Immunization Economics Pre-Congress Meeting

Bali, July 19-20th, 2025

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Zero-Dose: Community-based demand generation interventions

Bali, July 19, 2025

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Designing for the Unreached:

Estimating the Cost of Reaching Zero-Dose Children Through Human-Centered Solutions in Urban India

Dr. Alan Noble John, JSI – India

Mail: alan.john@jsi.org

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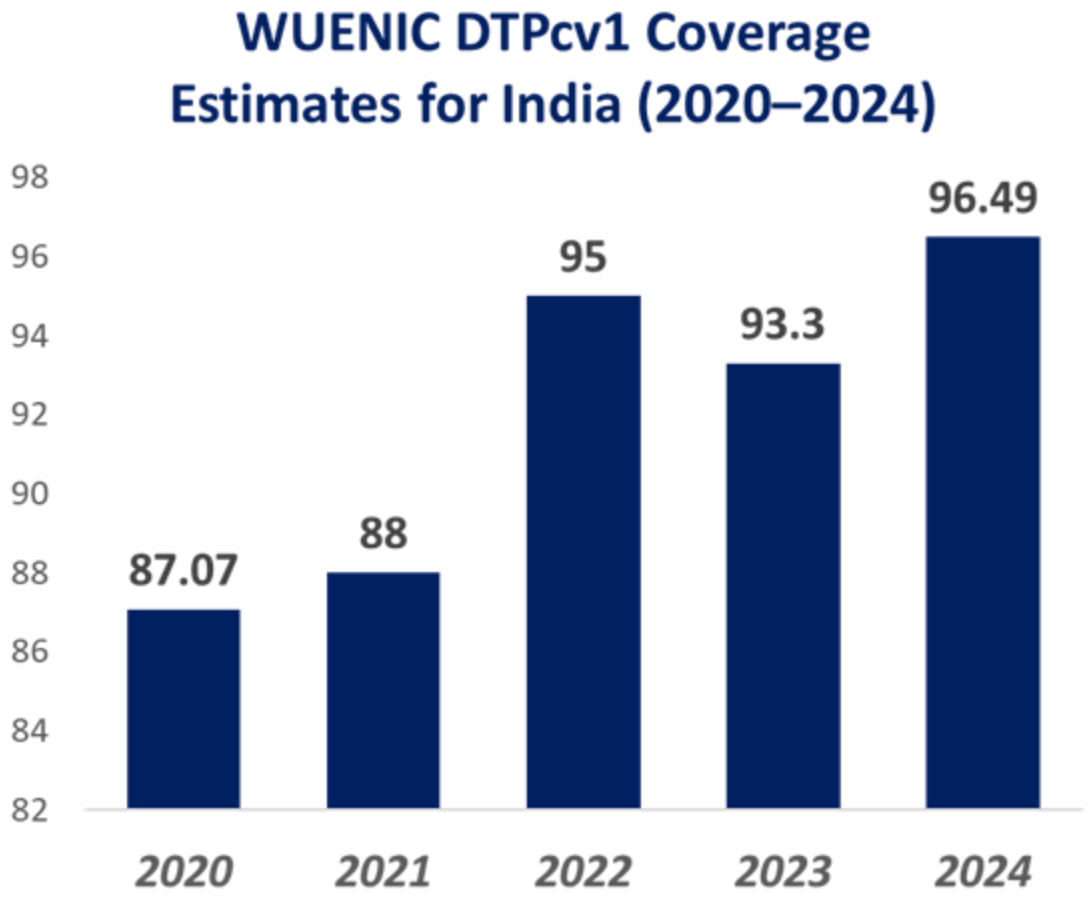
Indian Context

- Remarkable gains in the past with WUENIC estimates suggesting DTPcv1 coverage over 95%.

- However, the absolute number of ZD children still remains high (909K children – 2nd highest globally) – *WUENIC 2024*

Literature suggests national-level gains mask large sub-national variations (urban slums, remote rural)



What do we know?

- Routine immunization delivery costs vary widely in India—from $1.38 (Bihar), $1.5 (UP) to $2.93 (Kerala) per dose(Chatterjee et al., 2018).

- Whereas, *Clarke-Deelder et al (2024)* reports the incremental cost per ZD child reached during PIRI** is $63.10 (exclusive of vaccine costs)

*FIC- Fully Immunized Child (8 antigens)
**PIRI – Periodic Intensification of Routine Immunization (Intensified Mission Indradhanush(IMI) in India)

WUENIC DTP vaccination coverage – JRF (2024)

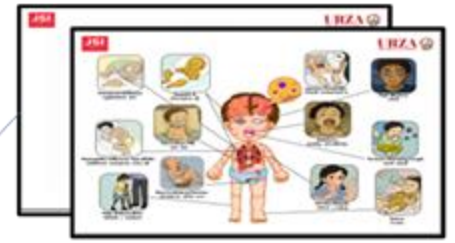
Going Beyond the 'What' to the 'Why' – Zero Dose Learning Agenda

Surface-level data tells us where zero-dose children are—but not why they remain Zero Dose.

Leading Barriers

- Vaccine & VPD awareness
- Low value of vaccines
- Fear of minor Adverse events
- Gendered barriers – limited women autonomy

ZDLA Solution



Zero dose Child : Definition

India : Potential ZD + True ZD

Potential ZD: 3-11 months, not received Penta 1

True ZD: 12-23 months, not received DTPcv1

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Costing Objectives and Methodology

	Objectives	Methods	Respondents	Proxy indicator
1.	To estimate health system and workforce investments required for delivering immunization to ZD children in urban India.	Baseline-Endline Assessment (Pre-post analysis)	Facility-based staff involved in Immunization activities	Number of Penta 1/DPT 1 vaccines administered to ZD children at baseline vs endline (1 month)
2.	To estimate intervention-specific lifecycle (design to delivery) costs of ZDLA interventions for planning, scale-up, and resource allocation of ZD strategies in urban India.	Retrospective Activity-based time-use matrix	JSI TA (Technical Staff, Design Researchers, Implementing Staff), Government staff, Finance officers	Overall Unique Number of Penta 1/DPT 1 vaccines administered to ZD children

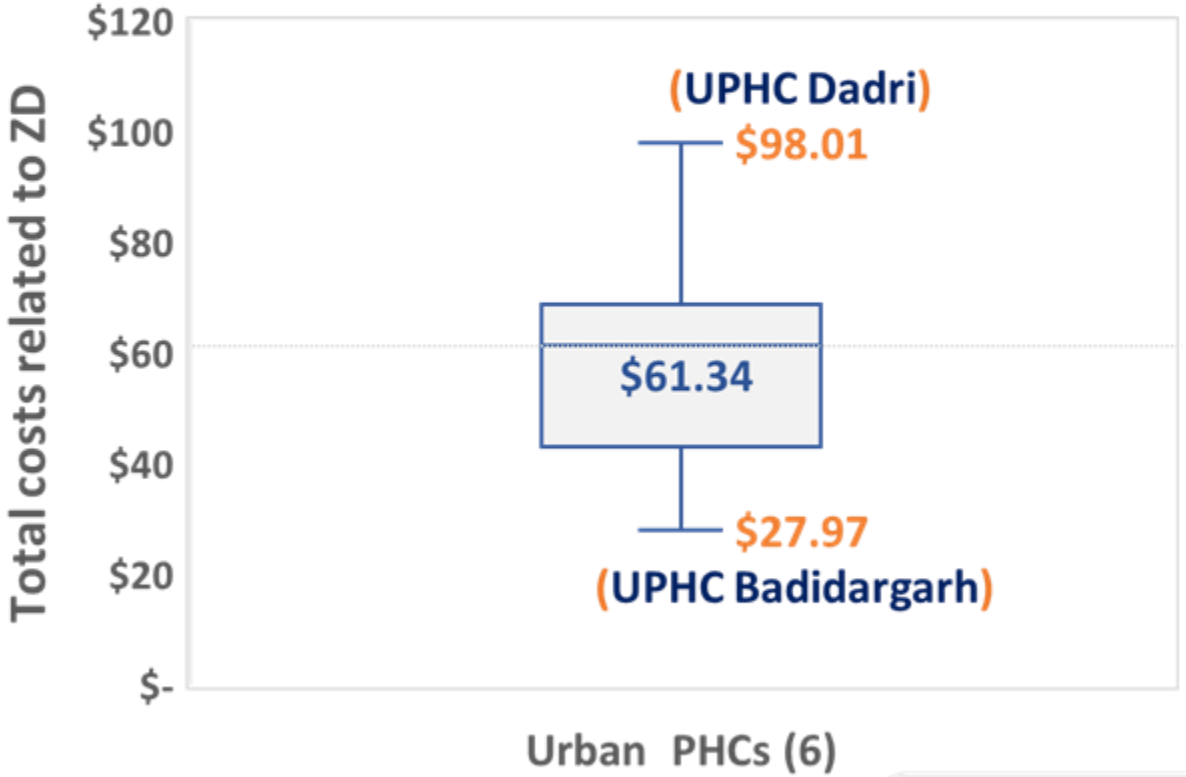
Objective 1. What are the Monthly routine baseline costs now?

