

**EVALUATING THE IMPLEMENTATION OF THE IMMUNISATION WHEEL IN
MADHYA PRADESH: FRONTLINE WORKER PERSPECTIVES, FIELD
ADAPTATION, AND ITS ROLE IN ENHANCING VACCINE UPTAKE AND
COMMUNICATION**

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Aditi Kashyap Thakan

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Dr. Dhirendra Kumar

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TO WHOM SO EVER IT MAY CONCERN

This is to certify that Ms. Aditi Kashyap Thakan worked as an Intern in Knowledge Management Division in National Health Systems Resource Centre, New Delhi from 10th March 2025 to 9th June 2025.

We wish her success in all future endeavours.

Brig. Sanjay Baweja
Principal Administrative Officer

CERTIFICATE

This is to certify that dissertation titled '*Evaluating the Implementation of the Immunisation Wheel in Madhya Pradesh: Frontline Worker Perspectives, Field Adaptation, and its Role in Enhancing Vaccine Uptake and Communication*' is a record of the research work undertaken by Ms. Aditi Kashyap Thakan in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, likely belonging to the Faculty Guide.

Faculty Guide
IIHMR University, Jaipur

Date

A handwritten signature in blue ink, likely belonging to the School Dean.

School Dean
IIHMR University, Jaipur

Date

DECLARATION BY STUDENT

I hereby declare that this dissertation titled 'Evaluating the Implementation of the Immunisation Wheel in Madhya Pradesh: Frontline Worker Perspectives, Field Adaptation, and its Role in Enhancing Vaccine Uptake and Communication' is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



(Signature)

Name of Student *Aditi Kashyap Thakur*

Date : *19/06/2025*

ABSTRACT

Title:

Evaluating the Implementation of the Immunisation Wheel in Madhya Pradesh: Frontline Worker Perspectives, Field Adaptation, and its Role in Enhancing Vaccine Uptake and Communication

Author Name:

Aditi Kashyap Thakan

Advisor Name:

Dr. Dharendra Kumar (faculty guide), Dr. Neha Dumka (Organisation mentor and guide)

Keywords:

Routine Immunisation, Immunisation Wheel, Frontline Health Workers, Behaviour Change Communication, Public Health Tools, Vaccine-dropout Reduction, Universal Immunisation Programme, Madhya Pradesh.

Background:

Despite advances under India's Universal Immunisation Programme, states like Madhya Pradesh continue to report high rates of incomplete immunisation and missed doses. To address communication gaps and improve adherence, a visual Behaviour Change Communication tool—the Immunisation Wheel—was introduced to aid frontline health workers (ASHAs and ANMs) in conveying due dates and counselling caregivers.

Objective:

1. To determine how frontline health workers (ASHAs and ANMs) implement and utilise the Immunisation Wheel during routine immunisation activities.
2. To explore the perceived behavioural and communication impacts of the Immunisation Wheel on caregiver engagement and immunisation adherence.
3. To identify key enablers, challenges, and recommendations for improving and scaling the Immunisation Wheel as a behaviour change communication (BCC) innovation.
4. To identify major operational, design-related, and institutional challenges encountered during the use of the tool, along with frontline suggestions for adaptation and scale-up.

Methodology:

A qualitative study was conducted in the Bhopal district of Madhya Pradesh using purposive sampling. In-depth interviews were carried out with Frontline workers (ASHAs and ANMs) to gather insights into their experience with the Immunisation Wheel. Thematic analysis was used to derive themes related to tool utilisation, communication practices, behavioural impact, and system-level enablers and barriers.

Results/Findings:

The study found that the Immunisation Wheel contributed positively to worker confidence, scheduling clarity, and caregiver understanding. Frontline workers reported that the tool made it easier to communicate the immunisation timeline and improved session interactions. However, challenges were noted in terms of durability, visual clarity, misalignment of dates, and lack of reporting mechanisms. Concerns were also raised about the discontinuation of the caregiver version of the Wheel and the absence of guidance on restocking and formal scale-up pathways.

Conclusions:

The Immunisation Wheel demonstrates that low-tech tools, when contextually designed and adequately supported, can significantly enhance routine immunisation delivery. For sustained impact, its institutionalisation within health systems and alignment with monitoring frameworks are essential.

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ABBREVIATIONS

List of Abbreviations used

ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health
AWC	Anganwadi Centre
BCC	Behaviour Change Communication
DLHS	District level household and facility survey
FLW	Frontline Workers
IMI	Intensified Mission Indradhanush
MI	Mission Indradhanush
NFHS	National Family Health Survey
PIRI	Periodically Intensified Routine Immunisation
RI	Routine Immunisation
SDG	Sustainable Development Goals
UIP	Universal Immunisation Program

Chapter 1

INTRODUCTION

1.1 Global Context of Immunisation

Immunisation is one of the most universally recognised cost-effective and impactful public health interventions, preventing an estimated 4.4 million deaths in children each year. Thanks to concerted global efforts since the World Health Organization's Expanded Programme on Immunization (EPI) launched in 1974, vaccination coverage worldwide saw dramatic improvements through the late 20th century. By 2019, before the COVID-19 pandemic, coverage of the third dose of diphtheria-tetanus-pertussis vaccine (DTP3) had plateaued around 85%, reflecting both the successes and the stagnation in reaching the last mile. The pandemic caused significant setbacks – routine immunisation services were disrupted, dropping global DTP3 coverage to 81% in 2021, a level not seen since the 2000s. As of 2023, coverage has only partially rebounded to 84%, still below pre-pandemic levels.

Beneath the global average lie stark inequities. Low-income countries continue to lag far behind high-income countries in vaccine access. For example, in 2023 the WHO African Region had DTP3 coverage of only 69%, whereas South Asia and Europe achieved 90–95%. Even within regions, large countries heavily influence statistics: more than half of the world's "zero-dose" children (those who receive no vaccines at all) are concentrated in just seven countries – a list that includes Nigeria, India, DR Congo, Ethiopia, Indonesia, Pakistan and Sudan. India alone accounted for roughly 2 million zero-dose children in 2023 despite its high overall coverage (93% of its 22.7 million infants). This paradox – a country achieving high coverage yet still having a large absolute number of unvaccinated children – underscores the immense birth cohort in India and the pockets of children missed by services.

Commitments on the international stage have recognized that the routine operations are insufficient to reach all children. The *Immunization Agenda 2030 (IA2030)* – a global strategy endorsed by the World Health Assembly in 2020 – with explicit aims to "leave no one behind," targets to reduce the number of zero-dose children by half and achieve 90% coverage for all essential vaccines by 2030 [1]. The global context thus sets the stage: despite tremendous progress, roughly *one in six* of the world's children still does not receive all basic vaccines, and about *one in fifteen* gets no vaccines at all. It is within

this global narrative that South Asia – and India in particular – has a critical role. India’s success or failure in immunising its vast child population significantly shapes worldwide figures, and innovations from India can potentially inform other countries struggling with similar challenges of scale and last-mile delivery.

1.2 Immunisation in India: UIP and Mission Indradhanush

India’s Universal Immunisation Programme (UIP), launched in 1985, is one of the largest routine immunisation programmes in the world. With an annual target of around 26 million infants and 30 million pregnant women, and over 13 million vaccination sessions held each year, the UIP is an enormous undertaking in both scope and complexity. It provides vaccines free of cost against a broad array of preventable diseases. Over the years, the schedule has expanded from the six basic EPI vaccines to include newer vaccines such as measles-mumps-rubella (MMR), Japanese encephalitis (JE) in endemic regions, pentavalent (combining DPT, Hib, Hepatitis B), inactivated polio vaccine (IPV), pneumococcal conjugate vaccine (PCV), rotavirus vaccine (RVV), and others. Notably, India was certified polio-free in 2014, a milestone achieved through decades of pulse polio campaigns and routine coverage. India also eliminated maternal and neonatal tetanus by 2015. These successes demonstrate both the strength of political commitment and the reach of immunisation services when robustly implemented.

Despite its vast scale, the UIP historically struggled to achieve uniform high coverage across India’s diverse states and districts. By the mid-2010s, national survey data revealed concerning gaps: in 2015–2016, only about 62% of children aged 12–23 months were fully immunised with all basic vaccines. Put differently, more than one-third of Indian infants were either partially immunised or completely unvaccinated at that time. Many received some vaccines but missed others, indicating gaps in continuity (the “dropout” problem). Coverage varied widely – urban areas and better-developed states tended to do better, while rural, remote, and socioeconomically disadvantaged areas (including many tribal districts) lagged. This uneven progress prompted the Government of India to launch Mission Indradhanush (MI) in December 2014, as an aggressive strategy to boost Routine Immunisation (RI) coverage in areas with the poorest indicators.

Mission Indradhanush was designed as a Periodic Intensification of Routine Immunisation (PIRI) – essentially, supplemental immunisation drives targeting pockets of low coverage, without creating a parallel system. Beginning in early 2015, the

government conducted multiple focused immunisation rounds in identified high-risk districts and urban slums, deploying extra teams and resources to vaccinate missed children. The first two phases of MI (2015–2017) targeted 528 districts with low baseline coverage and high dropout rates, leading to the vaccination of an estimated 25.5 million children over several rounds. An early assessment indicated encouraging improvements: in 2015, immunisation coverage in targeted areas rose from 64% to 74% within about six months. A more rigorous analysis using national survey data found that by 2017, full immunisation rates were 27% higher in MI-targeted districts compared to others, after adjusting for baseline differences. Not only did more children get all vaccines, but there were also gains in age-appropriate vaccination – the proportion of children receiving vaccines on the recommended schedule (without delays) was about 8% higher in MI areas. This evidence suggests Mission Indradhanush helped not just to *catch up* defaulters but also to instil more timely immunisation practices, likely through intensive awareness and outreach efforts.

Building on MI’s success, the government introduced Intensified Mission Indradhanush (IMI) in late 2017. IMI targeted the remaining pockets of low coverage with “saturation” drives, aiming to reach *every* left-out child. Planning and monitoring were further strengthened, and convergence with other departments (e.g. women and child welfare) was increased. The impact of IMI was notable – a coverage evaluation survey in 190 districts showed an average 18.5 percentage-point increase in full immunisation coverage after IMI rounds, compared to baseline (NFHS-4) levels. By the time of the National Family Health Survey in 2019–21 (NFHS-5), India’s *full* vaccination coverage had improved to 76.1% nationally – a significant rise from 62% just five years earlier, and the highest level on record. This means about three out of every four children now receive all recommended vaccines by age 2, according to survey data. The number of zero-dose children in India also fell sharply in recent years, from an estimated 2.7 million in 2021 down to 1.1 million in 2022, reflecting intensified efforts to reach the unreached. These improvements have been attributed to multiple rounds of Mission Indradhanush and IMI conducted across the country, as well as general health system strengthening and demand generation.

