Journal of Research and Development
A Multidisciplinary International Level Referred and Double Blind Peer Reviewed, Open Access
ISSN : 2230-9578 | Website: https://jrdrvb.org Volume-17, Issue-12| December 2025

Original Article

An Analysis of Pulse Polio Programmed Helps in Controlling the Infant Mortality Rate (Imr) In India and Strenghing the Public Health System

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Manuscript ID:
JRD -2025-171220
ISSN: 2230-9578
Volume 17
Issue 12
Pp.112-116
December 2025
Submitted: 17 Nov. 2025
Revised: 27 Nov. 2025
Accepted: 11 Dec. 2025
Published: 31 Dec. 2025

Abstract

The Pulse Polio Programme is a nationwide immunization campaign aimed at eradicating polio in India. Under this programme, oral polio vaccine (OPV) drops are given to all children below 5 years of age, irrespective of their previous immunization status, on specific days creating a "pulse" of vaccination coverage across the country. The Pulse Polio Programme is one of India's most successful public health initiatives, aimed at the eradication of poliomyelitis through mass immunization of children below five years of age. This programme has played a crucial role not only in eliminating polio but also in contributing to the reduction of the Infant Mortality Rate (IMR) in India. By preventing a potentially fatal and disabling disease, the programme reduces polio-related deaths, complications, and long-term disabilities among infants and young children. Repeated vaccination rounds ensure universal coverage, including hard-to-reach and marginalized populations, thereby strengthening herd immunity. In addition, the Pulse Polio Programme has enhanced public health infrastructure through improved surveillance, cold-chain management, community participation, and health awareness. These systemic improvements positively influence child survival beyond polio prevention, supporting overall maternal and child health services. Thus, the Pulse Polio Programme serves as an effective public health strategy that contributes significantly to controlling IMR and strengthening India's public.

Keywords: *Pulse Polio Programme, Infant Mortality Rate (IMR), Public Health, Polio Eradication, Immunization, Oral Polio Vaccine (OPV), Child Health, Disease Prevention, Universal Immunization Programme, Health Infrastructure, Surveillance System, Community Participation.*

Introduction

The Infant Mortality Rate (IMR) is a key indicator of a country's social development and the effectiveness of its public health system. In India, infant mortality has historically been influenced by preventable communicable diseases, inadequate immunization coverage, and limited access to healthcare services. Among these challenges, poliomyelitis once posed a serious threat to infant and child survival due to its potential to cause severe paralysis, complications, and death. To combat this, the Government of India introduced the Pulse Polio Programme as a nationwide mass immunization initiative.The Pulse Polio Programme aims to immunize all children below five years of age with Oral Polio Vaccine (OPV), regardless of their previous immunization status, thereby ensuring universal coverage and interrupting the transmission of the poliovirus. Beyond its primary objective of polio eradication, the programme has significantly strengthened India's public health system by enhancing disease surveillance, cold-chain management, health workforce capacity, and community participation. Through the prevention of polio-related morbidity and mortality and the improvement of immunization and health service delivery mechanisms, the Pulse Polio Programme has contributed substantially to controlling the Infant Mortality Rate in India. This topic seeks to analyze the role of the Pulse Polio Programme in reducing IMR while reinforcing the broader public health system.

Objectives of the Study

The main objectives of the topic are as follows:

- To study the concept and implementation of the Pulse Polio Programme in India.

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How to cite this article:
R.H.Janganawari. (2025). An Analysis of Pulse Polio Programmed Helps in Controlling the Infant Mortality Rate (Imr) In India and Strenghing the Public Health System. Journal of Research and Development, 17(12), 112–116. https://doi.org/10.5281/zenodo.18115413

Quick Response Code:
Website: https://jrdrvb.org/
DOI: 10.5281/zenodo.18115413
OPEN ACCESS

Journal of Research and Development
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- To analyze the role of the Pulse Polio Programme in preventing poliomyelitis among infants and young children.
- To examine the contribution of Pulse Polio immunization in reducing polio-related infant morbidity and mortality.
- To assess the impact of the Pulse Polio Programme on controlling the Infant Mortality Rate (IMR) in India.
- To understand how mass immunization campaigns strengthen the public health system.
- To evaluate the role of improved surveillance, cold-chain management, and outreach services developed under the Pulse Polio Programme.
- To analyze the role of community participation and awareness in improving child health outcomes.
- To highlight the significance of the Pulse Polio Programme in sustaining India's polio-free status and preventing re-emergence.
- To study the broader public health benefits of the programme beyond polio eradication.
- To provide insights for policy and programme improvements in maternal and child health services.

