A COMPARATIVE STUDY OF FULL IMMUNIZATION COVERAGE ACROSS HIGH AND LOW PERFORMING UPHCS IN DISTRICT PATNA USING HMIS DATA AND FIELD OBSERVATIONS

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in

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by

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Under the Supervision and Guidance of

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TO WHOM IT MAY CONCERN

This is to certify that Dr Sonam Kumari D/o Mr. Kamlesh Prasad, has successfully completed her internship with John Snow India Private Limited in the Urban RI Project from March 17, 2025 to June 16, 2025 based at Patna, Bihar.

We wish her good luck for all her future endeavors.

Sincerely,

For
John Snow India Private Limited

Parul Makkar
HR Lead

DECLARATION BY STUDENT

I hereby declare that this dissertation titled "A comparative study of full immunization coverage across high and low performing UPHCs in district Patna using HMIS data and field observation" 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Sonam Kumari

Dr. Sonam Kumari
Date- 20/6/2025.

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that dissertation titled "A Comparative Study Of Full Immunization Coverage Across High and Low Performing UPHCs in District Patna Using HMIS Data and Field Observation" is a record of the research work undertaken by Dr. Sonam kumari 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 her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide
IIHMR University, Jaipur
Date 20/06/25

School Dean
IIHMR University, Jaipur
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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

Abbreviation	Full Form
ANM	Auxiliary Nurse Midwife
AEFI	Adverse Events Following Immunization
ASHA	Accredited Social Health Activist
AWW	Anganwadi Worker
BCG	Bacille Calmette-Guerin (Tuberculosis Vaccine)
DIO	District Immunization Officer
ELA	Expected Level of Achievement
EHR	Electronic Health Record
FIC	Full Immunization Coverage
FLW	Frontline Health Worker
HMIS	Health Management Information System
ILR	Ice Lined Refrigerator
MOIC	Medical Officer In-Charge
NHM	National Health Mission
NUHM	National Urban Health Mission
OPV	Oral Polio Vaccine
PHC	Primary Health Centre
RI	Routine Immunization
TT	Tetanus Toxoid
UIP	Universal Immunization Programme
UPHC	Urban Primary Health Centre
U-WIN	Universal Immunization Information System
WHO	World Health Organization

ABSTRACT

Title:

A Comparative Study of Full Immunization Coverage Across High- and Low-Performing UPHCs in District Patna Using HMIS/UWIN Data and Field Observation

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Keywords:

Full Immunization Coverage, Urban Health, UPHC Performance, HMIS, U-WIN, ANM Interviews, Routine Immunization, Urban Bihar

Background:

Although India's immunization program has significantly expanded, gaps in coverage remain visible—especially within urban settings. In cities like Patna, certain Urban Primary Health Centres (UPHCs) consistently meet immunization goals, while others lag behind. These performance differences occur despite similar infrastructure and policy contexts, suggesting underlying operational and behavioral challenges that remain underexplored at the facility level.

Objective:

This study was undertaken to:

- Examine and compare full immunization coverage across select UPHCs in Patna.
- Assess how closely UPHC performance aligns with district-level Expected Level of Achievement (ELA) targets.
- Identify ground-level enablers and constraints through field visits and interactions with frontline health workers.
- Propose targeted, evidence-based strategies to enhance routine immunization services in urban Bihar.

Methodology:

A mixed-methods comparative study was conducted involving six UPHCs—three identified as high-performing and three as low-performing. Quantitative data covering the period April 2024 to March 2025 were sourced from Health Management Information System (HMIS) and U-WIN portals. Field-level data were gathered through structured observations of immunization sessions and in-depth interviews with 12 Auxiliary Nurse Midwives (ANMs). Qualitative analysis followed Braun and Clarke's thematic framework.

Findings:

UPHCs with high performance showed consistent immunization coverage, effective microplanning, and stronger ANM–community engagement. These centers were characterized by regular cold chain management and complete documentation. In contrast, underperforming centers struggled with missed targets, session delays, and low caregiver participation. Differences in ANM behavior, communication style, and community outreach efforts were critical in explaining performance gaps.

Chapter 1: Introduction

1.1 Background of the Study

Immunization remains one of the most effective and economically efficient public health interventions for reducing the burden of vaccine-preventable diseases (VPDs). The World Health Organization (WHO) estimates that immunization prevents between 2 to 3 million deaths globally every year. In India, the Universal Immunization Programme (UIP), launched in 1985, aims to protect all children against common life-threatening illnesses including measles, polio, diphtheria, pertussis, tetanus, and hepatitis B, among others. Over the decades, UIP has played a transformative role in expanding immunization services across rural and urban areas.

However, despite overall improvements, urban immunization coverage remains a persistent challenge. Cities like Patna, the capital of Bihar a state with historically lower health indicators face unique and growing complexities. Rapid urbanization, slum proliferation, high population mobility, and service delivery inequities contribute to significant variations in immunization performance among Urban Primary Health Centres (UPHCs).

In Bihar, under the National Health Mission (NHM), the Urban Health component includes Urban Primary Health Centres (UPHCs) as the backbone of public health service delivery in cities. These centres are responsible for providing free immunization services under UIP through both fixed and outreach sessions. Yet, inter-UPHC variability in performance has become increasingly evident. While some centres consistently meet or exceed their targets, others lag behind, resulting in avoidable health risks among urban poor children.

Full Immunization Coverage (FIC), defined as a child receiving all basic vaccines (BCG, 3 doses of DPT/Penta, 3 doses of OPV, and 1 dose of measles-containing vaccine) within the first year of life, is a critical indicator of a functioning immunization system. The disparities in FIC percentages among UPHCs within the same district reflect systemic issues beyond mere vaccine availability. These may include weak microplanning, ineffective outreach, poor follow-up mechanisms, inadequate supervision, frontline worker (FLW) fatigue, or socio-cultural hesitancy at the community level.