Despite these gains, India has not yet achieved the UIP goal of “full immunisation for 100% of children” or the IA2030 target of 90% coverage in all districts. About one-quarter of Indian children are still missing one or more vaccines. The government has continued to introduce new strategies, such as Mission Indradhanush 2.0 and 3.0 (further

phases focusing on hard-to-reach and migrant populations in 2019 and 2020) and IMI 4.0 in 2022 to address setbacks from COVID-19. The routine immunisation system in India relies on an extensive network of frontline health workers: Auxiliary Nurse Midwives (ANMs) who conduct vaccination clinics, and Accredited Social Health Activists (ASHAs) who undertake community mobilization and tracking of beneficiaries. Strengthening these routine processes – *immunisation sessions, microplanning, due list preparation, defaulter follow-up, and community awareness* – remains central to consolidating the gains from special drives. In essence, India’s strategy has shifted from “campaign mode” back to “routine mode” with added vigour, recognizing that sustainable high coverage must come from consistent, round-the-year services backed by continuous social mobilization.

1.3 Coverage Gaps and Persistent Challenges

Achieving and sustaining high immunisation coverage is not merely a technical exercise of vaccine supply; it is equally a social endeavour. India’s progress has been impeded by several historical and persistent issues that cause children to be missed or to drop out partway through their vaccine schedule. These challenges, which are mirrored in many countries, include missed opportunities, dropouts between doses, health system limitations, and behavioural or demand-side barriers.

One key issue is the dropout rate – children who start vaccination but do not complete the series. In the past, India’s immunisation dropout rates were substantial. For instance, using data from the mid-2000s, it was estimated that the dropout from the first dose (BCG at birth) to the last infant dose (measles at 9–12 months) was about 17–18% nationally. In some areas the dropout was even higher: a national survey (DLHS-3) around 2007–08 found districts with over 25% of children dropping out between the initial and later vaccines. Such dropouts indicate that many families engage with immunisation services at least once (so access is achieved), but continuity falters – perhaps due to lack of follow-up, waning motivation, or other barriers. High dropout rates directly translate to lower full-immunisation coverage and tend to concentrate among disadvantaged groups. A more recent analysis of NFHS-5 data suggests that dropout rates have improved over time with overall programme improvements. Still, about 20% of Indian children are “partially immunised” (having received some but not all vaccines), indicating ongoing challenges with completing the series. These partially immunised children often represent the “low-hanging fruit” for improving coverage – they and their caregivers have already

demonstrated willingness to vaccinate, but require additional support to ensure they return for all doses.

Both supply-side factors (health system performance) and demand-side factors (caregiver knowledge, attitudes, and circumstances) are at play when explaining the occurrence of vaccine dropouts. On the supply side, one classic issue has been health worker and system limitations in tracking and follow-up. In theory, every ANM and ASHA is supposed to maintain a due list of infants due for upcoming vaccines and a defaulter list of those who missed their doses. However, in practice these lists have not always been systematically used or kept up to date. A study in Uttar Pradesh in 2021 found that more than half of the children who dropped out were clustered in just 30% of the ASHAs' catchment areas. In those high-dropout areas, the frontline workers' record-keeping was often incomplete, and supervisory support was weaker. Furthermore, a qualitative evaluation in a north Indian district found that failures in *defaulter tracking mechanisms* – such as not following up when a child missed a session – contributed to dropouts. In that study, no reminder or follow-up was given to many mothers who defaulted, and the result was a dropout rate of 30% from BCG to DPT3 in the sample. This highlights a crucial gap: the system had the *infrastructure* (vaccination card stubs, registers) to track defaulters, but the *implementation* (actual use of those tools to reach out and bring the child back) was weak. Strengthening health worker capacity – in terms of training, supportive supervision, and simple job aids to manage information – has been identified as a key strategy to reduce dropouts.

On the demand side, behavioural and social barriers often underlie missed vaccinations. These range from lack of awareness and competing priorities to vaccine hesitancy. In a cross-sectional survey in Lucknow, for example, 24% of children were only partially immunised and 13% not immunised at all, and the reasons reported by caregivers included: “*forgot or postponed until later*,” the child being ill on the day of vaccination, unawareness of the need for multiple doses, and the misperception that “polio drops alone were sufficient”. Other cited barriers were distance to the immunisation site, mothers being too busy with work or household duties, and fear of side reactions from vaccines. A small but significant minority of families also expressed low trust or “no faith” in immunisation due to misinformation or past experiences. It is notable that these reasons are predominantly *modifiable*: they point to inadequate communication and convenience, rather than outright refusal. Indeed, truly anti-vaccine sentiment remains relatively low in India; most parents whose children are

unimmunised are not actively rejecting vaccines but either lack information or face logistic constraints. Studies have shown that factors like maternal education, maternal age, and whether the mother received antenatal care are strongly associated with immunisation uptake. Younger mothers with little schooling, who did not get antenatal counselling and who deliver at home, are more likely to drop out, due to both lower awareness and weaker links to health services. In such cases, the influence of community norms and frontline health workers becomes even more crucial in shaping positive behaviours.

India has also contended with geographic and cultural diversity that affects immunisation. Remote rural areas, nomadic communities, conflict-affected regions, and urban slums each present unique challenges. For example, tribal districts in central India have had chronically lower coverage, possibly due to difficult terrain and historical under-investment in health services. Migrant populations (seasonal workers moving for labour) often fail to complete vaccination schedules as they move between states. Social barriers like caste, gender norms (e.g. lower care-seeking for girl children in some contexts), and religious misconceptions have at times created pockets of hesitancy or low demand. All these factors underscore that achieving full immunisation coverage is not merely about vaccine supply, but about behaviour change communication (BCC), trust-building, and responsive health services.

Crucially, incomplete immunisation has real public health consequences. Children who miss vaccines remain vulnerable to life-threatening diseases, undermining India's ability to meet child mortality reduction goals. Outbreaks of measles, diphtheria, or pertussis in under-immunised communities can set back gains and erode confidence in the health system. Moreover, persistent dropout and missed coverage in any subgroup means the overall herd immunity is fragile –which disproportionately affects slums and vaccine-hesitant pockets. Thus, addressing the causes of dropout and missed doses is not only about individual rights to health, but also about India's commitment to broader targets like the Sustainable Development Goals (SDG 3). It is estimated that immunisation currently averts nearly a million child deaths per year in India, but closing the coverage gaps could save thousands more lives from pneumonia, diarrhoea, and other vaccine-preventable diseases. In sum, reaching that last 15–25% of children with all vaccines is essential for equity, for community protection, and for maximising the return on investment of India's immunisation programme.

1.4 Importance of Addressing Incomplete Immunisation

Despite the challenges outlined, the significance of focusing on this ‘final stretch’ of full immunisation is multi-fold. Firstly, from a child rights perspective, every child left unimmunised represents an unacceptable gap in access to a basic life-saving service. Immunisation is often considered a proxy for the strength of a primary healthcare system; thus incomplete immunisation signals deeper health system issues that likely also affect other services. Secondly, from a disease control perspective, un- or under-vaccinated clusters can sustain transmission of diseases and spark outbreaks. India’s goal of eliminating diseases like measles by 2023 (as per the National Strategic Plan) hinges on achieving >95% two-dose coverage uniformly – a target that clearly cannot be met if dropouts persist. During the COVID-19 pandemic, routine immunisation backsliding globally led to worrying outbreaks of polio and measles in various countries; this illustrated how quickly gains can be lost if focus lapses. Reaching high coverage and maintaining it is necessary to keep diseases at bay – especially in a country as populous as India where a small percentage gap translates to millions of susceptible children.

Thirdly, there are global and national commitments driving the urgency to address incomplete immunisation. India is a key contributor to the global IA2030 target of reducing zero-dose children. Already, India’s concentrated efforts have paid off in reducing its zero-dose count dramatically in one year (2022 vs 2021), which in turn drove a large portion of the global improvement. To sustain this, strategies must tackle not just zero-dose but also “left out” second or third doses (i.e. dropouts). India highlighted immunisation as a top priority for its development, by setting a goal of achieving 90% FIC by 2025 in its National Health Policy of 2017. Incomplete immunisation is also intertwined with other development indicators as it often correlates with poverty, low education, and gender inequality. Thus, addressing it has co-benefits: improving immunisation coverage can be a gateway to improving primary healthcare utilisation more broadly and can signal improvements in community trust and engagement with health services.

Finally, focusing on dropout reduction and completion of schedules is cost-effective. The majority of immunisation system costs are incurred in infrastructure and labour, which are fixed; the marginal cost of vaccinating an additional child (or an additional dose for a child) is relatively low. Therefore, it makes economic sense to ensure every opportunity is used to fully immunise each child – otherwise resources spent on partial vaccination

yield suboptimal impact. A child who got DTP1 and DTP2 but not DTP3, for example, has expended vaccines and health worker time without gaining full protection. Such inefficiencies can be minimized by better follow-up and BCC to encourage caregivers to complete the series. In summary, incomplete immunisation and dropouts are not just statistics – they represent real children at risk and indicate systems that need strengthening. Tackling these issues is essential for India to achieve its public health targets and to uphold the promise of health for all.

1.5 BCC Interventions to Reduce Dropouts

Behaviour Change Communication (BCC) and community engagement have proven indispensable in closing immunisation gaps around the world. Globally, various low- and middle-income countries have employed BCC-driven strategies to reduce immunisation dropouts. In Nepal, community health volunteers used flipcharts and home visit records to educate mothers, leading to increased vaccine completion. Pakistan implemented SMS-based reminder systems that significantly improved DTP3 coverage. In sub-Saharan Africa, visual tools like "My Village My Home" maps empowered communities to track each child's progress and reduce defaulter rates.

These interventions share a few commonalities: they simplify complex schedules, empower caregivers with knowledge, and support frontline workers in communication and tracking. Evidence from Uganda, Bangladesh, and Ethiopia also confirms that job aids and visual counselling tools help in overcoming literacy barriers and build caregiver confidence

Global experience highlights that increasing immunisation uptake is not solely about vaccine supply or cold chain – it is fundamentally about communication and community engagement. Such interventions create demand for vaccines, ensure caregivers know *when* and *why* to come back, and build trust in the safety and efficacy of vaccines. These lessons strongly inform India's efforts to address dropout and hesitancy. It is in this context that India's own local innovations, such as the Immunisation Wheel in Madhya Pradesh, merit close examination.

