rubella (MR) Vaccine, Pneumococcal Conjugate Vaccine (PCV), Tetanus & Diphtheria (Td) Vaccine, and Japanese Encephalitis (JE) Vaccine. These additions have enhanced the country's capacity to prevent a broader range of diseases.²

Through focused initiatives, India has strengthened its immunization efforts, with two key milestones being the country's declaration as "Polio-Free" in 2014 and the achievement of Maternal and Neonatal Tetanus Elimination in 2015. In December 2014, the Government of India

launched "Mission Indradhanush," a vital initiative designed to intensify immunization activities and achieve full immunization coverage (FIC) of 90%. The mission aimed to reach unvaccinated and partially vaccinated children, as well as pregnant women, in regions with low immunization coverage, including high-risk areas.³

Till date, 12 phases of Mission Indradhanush and Intensified Mission Indradhanush have been successfully completed. These efforts have reached over 54.6 million children and 13.2 million pregnant women with vaccinations. As per the latest National Family Health Survey (NFHS) reports, full immunization coverage in India has increased from 62% in 2015-16 to 76.4% in 2019-21.⁴ This improvement in immunization coverage has directly contributed to a significant decline in mortality and morbidity due to vaccine-preventable diseases (VPDs). The Under-5 mortality rate in India decreased from 45 per 1000 live births in 2014 to 32 per 1000 live births in 2020.⁵

Zero-Dose Children: A Critical Focus

"Zero-dose children" refer to children who have not received any basic vaccine. For operational purposes, zero-dose children are defined as those who have not received their first dose of Pentavalent vaccine by their first year of age. The number of zero-dose children is calculated as the difference between the estimated number of surviving infants and the reported number of infants vaccinated with the Pentavalent 1st dose vaccine.¹

Addressing the issue of zero-dose children is crucial because these children are highly vulnerable. Communities with high numbers of zero-dose children often also have



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significant numbers of under-vaccinated children. Zero-dose children are at increased risk for early childhood nutritional failures, high morbidity and mortality, poor growth, and poor long-term health outcomes.

These children are more likely to be part of marginalized and disadvantaged communities, facing deprivations like inadequate access to water, sanitation, and healthcare. Gender-based barriers, such as limited access to education and household decision-making power, further exacerbate the situation. As a result, these children are at heightened risk of vaccine-preventable disease outbreaks, which can spread rapidly, especially in communities with low immunization coverage. “Zero dose” highlights that these children have remained outside the radar of our immunisation coverage.

Global and Indian Scenarios of Zero-Dose Children

Globally, according to the WHO and UNICEF estimates, the number of zero-dose children increased from 12.9 million in 2019 to 16.1 million in 2020, and 18.1 million in 2021. However, in 2022, the number of zero-dose children decreased to 14.3 million, though this figure has not yet returned to pre-pandemic levels.

Most of the zero-dose children reside in low- and middle-income countries, with 10 countries accounting for 58% of the global zero-dose population. These countries are Nigeria, Ethiopia, India, the Democratic Republic of the Congo, the Philippines, Angola, Indonesia, Brazil, Pakistan, and Mozambique.

In India, the number of zero-dose children significantly increased during the COVID-19 pandemic. In 2020, the number of zero-dose children rose to 2.9 million due to the disruptions caused by the pandemic. However, there was a recovery in 2022, and the number decreased to approximately 1.1 million. According to National Family Health Survey (NFHS) data, the percentage of zero-dose children has declined over the years, from 33.4% in NFHS-1 to 6.4% in NFHS-5, reflecting the impact of intensified immunization efforts.

The Government of India has been actively working towards reducing the number of zero-dose children (children who have not received any vaccination, particularly Pentavalent 1). A comprehensive approach involving virtual meetings, field visits, data entry corrections, and special immunization campaigns has been undertaken to increase the vaccination coverage and ensure that children receive timely immunization.

Tamil Nadu’s Comprehensive Efforts to Reduce Zero-Dose Children

Tamil Nadu has been making significant strides in reducing the number of zero-dose children. The State adopted a comprehensive and multi-faceted approach, combining virtual meetings, field visits, data entry improvements, and special immunization campaigns to enhance vaccination coverage and ensure timely immunization for all children.