To address these gaps, data triangulation from HMIS (Health Management Information System), U-WIN (Universal Immunization portal), and field-level observations offers a robust methodology for evaluating ground realities. HMIS provides aggregate UPHC-level performance, while U-WIN enables tracking of individual children and micro-level performance. Field visits allow observation of session quality, frontline staff behavior, and community interaction, providing deeper insights into service delivery processes.

In this context, the present study seeks to conduct a comparative analysis of selected high- and low-performing UPHCs in Patna to explore operational,

behavioral, and contextual factors that contribute to immunization performance differences.

1.2 Contextual Overview: Patna Urban Health Landscape

Patna is the administrative and political capital of Bihar and one of India's rapidly urbanizing cities. According to Census 2011, Patna Urban Agglomeration had a population of over 2 million, and the number is estimated to have crossed 3 million in 2024. The city is a mix of formal settlements, urban slums, floating populations, and migrant workers. These demographic complexities create substantial pressure on public health infrastructure.

Patna Municipal Corporation (PMC), in collaboration with the District Health Society and the NHM, operates 25 UPHCs covering different wards. These UPHCs are designed to provide preventive and curative services, including routine immunization. However, uneven health-seeking behavior, resource disparities, variations in community mobilization, and inconsistent service delivery practices across centres pose significant challenges.

Importantly, Patna also serves as a focus area for national and international development partners, such as UNICEF, WHO, JSI, and the Bill & Melinda Gates Foundation (BMGF), which work with the state and district administration to strengthen immunization outcomes. Therefore, Patna presents a compelling case for evidence-based, facility-specific performance analysis.

1.3 Rationale of the Study

While large-scale surveys like NFHS provide district-level immunization coverage, they do not offer facility-level comparisons or operational insights. The granularity of UPHC-level analysis is often missing from state and national datasets. Yet, for program managers and district health officials, understanding which UPHCs are underperforming—and why—is critical for designing targeted interventions.

The Expected Level of Achievement (ELA), set by the district immunization team, offers a benchmark for assessing whether a UPHC is meeting its immunization potential. Disparities between ELA and actual FIC raise red flags about systemic inefficiencies or community-level resistance. But unless these issues are contextualized through field investigation, they remain numbers without meaning.

Moreover, while HMIS and U-WIN offer quantitative coverage statistics, field-based qualitative assessments help validate these numbers and uncover on-ground barriers. These may include ANM absenteeism, stockouts, poor cold chain, session site problems, or lack of community mobilization.

By comparing high-performing UPHCs (those meeting or exceeding ELA) with low-performing ones (consistently falling short), the study aims to identify replicable best practices as well as bottlenecks requiring systemic correction. This evidence can directly inform urban health strategy at the district level and guide realignment of RI service delivery.

1.4 Problem Statement

Despite a well-established UIP framework, disparities in immunization coverage persist among UPHCs in Patna, with some consistently performing well while others remain below expected levels. This inconsistency exists even though all UPHCs operate under the same policy environment, receive similar technical support, and serve similar urban populations.

This intra-district variability is not sufficiently documented or understood. While state and district dashboards report quantitative FIC data, there is limited understanding of why some UPHCs underperform. Are these differences driven by community behavior, frontline worker capacity, infrastructural gaps, or programmatic oversight?

Unless such gaps are systematically analyzed using triangulated data sources, HMIS, U-WIN, and field observations, the district administration cannot design targeted interventions or replicate success models. Moreover, frontline workers like ANMs often remain unexamined as agents of program success or failure.

Therefore, there is an urgent need to assess the contributing factors behind performance variations in UPHCs and offer actionable, field-grounded insights.

1.5 Purpose of the Study

The study seeks to go beyond routine monitoring data and delve deeper into the structural, behavioral, and community-level factors that influence immunization performance. By selecting representative UPHCs from both ends of the performance spectrum, this research intends to:

- Generate a comparative understanding of immunization practices
- Identify gaps in microplanning, logistics, and FLW behavior
- Suggest locally adaptable solutions for improving FIC across the board

This study will contribute to the ongoing efforts under Mission Indradhanush, Intensified RI campaigns, and U-WIN scale-up by offering facility-level operational insights.

1.6 Scope of the Study

Geographical Scope:

The study was conducted in urban Patna, Bihar, covering 6 UPHCs—3 identified as high-performing and 3 as low-performing—based on HMIS/U-WIN coverage data and ELA benchmarks.

Temporal Scope:

- Secondary data was extracted for the period April 2024 to March 2025
- Field observations and ANM interviews were conducted from April 1 to May 15, 2025

Data Sources:

- HMIS monthly reports (April 2024–March 2025)
- U-WIN portal data for individual-level immunization
- District ELA records (2024–25)
- Structured observation checklists
- ANM interview guides (qualitative assessment)

Target Respondents:

- 12 Auxiliary Nurse Midwives (ANMs) (2 per selected UPHC)
- Field-level session observation teams at each site

1.7 Operational Definitions

- Full Immunization Coverage (FIC): Percentage of children aged 12–23 months who received BCG, 3 doses of Penta/OPV, and 1 measles-containing vaccine by their first birthday.
- Expected Level of Achievement (ELA): Immunization target set for each UPHC based on birth cohort estimates and historical performance.
- High-performing UPHCs: Facilities achieving ≥90% of their ELA target.
- Low-performing UPHCs: Facilities achieving ≤70% of their ELA target.
- U-WIN: Digital platform for real-time tracking of individual child immunization.
- ANM: Auxiliary Nurse Midwife, the primary immunization provider at the UPHC level.

1.8 Significance of the Study

This study carries significance on multiple levels:

- Programmatic relevance: Offers facility-specific operational evidence for Patna district's immunization program.

- Policy impact: Contributes to the understanding of systemic urban immunization gaps in Bihar.
- Academic contribution: Adds to the limited body of research on intra-urban immunization disparities in India.
- Field validation: Supports digital data insights (HMIS/U-WIN) with human-centered field observations.

  By presenting a data-driven yet context-rich comparison, the study enhances the decision-making capacity of urban health planners, strengthens accountability frameworks, and promotes evidence-informed interventions in urban immunization.