1.6 The Immunisation Wheel (Tikakaran Chakra) Initiative in Madhya Pradesh

In Madhya Pradesh (MP), a central Indian state with a large rural and tribal population, improving immunisation coverage has been a priority due to historically lower rates. Over

the past decade, MP made commendable progress – full immunisation coverage of children 12–23 months increased from just 53.6% in 2015–16 to 77.1% by 2020–21. This leap of 23 percentage points was one of the largest among Indian states, attributable in part to Mission Indradhanush and state-led innovations. Yet, about one in five children in MP still does not receive all basic vaccines, and certain districts lag behind the state average. Recognising that missed appointments and dropouts were a persistent challenge, especially in remote communities, the Government of Madhya Pradesh in collaboration with development partners sought an intervention to strengthen interpersonal communication and scheduling at the last mile. The result was the development of the “Immunisation Wheel,” locally dubbed *Tikakaran Chakra*, an innovative job aid for health workers and a visual tool for caregivers, essentially like a circular vaccine calendar.

Crucially, the *Tikakaran Chakra* has been developed in *two versions* – one for ANMs (vaccinators) and one for ASHAs (community mobilisers). The content on both is similar regarding the schedule, but they are color-coded (the ANM’s wheel is green and the ASHA’s is pink) and the back side of each wheel is tailored to the worker’s role. For ANMs, the back of the wheel contains reminders about safe injection practices, session checklist, and key messages to give at the time of vaccination (e.g., advice on managing common side effects and the importance of the next visit) – reinforcing their communication during clinics. For ASHAs, the back has talking points on each vaccine-preventable disease and prompts to address common doubts – helping them during home visits to convince families. The ASHAs are also tasked with using their wheel to prepare and update their due lists.

The development of the Immunisation Wheel began in early 2020, led by the state Routine Immunization cell with technical support from external stakeholders. Health officials identified that frontline workers needed a “communication catalyst”, something to standardise and strengthen the information given to caregivers, and to ensure no confusion about dates. The first prototype was created with ANMs in mind, given that ANMs are the ones actually administering vaccines and often record the next due date on a card or inform verbally. By visualising the entire schedule at once, the wheel was intended to make the ANM’s explanation clearer: instead of simply saying “come next month,” she could physically show the mother *when* and *for what vaccine* the next visit was due. Field feedback on the initial design was positive about the concept but highlighted areas for improvement – for example, district officials and community members suggested using local dialect and more intuitive color coding. The design was

iterated and improved, including making it durable with a plastic lamination (important for field conditions).

By mid-2021, the Tikakaran Chakra was piloted in select districts of Madhya Pradesh. ANMs and ASHAs were trained together on using the wheels. For caregivers, a third version '*Caregiver's immunisation wheel*' was also introduced on a pilot basis. This caregiver wheel is essentially a take-home reminder: allowing parents themselves to keep track of upcoming vaccine dates by aligning to the child's birth date.

From a behavioural science perspective, the Immunisation Wheel incorporates several principles of effective BCC: visual appeal, interactivity, and agency. It turns abstract dates and medical terms into a concrete, hands-on artifact that *caregivers themselves* can manipulate and consult. This likely increases the caregiver's sense of control and understanding (self-efficacy) regarding immunisation, as evidenced by improved recall of dates. It also plays to memory aids – the wheel hanging on a wall works as a continual reminder (cue to action) in the household environment. For health workers, the wheel reduces cognitive load in calculating dates and ensures no antigen is forgotten during counselling.

Such tools do not replace the need for functional health systems or regular outreach, but they *augment* the effectiveness of each worker–client interaction. By simplifying the technical task (date calculation) and enhancing communication, the wheel enables the health worker to focus more on building rapport and addressing parental concerns – the human touch that often makes the difference between a defaulter and a compliant caregiver.

In Madhya Pradesh, as of 2023, the Immunisation Wheel initiative has been scaled up state-wide. The state government formally approved it as a part of the routine immunisation communication toolkit and began distribution across all districts, with orientation sessions for all ANMs and ASHAs. The Tikakaran Chakra exemplifies how a behaviour change communication tool, can support frontline workers and caregivers alike to bridge the last mile gap in immunisation. It transforms the abstract schedule into a conversational piece at every immunisation encounter, reinforcing the message that *full* immunisation is the norm and expectation.

In conclusion, Madhya Pradesh's Immunisation Wheel initiative sits at the nexus of global best practices and local innovation. It addresses a clear need – reducing missed

doses and dropouts – through a culturally appropriate, user-friendly solution. Keeping these complexities in mind, the present study has been designed to examine the use and implementation of the Immunisation Wheel (*Tikakaran Chakra*) in Madhya Pradesh as a behaviour change communication tool aimed at reducing immunisation dropouts and improving full immunisation coverage. The objective is to explore how this intervention is utilised by frontline workers such as ASHAs and ANMs, how it is perceived by beneficiaries, and what barriers and enablers exist in its routine usage. The larger purpose of this study is to comment on the effectiveness of the Immunisation Wheel as a model communication innovation within the broader Routine Immunisation programme, while identifying best practices, operational gaps, and contextual challenges that may hinder its scalability and long-term impact. In doing so, this study titled “*Evaluating the Implementation of the Immunisation Wheel in Madhya Pradesh: Frontline Worker Perspectives, Field Adaptation, and its Role in Enhancing Vaccine Uptake and Communication*” seeks to contribute meaningful insights toward the design and delivery of equitable, community-anchored immunisation services in India and similar low-resource settings.

Objectives:

1. To determine how frontline health workers (ASHAs and ANMs) implement and utilise the Immunisation Wheel during routine immunisation activities.
2. To explore the perceived behavioural and communication impacts of the Immunisation Wheel on caregiver engagement and immunisation adherence.
3. To identify key enablers, challenges, and recommendations for improving and scaling the Immunisation Wheel as a behaviour change communication (BCC) innovation.
4. To identify major operational, design-related, and institutional challenges encountered during the use of the tool, along with frontline suggestions for adaptation and scale-up.

Chapter 2

LITERATURE REVIEW

S.no	Authors (Year)	Location of study	Source journal	Sample size	Sampling techniques	Findings
1.	Singh P et al. (2020)	India	BMJ Global Health	190 districts	Stratified cluster sampling	Conducted across 190 low-coverage districts in India under Mission Indradhanush (MI). Showed a significant improvement in full immunisation (18.5 percentage-point increase). Demonstrates that focused, periodic intensification in routine immunisation using system-level strategies can yield measurable gains. Underscores the importance of demand-side and outreach innovations in addressing coverage gaps.
2.	Shrivast wa N et al. (2015)	India (NFHS-3)	Vaccine	10,000 + children	Secondary data analysis	Using NFHS-3 data, this study identified predictors such as maternal education, antenatal care, and place of delivery as strongly correlated with full immunisation. Highlights the socio-demographic barriers to vaccine adherence. Places emphasis on frontline health workers' role in bridging knowledge

						gaps among vulnerable caregivers.
3.	UNICEF/ WHO (2023)	Global	WHO/UNICEF Joint Reporting Form	194 countries	Administrative data and surveys	Global administrative and survey data showed DTP3 stagnating at 84% and 18 million zero-dose children in 2022. South Asia achieved >90%, but absolute numbers remain high due to population size. The report highlights inequities in coverage, making the case for country-specific and locally tailored communication tools.
4.	Gurnani V et al. (2018)	India	Vaccine	Narrative review	Narrative synthesis	Narrative review tracing the evolution of India's immunisation policies and programmes. Emphasises the expansion of the UIP and integration of new vaccines. Stresses the importance of frontline health worker engagement, communication tools, and outreach activities.
5.	Waisbord S & Larson H (2005)	Global	WHO Working Paper	Not applicable	Literature review	WHO-backed review arguing for investment in communication to support immunisation. Describes interpersonal communication, visual tools, and job aids as essential for vaccine acceptance and completion, reducing

						dropouts by simplifying schedules and encouraging informed caregiver engagement.
6.	Khan A et al. (2021)	Bangladesh, India, Pakistan	Human Vaccines & Immunotherapeutics	6,500 caregivers	Multistage stratified sampling	A cross-sectional, multi-country study to explore the behavioural and structural barriers contributing to immunisation dropouts in South Asia, involving structured interviews with over 6,500 caregivers. Highlighted a consistent pattern across countries: fear of adverse events following immunisation (AEFI), misinformation around vaccine safety, and geographic or financial barriers to reaching health facilities were major reasons for missed and delayed doses. Mothers who reported limited interaction with health workers or who had low trust in local facilities were more likely to skip follow-up doses. Reinforces the idea that low knowledge retention and risk perception amplify dropout behaviour.
7.	Balasubramanian S et al. (2021)	India (Uttar Pradesh)	Journal of Global Health Reports	400 mothers, 60 ASHAs	Mixed methods – household	Evaluated the role of Accredited Social Health Activists (ASHAs) in improving RI uptake in Uttar

					survey and interviews	Pradesh through a mixed-methods approach, using household surveys and in-depth interviews to understand how health worker engagement affected full immunisation coverage. Analysis revealed that mothers who had been visited at home by an ASHA in the previous month were significantly more likely to have completed their child's schedule. Qualitative findings revealed that interpersonal communication, when reinforced with materials such as health charts or visual references, significantly increased trust and recall.
8.	Patel M et al. (2020)	India (Madhya Pradesh)	Indian Pediatrics	20 ANMs, 350 children	Observational cohort study	Observational study in rural Madhya Pradesh focusing on the utility of due lists and defaulter tracking for improving immunisation adherence. Documented immunisation coverage trends with and without consistent due list usage. ANMs who rigorously updated and used due lists achieved a 20% higher compliance rate in ensuring

						children received timely vaccinations compared to those who relied on memory or verbal recall. Highlights how structured tools improve not only planning but also communication between health workers and families.
9.	Lwanga J et al. (2019)	Uganda	BMC Public Health	180 health workers	Cluster sampling	Studied the effect of visual job aids on immunisation counselling practices among health workers in Uganda. Conducted across 30 health facilities with 180 health workers, the cluster-sampled study introduced visual charts and cue cards as tools to support parental understanding. The intervention group demonstrated a 28% improvement in mothers' retention of vaccine due dates and a 16% increase in full immunisation compared to the control. Further, interviews revealed that visual materials were easier to understand for caregivers with low literacy, and improved caregiver-health worker dialogue. The study underscores the behavioural effectiveness of interactive