Range and Distribution of ZD Costs – Across Sites (n=6)

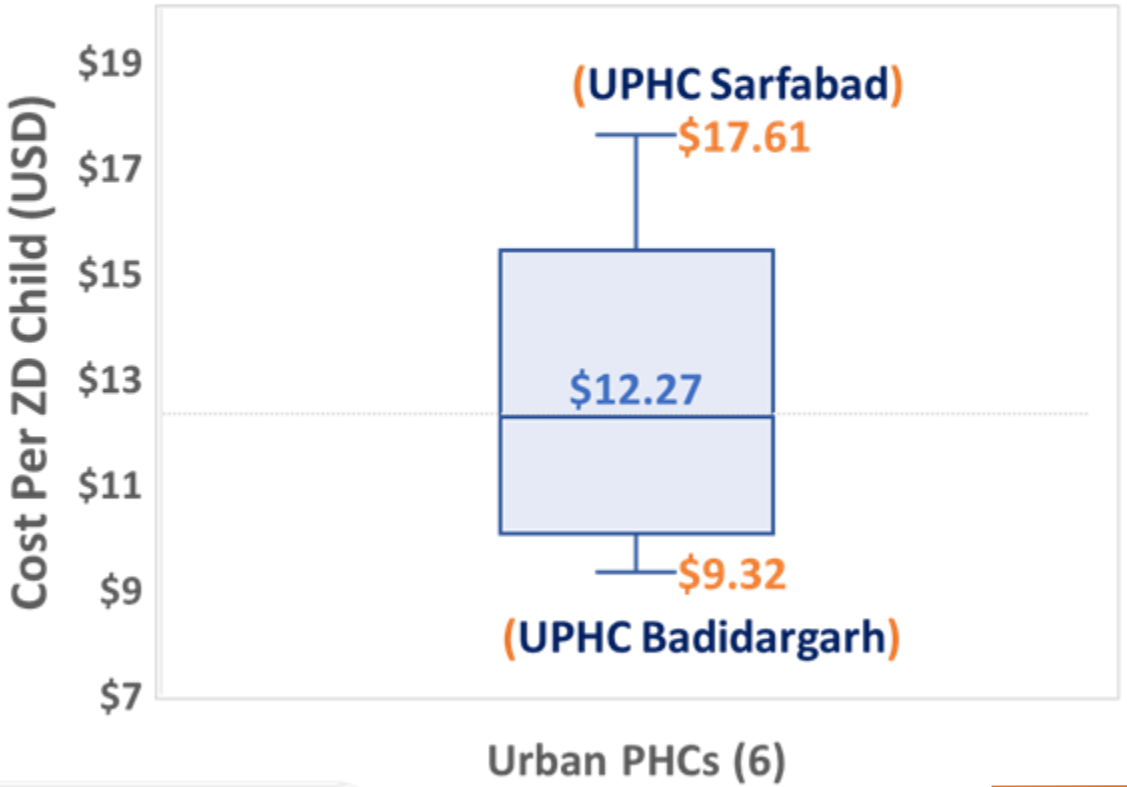
The Total cost related to ZD children ranges from $27.97 to $98.01 across UPHCs, with a **median of $61.34**.

The cost per ZD child ranges from $9.32 to $17.61 across UPHCs, with a **median of $12.27**.

*Distribution of **total cost related to ZD** across 6 UPHCs*



*Distribution of **Cost per ZD child** across 6 UPHCs*



Median monthly total cost - $61.34;
Median Cost per ZD child – $12.27

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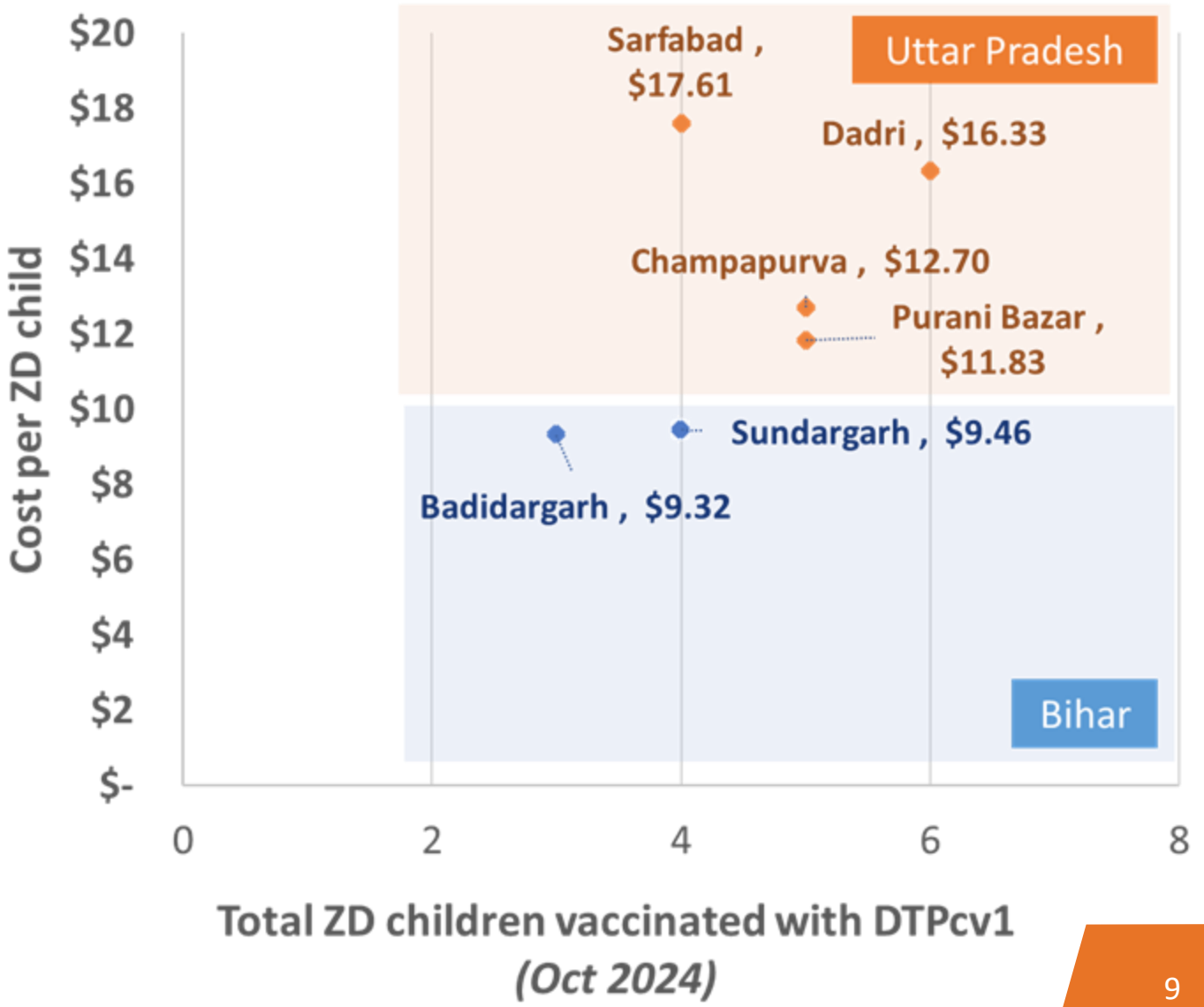
Cost Efficiency of Reaching ZD Children: Site-Wise Variation

- **Cost components include:** staff time**(identification, mobilization & vaccination)**, transport, and supplies—**excluding vaccine cost**.
- **Wide variation in cost per ZD child**: UP sites report higher cost per ZD child compared to Bihar sites.
  - ➢ This variation is primary driven by persistent vaccine hesitancy despite resource allocation.
- **Labour/time-use findings:** On average, just **5.5%** of CHWs' time is spent on ZD activities *(range: 3% in Badidargarh, Bihar to 9% UPHC Champapurva, UP)*



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Objective 2

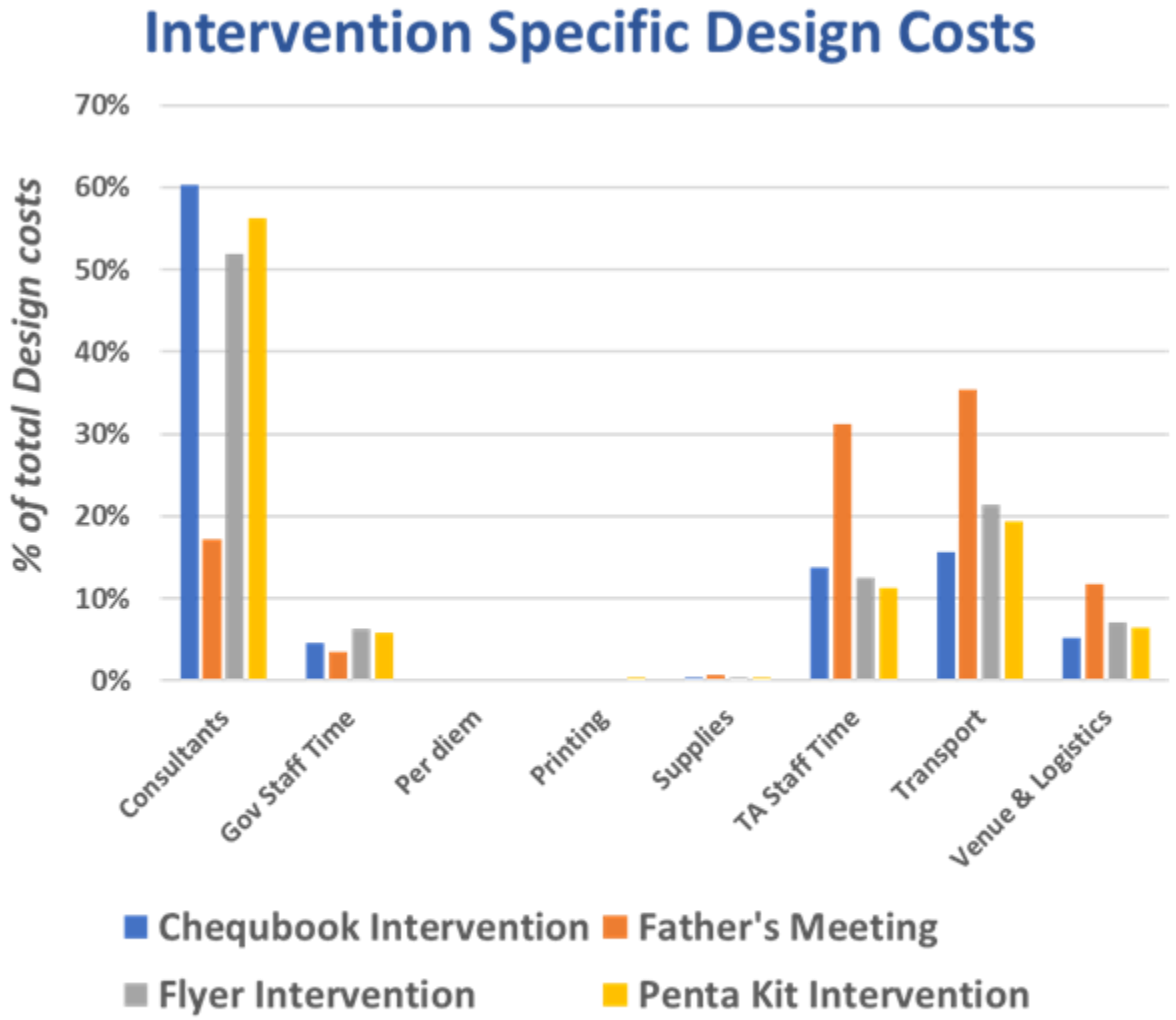
To estimate intervention-specific lifecycle (design to delivery) costs of ZDLA interventions for planning, scale-up, and resource allocation of ZD strategies in urban India.