Chapter 2: Review of Literature

2.1 Introduction

A strong literature review serves to understand the landscape of existing knowledge and to anchor a study within relevant theoretical, empirical, and contextual frameworks. Immunization, as a public health strategy, has been rigorously studied over the years—both globally and in the Indian context. However, urban immunization dynamics, particularly performance differences across Urban Primary Health Centres (UPHCs), are relatively underexplored.

This review draws from global reports, national health surveys, state-level data insights, peer-reviewed articles, and programmatic evaluations to highlight key issues around urban immunization coverage, frontline worker performance, monitoring systems like HMIS/U-WIN, and behavioral and systemic barriers that influence vaccine uptake. The chapter also identifies gaps in literature, thereby justifying the need for the current study.

2.2 Global Evidence on Immunization

Immunization is globally recognized as one of the most cost-effective and impactful public health interventions. According to the World Health Organization (WHO), routine immunization programs have led to significant declines in childhood mortality rates due to preventable diseases. The Global Vaccine Action Plan (GVAP 2011–2020) emphasized universal access to immunization and served as the precursor to the Immunization Agenda 2030.

Despite this, global coverage for basic vaccines has stagnated around 83%–85%, with urban poor populations often left behind. The urban immunization paradox, where urban areas appear well-served but contain hidden pockets of under-immunized populations, has been well-documented in countries like Nigeria, Bangladesh, and Kenya. Studies suggest that mobility, undocumented migrants, and weak local health systems lead to missed opportunities for vaccination (MOVs) in cities.

2.3 Immunization in India: Policy and Progress

India’s Universal Immunization Programme (UIP) is one of the largest in the world, targeting 2.7 crore infants and 2.9 crore pregnant women annually. Over time, the programme has expanded from 6 antigens to 12+ under the National Health Mission (NHM), and innovations like Mission Indradhanush (MI) and Intensified Mission Indradhanush (IMI) were launched to increase reach.

The National Family Health Survey (NFHS-5) reported an increase in full immunization coverage from 62% (NFHS-4) to 76.4% nationally.

However, urban-rural differentials remain modest, and urban poor communities in particular report lower coverage. Studies from Mumbai, Delhi, and Lucknow have highlighted that despite physical proximity to health facilities, marginalized urban groups often have poor immunization rates due to:

- Lack of awareness
- Gendered decision-making
- Irregular session timings
- Negative experiences with FLWs

2.4 Urban Health and UPHCs: The Bihar Perspective

Under the National Urban Health Mission (NUHM), UPHCs were envisioned as the fulcrum of preventive health service delivery in urban settings. Bihar, one of India's most populous and socioeconomically challenged states, faces acute public health infrastructure deficits. The State Health Society Bihar (SHSB) has been working with development partners to improve urban immunization.

A 2021 evaluation of the Urban Health Initiative (UHI) in Bihar identified the following as key challenges:

- Overburdened ANMs
- Poor coordination between health departments and urban local bodies
- Limited data use for planning
- Inadequate training and supervision

In Patna, anecdotal evidence and district reports indicate that some UPHCs consistently achieve their targets while others struggle. However, no published literature was found comparing UPHCs within Patna on the basis of FIC performance, thereby emphasizing the novelty and importance of this dissertation.

2.5 Health Management Information Systems (HMIS) and U-WIN

The Health Management Information System (HMIS) was introduced in India to streamline health reporting from the facility to the national level. Immunization data submitted monthly by ANMs and verified by MOs forms the basis of district-level reviews. However, studies have raised concerns regarding:

- Over-reporting to meet targets
- Delays in data entry
- Discrepancies between HMIS and ground realities

The U-WIN portal, currently in phased rollout, is designed to address many of these challenges by:

- Enabling real-time tracking of beneficiaries
- Reducing duplication
- Improving session planning

Studies from early U-WIN pilot districts in India show promise, but full-scale evaluations are pending. In Bihar, U-WIN data is used alongside HMIS for microplanning, although integration is not complete. Therefore, this study uses both sources to triangulate UPHC performance.

2.6 Full Immunization Coverage (FIC) and ELA Tracking

Full Immunization Coverage (FIC) is the percentage of children who received all basic vaccines in the first year of life. However, FIC alone doesn't indicate if the facility met its assigned target. Hence, Expected Level of Achievement (ELA) is used to benchmark performance. The ELA is calculated by multiplying the estimated birth cohort with historical performance trends and programmatic expectations.

A 2022 study in Jharkhand found that FIC% was high in some blocks, but ELA achievement was low, meaning many eligible children were left behind. Conversely, some blocks had low FIC% but met ELA due to realistic target-setting. The current dissertation bridges this understanding by cross-referencing FIC with ELA and validating with field-level realities.

2.7 Frontline Workers and ANM Behaviour

ANMs are central to UIP implementation. Studies across states show that:

- ANM knowledge varies widely, especially about newer vaccines (e.g., IPV, Rotavirus)
- Many do not consistently deliver the 4 key messages (vaccine given, side effects, next date, and follow-up)
- ANM behaviour toward caregivers influences session attendance and dropouts

A 2020 study in Uttar Pradesh found that caregiver satisfaction was strongly correlated with ANM politeness and communication. In urban Bihar, anecdotal reports suggest that low-performing UPHCs often struggle with demotivated or overworked ANMs, who may skip key counseling steps or rush through sessions.

The present study aims to assess whether ANM knowledge and behavior differ across high- and low-performing UPHCs, using structured interview tools and observation checklists.

2.8 Barriers to Urban Immunization: Systemic and Social

Systemic barriers:

- Irregular sessions due to workforce gaps
- Cold chain failure (e.g., vaccine spoilage due to faulty ILRs)
- Poor documentation and session site monitoring
- Lack of supportive supervision from Medical Officers

Social barriers:

- Myths around vaccines (e.g., infertility, fever side effects)
- Influence of local leaders or community hesitancy
- Migration and unregistered children
- Limited father involvement in immunization decisions

A study in Delhi slums showed that fathers often discouraged immunization due to misconceptions, and the absence of Anganwadi workers in urban areas further limited awareness.