						tools which improve scheduling recall and promotes proactive engagement with immunisation services in low-resource settings.
10	Yadav K et al. (2019)	India (Haryana)	PLOS ONE	2,800 children	Household survey	Analysed the association between home-based immunisation records (HBIRs) and full immunisation coverage (FIC) in Haryana, India. Drawing on a sample of 2,800 children under the age of two using household surveys, the study demonstrated that children whose caregivers retained their immunisation cards were 1.9 times more likely to be fully immunised. Additionally, the study showed that households where ANMs or ASHAs used the card during visits or sessions had higher awareness of vaccine schedules. The researchers concluded that HBIRs serve not only as passive documentation tools but as active memory and planning aids when coupled with counselling, reinforcing the idea that retention and

						visibility of vaccine schedules can have a significant behavioural impact on follow-through and completion.
11	Ali M et al. (2022)	India, Nepal, Sri Lanka	Vaccine X	12,000 + records	Regional DHS data analysis	A regional comparative study to examine immunisation trends across India, Nepal, and Sri Lanka using data from Demographic and Health Surveys (DHS). The study analysed over 12,000 immunisation records, focusing on full immunisation coverage and dropout rates. It found persistent immunisation dropouts, especially in rural and low-literacy populations, despite overall regional improvements. Maternal education emerged as a consistent predictor of full immunisation across countries. The findings are significant in highlighting that structural barriers are similar across South Asia, underscoring the need for simple, culturally adaptable communication tools that target caregiver education.

12	George A et al. (2017)	Bihar	Health Communication	420 FLWs	Pre-post intervention	Assessed the use of visual flipbooks as behaviour change communication (BCC) tools among frontline health workers (FLWs) in Bihar, India. The pre-post evaluation included 420 FLWs trained in immunisation counselling with flipbooks. Post-training assessments showed a 25% increase in immunisation knowledge scores and significant improvement in caregiver trust and adherence to vaccination schedules, laying importance on the role of structured, pictorial tools in enhancing interpersonal communication and boosting caregiver confidence.
13	Srinivasan R et al. (2016)	Kerala	Indian Journal of Public Health	200 caregivers	Qualitative focus groups and interviews	Explored caregiver perceptions of adverse events following immunisation (AEFI) in Kerala through focus group discussions and in-depth interviews with 200 caregivers. The study found that even mild, self-limiting AEFIs led to heightened perceived risk, often resulting in delayed or missed subsequent doses.

						This misperception was more prevalent among caregivers who did not receive adequate post-immunisation counselling. These findings emphasise the importance of consistent, clear, and visual counselling on what to expect post-vaccination and address gaps by standardising key messages and reinforcing vaccine safety.
14	Marathe A et al. (2023)	India (Delhi slums)	Journal of Urban Health	800 mothers	Stratified sampling	Investigated immunisation patterns in urban slums of Delhi, where residential mobility and weak follow-up systems contribute to high dropout rates. The study surveyed 800 mothers across multiple slum clusters using stratified sampling. Findings showed that frequent migration, loss of vaccination cards, and lack of session reminders significantly affected immunisation continuity. The study underscores the need for interventions that can function as visual scheduling aids and reminders, especially in informal settlements where digital tracking is limited

						and health access is fragmented.
15	Das J et al. (2020)	India (NFHS-4)	The Lancet Regional Health – Southeast Asia	75,000 + children	Secondary data analysis	Das J et al. (2020) analysed NFHS-4 data from across India to evaluate the influence of maternal education on full immunisation coverage. With a sample size exceeding 75,000 children, the analysis revealed that maternal education was the single most significant predictor of a child's immunisation status, more than economic or geographic factors. The study called for targeted communication and education strategies to bridge this gap. It strongly supports the use of simple, visual tools that empower low-literacy caregivers to understand and follow the vaccine schedule accurately.

Chapter 3

METHODOLOGY

3.1 Research Question

How is the Immunisation Wheel being used by frontline health workers in Madhya Pradesh, and what is its perceived impact on communication, caregiver engagement, and immunisation dropout reduction?

3.2 Study Design

This study employed a cross-sectional qualitative design to evaluate the implementation and effectiveness of the Immunisation Wheel (Tikakaran Chakra) as a behaviour change communication (BCC) tool in the Bhopal district of Madhya Pradesh. This approach enabled a nuanced understanding of the qualitative utility of the wheel, capturing frontline worker experiences and perceptions, as well as caregiver knowledge, attitudes, and practices regarding immunisation.

The rationale for this design was grounded in the complex nature of the intervention being studied. The Immunisation Wheel is not merely a material artefact but also a communication catalyst embedded within the larger health system. This approach was necessary to investigate both its technical functionality and socio-behavioural integration in the field.

3.3 Study Setting

The study was conducted in selected Anganwadi Centres (AWCs) within Phanda block of Bhopal district, Madhya Pradesh. The district was purposively chosen for its representation of both urban and peri-urban immunisation challenges and for being one of the implementation sites of the Immunisation Wheel pilot. The selected facilities serve populations with varying levels of immunisation coverage, enabling the study to explore heterogeneity in program implementation and user experience.

3.4 Study Area and Population

The target population consisted of two categories of participants: Auxiliary Nurse Midwives (ANMs) and Accredited Social Health Activists (ASHAs).

- **Frontline Health Workers (FLWs):** A total of 11 FLWs were included; 6 ANMs and 5 ASHAs, who had all received and used the Immunisation Wheel during routine immunisation services. These workers were interviewed and also surveyed using a structured checklist.

A few caregivers were also interacted with, however due to its small sample size (n=3), it is acknowledged as a limitation. Despite this, the data collected through them gave useful qualitative insights into community-facing aspects of the wheel's utility and was triangulated with the findings of ANM and ASHA sample.

Table 3.1: Location details

S.N	Location	Activities undertaken
	Travel to Bhopal, Madhya Pradesh	
1	National Health Mission, Madhya Pradesh	Introductory interactions with; 1. Deputy director for Immunisation Dr. Saurabh Purohit 2. Deputy director for Cold Chain Er. Vipin Shrivastava 3. Dr. Ram Kumar (Development Partner, UNICEF) 4. Dr. Kapil Jadon (Development Partner, UNDP)
2	Cold-chain points across Bhopal	Visits across several vaccine stores (regional, district and state) as well as cold-chain points were done to understand the very first step in the immunisation process.
3	Anganwadi Centre (urban)	Interaction with ANMs and ASHAs regarding wheel, observed RI session + use of the wheel in a practical setting, engaged with beneficiary.
4	Anganwadi Centre (urban)	Interaction with ANMs and ASHAs regarding wheel

5	Anganwadi Centre (rural)	Interaction with ANMs and ASHAs regarding wheel, observed RI session + use of the wheel in a practical setting, engaged with beneficiary.
6	Anganwadi centre (urban)	Interaction with ANMs and ASHAs regarding wheel

3.5 Sampling Technique

- **Purposive Sampling (FLWs):** ANMs and ASHAs were selected through purposive sampling, focusing on those who had actively used the Immunisation Wheel and were based in areas with varying immunisation coverage levels.

3.6 Tools Used for Data Collection

Three primary tools were used in the data collection process:

a. Structured Checklist (ANM/ASHA Survey)

A structured checklist was administered to all 10 FLWs to capture quantitative data on their use of the wheel, recall of its components, frequency of use, and perceived impact on counselling and defaulter tracking. The checklist included Likert-scale and binary-response items to quantify attitudes and operational challenges.

b. Semi-Structured In-Depth Interview

A semi-structured interview guide was developed to conduct in-depth interviews with the 11 ASHAs and ANMs. The guide was designed to explore:

- Introduction to the Immunisation Wheel
- Training received
- Experiences during use
- Perceived behavioural changes in caregivers
- Operational challenges
- Suggestions for improvement

These interviews were audio recorded (with consent), transcribed verbatim, and used for thematic analysis.

3.7 Data Analysis

Qualitative Data: Transcripts from in-depth interviews were subjected to thematic analysis. An inductive approach was used to code transcripts line-by-line, from which broader themes and sub-themes were generated. Qualitative analysis software was not used due to the small dataset; instead, coding was done manually using matrix frameworks.

3.8 Ethical Considerations

The study adhered to all ethical norms applicable to small-scale field-based evaluations. Informed verbal consent was obtained prior to any data collection. Participants were clearly informed about the purpose of the study, their right to withdraw at any time, and assured that their responses would remain confidential and anonymous. No identifiable data were collected, and all transcripts were de-identified during analysis. Data collection posed minimal risk to participants and involved no invasive questions or collection of sensitive personal data.

3.9 Limitations

This study was exploratory in nature and possesses the following limitations;

- The small sample of caregivers (n=3) as well as the frontline workers (n=11) limits generalisability of findings related to the wheel's usage and perceptions. Secondly, the study was confined to one district, and findings may not reflect

implementation realities in other parts of Madhya Pradesh where this initiative has been launched, thereby reducing its geographical scope. Furthermore, since the design of the study is cross-sectional in nature, it only captures a snapshot in time and may not reflect changes in practices or perceptions over the long term. Finally, since the FLW surveys were self-reporting questionnaires, it could have led to over-reporting of wheel usage due to social desirability bias.

Despite these limitations, the study provides grounded, context-specific insights into the implementation of the Immunisation Wheel and its perceived impact on the delivery of routine immunisation and caregiver engagement.

Chapter 4

RESULTS AND FINDINGS

This chapter presents the findings from a qualitative evaluation of the implementation and perceived impact of the Immunisation Wheel (Tikakaran Chakra) initiative in the Bhopal district of Madhya Pradesh. The study was conducted over a span of a few weeks in May 2025 and included interactions with key frontline health workers (FLWs)—specifically, five Auxiliary Nurse Midwives (ANMs) and five Accredited Social Health Activists (ASHAs) who were operating across selected Anganwadi Centres in both urban and rural zones of Phanda block in Bhopal. The objective was to understand their lived experiences with the wheel’s introduction, usage, challenges, and influence on immunisation service delivery.

Purposive sampling was used to select frontline workers who had been actively involved in the rollout and routine usage of the wheel for at least one year. Data was collected using a checklist tool was utilised to get objective answers about the perception of the tool, as well as an in-depth interviews guided by a semi-structured tool, allowing for both narrative expression and thematic consistency. Transcripts from these interviews were analysed thematically to extract recurring patterns of meaning and operational insights.