Government of India's Role in Strengthening Tamil Nadu's Vaccination Efforts

The Government of India (GOI) stated that urgent attention was solicited to the HMIS data from Tamil Nadu, as this data was included in the global immunization database of WHO and UNICEF. This data was reviewed, analyzed, and published annually in the WHO and UNICEF Estimates of National Immunization Coverage (WUENIC) report. The report drew attention to critical vaccination gaps and highlighted the performance of countries, as well as the performance of individual states. The latest WUENIC report for 2023 indicated that the burden of zero-dose children who had not received the Pentavalent-1 vaccine had increased in Tamil Nadu compared to the year 2022. Based on the comparative HMIS data (January to October) for the years 2022, 2023, and 2024, a decrease in the number of children vaccinated with the Pentavalent-1 dose was reported in Tamil Nadu. To initiate and strengthen efforts to reduce the number of zero-dose children, Tamil Nadu actively engaged in virtual meetings organized by the Government of India. Held on 18th October 2024, these meetings served as a platform to review the state's immunization performance. The primary objective was to assess the vaccination coverage and explore effective strategies to address the issue of zero-dose children.

Table 1: Number of infants vaccinated with Pentavalent-1 in 2022 to 2024 based on HMIS (January to October)

State/UT	Jan-Oct 2022	Jan-Oct 2023	Jan-Oct 2024	% Decrease in 2024 from 2022	%Decrease in 2024 from 2023
Tamil Nadu	7,66,600	7,18,837	6,84,791	11%	5%

Addressing Discrepancies in Pentavalent 1 Coverage

The Government of India communicated a difference of 1,07,918 in Pentavalent 1 coverage between the periods January 2023 to December 2023 and January 2024 to October 2024. Despite this reported discrepancy, Tamil Nadu has made significant progress in achieving its vaccination targets.

There is a discrepancy in the denominator data while calculating the percent-age of children in Tamil Nadu.

The Government of India had considered the SRS birth rate is 13.8% for calculation though the projected Crude Birth Rate is 11.6 for the year 2024 as per RGI which had been communicated to GOI.

The actual live births happened and registered in State Civil Registration System in Tamil Nadu in 2023-24 is 8,95,463 against the estimated 10,48,690 births. The difference between the estimated infant population for the FY 2023-24 and actual live births happened and registered in StateCivil Registration System in Tamil Nadu in 2023-24 is 1,53,227 births.

Table 2: Full Immunisation coverage based on Estimated Infant population and CRS (2019- 2023)

S.No	Year	Estimated Infant Population as per GOI	Live births as per HMIS	Live births as per State CRS	IHIP HMIS Performance	FI% based on Estimated Infant Population	FI% based on CRS
	a	b	c	d	e	f=e*100/b	g=e*100/d
1	2019	11,06,010	9,33,410	9,29,427	9,44,470	85.4	101.2
2	2020	11,04,140	9,28,336	9,28,158	9,02,796	81.8	97.3
3	2021	10,70,510	9,13,557	9,06,512	8,89,885	83.1	98.2
4	2022	10,45,590	9,16,340	9,28,699	9,33,498	89.3	100.5
5	2023	10,48,690	8,78,055	8,95,463	9,00,001	85.8	100.5

For the period of April 2024 to October 2024, Tamil Nadu achieved 484,143 out of the target of 511,562 (95%) in the TNHMIS system and 485,014 (95%) in the IHIP system. The CRS Birth count during the same period was approximately 5.00 lakhs, which aligns with the proportionate target for the state. This reflects the total number of births registered under the CRS system, ensuring that the registration was 100% accurate. Despite the initial discrepancies in the coverage data, Tamil Nadu has been successful in vaccinating nearly 95% of the children born in the state between April 2024 and October 2024 with the Pentavalent 1 vaccine, leaving only a minimal number of children unvaccinated.

Discussions with GOI Officials: Strengthening Immunization Systems

Further reinforcing its commitment, Tamil Nadu hosted a visit from two Government of India officials on 12th November 2024. The focus of the visit was to evaluate the state's coverage for Pentavalent 1 vaccinations, particularly in relation to zero-dose children. During their discussions with the State's Joint Director of Immunization, the officials identified areas where improvements could be made, especially concerning facilities that had not reported their vaccination data. The outcome of these discussions led to targeted actions aimed at addressing reporting gaps and ensuring that all children received their vaccinations as scheduled. These

efforts underscore Tamil Nadu's commitment to improving immunization coverage and reducing zero-dose children across the state.