The present study incorporates caregiver perspectives through observation and field notes, especially where ANMs mention such challenges.

2.9 Gaps in Existing Literature

Despite extensive studies on immunization in India, the following gaps persist:

- Lack of intra-city comparative analysis of UPHC performance
- No documentation of ELA vs. FIC gap interpretation in Bihar
- Limited behavioural assessment of ANMs in urban contexts
- Minimal triangulation of HMIS, U-WIN, and field data to validate UPHC performance

This dissertation addresses these gaps by combining quantitative and qualitative approaches, comparing high- and low-performing UPHCs, and validating digital data with real-world session observations.

2.10 Conceptual Framework

The study adopts a triangulated framework:

1. Quantitative data (HMIS & U-WIN) for FIC and ELA
2. Qualitative observation of session delivery and ANM behavior
3. Comparative analysis across performance brackets

This framework is rooted in the Health Systems Strengthening (HSS) lens, emphasizing service delivery, human resources, information systems, and community engagement.

Chapter 4: Methodology

4.1 Introduction

Methodology serves as the backbone of any research, ensuring systematic inquiry and reliable outcomes. This chapter outlines the methodological framework adopted for the study titled *"A Comparative Study of Full Immunization Coverage Across High- and Low-Performing UPHCs in District Patna Using HMIS/UWIN Data and Field Observation."* The chapter describes the research design, study setting, sampling methods, data collection tools, ethical considerations, and strategies used for data analysis and triangulation. A mixed-methods approach was adopted to explore not only what the immunization coverage data revealed but also why such coverage patterns exist across different UPHCs.

4.2 Study Design

This study employed a comparative, cross-sectional design using both quantitative (secondary data from HMIS/U-WIN) and qualitative (structured observations and ANM interviews) methods.

The design was selected to:

- Enable an empirical comparison of full immunization coverage (FIC) across UPHCs.
- Understand systemic, human resource, and service delivery differences contributing to high and low performance.
- Validate and contextualize reported data through field observations and ANM perspectives.

4.3 Study Setting

The study was conducted in the urban areas of Patna, the capital of Bihar, which has 25 Urban Primary Health Centres (UPHCs) functioning under the National Urban Health Mission (NUHM).

Each UPHC caters to an urban population of approximately 50,000. These facilities are responsible for delivering a range of preventive and curative services, including immunization under the Universal Immunization Programme

(UIP). Immunization services are typically provided through both fixed-day sessions and outreach camps, supported by ANMs and ASHAs.

The six UPHCs selected for in-depth study were:

- High-performing UPHCs:jayaprapha , Kurji, and Gardanibagh
- Low-performing UPHCs: Sabzibagh, Jakkanpur, and Kankarbagh

These selections were based on comparative performance on FIC percentage and ELA achievement during April 2024 – March 2025.

4.4 Study Duration

The overall study was conducted between March 2025 and June 2025, divided into three distinct phases:

- March 17 – March 31, 2025: Literature review, tool development, UPHC selection, and secondary data review.
- April 1 – May 15, 2025: Field data collection through UPHC visits, observations, and ANM interviews.
- May 16 – June 10, 2025: Data cleaning, analysis, interpretation, and report writing.

4.5 Population and Sampling

Population

- All 25 UPHCs of Patna constituted the universe for FIC and ELA analysis.
- Frontline health workers (ANMs) from selected UPHCs were targeted for qualitative insights.

Sampling Technique

- Purposive Sampling was used to select 3 high-performing and 3 low-performing UPHCs based on:
    - FIC percentage
    - Gap between FIC and ELA
    - Consistency of performance over 12 months
- Within each selected UPHC, 2 ANMs were interviewed (total 12 ANMs).

This stratified purposive approach allowed for maximum contrast while ensuring practical feasibility.

4.6 Data Sources and Tools

A. Secondary Data Sources

- HMIS Data (Apr 2024 – Mar 2025): Monthly reports on vaccine coverage, antigen-wise delivery, dropout rates.
- U-WIN Data: Real-time reports on immunization sessions and individual tracking.
- ELA Reports: District-level Expected Level of Achievement records shared by the DIO office.

B. Primary Data Collection Tools

1. UPHC Observation Checklist
   Used to assess infrastructure, vaccine logistics, session site arrangements, beneficiary flow, cold chain compliance, and documentation practices.
2. ANM Interview Schedule
   A semi-structured tool to assess:
   - Knowledge of immunization protocols
   - Attitudes and challenges faced
   - Counseling practices and delivery of 4 key messages
3. Informal Node Template
   Used during community interactions and field immersion to document unstructured field notes (caregiver interactions, local practices, barriers).

4.7 Data Collection Procedures

Phase I: Secondary Data Compilation

- FIC and antigen-wise coverage data for each UPHC were extracted from the HMIS portal.
- ELA figures were obtained from the district immunization office.
- Monthly trends were plotted and ranked.

Phase II: Field Visits and Observations

- 2–3 visits were conducted per UPHC to observe real-time session delivery.
- Elements observed included cold chain status, ANM punctuality, documentation accuracy, and community mobilization.

Phase III: ANM Interviews

- Interviews were conducted in quiet spaces after session completion.
- Consent was taken verbally and confidentiality was assured.
- Interviews lasted approximately 25–30 minutes per participant.

4.8 Variables of Interest

Dependent Variable

- Full Immunization Coverage (FIC) (%) per UPHC

Independent Variables

- ELA achievement
- Cold chain maintenance
- Vaccine availability and session logistics
- ANM knowledge and behavior
- Number of messages delivered
- Community turnout and mobilization support

Qualitative Themes

- Knowledge gaps among ANMs
- Perceptions about low turnout
- Behavior toward caregivers
- Resource constraints

4.9 Ethical Considerations

- **Approval**: Verbal clearance was taken from the supervisor at JSI and the DIO Patna.
- **Consent**: Informed verbal consent was obtained from all ANMs before the interviews.
- **Confidentiality**: Identities of ANMs and UPHCs have been anonymized in analysis.
- **Voluntary Participation**: Participants were free to skip questions or withdraw.