The results are organised thematically and highlight key aspects which aim to provide a grounded understanding of how the Immunisation Wheel has functioned within existing RI systems, how it is perceived by its primary users, and what lessons may be drawn from its implementation for future BCC innovations.

Table 2: Themes and Sub-Themes for Evaluation of the Immunisation Wheel Initiative

Theme No.	Theme	Sub-Themes
1	First Impressions and Orientation to the Wheel	1.1 First encounter and Initial response 1.2 Official Introduction and Training 1.3 Adequacy and clarity of orientation

2	Integration into Routine Immunisation Workflows	2.1 Operational ease of use 2.2 Compatibility with session work
3	Impact on Interpersonal Communication	3.1 Improved engagement with caregivers 3.2 Changes in caregiver behaviour
4	Perceived Effect on Dropout Reduction and Awareness	4.1 Visibility and memory aid for vaccine dates 4.2 Increased completion of immunisation 4.3 Enhanced caregiver awareness
5	Design and Operational Challenges in Field Use	5.1 Field usage and its challenges 5.2 Absence of monitoring and reporting mechanisms
6	Reflections on Empowerment, Adaptation, and the Future of the Tool	6.1 Confidence and role reinforcement 6.2 Worker-driven innovations and feedback 6.3 Reflections on the caregiver wheel 6.4 Aspirations for scale-up

1. Training and Orientation

1.1 First Encounter and Initial Response

ASHAs and ANMs consistently recalled the first time they saw the Immunisation Wheel with clarity. Most were introduced to the tool during routine VHNDs (Village Health and Nutrition Days) or through immunisation review meetings. ANMs reported that it was first shown to them by the block or district supervisors, while ASHAs mentioned exposure either through ANMs or joint VHND sessions. One ANM shared:

“At first I thought it was some kind of a clock because of its round design. But when they turned it and showed how dates come up based on the child’s birthdate, I understood that it was for scheduling the vaccines. It was simple but smart.”

The novelty of the design stood out to many. The circular, calendar-like structure was seen as unique and engaging. While some ASHAs admitted to initial confusion, especially about how to align dates or read the schedules, this was generally short-lived

once the basic mechanism was explained. Most importantly, their first impressions were overwhelmingly positive, with many describing the wheel as a "nayi cheez" (new thing) that seemed useful at first glance.

1.2 Official introduction and training

Both cadres of respondents (ANMs and ASHAs) consistently recalled receiving training sessions when the Immunisation Wheel was first introduced. All the ANMs reported to have received a one-day long training session in Bhopal. The training sessions were typically conducted by the Immunisation department of the National Health Mission in tandem with an external stakeholder in Bhopal city, where a collective of ANMs were asked to gather and they were then given an introduction to wheel, its purpose and the practical demonstrations of its functioning.

“When we first got the wheel, there was a collective training in Bhopal. They showed us how to match the date of birth with the arrow, and how the dates for all vaccines appear automatically. It was a new concept, so they talked us through the process and made us practice a few times.” **ANM, urban AWC**

While ANMs often received a more direct orientation, ASHAs were introduced second-hand. Most were taught how to use the wheel by the ANMs at their respective facilities on immunisation days, or through peer-sharing within their ASHA clusters.

“Our ANM Didi showed it to us at the Anganwadi centre. We didn’t get full training, but she explained how to match the child’s date of birth and read the vaccine dates. It was easy after that.” **ASHA, urban AWC**

While the initial comprehension was reported to be high, a few workers indicated that they were slightly confused about aligning the wheel and interpreting the corresponding schedule dates without supervision. In particular, ASHAs, who do not administer vaccines directly, reported a slightly lower retention of the wheel's technical aspects during the first few months. The responses suggest that while the first training was impactful, hands-on follow-up was critical to deepen understanding.

“I was confused about what to tell the mother exactly from the wheel, so I mostly ended up manually calculating all dates for a more accurate date. But after using it two-three times with ANM didi, I got more confident.” **ASHA, urban AWC**

Such peer reinforcement was especially critical where formal follow-up training or printed guides were lacking. Many ASHAs noted that since they did not receive a written manual, they relied heavily on word-of-mouth and trial-and-error to understand nuances of communication with caregivers.

Despite the variability in the formality of training, frontline workers largely adapted to using the wheel in their day-to-day routines. This indicates a significant degree of intuitive usability in the tool's design, although it also suggests a missed opportunity for standardised orientation.

1.3 Adequacy and clarity of orientation

Most FLWs felt that the orientation was broadly adequate in duration and depth, though some remarked that more time could have been spent on question-and-answer sessions or practice scenarios.

“It was only a one day session for everyone. It was good, but it felt a little rushed. It would have helped more if they held longer training sessions.” **ANM, urban AWC**

However, ASHAs reported that the clarity of instructions around their specific responsibilities (i.e., communication and mobilization versus session-level explanation) could have been better delineated.

“They told us to use the wheel during home visits, but it was not very clear what we should say apart from showing the date. That part we had to learn by observing others.” **ASHA, urban AWC**

2. Integration into routine immunisation workflows

2.1 Operational ease of use

Across respondents, the Immunisation Wheel was described as a tool that significantly reduced the cognitive load required for calculating due dates. Many ANMs highlighted that date calculations, particularly under pressure during immunisation sessions, were error-prone and time-consuming prior to the Wheel's introduction. The Wheel was said to simplify this process by providing a visual, non-verbal reference for vaccine scheduling.

“Earlier we had to count months or refer to the register every time. Now I just rotate the Wheel, and the dates come directly. This is faster and less confusing for me.” ANM, urban AWC

ASHAs similarly reported that the Wheel allowed them to offer more confident and immediate answers when asked about upcoming immunisation dates. The simplicity of the tool’s design enabled its consistent use even by stakeholders who had lower educational qualifications, demonstrating the tool’s success in being both low-tech and intuitive; which is an essential feature for scalable interventions in rural and resource-constrained settings.

“For us, the chakra is easy. Even if someone doesn’t have much educational qualifications, it can still be understood easily and show others how to use it.” ASHA, rural AWC

2.2 Compatibility with RI session work

The Immunisation Wheel was found to be largely compatible with RI sessions, particularly for ANMs. It was used actively during both home visits and vaccination days at Anganwadi Centres. In fact, a few ANMs even reported that when there were high beneficiary loads or when multiple logistical tasks competed for their attention, the wheel made their work much easier

“We use the Wheel for every new baby, but sometimes we end up having too many children in one session, so the wheel really helps to streamline the process because of its easy to use mechanism.” ANM, rural AWC

Not only this, but FLWs also reported that the tool’s value was also maximized during one-on-one counselling sessions. Some ASHAs mentioned using the Wheel after the AWC to mark due dates in the child’s card and as a prompt to remind caregivers in the next home visit.

“Even if I don’t get time in the session, I go to the house later and tell the family using the chakra. They feel more confident when they see something visual.” ASHA, urban AWC

Importantly, the Wheel did not require additional infrastructure or digital literacy, making it easily deployable in existing outreach contexts. Workers adapted its usage pattern

according to their own workload and the needs of their catchment populations, suggesting flexibility in its integration into fieldwork.

3. Impact on interpersonal communication

3.1 Improved engagement with caregivers

Respondents across both ASHA and ANM groups reported that the Immunisation Wheel enhanced the clarity and effectiveness of their communication with caregivers. Several participants described how the visual and interactive nature of the tool made it easier for caregivers to grasp hard-to-remember immunisation schedules and reduced misunderstandings related to vaccine dates and types.

“When I show them the chakra and point to the date, they understand faster. Before, we would say the date and they wouldn’t always remember it. Now they can see and remember.” **ASHA, urban AWC**

The Wheel provided a tangible medium through which FLWs could explain vaccine timelines, rather than relying solely on verbal recall or card-based reminders. This, according to many participants, increased the confidence of caregivers and built a sense of credibility around the information provided by the health worker.

“They see us rotating the Wheel and showing everything. They believe that we know what we are doing..” **ANM, urban AWC**

For caregivers with low literacy, the Wheel’s visual format was particularly beneficial. It served as a bridge between technical information and household decision-making, leading to improved engagement and mutual understanding.

3.2 Enhanced caregiver behaviour and awareness

All respondents perceived that after the introduction of the Immunisation Wheel most parents remembered appointments better. The clarity offered by the Wheel was cited as an important reason behind this improved compliance. They also noted that caregivers were more proactive in maintaining their child’s immunisation card and verifying dates

independently. This behaviour was perceived as a sign of increased engagement and ownership.

“Mothers now ask us – ‘Didi, you said this vaccine is due, but the Wheel is showing this date. Which one is correct?’ They are asking more questions and not just blindly following.” ANM, urban AWC

This suggests a positive shift in the caregiver-health worker dynamic—from a passive recipient model to a more interactive and informed process. Importantly, ASHAs noted that in households where there was prior hesitancy or confusion about immunisation, the Wheel acted as a conversation starter and helped dispel doubts. Although such cases were not reported universally, they highlight the potential of the Wheel in facilitating tailored counselling in hesitant households.

“One family in my area was scared of fever after vaccines. I showed them the chakra and explained why this was a normal reaction to the vaccine using the information on the backside of the wheel. Slowly they started to understand and trust us.” – ASHA, rural AWC

4. Perceived Effect on Dropout Reduction and Awareness

4.1 Visibility and memory aid for vaccine dates

ASHAs and ANMs consistently described the Immunisation Wheel as an effective memory aid that caregivers could understand and remember easily. The visual and rotational nature of the wheel simplified the vaccine schedule and made it more accessible to families, particularly those with limited literacy. Unlike verbal instructions or handwritten notes on cards, the wheel was seen as tangible, durable, and easy to consult.

4.2 Perceived increased completion of immunisation

Most respondents observed that since the introduction of the Immunisation Wheel, dropout rates within their assigned populations had declined. They attributed this to the improved clarity of the full vaccine schedule, which made it easier for families to plan and follow through with appointments. ASHAs in particular noted that the wheel allowed them to give more precise reminders during home visits, reducing the number of defaulters and easing the burden of defaulter tracking. Although the effect varied across

centres, the general perception was that the Wheel played a contributory role in improving continuity and compliance.

In one case, an ASHA noted that the chakra even helped in motivating families who were unsure or irregular in seeking immunisation to complete the entire schedule.

