

SYNOPSIS

Title: Understanding the Impact of Structured Monitoring and Supportive Supervision Through the 'Anand Diwas' Initiative on Cold Chain Management and Immunization Outcomes in Madhya Pradesh

INTRODUCTION

“Though the world has gained notable achievement in child mortality reduction in the last two decades, there is still high under-five mortality. Globally, 29% of under-five mortalities are due to poor vaccine cold chain management in developing countries” (1). “About ten million under-five children are dying due to preventable causes each year globally, of which majority of deaths happened in developing regions” (2). “Vaccination is the intervention used to prevent or eradicate childhood diseases. It is the most cost-effective health intervention” (3). “The World Health Assembly established the expanded program on Immunization (EPI) in 1974, an action which marked a proactive commitment to extend the protective benefits of vaccination to all, where the cold chain system is used for storing, transporting and distributing vaccines and other biologicals in recommended temperatures until they reach beneficiaries” (4).

“Most public health programs are implemented primarily at the community level, and India’s Universal Immunization Program (UIP) has often provided a gateway for providing primary health services to all communities, irrespective of their geographic location, caste, and religion. A timely delivery of safe and potent vaccines, which relies on an efficient cold chain system, is the course of action for every health facility to effectively implement routine immunization and other health programs.” (5). “India’s Universal Immunization Program is one of the largest immunization programs globally in terms of the quantity of doses delivered, number of beneficiaries reached, number of immunization sessions organized, geographical spread, and diversity of areas covered. The program targets 27 million newborns and 30 million pregnant women each year. This requires more than 150 million doses of vaccines. Vaccines save lives and reduce the risk of infection and disease transmission by strengthening the body’s immune system. Currently, 3.5 to 5 million deaths per year are prevented from early childhood immunizations.” (6). “Achieving high coverage rates is considered one of the parameters to measure the success of the immunization program” (3).

“Success of national immunization program is highly dependent on supply chain system for delivery of vaccines and cold chain equipment” (7). “Any break in the cold chain may

result in an unrecoverable loss in potency lowering effective coverage leading to outbreaks of some vaccine-preventable diseases regardless of reported good coverage” (8). “Due to highly thermosensitive nature of vaccines, they have a fixed shelf life, and their potency is lost over time. To prevent this irreversible loss and wastage of vaccines proper storage and temperature conditions are to be maintained. Therefore, it is important to have a rigorous cold chain management for vaccines at each cold chain point to ensure that safe and potent vaccines are delivered to the beneficiaries. Also, an adequate number of knowledgeable, skilled and motivated human resources is critical in maintaining an effective and efficient vaccine cold chain” (8). “Sustainable Development Goals (SDGs) also highlight the well-being of vaccine recipients and equitable access for all. The SDG in the vaccine cold chain management enables adequate transportation and storage that increases operational, economic and environmental performances” (9). “The World Health organization recommends that vaccine should be stored in a refrigerator keeping the temperature reading between +2 and 8°C and transporting vaccines using vaccine carriers through properly prepared coolant packs at the health facility. Vaccine refrigerators, electronic refrigerators temperature loggers and vaccine vial monitoring are essential logistics for maintaining the potency of vaccines” (2). “Despite an increase in the number of cold chain points (CCPs), the network has not kept up with the India’s population growth. India’s more than 27,000 CCPs serve an average population of about 46,000 each and in some states, a CCP can serve more than 1,50,000. The biggest challenge is the safe storage of vaccines at remote locations due to disrupted supply of electricity from district to district, especially at village level and health facilities/CCPs rely on generators to provide backup power when electricity is erratic” (6).

“An efficient healthcare system is measured by the improved health outcomes of citizens by making quality services available to all through bridging of the gap in the supply of quality primary health care services. And to overcome challenges in the management of vaccine cold chain, supportive supervision can be used to provide high-quality services and enhanced performances of vaccine cold chain handlers (VCCH). Supportive supervision is a process of helping staff to improve their work performance regularly, as several studies have associated positive outcomes such as improved job performance, satisfaction and motivation with supportive supervision” (4). “The World Health Organization-United nations International Children’s Emergency Fund (WHO-UNICEF) effective vaccine management (EVM) initiative provides materials and tools required to assess the Immunization Supply Chains (iSCs) and help countries improve their supply

chain performance. It is based on the principle that repeated assessments of iSC against well-established standards of quality management can help guide policy makers and program managers, and hence improve the performance of country's iSC" (5).

Madhya Pradesh, the second largest state of India has 52 districts with an annual target of 22.5 lakhs pregnant women and child (0-1 years) population of 19.86 lakhs as per HMIS 2022 data. 77% of children of age group 12-23 months are fully immunized. This percentage has increased from 53.6% from NFHS 4 (2015-16) to 77% in NHFH 5 (2019-21). There are total 1249 cold chain points in 52 districts of the state as per NCCMIS Dec 2022 data. Under the immunization programme in the state vaccines for twelve preventable diseases is provided. There has been a consistent rise in the immunization coverage in Madhya Pradesh. However, for implementation of UIP effectively, factors such as cold chain and vaccine logistics management need a greater focus and consideration.

Vaccine management and gap identification is done through Effective Vaccine Management (EVM) which is a global initiative to strengthen the cold chain system, supply and ensure the safety and efficiency of vaccines up to the point of administration. First EVM in Madhya Pradesh was done in the year 2010, then in 2016 and third was done in the year 2022 in the month of march and April.