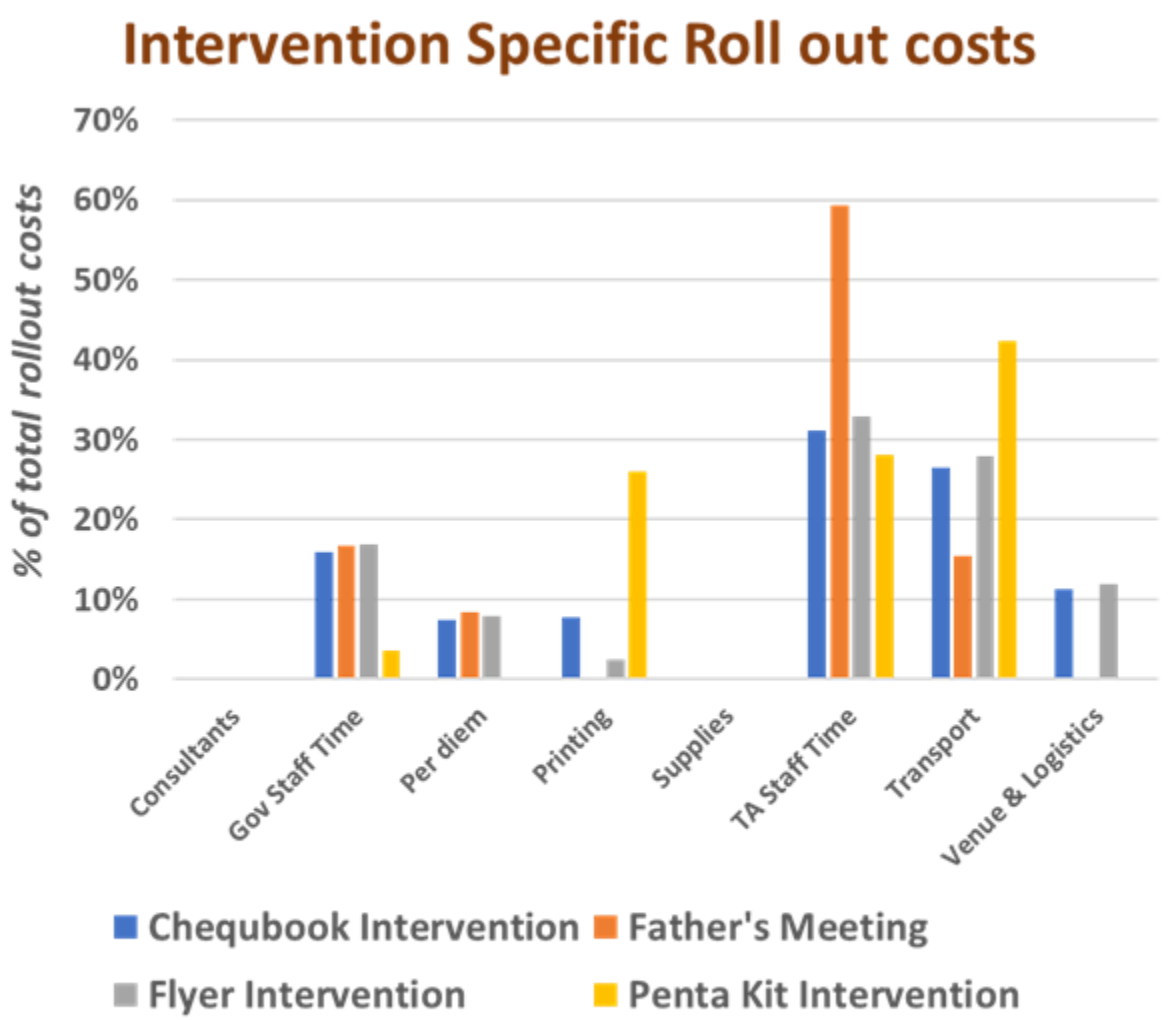
Methods

Retrospective Activity-based time-use matrix

Disaggregated Design v/s Rollout Costs

Relative cost shares for design and rollout phases, by intervention and input category





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**Consultants = HCD/Design experts; **TA Staff = Technical Assistance*

What scales, what doesn't?

Monthly Normalized Cost and Feasibility

Intervention	Monthly normalized costs (Design)	Monthly normalized costs (Rollout)	Design Complexity	Rollout Complexity & Community acceptability	Early Impact
Flyer	$3,270.7	$2,546.9	Moderate (low rework, quick turnaround)	Low - Moderate (training logistics)	**Number of ZD children contacted with flyer and Chequebook: 1058** **Number of ZD vaccinated: 382***
Chequebook	$4,499.2	$2,690.4	Moderate – High (required stakeholder iterations)	Low - Moderate (training logistics)	

**Data collection period: Feb 2025 – June 2025*

What scales, what doesn't?

Monthly Normalized Cost and Feasibility

Intervention	Monthly normalized costs (Design)	Monthly normalized costs (Rollout)	Design Complexity	Rollout Complexity & Community acceptability	Early Impact
Father's Meeting	$1,363.1	$1,393.7	Low - Moderate (known strategy, contextually adaptations)	High (planning, coordination, mobilization and facilitation)	Number of ZD father attended: 148
Penta kit	$2,121.1	$1,093.8	High (Logistically-heavy, design iterations)	High (Logistics-heavy, customized items – supply chain concerns)	Interim analysis awaiting

What are we learning?

- ***Behavioral (demand-side) interventions are cost-intensive to design***, but much needed to overcome the deep-rooted hesitancy in urban slums.

- ***Resource intensity does not guarantee conversion***: Higher staff time and spending does not translate to greater uptake, due to persistent hesitancy – not access barriers.

- ***Labour time is highly localized*****:** While the average CHW spends just **5.5%** of total time on ZD, **ASHAs covering ZD clusters spend 20–30%** of their work time counseling these families, often with limited results due to rooted hesitancy.

  - **Example (Dadri UPHC):** Of 119 outreach sessions, only **32** included ZD clusters; only 6 of 14 ANMs and 24 out of 40 ASHAs + Link workers engaged with ZD families.

- **Cost efficiency is site-dependent:** Per-child costs are substantially higher where conversion is lowest, thus reinforcing the need for targeted behavioral demand generation interventions, not just more resources.

Policy Takeaways

- ***Higher Cost of Reaching Zero-Dose (ZD) Children***: Preliminary analysis suggests that cost per ZD child reached >> Cost of routine immunization service delivery.

- ***Need to address persistent hesitancy***: High effort does not equal high conversion in ZD communities – behavioral barriers remain the primary constraint, not lack of outreach.

- ***Interventions must be hyper-targeted***: General outreach efforts are not enough – resources and strategies should zero in on specific ZD clusters and the CHWs serving them.

- ***Concentrated Labour burdens***: Need to recognize and support ASHAs/Mobilizers in high-burden ZD clusters; blanket averages can mask local workload and resource needs.

What's next for us

1. *Endline Costing Assessment*

Final round of costing for Objective 1: capturing health system and workforce costs after full intervention rollout.

2. *Learning-by-Doing (LxD) Costing*

Estimating the cost of continuous learning and iterations based on sprint reviews, including:

- ***Monthly costs for User Advisory Group (UAG) meetings*** for field feedback and community acceptability.
- ***Staff time and operational expenses*** for rapid adaptation and course-correction based on community and stakeholder insights.

Thank you

For more details, reach out to:

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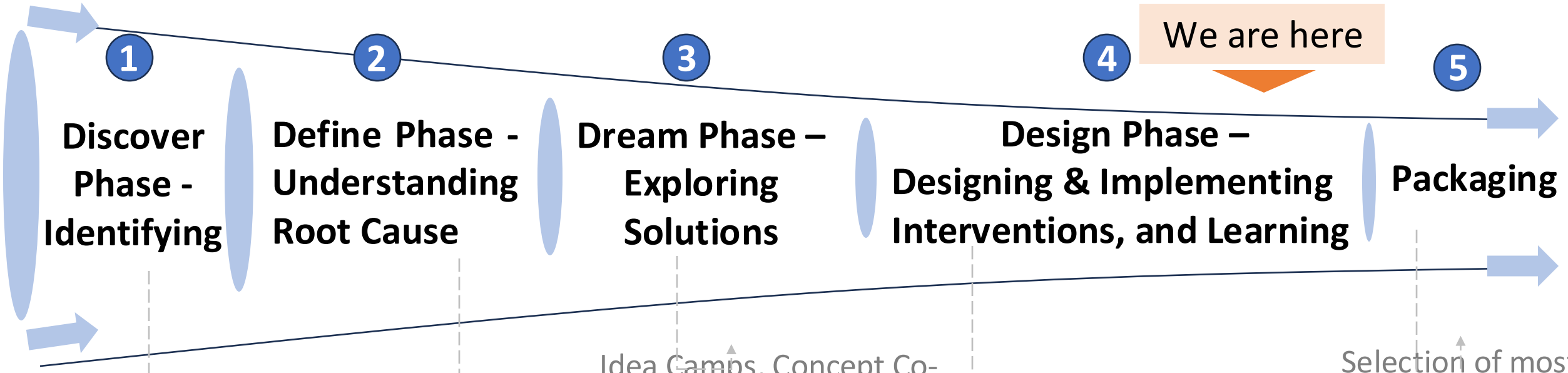
Cost and Cost-effectiveness analysis of HCD-based targeted interventions for ZD children in high-burden regions of India (Ongoing Project)

July 2025

Presented by Devak Namdhari

Clinton Health Access Initiative, India

Our approach towards the Zero Dose Learning Agenda



Literature review, Data Synthesis, Program interviews, Isochrone Mapping, ZD Profiling

Participatory games, Mural boards, Driver socialisation

Idea Camps, Concept Co-creation, Idea Prioritization

Low-fidelity and high-fidelity prototype testing, learning exercise,
Implementation & LxD

Selection of most effective interventions for sustainable adoption

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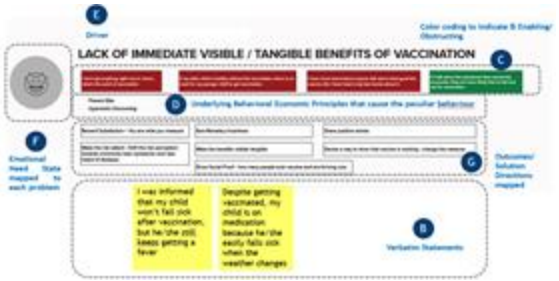
Leveraging human-centered design and behavioral science principles

Deep-dive with Communities

Unlock System 1 for deeper engagement through participatory games with caregivers and HCWs (extreme users)



Clustering for RCA

Cluster and categorize verbatims to themes, identify peculiarities obstructing and enabling vaccine uptake