“One family had missed the last two vaccines. I used the Wheel to show them what was left and why it mattered. They brought the child to the next VHND.” **ASHA, urban AWC**

4.3 Enhanced caregiver awareness

A common theme across the interviews was the perceived increase in caregivers’ awareness of the immunisation schedule and the diseases being prevented. Respondents highlighted that the wheel, in addition to being a scheduling tool, also served as a conversation starter about vaccine-preventable diseases.

“When we explain the Wheel, we also talk about what each vaccine is for. Mothers now know about polio, tetanus, and rotavirus.” **ANM, urban AWC**

Several ASHAs described the back side of the Wheel as a useful aid during counselling, especially for first-time mothers or families that had shown hesitancy in the past.

“Earlier they didn’t ask questions. Now they ask – what is this vaccine for? That means they are more aware and interested.” **ASHA, rural AWC**

This perceived shift in caregiver behaviour towards proactive participation and informed decision-making reinforces the idea that visual tools can effectively support behaviour change, especially in low-literacy settings.

5. Design and operational challenges in field use

The effectiveness of the Immunisation Wheel as a job aid is not only determined by its conceptual appeal but also by its design usability and integration into field realities. Frontline health workers consistently pointed out several limitations regarding its physical build, layout, scheduling accuracy, and the absence of systematic reporting and feedback loops. These operational issues, though not always dominant in the

conversation, were widely acknowledged and critically shape the overall effectiveness and future scalability of the intervention.

5.1 Field usage and its challenges

Across the interviews, ASHAs and ANMs expressed that the physical build of the wheel was largely appropriate for regular use in field conditions. Its compact size made it “easy to carry” and “useful even during travel,” as one ASHA stated. However, some noted that with continuous use, the central rivet tended to loosen or the paper material started to wear out and tear.

“After a few months of using it, the disc starts loosening from the centre. Then we have to adjust it forcefully, and it ends up tearing if we’re not careful.” **ASHA, rural AWC**

The clarity and readability of the wheel’s layout came up frequently. Many ANMs appreciated the visual format, stating that it “helped simplify vaccine dates,” but others, particularly ASHAs, found the text “too small” or “not easy to read in low light.” Multiple respondents, especially those serving populations with limited literacy, suggested incorporating more visual cues.

A recurrent issue mentioned was occasional misalignment of vaccine schedules when setting the wheel to the child’s birthdate. This misalignment, though not always frequent, caused confusion.

“Sometimes when we enter the birthdate, there is a slight confusion about the dates showing up wrong, mostly due to print issues and the font size being too small. That leads to confusion and sometimes we just have to end up manually calculating all dates.” **ANM, urban AWC**

5.2 Absence of monitoring and reporting mechanisms

While the wheel served as an excellent visual aid during interactions, it was not embedded within any formal documentation or monitoring system. As several workers pointed out, there was “no place to report its usage”. This means that there is no mechanism to track its actual impact on reducing dropouts or improving schedule adherence. expressed;

“We use it, but there’s no form to say we did. So no one checks if it made a difference.” **ANM, urban AWC**

Others echoed the suggestion of creating a simple checklist or reporting column within existing registers, where they could mark wheel-based counselling sessions. Some even suggested integrating the wheel into the home-based records (like MCP cards) or the due list preparation process, so that its use became institutionalised rather than ad hoc.

The lack of upward communication also hindered feedback, where respondents said there was no way of monitoring everyday usage and issues, despite having insights from the ground. Institutional support, both during roll-out and through periodic reviews, emerged as a crucial enabler for tool integration. Where supportive supervision was present, use of the Wheel remained high and consistent; where it was absent, workers relied on personal motivation and experience.

6. Final reflections on empowerment, adaptation, and the future of the tool

6.1 Confidence and role reinforcement

Many frontline workers described a noticeable improvement in their confidence when counselling caregivers after adopting the wheel. It gave them a tangible, structured tool that supported their verbal explanations and helped them convey immunisation schedules more authoritatively. A sense of clarity and autonomy was particularly important for newer or less experienced ASHAs, who often felt nervous when interacting with caregivers. The visual nature of the tool reduced their dependency on memory and made them feel more professional.

“It gives me confidence. Even if someone asks suddenly about the next dose, I can just show them on the wheel and answer immediately with confidence.” **ASHA, urban AWC**

ANMs echoed similar sentiments, especially in terms of efficiency and consistency in communication during VHNDs or RI sessions.

Furthermore, the presence of a tool specifically designed for ASHAs was seen as a sign of recognition and investment in their role. Many workers expressed that having their own version of the wheel gave them a sense of ownership and professional identity. The wheel became symbolic of their role in the immunisation chain, and this recognition translated into renewed enthusiasm for community mobilisation.

6.2 Worker-driven innovations and feedback

In the process of using the tool, workers developed context-specific ideas for improvement. These included physical enhancements such as making the material waterproof or tear-resistant as well as content-based revisions, like incorporating symbols or illustrations for low-literacy settings. Others called for a dual-language version or dialect-specific adaptations to improve comprehension and cultural relevance. Some even proposed replicating the tool's functionality to cover other services such as antenatal care or nutritional milestones, thereby transforming it into a multi-purpose counselling aid. These grounded suggestions reflect a high level of user engagement and a desire to co-create tools that serve their needs more effectively.

6.3 Reflections on the caregiver wheel

Originally conceptualised as a three-tiered intervention, the Immunisation Wheel was designed in three distinct formats—tailored separately for ASHAs, ANMs, and caregivers. While the versions for frontline workers were intended to aid in counselling and service planning, the caregiver version was envisioned as a household-level behavioural nudge, acting as a tangible visual reminder for parents to adhere to their child's immunisation schedule.

However, while in conversation with officials from the State Immunisation Cell at NHM Bhopal, it was clarified that the caregiver version was discontinued shortly after the initial phase of implementation. Despite promising results from the pilot intervention, the caregiver-specific tool was reportedly underutilised. Programmatic feedback suggested that caregivers did not actively refer to the wheel once they returned home, and it was often misplaced or forgotten, and hence did not yield the desired behavioural reinforcement. This decision was made in consultation with external partners and was grounded in concerns around cost-effectiveness, operational feasibility, and alignment with existing communication strategies.

From a programmatic standpoint, this discontinuation was rationalised; however, perspectives from frontline workers painted a more layered picture. Several ASHAs and ANMs expressed disappointment about the caregiver wheel's absence, emphasising its potential as a supplementary reminder tool that could help reinforce counselling provided during VHND sessions.

“If mothers had something to see at home, like the wheel, they would remember dates better. We cannot visit everyone before every session.” **ASHA, rural AWC**

6.4 Aspirations for scale-up

Despite operational challenges, the tool was seen as highly scalable by most respondents. There was a clear desire among ASHAs and ANMs for its broader adoption across districts and states. Some workers suggested it be introduced nationwide with minor contextual customisation.

“Like the MCP card is used everywhere, this wheel should also be given everywhere. It will make our work easy and help with reminders.” **ASHA, rural AWC**

The desire for systemic backing reflects a recognition of the tool’s utility, but also a call for health systems to recognise and embed frontline innovations within broader strategies.

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Chapter 5

DISCUSSION

This study examined the implementation and field-level impact of the Immunisation Wheel (Tikakaran Chakra) initiative in Bhopal district of Madhya Pradesh, focusing on how frontline health workers perceived, utilised, and adapted the tool within routine immunisation workflows. This chapter critically engages with the thematic findings from Chapter 4 and draws upon established literature on behavioural change communication (BCC), immunisation adherence, and health systems innovation. By juxtaposing empirical insights from the field with national and global evidence, the analysis explores how the Immunisation Wheel functioned as a low-tech, user-driven intervention aimed at improving vaccine schedule adherence, enhancing caregiver engagement, and empowering ASHAs and ANMs. In doing so, this chapter situates the intervention within broader discourses on health equity, tool scalability, and the evolving role of frontline workers in India's Universal Immunisation Programme.

5.1 Training and Orientation: Foundations for Effective Implementation

The introduction of the Immunisation Wheel was met with largely positive reception by both ANMs and ASHAs. While formal training for ANMs was systematically implemented through structured sessions conducted by the National Health Mission in Bhopal, ASHAs primarily acquired knowledge through peer transmission or on-site demonstrations. This divergence in training modalities reflects a well-documented gap in differentiated capacity-building approaches, particularly for community-level health workers.

George et al. (2017) demonstrated that structured training using flipbooks improved both FLW knowledge and caregiver adherence to immunisation schedules. Similarly, Balasubramanian et al. (2021) emphasised the importance of consistent home-based counselling by ASHAs in achieving higher immunisation uptake. In this study, while ASHAs ultimately adapted to the tool through experiential learning, the lack of systematic follow-up training and printed instructional aids resulted in initial ambiguity regarding correct usage and caregiver communication.

These findings underscore the necessity for continuous, role-specific training models. As Shrivastwa et al. (2015) and Gurnani et al. (2018) assert, FLWs function as both health providers and behaviour change agents. Thus, their ability to convey accurate,

comprehensible information—especially through visual tools—depends heavily on the clarity and depth of initial orientation processes.

5.2 Relevance and Fit within Broader RI Strategies

The integration of the Immunisation Wheel into routine immunisation (RI) workflows aligns with global and national efforts that underscore the importance of context-specific, low-tech communication tools. Waisbord & Larson (2005) argued nearly two decades ago for embedding interpersonal communication and visual job aids within immunisation systems to improve vaccine uptake. The Wheel, as used in Bhopal, acts precisely in this capacity—bridging the gap between health worker intent and caregiver understanding.

Its success in aiding date recall and boosting caregiver engagement mirrors results from Uganda, where Lwanga et al. (2019) documented a 28% improvement in parental retention of vaccine due dates using visual aids. Likewise, George et al. (2017) observed a significant uptick in caregiver trust when FLWs used pictorial flipbooks. These findings support the conclusion that the Wheel, even in its rudimentary paper form, is functionally aligned with international evidence on what drives RI compliance in low-resource contexts.

5.3 Integration into Routine RI Workflows: Operational Synergy and Simplification

The Immunisation Wheel was perceived as a functionally sound tool that significantly reduced the cognitive burden associated with date calculations during immunisation sessions. ANMs consistently reported that the tool enhanced efficiency and accuracy, particularly in high-volume contexts. These observations align with the findings of Patel et al. (2020), who demonstrated that structured due list systems yielded higher immunisation compliance compared to ad hoc or memory-based approaches.