Review of Literature

The present study analysis several studies, reports, and policy documents have examined the role of immunization programmes in improving child health outcomes and reducing infant mortality in India. The Pulse Polio Programme, in particular, has received significant attention due to its success in polio eradication and its broader impact on the public health system.The Pulse Polio Programme, launched in 1995, has been widely analyzed as one of the most successful public health interventions in the country. Park (2019), in Park's Textbook of Preventive and Social Medicine, emphasizes that mass immunization campaigns like Pulse Polio were critical in interrupting poliovirus transmission and protecting children under five years of age. The study highlights that sustained high coverage and repeated vaccination rounds were essential in achieving polio eradication in India.Bhattacharya (2012) explored the historical and social dimensions of polio control in India and noted that the Pulse Polio Programme not only reduced polio incidence but also improved public confidence in vaccination programmes. The author argues that community mobilization and political commitment played a key role in the programme's success. Lahariya (2014) analyzed India's polio eradication efforts and concluded that the strategies adopted under the Pulse Polio Programme—such as micro-planning, surveillance of Acute Flaccid Paralysis (AFP), and targeted vaccination—strengthened the country's immunization infrastructure. The study further states that these strategies were later integrated into other public health initiatives, contributing indirectly to reductions in infant mortality. World Health Organization (WHO) reports highlight that India's polio-free certification in 2014 was the result of consistent immunization efforts and strong health system support. WHO documents also note that the surveillance and cold-chain systems developed for polio were later used to monitor and control other vaccine-preventable diseases, improving overall child survival rates.

UNICEF studies emphasize the role of Pulse Polio campaigns in raising public awareness about child health and immunization. According to UNICEF, increased caregiver awareness and improved access to vaccines have contributed to better utilization of health services, which plays an important role in reducing infant and child mortality. National Family Health Survey (NFHS) and Sample Registration System (SRS) reports show a steady decline in India's Infant Mortality Rate over the years. While this decline cannot be attributed solely to the Pulse Polio Programme, several researchers argue that strengthened immunization systems and improved preventive healthcare services—supported by Pulse Polio initiatives—have been significant contributing factors. In summary, existing literature indicates that the Pulse Polio Programme has had a multifaceted impact on child health in India. Beyond eradicating polio, it has contributed to the reduction of infant morbidity and mortality and has strengthened the public health system through improved immunization coverage, disease surveillance, and community participation. However, the literature also suggests the need for continuous evaluation to ensure sustainability and balanced allocation of health resources. The World Health Organization (WHO) has highlighted that mass immunization campaigns like Pulse Polio were instrumental in interrupting poliovirus transmission in endemic countries, including India. WHO reports emphasize that sustained high immunization coverage and strong surveillance systems not only eliminated polio but also strengthened health systems and child survival mechanisms. Studies published by UNICEF underline that polio vaccination campaigns helped reach marginalized and hard-to-reach populations, thereby reducing inequalities in child health services. According to UNICEF, repeated vaccination rounds increased parental awareness about immunization and encouraged greater utilization of routine maternal and child health services, indirectly contributing to reductions in Infant Mortality Rate (IMR).

Importance of the Study

The present study is important as it highlights the significant role of the Pulse Polio Programme in improving child health outcomes and strengthening the public health system in India. Although the programme was primarily designed to eradicate poliomyelitis, its broader impact on reducing the Infant Mortality Rate (IMR) and enhancing preventive healthcare deserves systematic analysis. This study is valuable for understanding how large-scale immunization programmes contribute not only to disease control but also to overall improvements in child survival and public health infrastructure. By examining the indirect effects of the Pulse Polio Programme on IMR, the study provides insights into the effectiveness of immunization strategies in reducing infant morbidity and mortality. The study also offers guidance for improving the planning and implementation of future health programmes aimed at maternal and child health. In

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addition, the study emphasizes the importance of community participation, awareness creation, and health system strengthening, which are essential for achieving sustainable reductions in infant mortality and for building a resilient public health system.