Co-creation of Ideas

In-person solutioning sessions with caregivers, community influencers and HCWs/FLWs

Prioritization of Ideas for testing

Workshops with program managers and govt. stakeholders for prioritization of ideas

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Hyperlocal interventions developed and deployed in 120+ focus health facilities in high ZD burden regions

Exemplars for Global Health (EGH) Framework

- **Intent**
  - Helping understand the importance and urgency of vaccination while allaying AEFI fears

  - Making it easier to track the vaccination journey

- **Access**
  - Increase awareness on where and when to seek services

- **Readiness**
  - Improving HCW/FLW Capacity for Service Delivery

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Framework for Estimation of Incremental Cost of HCD-based Interventions

Incremental Cost

Intervention Design

- Opportunity Cost of time spent
  - Govt. Stakeholders*
  - CHAI staff
  - HCD Consultants
- Workshops (Co-creation, Idea prioritisation)
- Transportation/Printing for prototypes

Roll-out

Initiation

- Printing/Transportation of interventions
- Training of implementation HR

Implementation

- Opportunity cost of time spent:
  - Govt. HR in intervention delivery*
  - Govt. HR in supervision activities*
- M&E by CHAI staff
- Administrative Costs

*Primary Data Collection (Probability Proportional to Size Technique)

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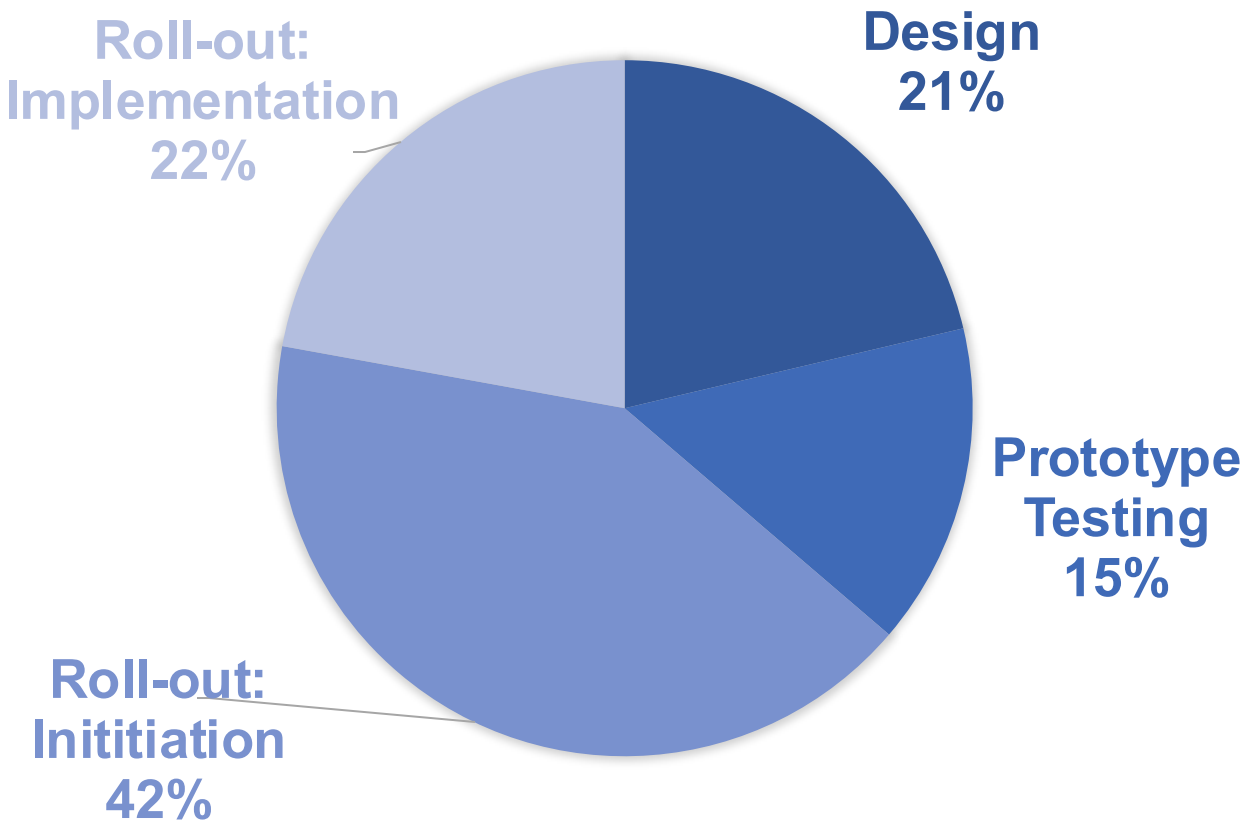
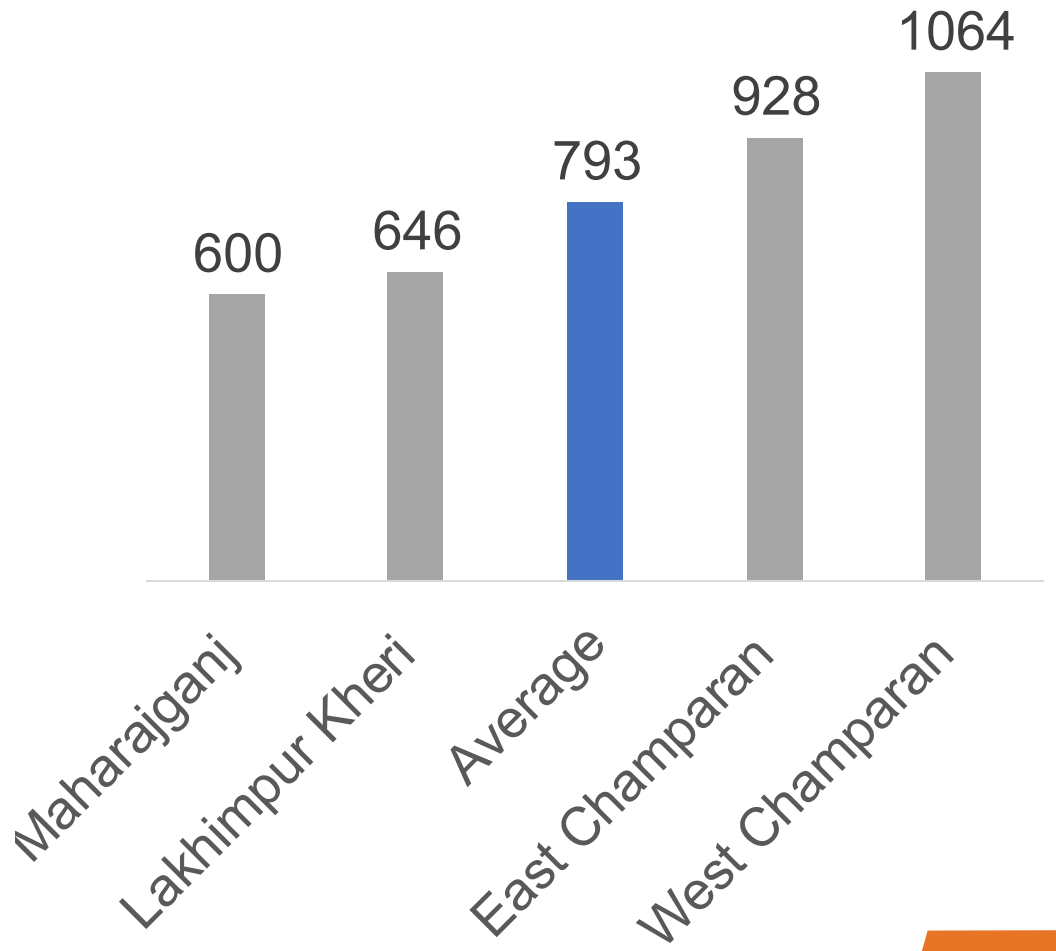
Preliminary Findings from the Costing Analysis (Roll-out Phase: April 2025 – Ongoing)* (1/2)

Distribution of Total Cost Incurred (Phase-wise)



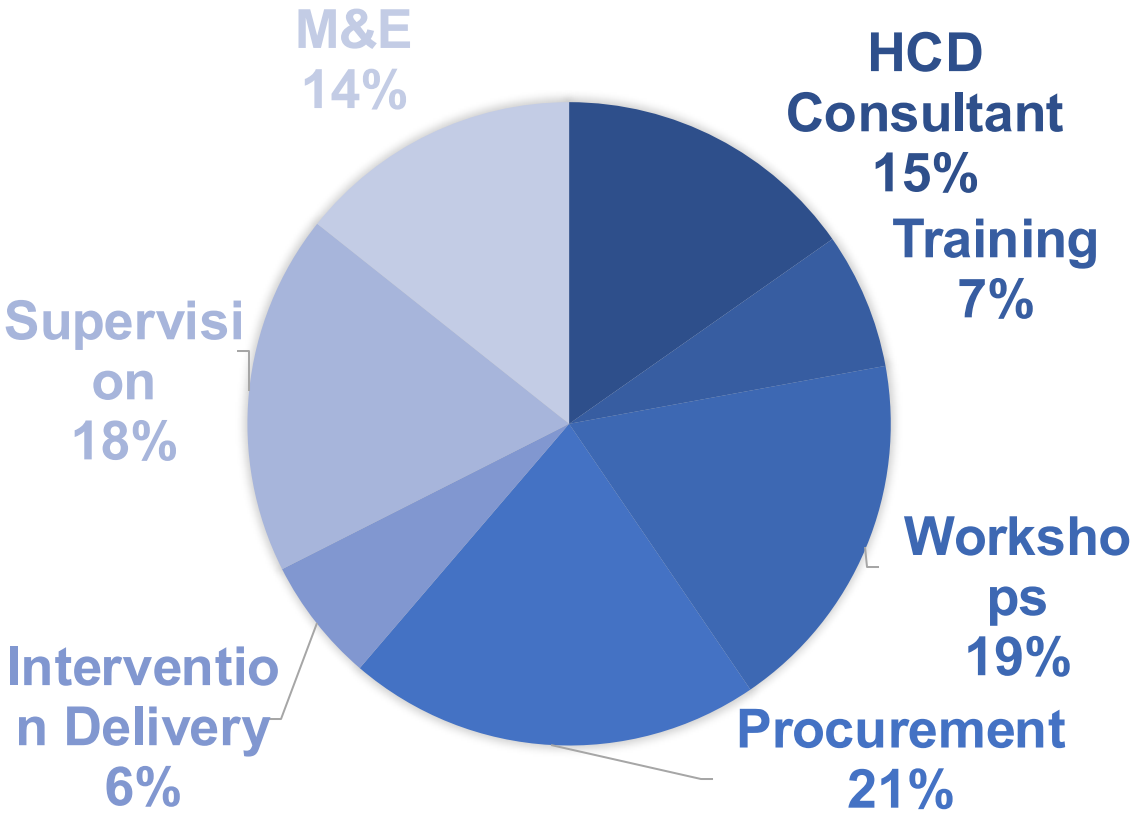
Total Cost Per Facility (USD)



*Project is currently underway; Expected completion by November 2025. Findings presented here are preliminary and subject to further validation.