Virtual review meetings and Immediate actions

The very next day, on 13th November 2024, the Joint Director of Immunization /State Immunization Officer Tamil Nadu had conducted a Zoom video conference with District Health Officers (DHOs), Assistant Directors (ADs), and other health officials across the State. This meeting served to reinforce the importance of timely data uploads for immunization performance and to address missing reports from several health facilities. Clear instructions were given to ensure that data for all unreported facilities was uploaded immediately. This was an essential step in ensuring accurate tracking of immunization efforts and identifying areas requiring further intervention.

Repeated communications were sent to the districts to fill in all fields with either performance data or "Zero" for non-performing facilities and to enter "Not applicable" for the 749 units which does not provide vaccination.

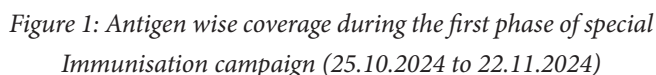
Special Immunization Campaigns in Tamil Nadu

In its dedicated efforts to increase vaccination coverage and reduce the number of zero-dose children, Tamil Nadu implemented two phases of Special Immunization Campaigns aimed at vaccinating dropouts, left-outs, and zero-dose children, particularly focusing on areas that were underserved or at high risk. These campaigns played a crucial role in reaching every child and ensuring they received their timely vaccinations.

Phase 1: October-November 2024

The first phase of the Special Immunization Campaign was held across urban and rural areas in Tamil Nadu. Sessions were scheduled on 25th October, 8th November, 15th November, and 22nd November 2024. The focus during this phase was on vaccinating dropouts and left-out children, while ensuring that accurate data was promptly and effectively recorded for all those vaccinated. In total, 18,391 sessions were conducted throughout the State, successfully vaccinating 69,326 children. Key efforts during this phase included reaching children across both urban and rural areas, making sure that the data of all vaccinated children was accurately recorded, and targeting children who had missed their vaccinations or were overdue for their doses.

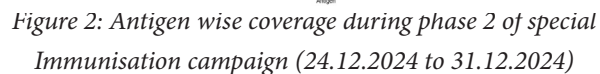
S.No.	Date	No. of sessions planned	No. of sessions held	Total vaccinated children
1	25.10.2024	5,178	5,102	22,732
2	08.11.2024	4,855	4,722	14,717
3	15.11.2024	4,145	4,032	10,411
4	22.11.2024	4,645	4,535	21,466
	Total	18,823	18,391	69,326



The second phase of the campaign took place later in the year, from 24th December to 31st December 2024. This phase focused on completing any missed vaccinations, with a particular emphasis on ensuring that zero-dose children were reached before the start of the IMI 6.0 campaign.

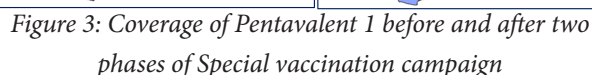
Table 4: Vaccination coverage in special Immunisation Campaigns during Phase 2 (24.12.2024 to 31.12.2024)

S.No.	Date	No. of sessions planned	No. of sessions held	Total vaccinated children
1	24.12.2024	2,882	2,595	2,207
2	26.12.2024	3,788	3,271	4,755
3	27.12.2024	4,410	4,226	20,427
4	28.12.2024	2,829	2,557	3,315
5	30.12.2024	2,528	2,328	2,208
6	31.12.2024	2,080	2,069	800
	Total	18,517	17,046	33,712



To ensure the success of these campaigns, District Health Officers (DHOs) played a vital role in coordinating local health workers, including DMCHOs, CHNs, SHNs, and all VHNs/UHNs, to ensure the campaigns reached every child. They were instructed to conduct the campaigns across all areas, with special attention to high-risk zones and vacant or uncovered regions where immunization rates were low. A priority was given to vaccinating zero-dose children—those who had never been vaccinated. The health officers were also tasked with ensuring that no delays in vaccinations occurred, even before the IMI 6.0 phase, ensuring timely and consistent immunization for all eligible children.