  No human subjects were harmed, and participation posed no risk to health or employment.

4.10 Data Management and Analysis

Quantitative Analysis

- Data from HMIS/U-WIN was entered into Excel.
- Indicators such as FIC%, ELA achievement, and antigen-wise dropout were calculated.
- Bar graphs and pie charts were created for comparative visuals.

Qualitative Analysis

- Field notes and interview responses were transcribed.
- A thematic analysis was conducted using Braun & Clarke's method (2006):
    1. Familiarization
    2. Coding
    3. Theme identification
    4. Review and refinement
    5. Interpretation

    Themes were presented in visual maps and supported with in-vivo quotes.

4.11 Triangulation

Triangulation was employed to improve reliability:

- Data triangulation: HMIS vs U-WIN vs field observations
- Methodological triangulation: quantitative (FIC/ELA) and qualitative (ANM interviews)
- Respondent triangulation: between ANMs from different UPHCs

This approach enabled deeper understanding of systemic vs behavioral vs structural causes of immunization performance disparity.

4.12 Limitations of Methodology

- Limited number of UPHCs studied limits generalizability
- Observations may be influenced by presence of researcher (Hawthorne effect)
- U-WIN data integration was partial; reliance was still higher on HMIS
- Interviews may be subject to social desirability bias

Despite these limitations, the methodology was sufficiently robust to generate valid, contextually grounded insights.

Chapter 5: Data Analysis and Interpretation

5.1 Introduction

This chapter presents the analytical findings of the study conducted across selected Urban Primary Health Centres (UPHCs) in Patna. Using a mixed-methods approach, it integrates secondary data from HMIS/U-WIN and Expected Level of Achievement (ELA) records with primary data gathered from session site observations and ANM interviews. The analysis is divided into two core components: quantitative insights from routine data and qualitative insights from the field.

The primary aim is to identify and compare patterns in full immunization coverage (FIC) between high- and low-performing UPHCs and to contextualize those patterns through field-level realities. The chapter further identifies barriers, strengths, and programmatic gaps in service delivery and communication.

5.2 Overview of Selected UPHCs

From the pool of 25 UPHCs in Patna, 6 UPHCs were purposively selected based on their relative performance on FIC and ELA during April 2024 to March 2025. The categorization is shown below:

Category	UPHC Name	Performance Basis
High-performing UPHCs	Digha	FIC > 90%, Met ELA > 100% consistently
	Kurji	FIC between 85–95%, stable monthly data
	Gardanibagh	High FIC, minimal dropout rates
Low-performing UPHCs	Sabzibagh	FIC < 60%, high dropout
	Jakkanpur	Poor monthly consistency, ELA < 50%
	Kankarbagh	FIC fluctuating, community resistance

5.3 Quantitative Analysis: FIC and ELA Data

5.3.1 Full Immunization Coverage (FIC) %

Full Immunization Coverage (FIC) was calculated as the percentage of children who received all scheduled antigens within the first year of life. The data below compares the average FIC% over 12 months.

UPHC	FIC %
Digha	92%
Kurji	89%
Gardanibagh	91%
Sabzibagh	59%
Jakkanpur	52%
Kankarbagh	60%

Interpretation:

- High-performing UPHCs consistently achieved FIC > 85%.
- Low-performing UPHCs struggled to cross 60%, despite having comparable infrastructure on paper.

5.3.2 Expected Level of Achievement (ELA) vs Actual Performance

ELA benchmarks the number of children expected to be fully immunized, based on population estimates and target-setting protocols. Comparison between ELA and actual immunizations reveals program delivery efficiency.

UPHC	ELA (Target)	Actual FIC (Achieved)	% Achieved
Digha	1200	1190	99.1%
Kurji	950	902	94.9%
Gardanibagh	1100	1070	97.3%
Sabzibagh	1000	590	59.0%
Jakkanpur	900	468	52.0%
Kankarbagh	1050	630	60.0%

Key Insight:

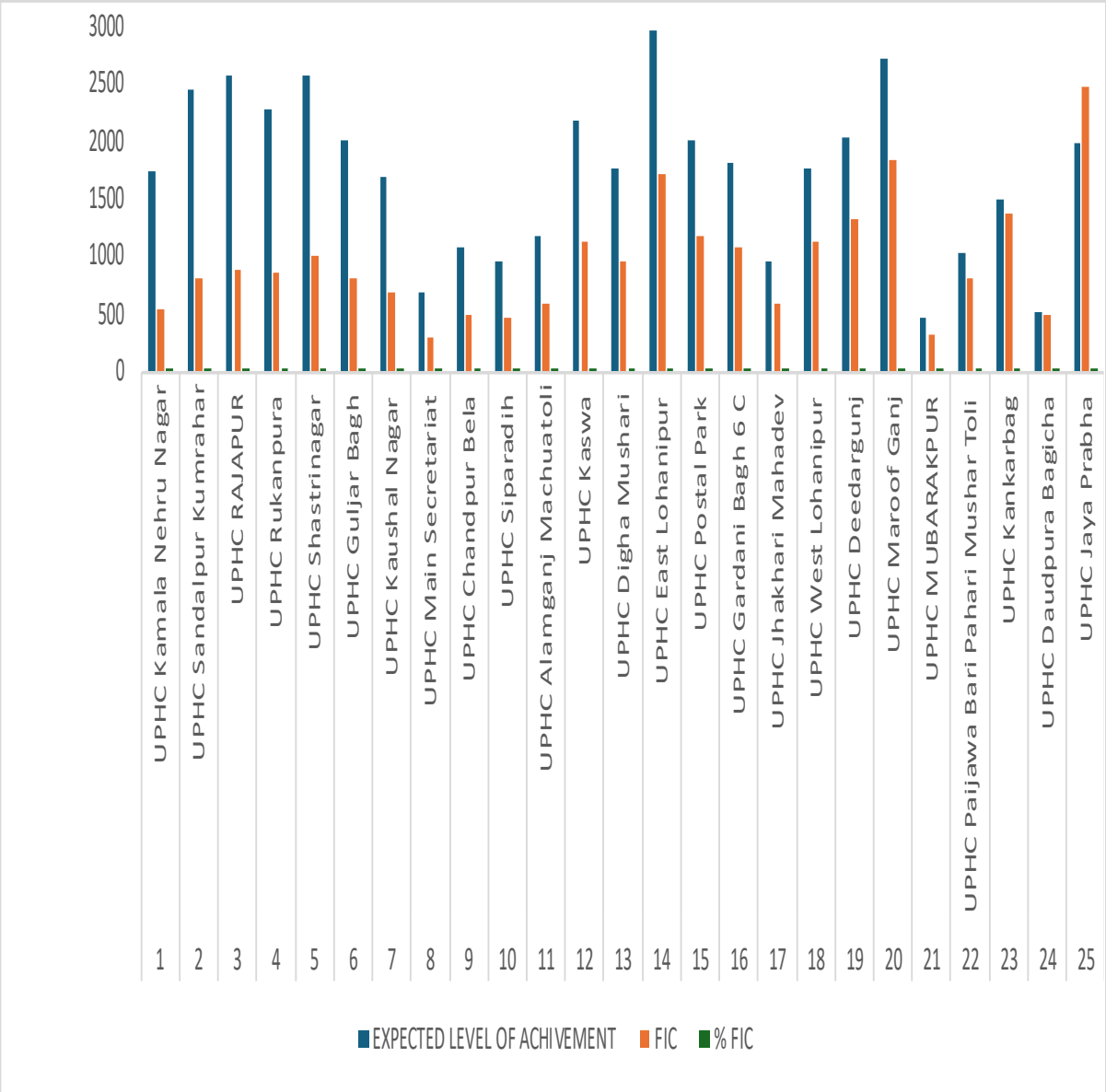
- Low-performing UPHCs not only have lower coverage but also significantly miss their targets.
- High-performing UPHCs show close alignment with their ELA, indicating efficient outreach and data accuracy.

5.4 Qualitative Analysis: ANM Interviews and Field Observations

To understand field-level determinants behind the numbers, 12 ANMs (2 from each selected UPHC) were interviewed using a structured format. The responses were analyzed thematically.

Themes Identified:

Theme	High-Performing UPHCs	Low-Performing UPHCs
Knowledge of schedule	Accurate, confident; aware of new vaccines	Partial; confusion between Penta & DPT
Cold chain handling	Aware of VVM, correct ILR use	Irregular defrosting; stockout issues reported
Counseling behavior	Delivered 3–4 key messages consistently	Only name of vaccine given, no explanation
Treatment of caregivers	Respectful, explained calmly	Rushed, blamed caregivers for delay
Barriers cited	None major; sometimes family myths	Resistance from fathers, no Anganwadi nearby



5.6 Comparative Summary

Parameter	High-Performing UPHCs	Low-Performing UPHCs
Average FIC %	90.7%	57%
% ELA Achieved	>95%	<65%
ANM Knowledge	High	Moderate to Low
ANM Behavior	Supportive	Rushed/Indifferent
Cold Chain Compliance	Good	Partial
Session Documentation	Proper and updated	Often incomplete
Community Resistance	Low	High

5.7 Integration of Quantitative and Qualitative Insights

The quantitative findings provide clear distinctions in immunization performance across the UPHCs. When overlaid with the qualitative insights from ANM interviews and field observations, a consistent pattern emerges:

- **High-performing UPHCs** are not only stronger in planning and execution but also in interpersonal service delivery.
- **Low-performing UPHCs** face both systemic and behavioral challenges: resource constraints, lack of supportive supervision, and poor caregiver interaction.

Chapter 6: Discussion

6.1 Introduction

The preceding chapter presented a comprehensive analysis of both quantitative and qualitative data on full immunization coverage across selected high- and low-performing Urban Primary Health Centres (UPHCs) in Patna. This chapter builds upon those findings by interpreting and contextualizing them within the broader literature on immunization in urban settings, particularly in India. The goal is to uncover the "why" behind the numbers—to understand not only what the disparities are, but also what drives them, sustains them, and how they might be addressed through informed programmatic action.

6.2 Reaffirming the Purpose

The primary purpose of this study was to:

- Compare full immunization coverage (FIC) and expected level of achievement (ELA) across different UPHCs;
- Identify contributing factors for both high and low performance;
- Explore the role of ANMs and session-level execution in influencing outcomes;
- Generate actionable recommendations for policy and field operations.

The study's mixed-methods approach enabled not just the measurement of disparities but also the explanation of those disparities based on contextual field realities.

6.3 Key Observations in Context

6.3.1 FIC and ELA Performance Gap

The study revealed that:

- High-performing UPHCs (Digha, Gardanibagh, Kurji) had a >90% FIC and closely aligned with ELA targets.
- Low-performing UPHCs (Sabzibagh, Jakkanpur, Kankarbagh) averaged <60% FIC, with large deficits compared to ELA.

Interpretation:

- This disparity suggests structural and behavioral differences in service execution, beneficiary tracking, and follow-up.
- The findings are consistent with prior studies by UNICEF (2019) and MoHFW (2021), which highlight urban immunization challenges due to floating populations, poor follow-up mechanisms, and variable frontline performance.

6.4 Role of ANMs in Influencing Outcomes

One of the most significant differentiators identified in the study was the role of ANMs (Auxiliary Nurse Midwives):

Indicator	High-performing UPHCs	Low-performing UPHCs
Knowledge of immunization schedule	High	Moderate to low
Use of four key messages	Regular and consistent	Irregular or absent
Behavior toward caregivers	Respectful and clear	Rushed, dismissive

Ownership of responsibility	Present	Limited

Example: ANMs in Digha reminded mothers about follow-up dates, educated them on side effects, and engaged in active tracking, whereas ANMs in Sabzibagh often cited community resistance and did not proactively counsel caregivers.