Preliminary Findings from the Costing Analysis (Roll-out Phase: April 2025 – Ongoing)* (2/2)

Distribution of Total Cost Incurred (Component-wise)



Major Drivers:

- Procurement (including transportation & printing) of interventions
- Workshops (logistics, travel)
- Supervision (Costs of time spent by government staff)
- M&E (Baseline data collection)
- HCD Consultant Costs for Intervention design

*Project is currently underway; Expected completion by November 2025. Findings presented here are preliminary and subject to further validation.

Approach towards Assessing Benefit from HCD-based Interventions

Additional ZD Reached

- Interrupted Time-series Regression on reporting of Pentavalent 1st doses and DPT 1st doses basis the government administrative data sources (HMIS)
- Accounting for seasonal variation

Deaths Averted

- Utilisation of LiST to extrapolate deaths averted at a sub-national level

The Lives Saved Tool

DALYs Averted

- Conversion of deaths averted to DALYs averted
- Factoring the benefit across all vaccination doses for the 0-2 y/o age cohort
- Sources: Global Burden of Disease Study , LiST, VPD Surveillance estimates

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Initial Results on Cost-effectiveness for East Champaran, Bihar (April 2025-Ongoing)*

Within **two months of implementation**, our 27 focus facilities in East Champaran have displayed improvements in additional Zero dose children reached

Cost per additional ZD reached		Incremental Cost		Incremental Benefit
• **$501 (with technical assistance costs)** • **$379 (without TA costs)****	=	• Total: $25,045 ($18,952 without TA) • Per Facility: $927 ($702 without TA)**	/	Total: 50 additional ZD children reached Average Per Facility: ~2

Given that the cost estimates are including everything apart from the additional variable cost for monitoring (less proportion of the whole) and that we will be able to reach more ZD children over time, **we expect the Cost per additional ZD reached to further decline**

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*Project is currently underway; Expected completion by November 2025. Findings presented here are preliminary and subject to further validation.
**Incremental economic delivery costs to be benchmarked to govt. standards

Learnings and Challenges

Challenges	Learnings
Delayed Primary Data Collection on Remuneration of HCWs/FLWs	Adaptive methodology design to accommodate alternate scenarios
Intervention impact progressively increases, beyond the intervention timelines	Benefit estimation techniques should factor in projection based models
Limited data visibility for estimating DALY averted estimations at hyperlocal levels	Utilisation of conversion techniques for arriving at DALY estimations
Unit of evaluation conversions need to be synchronous across the methodology	Leverage tested methods for aggregation of datapoints utilising sampling weights
Externalities affecting the data source for benefit estimations	Refer to multiple data sources for validation and triangulation

Way Forward

- Continued collection of variable costs ($ value of time spent on intervention delivery, monitoring, supervision; changes in intervention design) on a monthly basis
- Benchmarking estimated costs (currently as per CHAI expenditure standards) to government standards (normalised mass procurement costs, technical assistance by existing government HR, workshop costs etc.) for adoption within existing systems
- Triangulation of data across multiple sources for validation of quality
- Projection based deterministic models for mapping incremental costs and incremental benefits over prolonged periods of time beyond the 6-month long implementation timeline
- Benchmarking of the incremental cost-effectiveness ratio against the World Health Organisation's Choosing Interventions that are Cost Effective (WHO-CHOICE) threshold.

Benchmarking the feasibility of implementation at scale basis cost-effectiveness considerations of the model to affect national/sub-national policies for reaching underserved ZD children in high burden regions

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Thank you

For more details, please reach out to:

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Effectiveness and cost efficiency of active community-based surveillance augmented by referral slips on reducing zero-dose and under-immunized children in pastoralist/ semi-pastoralist communities in Ethiopia.

The SABIN Vaccine Institute Research Project; Alemnesh Teka ; Ethiopia BSC, MSW

Negussie Deyessa[1] Filimona Bisrat[2]Legesse Kidanne[2] Muluken Asress[2] Bahiru Getachew[2] Tenager Tadesse[2]

Community Volunteers

- Members of the community
- Selected by their wish to serve the community
- Expected to work two hours per day and two days per week
- Supported by the community for their work
- Relatively non-paid but received incentives

➔ Connecting the public and the health provider

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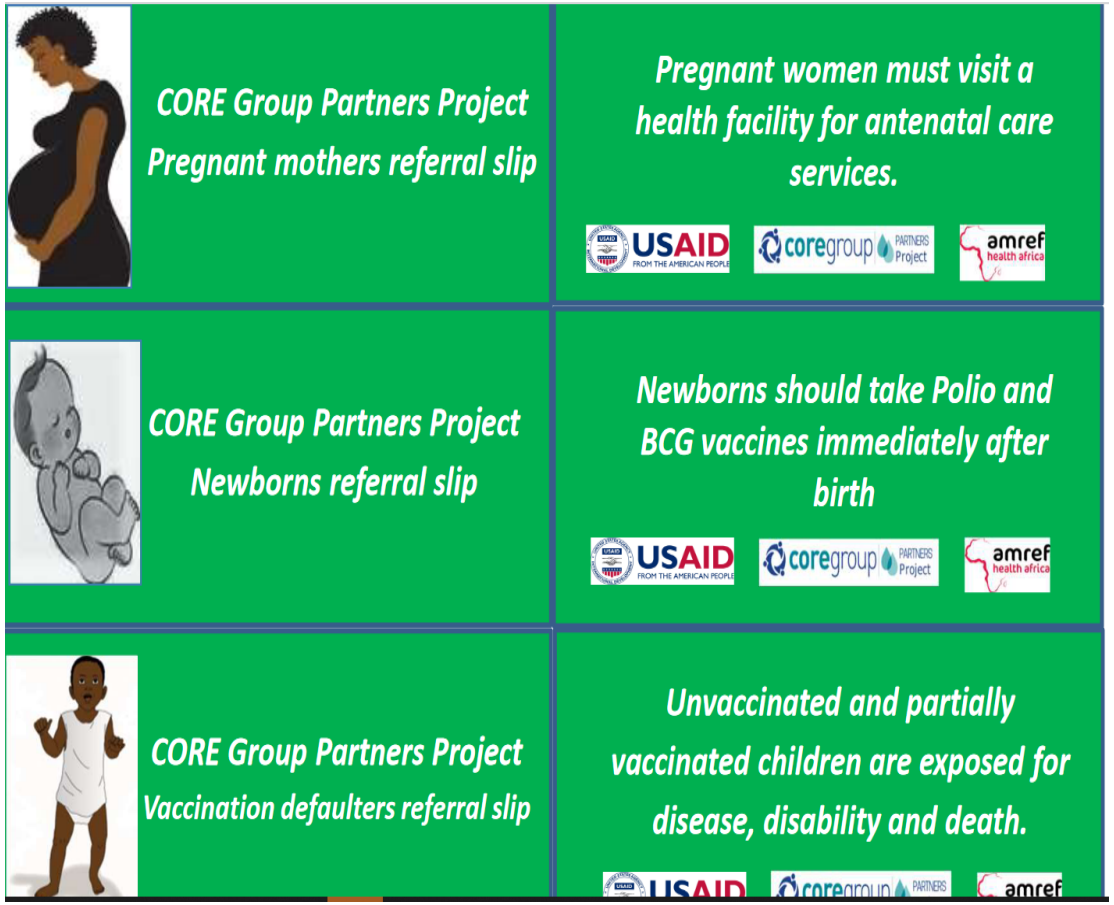
Context of Referral Slip



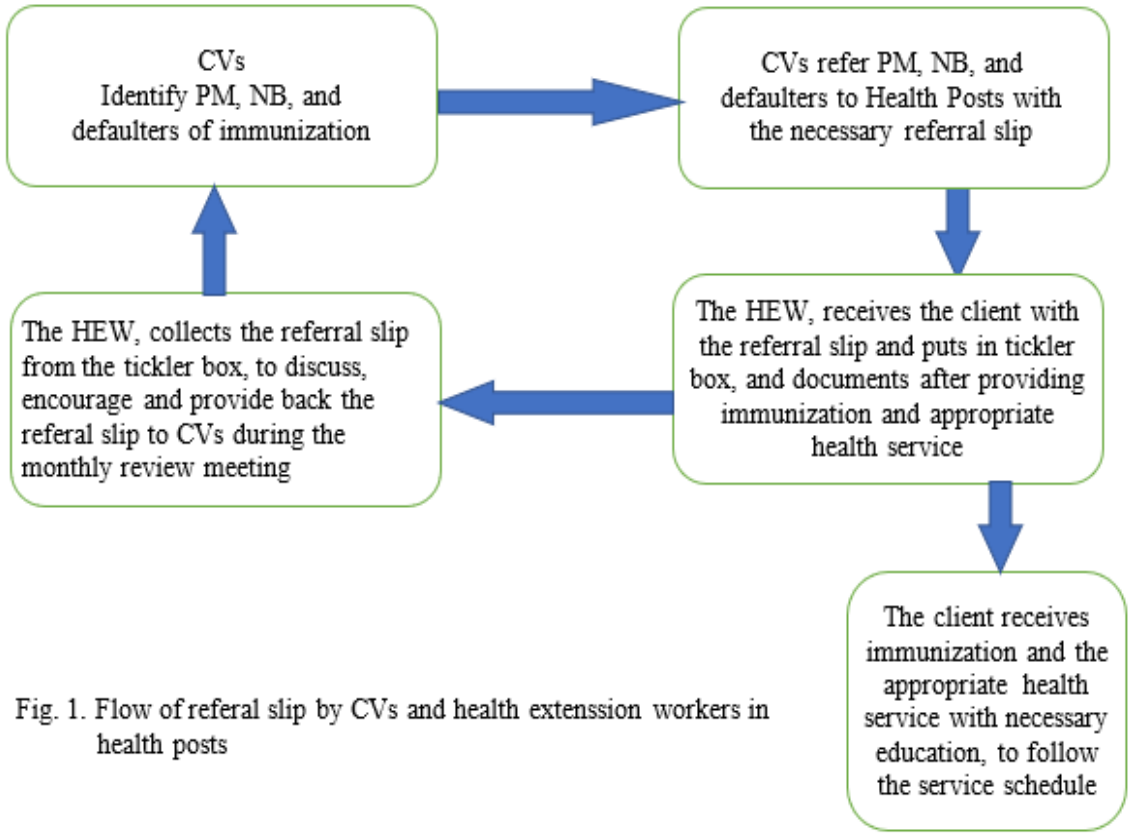


Fig. 1. Flow of referal slip by CVs and health extenssion workers in health posts