Moreover, the Wheel’s manual, visual nature was especially beneficial in settings with limited digital infrastructure or low literacy—resonating with the conclusions of Waisbord and Larson (2005) and Lwanga et al. (2019), who argued for the integration of low-tech job aids into frontline workflows. The adaptability of the Wheel across multiple settings—from Anganwadi Centres to home visits—further validates its design as a scalable tool. Nonetheless, the lack of standardised recording protocols inhibited formal tracking of its usage, echoing Yadav et al. (2019) who called for integrated documentation strategies that couple communication with data visibility.

5.4 Interpersonal Communication and Caregiver Behaviour

The results in Chapter 4 show that the Wheel effectively enhanced interpersonal communication between FLWs and caregivers. ASHAs and ANMs reported a noticeable increase in caregiver questions, participation, and retention of immunisation-related information. These behavioural shifts affirm Khan et al.'s (2021) multi-country study, which identified low interaction and poor trust in FLWs as predictors of vaccine dropout. In this context, the Wheel functioned not merely as an educational tool but as a credibility-building device.

Furthermore, the visual interactivity of the tool may have mitigated some socio-demographic barriers, such as literacy and recall limitations, which are well-documented constraints in India (Shrivastwa et al., 2015; Das et al., 2020). Caregivers' ability to refer to tangible, date-specific visuals likely enhanced their self-efficacy—a core determinant of health-seeking behaviour.

5.5 Potential Role in Reducing Dropouts

The Immunisation Wheel appears to have contributed to reducing missed or delayed doses by simplifying complex scheduling tasks, improving recall, and enabling targeted follow-up. This is consistent with findings by Patel et al. (2020), who demonstrated that structured planning tools like due lists increased vaccine adherence by 20%. In this study, several ASHAs described using the Wheel in home visits as a reminder tool, which seemed to increase follow-through among defaulting families.

While causality cannot be inferred from qualitative accounts alone, the consistency of these narratives across rural and urban contexts suggests a positive trend. Moreover, ASHAs' ability to tailor messaging using the Wheel echoes the findings of Yadav et al. (2019), where usage of HBIRs during counselling led to a 1.9x increase in full immunisation. This synergy of record-keeping and visual counselling points to a possible future where tools like the Wheel could be integrated into home-based records.

5.6 Implementation Gaps and Operational Weaknesses

Despite its strengths, the Wheel's limited formal integration into the health system emerged as a major bottleneck. Chapter 4 highlighted a critical absence of monitoring, supervision, and structured feedback loops. This mirrors implementation challenges

highlighted by Marathe et al. (2023), who emphasised that the effectiveness of communication tools in urban slums was diluted by weak follow-up and documentation systems. Similarly, Balasubramanian et al. (2021) observed that even when tools were available, lack of systemic support undermined their consistent use.

Furthermore, design limitations—such as poor print clarity, misalignment, and fragile build quality—mirror concerns raised by studies such as Srinivasan et al. (2016), which found that miscommunication or ambiguity about side effects often stemmed from poor-quality educational materials.

5.7 Reflections on the Discontinuation of the Caregiver Wheel

A key insight from the study relates to the discontinued caregiver version of the Wheel. While policymakers considered it operationally redundant, FLWs saw it as a potential enabler of household-level behaviour change. This disjunction between programmatic decisions and ground-level insights reiterates the need for participatory tool design. The caregiver version could have functioned similarly to HBIRs in Haryana (Yadav et al., 2019), acting as a home-based visual scheduler with the added benefit of symbolic reinforcement.

This underscores a common theme across immunisation literature: sustainability and scalability of innovations depend not just on pilot-phase efficacy, but on sustained usability and institutional embedding.

5.8 Recommendations for Future Scaling and Tool Evolution

The findings suggest a clear demand for scale-up, especially with customisation. Echoing Gurnani et al. (2018), who advocated for multi-pronged RI expansion supported by innovations in outreach tools, FLWs in this study advocated for waterproof material, dual-language options, and multi-service functionality. The success of such an upgrade would depend on systematic design revision and incorporation of frontline feedback—much like the flipbook interventions evaluated by George et al. (2017) in Bihar.

Chapter 6

CONCLUSION

This study sought to explore the adoption, utility, and perceived effectiveness of the Immunisation Wheel (Tikakaran Chakra) as a behavioural communication tool within the Routine Immunisation programme in Madhya Pradesh. Through in-depth qualitative interviews with five ASHAs and six ANMs across selected Anganwadi Centres in Bhopal district, supplemented by insights from three caregivers, the research presents a grounded understanding of how the tool is used in practice, how it influences interpersonal communication and immunisation adherence, and what operational and systemic factors shape its effectiveness on the ground.

The findings highlight that the Immunisation Wheel was broadly well-received by frontline health workers. Both ASHAs and ANMs reported improvements in their ability to communicate the immunisation schedule clearly and consistently. The wheel helped reduce confusion around dates and served as a visual prompt during counselling sessions, enabling better caregiver understanding and engagement. Importantly, its alignment with existing immunisation workflows made it easy to adopt without placing additional burden on health workers. Supervisory support and informal peer reinforcement were also found to play a role in sustaining its use.

The Immunisation Wheel, while a relatively simple intervention, exemplifies the potential of well-designed, low-tech job aids to catalyse improvements in communication, planning, and adherence within routine immunisation. Its effectiveness, as evidenced in this study, is rooted not only in its technical function but in the socio-behavioural transformation it fosters—empowering frontline workers, engaging caregivers, and demystifying immunisation schedules.

Nonetheless, the study also reveals important gaps and constraints that impact the sustainability and scalability of the tool. Issues around physical durability, schedule misalignment, and the lack of embedded reporting or tracking mechanisms were repeatedly cited. Moreover, while the tool bolstered health worker confidence and motivation, the discontinuation of the caregiver wheel version and the absence of formal institutional support mechanisms underscore challenges in maintaining consistent usage over time. Despite being officially approved and distributed across the state, there was little clarity on whether the wheel's use was being monitored or evaluated in practice.

These limitations, however, are equally instructive: innovations must be institutionalised to survive beyond pilot phases. For the Wheel to realise its full potential, health systems must evolve to co-create, track, and continuously refine such tools, grounded in the lived realities of the workers and communities they are meant to serve.

The Immunisation Wheel clearly demonstrates potential as a low-cost, user-friendly aid that enhances interpersonal communication and promotes immunisation completion. Yet, its long-term value will depend on whether systemic issues—such as tool distribution, supervision, feedback integration, and training—are addressed with equal rigour. The study reinforces the need for design-led behavioural interventions that are embedded within routine workflows, backed by data systems, and supported by continuous learning and feedback from frontline users.

6.1 Implications of the Study

The study contributes to the growing body of evidence supporting the use of visual job aids in improving immunisation adherence and frontline health worker performance. It underscores the importance of culturally appropriate, context-sensitive tools in bridging communication gaps between health workers and caregivers. In doing so, it highlights the critical role that health worker empowerment and interpersonal communication play in reducing dropout rates and promoting full immunisation.

The findings also have operational implications for public health administrators and programme designers. For innovations like the Immunisation Wheel to be effective at scale, they must be systematically integrated into training, supervision, and reporting frameworks. Additionally, tool usability must be balanced with adaptability—considering field-level constraints, literacy barriers, and evolving immunisation policies.

The mixed perceptions around the caregiver wheel version further emphasise the need for iterative design and continuous field feedback before discontinuing components. Overall, the study advocates for a system-oriented approach that values frontline worker input, promotes consistent usage through supportive infrastructure, and recognises behavioural tools as integral—not peripheral—to routine immunisation delivery.

6.2 Recommendations

A few recommendations for the scalability of the intervention after the detailed discussions with the stakeholders include;

- Improving the durability of the wheel by changing the material used. A few frontline workers reported to have broken/torn/damaged wheels due its paper getting damaged easily.
- The size of the wheel can be increased marginally to enhance font size of the key messages. Some ASHAs and ANMs reportedly faced difficulty in reading the dates on the wheel correctly as they found print too small to be easily legible.
- Decentralise the purchase and storing of the availability of the wheel to reduce logistics delays in case the replacements are required.
- Introduction of modified versions of the wheel, in local languages/dialects for better comprehension across various populations, should be tried.
- Digital version of the RI Wheel, for smartphones such as a mobile app or digital calculator version of the wheel could be introduced.
- A bigger version of the wheel can be installed as a permanent fixture at the SHC and PHC level health facilities, as well as the R.I session sites. These can be used a demonstration tool, and an interactive IEC tool, to better engage the community members.
- Development of a similar visual aid for other health programs can also be tried.

References

1. Rachlin A, Adegoke OJ, Bohara R, Edson Rwagasore, Sibomana H, Kabeja A, et al. Building Data Triangulation Capacity for Routine Immunization and Vaccine Preventable Disease Surveillance Programs to Identify Immunization Coverage Inequities. *Vaccines* [Internet]. 2024 Jun 11 [cited 2025 Mar 29];12(6):646–6.
2. Dhawan V, Chakraborty AB, Dhandore S, Dhalaria P, Agarwal D, Singh AK. Mission Indradhanush and Intensified Mission Indradhanush—Success Story of India’s Universal Immunization Program and the Role of *Mann Ki Baat* in Bridging the Immunization Gap. *Indian J Community Med*. 2023;48(6):823–827.
3. Pradhan SK. Time to Revamp the Universal Immunization Program in India. *Indian J Public Health*. 2010;54(2):71–74.
4. Saikia N, Kumar K, Bora JK, Mondal S, Phad S, Agarwal S. What Determines the District-Level Disparities in Immunization Coverage in India: Findings from Five Rounds of the National Family Health Survey. *Vaccines (Basel)*. 2023;11(4):851.
5. Dhalaria P, Kapur S, Singh AK, Priyadarshini P, Dutta M, Arora H, et al. Exploring the Pattern of Immunization Dropout among Children in India: A District-Level Comparative Analysis. *Vaccines (Basel)*. 2023;11(4):836.
6. Mboussou F, Kada S, Danovaro-Holliday MC, Farham B, Gacic-Dobo M, Shearer JC, et al. Status of Routine Immunization Coverage in the World Health Organization African Region Three Years into the COVID-19 Pandemic. *Vaccines (Basel)*. 2024;12(2):168.
7. Avelino-Silva VI, Ferreira-Silva SN, Muniz Soares ME, Vasconcelos R, Fujita L, Medeiros T, et al. Say it Right: Measuring the Impact of Different Communication Strategies on the Decision to Get Vaccinated. *BMC Public Health*. 2023;23:1162.
8. Siddiqi DA, Munir M, Taighoon SM, Khan AJ, Khan MI, Khan MI, et al. Effect of Vaccine Reminder and Tracker Bracelets on Routine Childhood Immunization Coverage and Timeliness in Urban Pakistan: Protocol for a Randomized Controlled Trial. *BMC Public Health*. 2019;19:1421.
9. Introducing rotavirus vaccine in the Universal Immunization Programme in India: From evidence to policy to implementation. *Vaccine* [Internet]. 2019 Sep 16 [cited 2021 Mar 16];37(39):5817–24.