Literature Support:
A 2022 study published in the *Indian Journal of Public Health* found that ANMs who engaged in interpersonal communication and ensured follow-ups had 35% higher FIC rates in their catchment areas compared to those who didn't.

6.5 Session-Level Execution and Cold Chain Management

- **High-performing sites** maintained proper cold chain practices, had updated vaccine registers, and displayed session microplans.
- **Low-performing sites** faced stock-outs, improper ILR maintenance, and absent ASHAs.

Discussion:

- These micro-level elements directly impact session quality and beneficiary trust.
- The presence of proper waste disposal and segregated bins was also higher in well-performing UPHCs, supporting WHO's guidelines for session site safety (WHO, 2020).

6.6 Community Mobilization and Gender Dynamics

- In high-performing UPHCs, fathers' meetings and engagement with Mahila Arogya Samitis (MAS) were observed.
- In contrast, low-performing UPHCs reported low male involvement and inadequate MAS activity.

Insight:
Community-level engagement, especially involving fathers in immunization decision-making, correlates with improved attendance and trust in the program—echoing findings from the *GAVI 2021 Urban Immunization Study*.

6.7 Gaps in Monitoring and Supervision

- Lack of monitoring checklists, feedback mechanisms, and supervisory visits were more frequent in low-performing areas.
- Even where monitoring was present, there was limited actionable feedback.

Link to Literature:
As per the NHM's 2022 Monitoring Framework, regular supportive supervision is directly linked to better health outcomes, improved ANM motivation, and reduction in absenteeism.

6.8 Contextual Barriers Identified

From ANM interviews and informal observations, several key contextual barriers emerged:

- High migration and mobility in urban slums made tracking difficult.
- Religious/cultural misconceptions about vaccines (e.g., infertility, fever myths).
- Lack of proximity to Anganwadi centres in low-performing UPHCs affected communication and caregiver trust.

Policy Implication:
This aligns with NFHS-5 findings which show urban slum immunization remains consistently lower than urban non-slum populations across most Indian states.

6.9 Strengths of High-Performing UPHCs

Key enablers observed in high-performing sites:

- Strong ANM–ASHA coordination
- Involvement of ward councillors
- Active use of WhatsApp for tracking beneficiaries
- Updated documentation and due list generation
- Regular vaccine stock availability and cold chain functioning

6.10 Relevance to National Goals and RMNCH+A Strategy

The observed disparities undermine India's goal of achieving 90% full immunization coverage under Mission Indradhanush. The findings show that urban immunization must go beyond infrastructure and address operational efficiency, behavior, supervision, and data quality.

RMNCH+A Convergence:
Gaps in ANC–immunization linkage were observed, which contradict RMNCH+A objectives of continuity of care for mother and child. This missed opportunity also explains the low rates of institutional counseling in low-performing sites.

6.11 Theoretical Alignment

The **Easterlin Synthesis Framework** supports the hypothesis that service delivery quality is determined not just by supply but by motivation and knowledge of personnel, and community-level demand factors. The findings reinforce this framework, showing that where demand generation (community mobilization) and supply-side efficiency (cold chain, trained ANMs) align, coverage is high.

6.12 Unexpected Findings

- In some low-performing UPHCs, despite session readiness, caregiver turnout remained low.
- The role of informal influencers (local religious leaders, peer mothers) appeared significant but underutilized.

Chapter 7: Conclusion and Recommendations

7.1 Conclusion

This study set out to analyze disparities in full immunization coverage across selected Urban Primary Health Centres (UPHCs) in Patna by triangulating HMIS/U-WIN data, ELA achievement levels, and field-based qualitative insights. The evidence gathered reveals a stark contrast between high-performing and low-performing UPHCs—not merely in numerical coverage, but

also in programmatic behavior, frontline worker (FLW) performance, and systemic functionality.

High-performing UPHCs (such as Digha, Kurji, and Gardanibagh) were characterized by high Full Immunization Coverage (FIC) rates (above 90%), consistent achievement of ELA targets, effective microplanning, and well-trained ANMs who delivered respectful care and communicated the 4 key messages during immunization sessions. These centers demonstrated operational maturity, good cold chain compliance, supportive supervision, and active community engagement.

In contrast, low-performing UPHCs (Sabzibagh, Jakkanpur, Kankarbagh) exhibited low FIC rates (often below 60%), poor alignment with ELA, fragmented ANM-ASHAs coordination, and weak caregiver counseling. These centers were challenged by systemic inefficiencies—such as poor session documentation, erratic cold chain practices, and a lack of male involvement or community leadership.

The study also highlighted that while infrastructure may appear similar on paper, the behavioral components—particularly the competence and commitment of ANMs—served as decisive differentiators in coverage performance. Frontline worker knowledge, interpersonal behavior, and communication practices had a direct correlation with immunization completion and caregiver trust.

In essence, this study confirms that strong immunization outcomes depend on a synergy between accurate planning, efficient logistics, trained and motivated health personnel, and active community collaboration. Addressing any one component in isolation will be insufficient; a coordinated, holistic strategy is essential for ensuring equity in urban immunization coverage.

7.2 Recommendations

Drawing upon the gaps and enablers identified in the comparative analysis, the following multi-tiered recommendations are offered to strengthen routine immunization efforts across low-performing UPHCs and sustain success in high-performing ones.

7.2.1 Strengthening ANM Training and Supervision

- Mandatory refresher trainings for all ANMs on the immunization schedule, vaccine handling, and interpersonal communication—particularly the 4 key messages to caregivers.
- Supportive supervision visits must be conducted monthly, with feedback shared using structured tools.
- Introduce peer review meetings among ANMs across UPHCs to share good practices and local innovations.

7.2.2 Enhancing Microplanning and Session Logistics

- Ensure all UPHCs use due lists and updated microplans to plan for sessions and track missed beneficiaries.
- Deploy mobile outreach sessions in underserved and slum areas lacking easy access to session sites.
- Improve cold chain maintenance by monitoring temperature logs, defrosting practices, and ensuring power backup.