Objective

- To assess the effect of the CV in improving the full immunization coverage and reducing zero-dose and under-immunized children

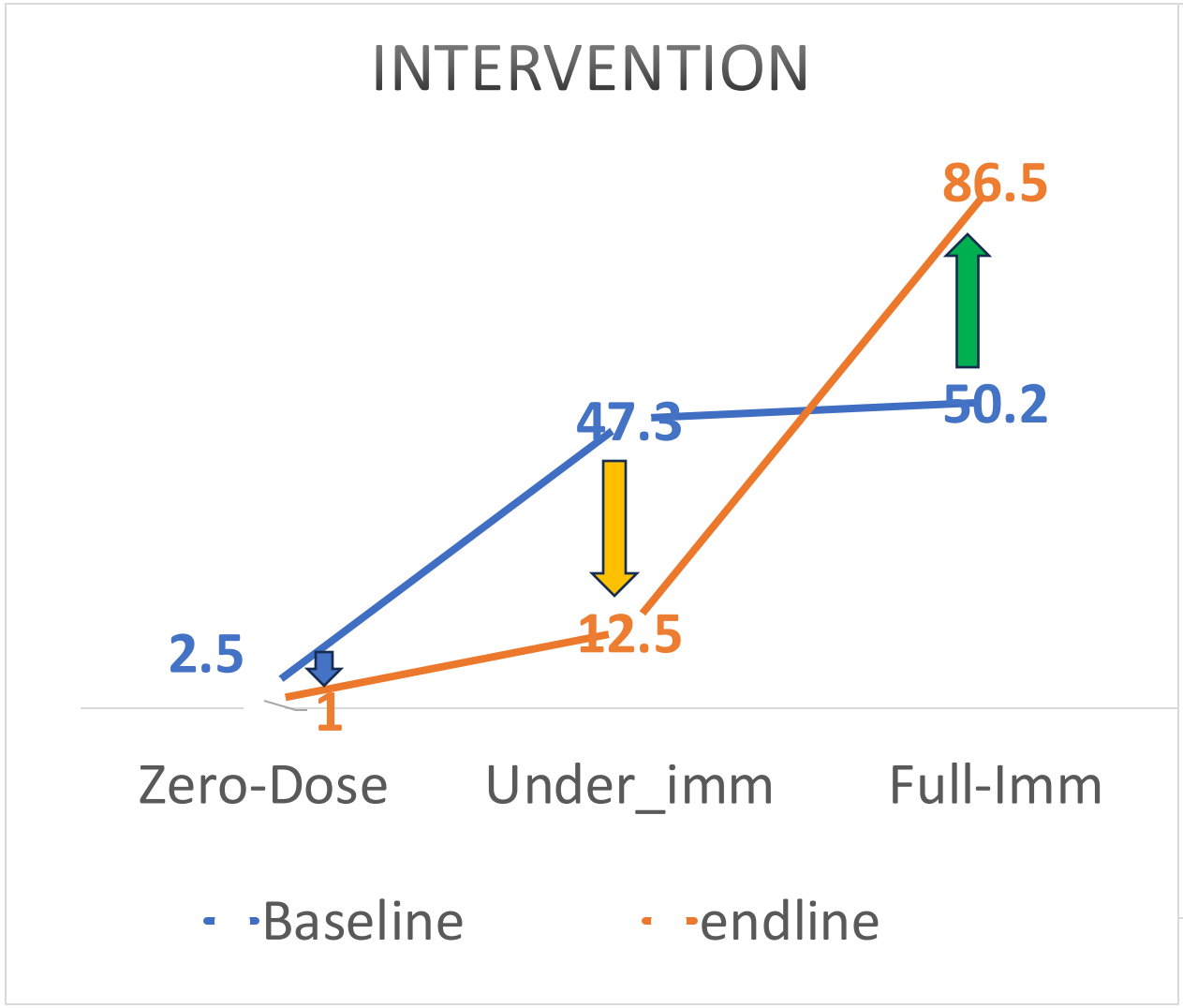
- To assess the cost-effectiveness of the intervention by evaluating the program's performance.

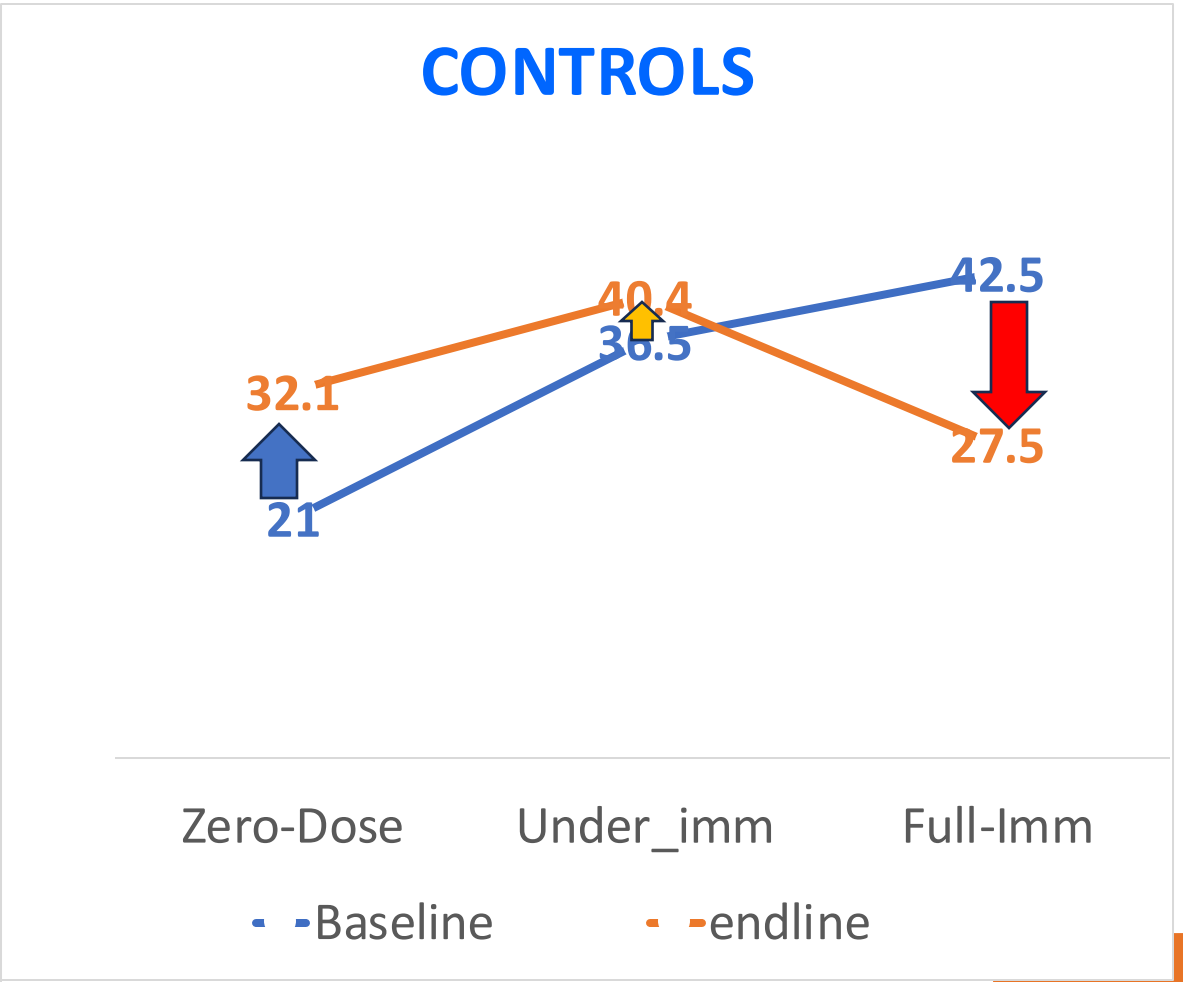
Method

- A cluster-randomized controlled trial (cluster-RCT) in Ethiopia studied pastoralist communities.
- Twelve rural kebeles (480 children aged 12-23 months) were assigned to the **intervention group**, and 12 were assigned to the **control group**. In general, 960 caretakers participated.
- Data collected via ODK and analyzed in SPSS.
- Immunization coverage, zero-dose status, and under-immunization were compared
- Financial data were collected. Cost-effectiveness was analyzed only in the intervention areas.