The results of these Special Immunization Campaigns were significant, as both phases contributed to a marked improvement in the coverage of Pentavalent 1 vaccines (Figure1). In total, 18,391 sessions were held during Phase 1 and 17,046 sessions during Phase 2, vaccinating over 100,000 children. These efforts, particularly focused on zero-dose children and hard-to-reach areas, led to better immunization outcomes across Tamil Nadu. By targeting dropouts, left-out children, and areas with gaps in vaccination coverage, these campaigns not only increased the overall vaccination rate but also ensured that Tamil Nadu was on track to meet its immunization goals and reduce the number of zero-dose children.



Improvement in Facility Reporting Status

Tamil Nadu has taken proactive steps to improve the reporting status of immunization facilities and address data gaps. Initially, the GoI report indicated that out of 14,652 reporting units, 13,777 had submitted their data, leaving 875 units unreported. Similarly, as per the IHIP report November 2024, out of the total 14,665 state facilities, 749 are categorized as "Not Applicable," which includes Urban Health Wellness Centres, ESI Dispensaries leaving 13,916 facilities as actual reporting units. Recognizing the importance of improving data completeness, Tamil Nadu requested the Government of India to unfreeze the IHIP portal to allow districts to enter the data for these non-reported facilities. In response to Tamil Nadu's request, the GoI unfroze the IHIP portal starting from January 2024. This decision enabled districts across the state to update the data for facilities that had not reported earlier. To ensure smooth implementation, Tamil Nadu issued clear instructions to District Health Officers (DHOs) and other relevant officials. They were directed to update the IHIP portal by the 10th of each succeeding month and to fill in all fields with either performance data or "Zero" for non-performing facilities and to enter "Not applicable" for the 749 units which does not provide vaccination. Additionally, the state emphasized that monthly performance entries in the IHIP portal should align with the State HMIS performance for each antigen, except for the Birth Dose. This alignment ensured consistency between the state and national reporting systems. Due to these efforts, the Facility reporting status of the state improved drastically, 13,916 reporting units out of 14,665 have now submitted their data, leaving 376 facilities still unreported. Tamil Nadu continues to work diligently towards closing these reporting gaps, ensuring that all facilities consistently update their data and contribute to the state's immunization efforts.

Table 5: Facility reporting status of Tamil Nadu as per IHIP, November 2024

State	Facility to be reported	Not applicable*	Actual Facility Reporting Units	Not reported as per GOI on October 2024	Not reported as on November 2024
Tamil Nadu	14665	749	13916	875	376

* Not applicable includes 749 units which does not provide vaccination Urban Health Wellness Centres, ESI Dispensaries and private hospitals

Leave No One Behind

The concerted efforts of both the Government of India and the Tamil Nadu State Health authorities have resulted in notable improvements in immunization

coverage, particularly for zero-dose children. Through targeted strategies such as special immunization campaigns, data reporting improvements, and close monitoring and supportive supervision Tamil Nadu has made significant strides toward achieving its immunization goals. By addressing the gaps in vaccination coverage and ensuring that no child is left behind, the state has made substantial progress in reducing the number of zero-dose children. Moving forward, sustained efforts, regular evaluations, and continuous community engagement will be key to further enhancing immunization coverage and ensuring that every child receives the protection they deserve, thus safeguarding their health and contributing to a healthier future for all.

CONFLICT OF INTEREST

None

REFERENCES

1. National Health Mission. National Health Mission [Internet]. [cited 2024 Sep 22]. Available from: <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=824&lid=220>
2. Immunization Technical Support Unit (ITSU), Ministry of Health and Family Welfare. Strategic approach for reaching zero dose children in India: India's zero dose implementation plan [Internet]. New Delhi: ITSU; 2024 [cited 2025 Apr 15]. Available from: <https://itsu.org.in/wp-content/uploads/2024/05/Zero-Dose-Document-Small-ViewOnly.pdf>
3. Ministry of Health and Family Welfare. UWIN [Internet]. [cited 2024 Sep 22]. Available from: <https://uwin.mohfw.gov.in/home>
4. National Family Health Survey (NFHS-5) [Internet]. [cited 2024 Sep 22]. Available from: <https://nfhs.in/nfhuser/nfhs5.php>