Research Methodology

The present study adopts a descriptive and analytical research design. This approach is used to examine the implementation of the Pulse Polio Programme in India and to analyze its role in controlling the Infant Mortality Rate (IMR) and strengthening the public health system. The study is based on secondary data, collected from reliable and authentic sources, including: Government of India publications (Ministry of Health and Family Welfare) Reports of the World Health Organization (WHO) and UNICEF National Family Health Survey (NFHS) reports Sample Registration System (SRS) data Research articles, journals, books, and official websites related to public health and immunization programmes.

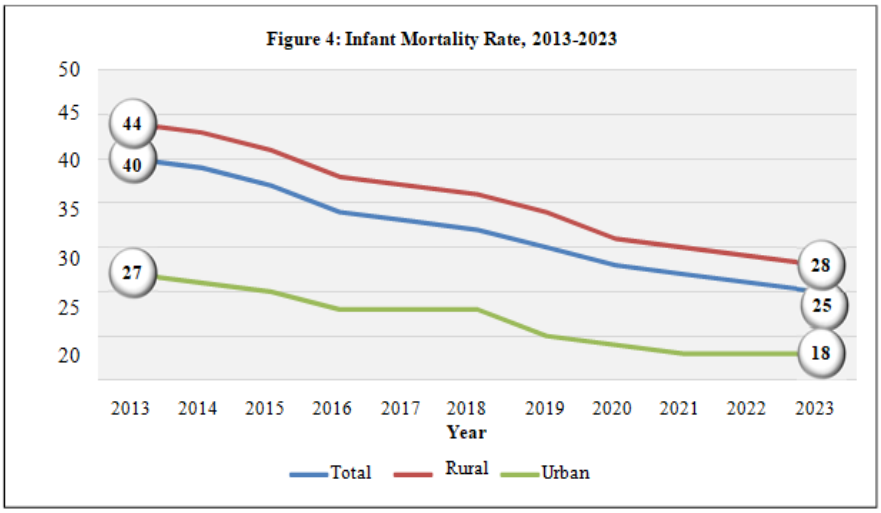

Table1: Estimated Birth Rate, Death Rate and Infant Mortality Rate,2023

India/States/ Union Territories	Birth Rate			Death Rate			Infant Mortality Rate		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
India	18.4	20.3	14.9	6.4	6.8	5.7	25	28	18
AndhraPradesh	15.0	15.6	13.9	6.9	7.6	5.6	19	21	14
Assam	19.8	21.0	13.04	6.2	6.3	5.6	30	32	15
Bihar	25.8	26.5	20.9	6.1	6.1	5.8	23	23	24
Chhattisgarh	22.3	24.1	16.6	8.3	8.6	7.4	37	39	29
Delhi	12.9	14.4	12.8	4.5	5.2	4.5	14	4	14
Gujarat	17.6	19.5	15.5	6.4	7.3	5.3	20	23	15
Haryana	18.7	20.0	16.8	6.8	7.1	6.4	26	29	20
.Jammu&Kashmir	14.8	16.0	12.2	5.6	5.6	5.5	14	14	12
Jharkhand	20.6	22.0	16.3	6.3	6.5	5.6	29	31	21
Karnataka	15.2	16.2	13.9	6.8	7.8	5.6	14	16	11
Kerala	12.3	12.2	12.4	7.2	7.3	7.2	5	5	5
.MadhyaPradesh	22.5	24.4	17.5	6.8	7.1	6.0	37	39	30
Maharashtra	14.0	14.7	13.3	6.1	7.0	5.1	14	17	10
Odisha	16.0	16.9	12.1	7.7	8.0	6.1	30	31	23
Punjab	13.8	14.4	13.0	7.3	8.2	6.2	17	19	14
Rajasthan	22.9	23.9	20.1	5.9	6.0	5.6	29	31	23
Tamil Nadu	12.0	12.5	11.5	6.9	8.0	6.1	12	13	11
Telangana	15.8	16.2	15.2	6.3	7.1	5.3	18	20	15
UttarPradesh	23.6	24.7	20.5	6.5	6.7	5.9	37	39	27
Uttarakhand	16.9	17.6	15.1	6.1	6.3	5.6	20	21	19
WestBengal	14.0	15.3	11.0	5.7	5.6	5.9	17	17	17