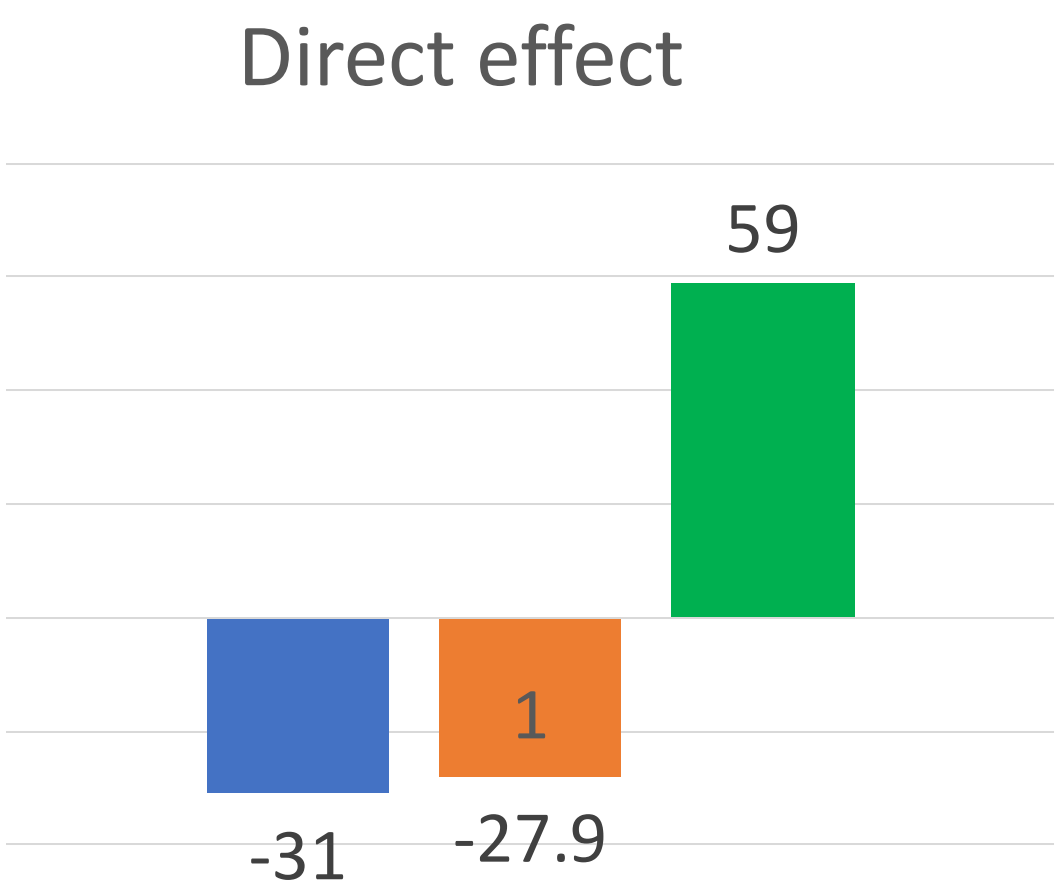
Results

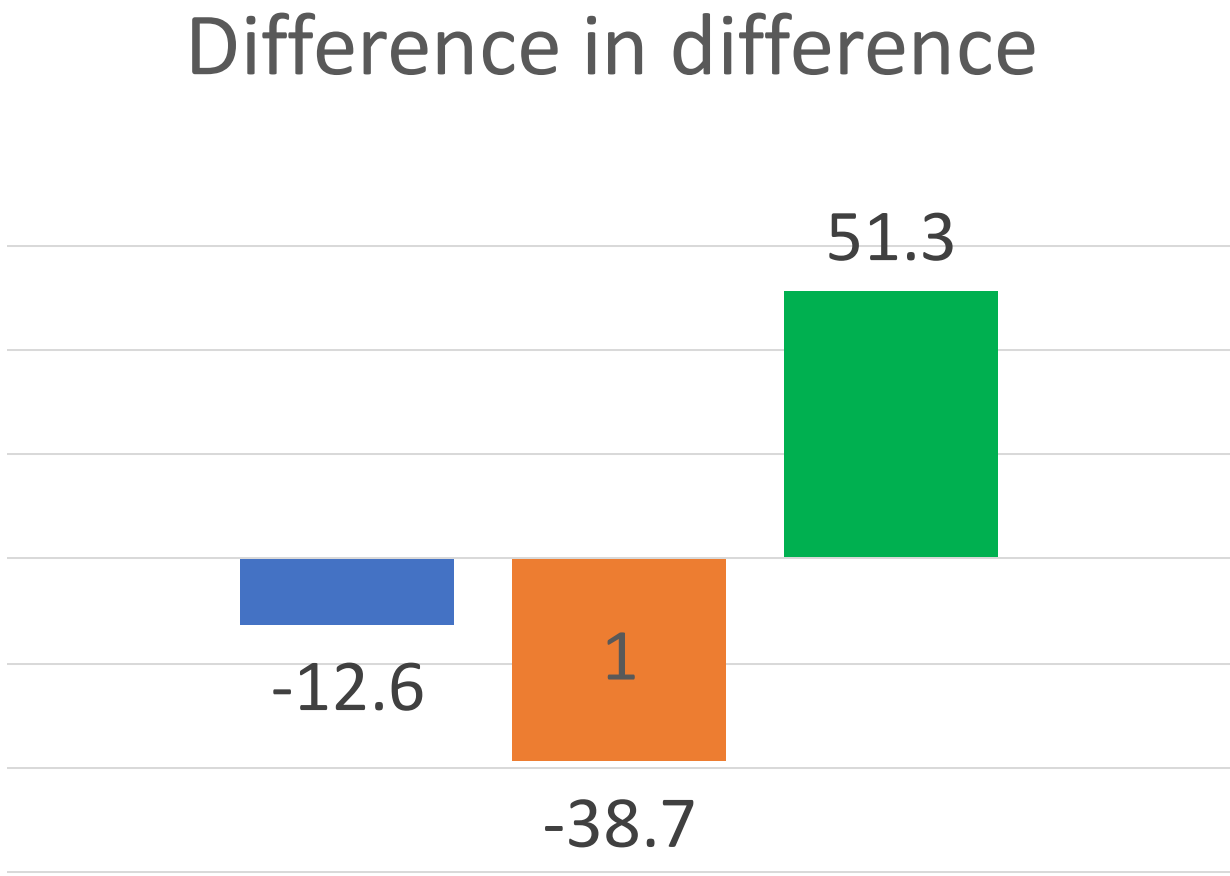
Description of immunization at baseline and end-line survey





Effect Size





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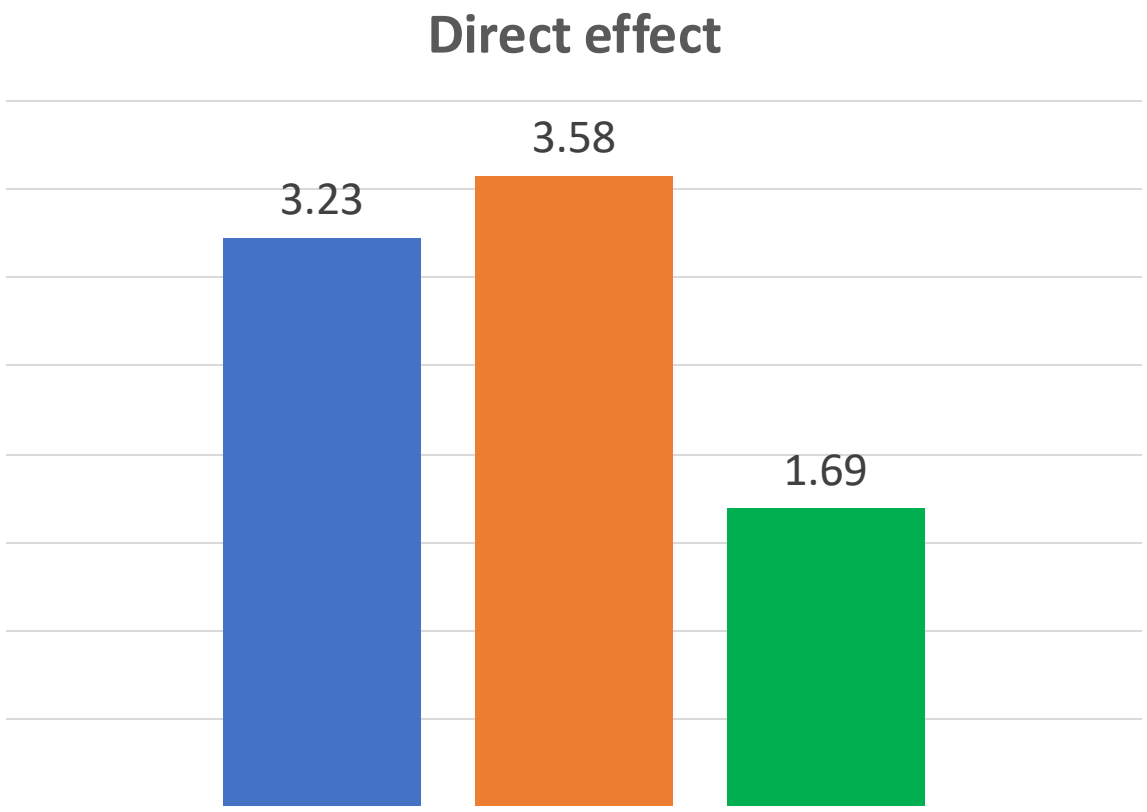
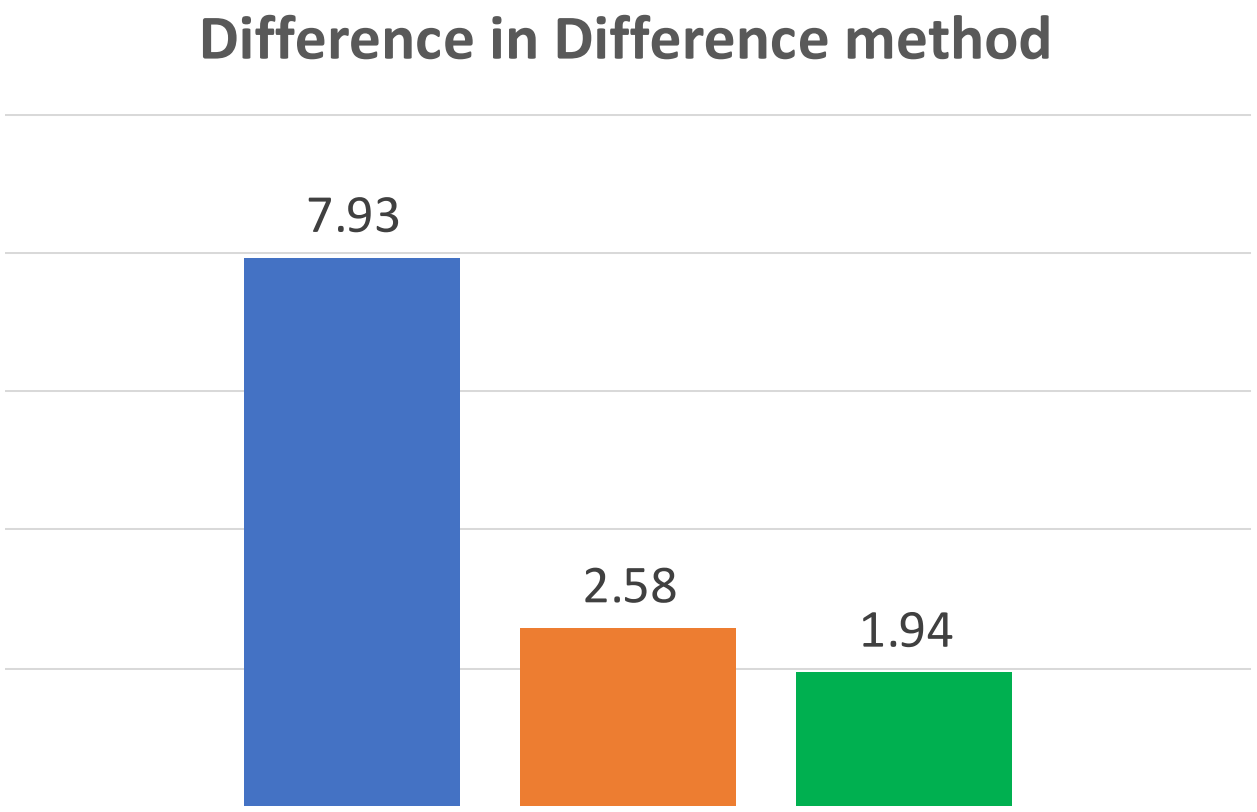
Zero dose Under-immunized Fully vaccinated