Anand Diwas was Madhya Pradesh government initiative, which started in the year 2022 in the month of October. It was introduced as an innovative approach, in which first working day of every month is designated for comprehensive supportive supervision. All the cold chain facilities in the state are visited and the observations are recorded in various formats in the Supportive Supervision 2.0 App developed by Ministry of Health and Family Welfare. Various health cadres are involved, and state, regional and district level facilities are visited by them. Officials fill out Sub DVS, DVS, RVS and SVS forms using the app. The visits are tracked by using the raw data files from NCCMIS portal and then data is analysed at state level. Findings are used to share feedbacks within the district teams so that they can track improvements and challenges can be addressed effectively. A multi-level monitoring system is formed that drives continuous improvements in the cold chain management. Month wise comparative findings are also discussed and shared at all levels of healthcare. This initiative helped improved supportive supervision dramatically, as reflected in 263% rise in FY 24-25, compared to just 17% in FY 19-20, 41% in FY 20-21 and 39% FY 21-22.

RESEARCH QUESTIONS

- How is the Anand Diwas initiative being implemented at cold chain point level in Madhya Pradesh?
- What are the perceived changes in cold chain management practices and infrastructure since the implementation of Anand Diwas?
- How do healthcare workers and program managers perceive the impact of structured monitoring on vaccine quality and immunization service delivery?
- What operational challenges and facilitating factors influence the effectiveness of Anand Diwas in different settings?

OBJECTIVES

- To understand the implementation process and structure of the Anand Diwas initiative at cold chain points.
- To explore the perceived impact of structured monthly monitoring on cold chain infrastructure, equipment maintenance, and vaccine storage practices.
- To understand how Anand Diwas has influenced vaccination quality from the perspective of frontline health workers.
- To identify enablers and barriers in the operationalization of the initiative across different facility contexts.

MATERIAL AND METHODS

Study Design:

A field-based qualitative study using exploratory design.

Study Setting:

Phanda Block, Bhopal region, Madhya Pradesh.

Study Population:

Government cold chain and immunization personnel directly involved in vaccine logistics and service delivery.

Inclusion Criteria:

Cold chain handlers, technicians, MOICs, DIOs, ANMs, storekeepers and support staff who have participated in Anand Diwas activities.

Exclusion Criteria:

Health personnel not involved in cold chain monitoring or Anand Diwas.

Study Tools:

Key Informant Interview (KII) checklists, observation checklists, document review tools based on WHO EVM and NCCVMRC guidelines.

Duration Of Study:

May 2025 (1 month)

Sample Size:

Four cold chain points, One State Vaccination Store, One District Vaccination Store, Four Anganwadi Centres and related health personnel across Bhopal region.

Sampling Technique:

Purposive sampling was used to select the active sites of cold chain and participants, emphasising those information-rich cases most relevant to the study.

Data Collection Procedure:

- In-depth interviews with state and district officials, VCCHs, MOICs, ANMs, and development partners.
- Field observation of immunization sessions and cold chain practices.
- Documentary review of Anand Diwas checklists, visit reports, temperature logbooks, and factsheets.

Operational Definitions:

- **Cold Chain Management (CCM):** Refers to the storage and transport of vaccines at recommended temperatures from the manufacturer to the point of use.
- **Supportive Supervision:** A process of helping staff improve performance through regular and structured monitoring, feedback, and on-site mentoring.
- **Vaccine Cold Chain Handler (VCCH):** Personnel responsible for maintaining vaccine storage equipment at cold chain points.

DATA ANALYSIS PLAN

Qualitative data collected through interviews, observations and document reviews were analysed using thematic content analysis. All interview transcripts and field notes were first read repeatedly to identify, analyse and report patterns within qualitative data. Importantly, all coding and analysis were done manually (**no** use of qualitative analysis software was made). This approach enabled a detailed exploration of themes related to “equipment checks,” “record keeping,” “supervisory visits,” etc. all audio-recorded interviews were transcribed verbatim. The data portions were coded and reviewed in an iterative manner to improve reliability and minimize individual bias. Overall, triangulation of multiple data sources and analyst perspectives increased the trustworthiness of conclusions.

ETHICAL CONSIDERATIONS

Prior to data collection, it was explained that participation was voluntary and informed verbal and written consent were obtained from all participants after explaining study's purpose. Participants were reassured that their responses would remain confidential. No personal identifiers (names, exact job titles, or facility names) were attached to the data, and transcripts were stored securely with limited access. Since many participants were government health staff (some known to the interviewers), we emphasized confidentiality and framed questions around system practices (not individual performance) to minimize any discomfort.

IMPLICATIONS OF RESEARCH

“There is a paucity of data on the theme of how supportive supervision influences the vaccine cold chain management practices of service providers and vaccine handlers” (4), therefore, this study titled “Understanding the Impact of Structured Monitoring and Supportive Supervision Through the 'Anand Diwas' Initiative on Cold Chain Management and Immunization Outcomes in Madhya Pradesh” aims to understand how state's local initiatives of structured monitoring and comprehensive supportive supervision of cold chain points through 'Anand Diwas' impacts cold chain management and immunization outcomes and how such interventions can be replicated to other states with similar healthcare settings.

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