Note: Infant Mortality Rates in different States During year period 2021-2023
Sources: SRS Bulletin office of the registrar general of India 2023 Report

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Table 1 presents the estimated Birth Rate, Death Rate and Infant Mortality Rate (IMR) for India and selected States/Union Territories in 2023, with a comparison between total, rural and urban areas. At the national level, India's total birth rate is 18.4 per thousand population, which is significantly higher in rural areas (20.3) than in urban areas (14.9). This rural–urban gap reflects differences in education levels, access to family planning services, early marriage, and socio-economic conditions. Among the states, Uttar Pradesh (23.6), Rajasthan (22.9), Madhya Pradesh (22.5) and Bihar (25.8) report higher birth rates, indicating slower demographic transition. In contrast, Kerala (12.3), Tamil Nadu (12.0) and Delhi (12.9) show much lower birth rates, reflecting better awareness, higher female literacy, and effective reproductive health services. India's total death rate stands at 6.4, with rural areas (6.8) showing higher mortality compared to urban areas (5.7). This pattern is consistent across most states and highlights disparities in healthcare infrastructure, nutrition, and access to medical services in rural regions. States such as Chhattisgarh (8.3), Kerala (7.2) and Odisha (7.7) report relatively higher death rates, while Delhi (4.5) and West Bengal (5.7) show comparatively lower rates. The Infant Mortality Rate in India is 25 per 1,000 live births, with a stark rural–urban difference: 28 in rural areas versus 18 in urban areas. This gap highlights persistent inequalities in maternal and child healthcare, sanitation, nutrition, and immunization coverage. States with high IMR include Madhya Pradesh (37), Uttar Pradesh (37), Chhattisgarh (37) and Odisha (30), particularly in rural areas. On the other hand, Kerala (5), Tamil Nadu (12), Karnataka (14) and Delhi (14) report lower IMR, reflecting stronger public health systems and effective child health interventions.

The table clearly indicates that rural areas consistently record higher birth rates, death rates, and infant mortality rates compared to urban areas across India. States with weaker healthcare infrastructure and lower socio-economic development continue to face higher IMR. This underlines the importance of national programmes such as the Pulse Polio Programme and other immunization initiatives, which play a crucial role in reducing infant mortality and strengthening the public health system.

Results and Discussion

The data presented in Table 1 reveal significant variations in birth rate, death rate and infant mortality rate (IMR) across India and its States/Union Territories in 2023. At the national level, India recorded a birth rate of 18.4, a death rate of 6.4, and an IMR of 25 per 1,000 live births. A clear rural–urban disparity is observed in all three indicators. Rural areas consistently show higher birth rates, higher death rates and higher IMR compared to urban areas. The rural birth rate (20.3) is notably higher than the urban birth rate (14.9). Similarly, the rural IMR (28) exceeds the urban IMR (18), indicating greater health risks for infants in rural regions. State-wise analysis shows that Uttar Pradesh, Madhya Pradesh, Rajasthan, Chhattisgarh and Bihar have high birth rates and IMR, particularly in rural areas. In contrast, states such as Kerala, Tamil Nadu, Karnataka and Delhi exhibit lower birth rates and IMR, were reflecting better health outcomes.