Number needed to reduce/ improve





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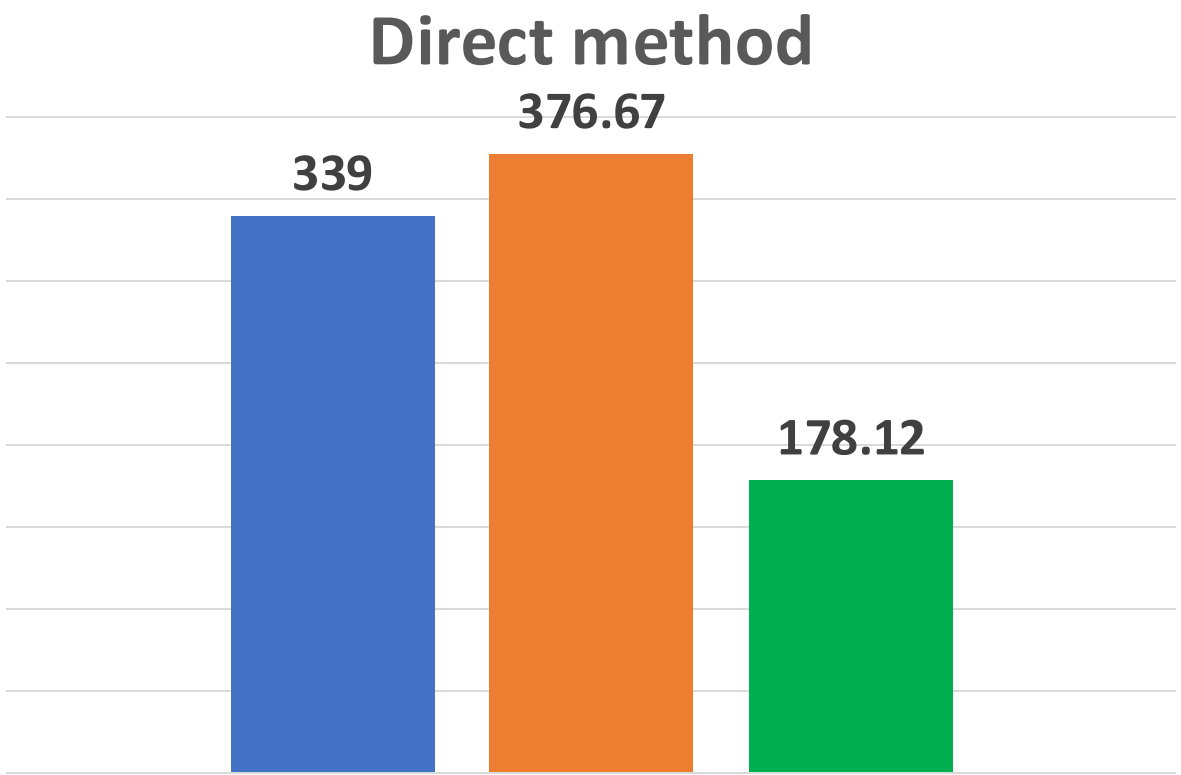
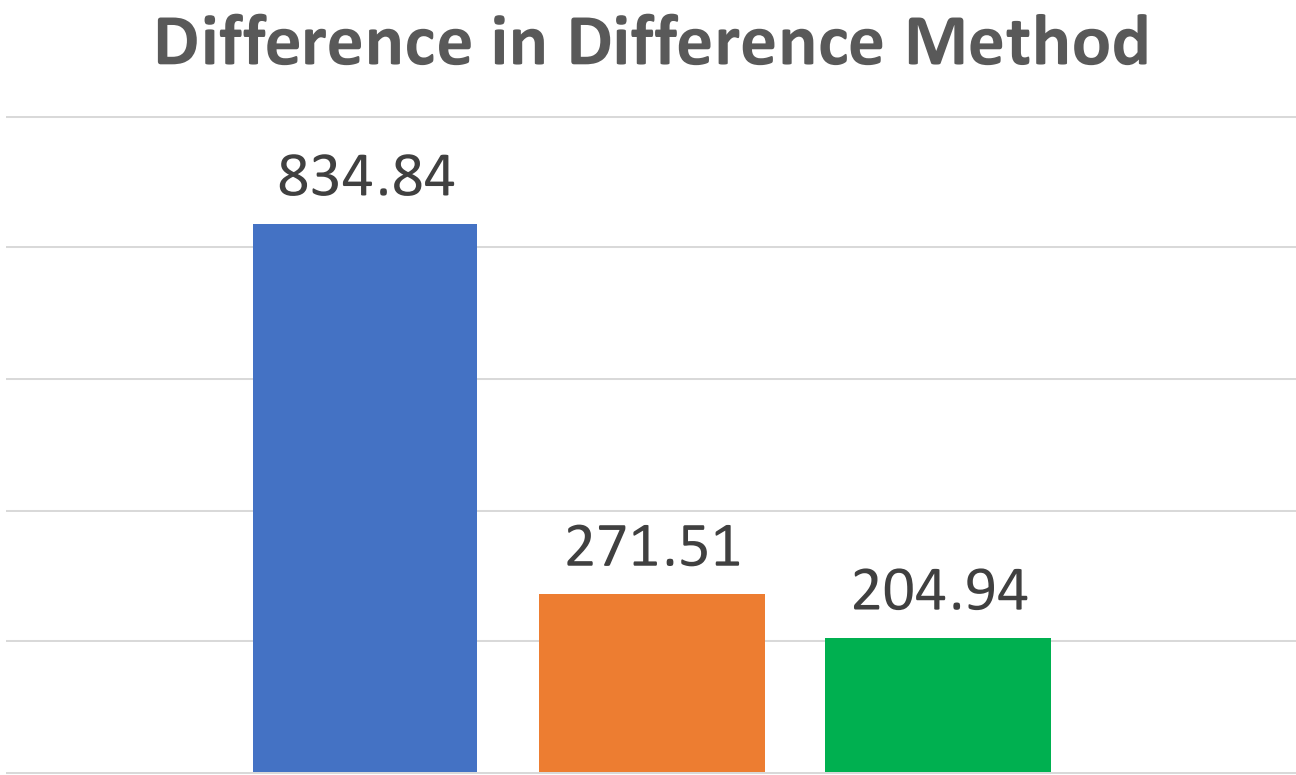
Zero dose Under-immunized Fully vaccinated

Cost needed ($) to reduce/ improve by 1%





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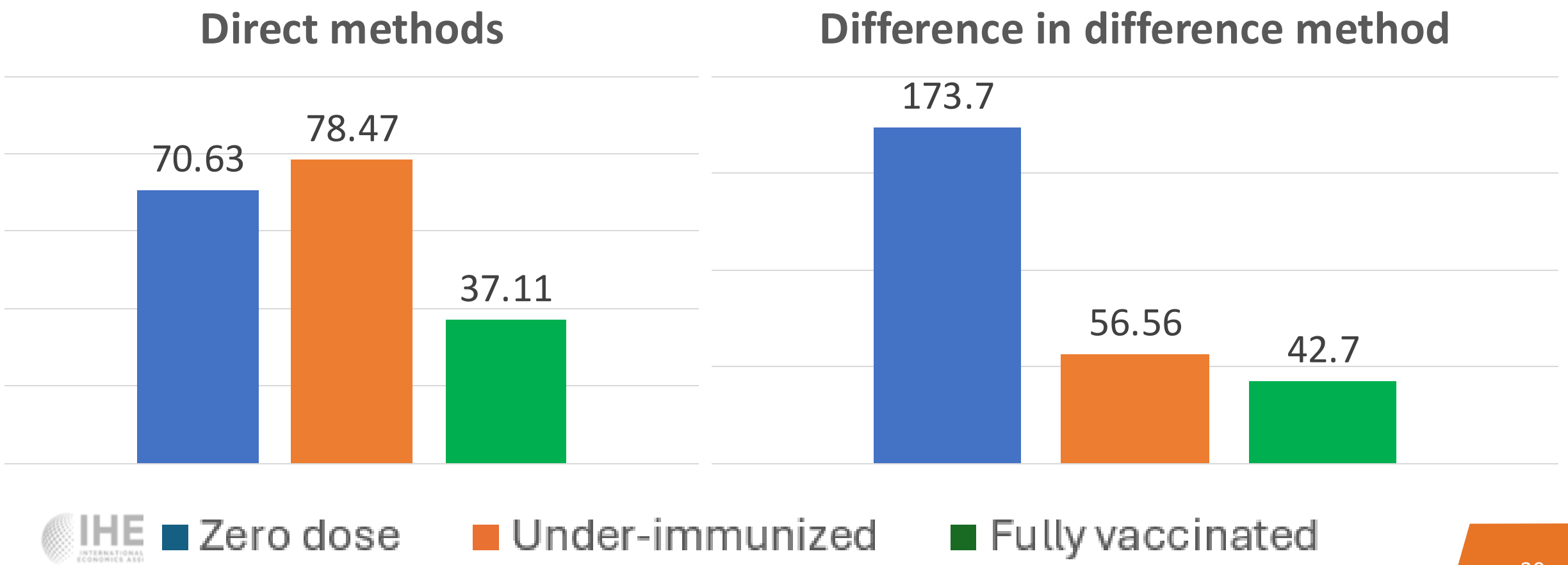
Zero dose Under-immunized Fully vaccinated

Cost needed ($) per individual reduction/improvement



Recommendation

- Establishment of the system [Comm. Volunteers
- Adopt similar intervention strategies
- The need for further studies to replicate this approach in other settings
- Collaboration of policymakers and researchers to implement evidence-based strategies that reduce barriers to vaccination.

Thank you

Special thanks from the research group

- The Sabin Vaccine Institute for funding the project
- CGPP Staff
- CGPP Zonal Coordinators
- IHEA.
- Sincere gratitude to the Professor. Negussie Deyesaa (the lead of the research).

- alemnesht.cgpp@gmail.com

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Zero-Dose: Community-based demand generation interventions

Bali, July 19, 2025

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