10. S Sandeep, Biradar SS, Veeresh Veeresh. Assessment of Parents Knowledge, Attitude and Practice about Child Vaccination in Selected Rural Areas of Kalaburagi District, India. *Journal of Drug Delivery and Therapeutics*. 2024 Apr 15;14(4):69–76.
11. Favin M, Steinglass R, Fields R, Banerjee K, Sawhney M. Why children are not vaccinated: a review of the grey literature. *Int Health*. 2012;4(4):229–238.
12. Sousa Neto AR, Silva ARB, Aranha GN, Queiroz-Cardoso AI. Health education as a strategy for encouraging children's vaccination: rapid review. *Rev Pre Infec e Saúde [Internet]*. 2024;10:5301.
13. Datta A, Mog C, Das S, Datta S. A cross-sectional study to assess the immunization coverage and vaccine dropout rates among 12 to 23 months old children in a rural area of Tripura. *Int J Med Sci Public Health*. 2017;6(2):394–399.
14. Chaudhuri PK, Madhur A, Anshu K, Kumari S, Kumar A, Singh J, et al. Examining current vaccination practices for neonates, including healthcare provider and parental attitudes and the challenges of implementing vaccination schedules: a clinical study. *J Pharm Bioall Sci*. 2024;S2818–S2820.
15. Atteraya MS, Song IH, Ebrahim NB, Gnawali S, Kim E, Dhakal T. Inequalities in childhood immunisation in South Asia. *Int J Environ Res Public Health*. 2023;20(3):1755.
16. Khan A, Shankar H. Tracking immunization milestones: a community-based survey of child vaccination compliance from birth to one year age in India. *Int J Reprod Contracept Obstet Gynecol*. 2024;13(9):2275–2280.
17. Ratna M, Singh SK, Sinha NK, Kannure M, Bhatia M, Aggarwal MK, et al. Developing a roadmap to reach and sustain 90% full immunization coverage through a cross-sectoral system strengthening strategy in Bihar, India. *BMC Health Serv Res*. 2024;24:933.
18. Aisyah HS, Tangpukdee J. The effect of education intervention on caregiver's knowledge about vaccination in children aged 0-23 months. *Asia Pac J Sci Technol*. 2023;28(1):APST-28-01-04.
19. Dhalaria P, Kapur S, Singh AK, Priyadarshini P, Dutta M, Arora H, et al. Exploring the pattern of immunization dropout among children in India: a district-level comparative analysis. *Vaccines*. 2023;11(4):836.

APPENDICES

APPENDIX 1

Directive Checklist

I. Problem Identification

1. Before the Immunization Wheel was introduced, what were the common reasons children missed or delayed their vaccinations in your area?
2. What was the percentage of children who missed/faced delayed vaccinations?
3. How did you track immunization due dates previously? What were the challenges with that method?
4. What was the level of awareness of beneficiaries on the full immunization schedule before this program?
5. What were the challenges in communication faced between health workers and caregivers about immunization status?

II. Program Design

6. How were you introduced to the Immunization Wheel? (e.g., training, demonstration, etc.)
7. Can you explain how the wheel works? How do you use it during field visits or sessions?
8. What was the orientation provided to you before using the Immunization Wheel?
9. Do you feel the tool is easy to use? What aspects are most helpful/difficult for your work?
10. What additional tools or registers do you use alongside the wheel?
11. What are any features of the wheel that could be improved for better results?

III. Program Outputs and Outcomes

12. Since the introduction of the Immunization Wheel, have you noticed any change in:
 - Beneficiaries awareness about vaccines?
 - Attendance at immunization sessions?

- Dropout rates between vaccine doses?

13. Can you share any example where the wheel helped convince or inform a hesitant caregiver?
14. Has the wheel helped you keep better records or manage your workload during immunization days?
15. Do beneficiaries find the wheel easy to understand and helpful?
16. What feedback have you received from caregivers or other health workers regarding the wheel?

IV. Financial Aspects: Initial Investment and Present & Long-Term Costs

17. Were you aware of costs incurred on this tool by your health centre or district?
18. Do you think the tool is affordable and worth the investment in the long run?
19. Are there any recurring costs (e.g., replacements, updates, or training) associated with the tool? What are the challenges of its upkeep?
20. Do you think the benefits of using this tool justify the costs and efforts involved?

V. Present Status, Mechanisms, Processes Continued and Pathways for Future

21. Are you currently using the Immunization Wheel regularly? How often?
22. How do you record and track data related to immunization using this tool?
23. What kind of additional support or resources would help you use this tool more effectively?
24. How can this tool be adapted or modified for different areas or populations? If so, how?
25. Is there any process for reviewing data and getting feedback on the tool's effectiveness?

VII. Key Learnings and Scalability

26. What is the most significant benefits you've experienced from using the Immunization Wheel?
27. What challenges have you faced in using or distributing the wheel?
28. Would you recommend this tool for other districts or states? Why or why not?
29. In your view, what has made this program successful in your area?

30. What are your key learnings from this experience that could guide future programs?
31. What advice would you give to other frontline workers starting to use this tool for the first time?

APPENDIX 2

Immunisation Wheel Checklist for Frontline Workers

Section A: Demographic Information

1. Name of Health Facility:
2. District:
3. Block:
4. Population covered:
5. Respondent's Name:
6. Designation: ANM / ASHA / Other
7. Years of experience in Current Role:
8. Date of Survey

Section B: Training and Orientation

1. Have you received training on how to use the Immunisation Wheel?

- ☐ Yes

- ☐ No

2. How would you rate the training quality?

- ☐ Excellent

- ☐ Good

- ☐ Satisfactory

- ☐ Poor

- ☐ Very Poor

3. Was practical demonstration included during training?

- [] Yes

- [] No

4. Are you aware that ANMs use a green wheel and ASHAs use a pink wheel?

- [] Yes

- [] No

Section C: Wheel Usage

5. How often do you use the Immunisation Wheel?

- [] In every session/community visit

- [] Only sometimes

- [] Rarely

- [] Never

6. Number of times you used the wheel in the last month:

- [] 0–5 times

- [] 6–10 times

- [] 11–15 times

- [] More than 15 times

7. Helpfulness of the wheel for:

a) Calculating Due Dates

- [] Very helpful

- ☐ Somewhat helpful

- ☐ Not helpful

b) Explaining Vaccine Schedules

- ☐ Very helpful

- ☐ Somewhat helpful

- ☐ Not helpful

c) Preparing Due Lists

- ☐ Very helpful

- ☐ Somewhat helpful

- ☐ Not helpful

8. Has the Immunisation Wheel helped convince caregivers to vaccinate on time?

- ☐ Yes

- ☐ No

- ☐ Can't say

9. Do you face any difficulty using the Wheel?

- ☐ Yes (Specify in comments)

- ☐ No

Section D: Caregiver Response and Impact

10. How do caregivers react when you use the wheel?

- ☐ Very Interested

- ☐ Somewhat Interested

- ☐ Not Interested

11. After introduction of the wheel, have you observed:

- ☐ Increase in caregiver questions

- ☐ Better attendance at sessions

- ☐ Decrease in missed vaccinations

- ☐ No significant change

12. Does the Immunisation Wheel help reduce vaccine dropouts?

- ☐ Yes

- ☐ No

- ☐ Not sure

Section E: Monitoring and Feedback

13. Has your use of the wheel been reviewed by a supervisor?

- ☐ Yes

- ☐ No

14. Are you required to report or document use of the wheel?

- ☐ Yes

- ☐ No

15. In your opinion, what changes (if any) are needed in the Immunisation Wheel?

- ☐ Improve material durability

- ☐ Simplify instructions

- ☐ No changes needed

- ☐ Other:

16. Would you recommend continued use of the wheel?

- ☐ Strongly recommend

- ☐ Recommend with modifications

- ☐ Do not recommend

APPENDIX 3

Semi-Structured In-Depth Interview

Introduction and Use of the Immunisation Wheel (Tikakaran Chakra)

Section 1: Experience with the Immunisation Wheel

- 1.1 Can you describe how you first learned about the Immunisation Wheel and its purpose?
- 1.2 How was your initial experience when you first started using the wheel during your work?
- 1.3 How has your opinion on it changed since then?
- 1.4 What changes have you observed in your daily routine or workflow after the introduction of the wheel?

Section 2: Training and Support

- 2.1 Did you receive any official training or orientation when the wheel was first introduced?
- 2.2 How effective was the training you received regarding the Immunisation Wheel?
- 2.2 Were there any parts of the training you felt were missing or could be improved?
- 2.3 After the training, did you feel confident enough to use the wheel independently in your sessions/visits?

Section 3: Practical Usage and Challenges

- 3.1 Do you use the immunisation wheel during your fieldwork? How often?
- 3.2 In what situations or sessions do you find the wheel most helpful?
- 3.3 Can you describe any specific difficulties or challenges you faced while using the wheel?
(Probe: design issues, time pressure, caregiver understanding, logistical problems)
- 3.4 Have you adapted or innovated a use of the wheel in any way that works better for you or the community?

Section 4: Perceived Impact on Caregivers and Community

4.1 How have caregivers/beneficiaries reacted when you use the wheel to explain immunisation schedules?

4.2 Have you noticed any changes in their attitudes towards immunisation since the wheel was introduced?

4.3 In your opinion, has the wheel helped reduce missed vaccinations or dropout cases? (Probe for examples if yes)

Section 5: Monitoring and Feedback

5.1 Has there been any form of monitoring on your usage of the wheel during field visits?

5.2 Is there any formal or informal system for reporting your experiences or problems related to the wheel?

5.3 Do you feel you get enough support from supervisors or peers regarding using the wheel?

Section 6: Recommendations and Future Use

6.1 What would you suggest to improve the Immunisation Wheel — either in its design, content, or the way it was introduced?

6.2 Would you recommend expanding the use of a similar wheel in other programs (e.g., maternal health, nutrition)?

6.3 How can the government or program teams better support frontline workers in using tools like the Immunisation Wheel?

Section 7: Closing

- Additional comments, feedback, or stories from the field related to the Immunisation Wheel.