Discussion

The results indicate that socio-economic conditions, healthcare infrastructure and public health interventions play a crucial role in determining infant mortality and overall demographic trends. Higher IMR in rural areas can be attributed to limited access to quality healthcare, poor nutrition, inadequate sanitation, and lower awareness of maternal and child health services. States with low IMR, such as Kerala and Tamil Nadu, have strong public health systems, higher female literacy, widespread immunization coverage, and effective implementation of child health programmes. In contrast, states with high IMR continue to face challenges such as poverty, malnutrition, and inadequate healthcare facilities. Overall, the table demonstrates that while India has made progress in reducing IMR, regional and rural–urban disparities persist, emphasizing the need for targeted health interventions, improved healthcare delivery in rural areas, and sustained focus on maternal and child health programmes.

Findings of the Study

The study finds that the Pulse Polio Programme is a nationwide mass immunization initiative launched to eradicate poliomyelitis. Its systematic implementation through National and Sub-National Immunization Days ensured repeated coverage of all children below five years, including those in hard-to-reach areas.The findings reveal that regular administration of Oral Polio Vaccine (OPV) under the programme has effectively prevented polio infections among infants and young children, leading to a sharp decline in polio cases across the country.The study indicates that Pulse Polio immunization significantly reduced polio-related disability and deaths among infants. Early immunization minimized the severity of infections and prevented long-term paralysis.The findings show that states with effective implementation of Pulse Polio and routine immunization programmes report lower Infant Mortality Rates. The programme contributed indirectly to IMR reduction by strengthening child survival interventions.It is observed that mass immunization campaigns improved health infrastructure, manpower coordination, and inter-sectoral convergence, thereby strengthening India's public health delivery system.The study finds that the programme led to the development of strong disease surveillance systems, efficient cold-chain networks, and extensive outreach services, which are now used for other immunization and health programmes.The findings highlight that active community participation, involvement of ASHA workers, Anganwadi workers, and NGOs, and increased awareness significantly improved

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immunization coverage and child health outcomes.The study confirms that continuous Pulse Polio rounds and surveillance have been crucial in maintaining India's polio-free status and preventing the re-emergence of the disease. The programme generated broader public health benefits such as improved routine immunization coverage, better monitoring of child health, and preparedness for other mass health campaigns.The findings suggest that lessons from the Pulse Polio Programme can be effectively applied to improve maternal and child health services, especially in rural and high IMR regions.

Suggestions of the Study

The infrastructure and experience gained from the Pulse Polio Programme should be further integrated into routine immunization services to ensure full coverage of all vaccine-preventable diseases among infants and young children. This study focus that continuous awareness programmes should be conducted to educate parents about the importance of immunization, nutrition, and child healthcare. Community involvement strengthens trust in public health initiatives. This study suggests that Regular training and motivation of healthcare workers and volunteers are essential to improve service delivery, data reporting, and community outreach.The study indicates while conducting mass immunization campaigns, care should be taken to avoid disruption of routine health services. Adequate planning and manpower allocation are necessary to maintain continuity in primary healthcare delivery.The successful strategies of the Pulse Polio Programme should be integrated into broader national health policies to ensure sustainability and long-term improvements in child health outcomes

Conclusion

The Pulse Polio Programme has played a crucial role in improving child health outcomes in India and stands as a landmark achievement in the country's public health history. Although its primary objective was the eradication of poliomyelitis, the programme has significantly contributed to the reduction of infant morbidity and mortality by preventing a life-threatening and disabling disease among children under five years of age. Through widespread immunization coverage, community awareness, and sustained government commitment, India successfully eliminated polio, thereby safeguarding millions of infants from paralysis and premature death. Beyond disease eradication, the Pulse Polio Programme has strengthened the public health system by enhancing immunization infrastructure, improving disease surveillance, and building the capacity of healthcare workers. The strategies of micro-planning, community participation, and inter-sectoral coordination developed under the programme have been effectively utilized in other national health initiatives, leading to broader improvements in maternal and child health services. Consequently, the programme has indirectly supported the decline in the Infant Mortality Rate (IMR) by promoting preventive healthcare and improving access to essential health services. In conclusion, the Pulse Polio Programme not only achieved its immediate goal of polio eradication but also laid a strong foundation for a resilient and responsive public health system in India. Its success demonstrates that sustained immunization efforts, coupled with strong political will and community involvement, can significantly reduce infant mortality and enhance the overall effectiveness of the healthcare sys

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