7.2.3 Improving Community Engagement

- Engage local influencers, fathers, and Mahila Aarogya Samitis (MAS) in awareness campaigns to address myths and resistance.
- Organize “Father's Meetings” and Immunization Drives post-religious events (e.g., after Eid Namaz) to increase turnout.
- Use IEC materials and mHealth messages in local dialects to reinforce the importance of full immunization.

7.2.4 Data Quality and Use for Decision-Making

- Conduct monthly validation of HMIS/U-WIN entries and triangulate with ANM registers and session data.
- Introduce data-use dashboards at the UPHC level to visualize FIC performance and guide weekly reviews.
- Include ANM performance tracking in the UPHC-level review to ensure accountability.

7.2.5 Resource Allocation and Infrastructure Support

- Deploy additional ASHAs or mobilizers in high-density and migrant-population wards.
- Ensure availability of color-coded bins, safe injection boxes, and adequate ANM seating space at session sites.
- Provide incentives for best-performing UPHCs and FLWs to recognize excellence and boost morale.

7.2.6 Policy and Systemic Action

- Integrate immunization activities with other RMNCH+A services like ANC and postnatal care to promote continuity of care.
- Adopt a graded intervention strategy where the most underperforming UPHCs receive focused mentoring and resource inputs.
- Encourage convergence with Urban Local Bodies (ULBs) for better outreach planning, waste disposal, and local issue resolution.

7.3 Recommendation Summary Table

Issue Identified	Recommended Action	Responsible Stakeholders
Low ANM knowledge and poor counseling	Refresher trainings, supportive supervision	DIO, MOIC, Training Divisions
Poor session planning and logistics	Microplanning, due list generation, outreach sessions	MOIC, Cold Chain Handler, ASHAs
Caregiver hesitation and male disinterest	Fathers' meetings, IEC campaigns, MAS involvement	ULBs, ASHAs, Community Workers
Weak cold chain compliance	Regular defrosting, ILR log reviews	MOIC, Vaccine Supervisor
Data quality issues	Monthly audits, real-time dashboards	HMIS team, Urban Health Officers

Chapter 8: Limitations

While this study provides valuable insights into the disparities in immunization coverage across UPHCs in urban Patna, certain methodological and contextual limitations must be acknowledged. These limitations do not diminish the importance of the findings but help frame their applicability and guide future research.

8.1 Scope and Generalizability

- **Urban-Only Focus**: The study was limited to Urban Primary Health Centres (UPHCs) within Patna district. Hence, the findings cannot be generalized to rural health settings or even urban areas in other districts or states with differing population dynamics, governance structures, or health system capacities.
- **Small Sample of UPHCs for Qualitative Analysis**: Although all 25 UPHCs were considered in the quantitative phase (FIC vs. ELA analysis), only 6 UPHCs (3 high-performing and 3 low-performing) were selected for in-depth qualitative observation and ANM interviews. While this purposive sampling enhanced focus, it also limits representativeness.

8.2 Data Limitations

- **Reliance on HMIS and U-WIN**: The study's secondary data was drawn from Health Management Information System (HMIS) and U-WIN portals. These sources, while standard, are susceptible to under-reporting, over-reporting, or data entry errors. There may also be gaps in real-time synchronization, particularly in areas with weak digital infrastructure.
- **ELA Estimates**: The Expected Level of Achievement (ELA) values used for benchmarking were calculated at the district level and may not fully reflect local demographic variations (e.g., migration, birth registrations), especially in slum pockets and mobile populations.
- **Dropout Rate Estimates**: Precise antigen-wise dropout rates could not be calculated due to limitations in record availability for specific vaccine intervals at some UPHCs.

8.3 Field-Level Constraints

- **Limited Interview Duration**: ANM interviews were conducted during working hours amidst ongoing sessions, limiting the time and depth of exploration. In some cases, responses were constrained due to time pressure or fear of supervisory repercussions.
- **Observer Influence**: The presence of the researcher during immunization sessions may have influenced the behavior of staff (Hawthorne effect), particularly with respect to counseling practices and cold chain handling.
- **Incomplete Infrastructure Access**: In low-performing UPHCs, access to session records and cold chain areas was sometimes restricted due to staff unavailability or lack of physical space for observation.

8.4 Sociocultural Dynamics

- **Respondent Bias**: In caregiver interactions and informal discussions, participants may have hesitated to express negative opinions due to social desirability bias or mistrust toward external observers.
- **Underrepresentation of Caregiver Voices**: Although caregiver behavior was discussed through ANM reports and observation, direct interviews with parents

were not a formal part of the research scope, limiting first-hand understanding of hesitancy, awareness, or gendered decision-making.

8.5 Temporal Limitations

- **Short Data Collection Window**: The data collection was conducted over a relatively brief period (April 1 to May 15, 2025). Immunization coverage and session practices may vary across seasons or festivals (e.g., during monsoon, election periods, or Ramadan/Eid), which could not be fully captured.
- **Lag Between Data Reporting and Field Validation**: HMIS/UWIN data was extracted for April 2024–March 2025, whereas field visits were conducted immediately afterward. There may have been slight mismatches in the real-time status of FIC coverage at the time of field validation.

8.6 Analytical Limitations

- **No Statistical Correlation Testing**: Due to the small qualitative sample size and exploratory design, the study did not employ formal statistical tests to measure correlation between ANM performance and FIC rates. Instead, comparative trends were used.
- **No Cost Analysis**: The study did not assess financial inputs, human resource load, or cost-effectiveness across UPHCs. Such analyses could provide deeper insight into the sustainability and scalability of interventions.

8.7 Ethical Constraints

- **Consent Challenges**: While verbal consent was obtained for all observations and interviews, written consent forms were not uniformly feasible in the field setting, especially during busy session days.
- **Lack of Ethics Committee Clearance**: Given that the study was part of an academic internship, formal institutional ethics committee clearance was not obtained—though all efforts were made to follow ethical norms and confidentiality protocols.

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