

REACHING ZERO-DOSE CHILDREN

Key Barriers and Interventions

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START
CENTER

STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER
Department of Global Health | University of Washington

AGENDA

- Project team and START overview
- Project Background
- Research Objectives
- Study Methodology
 - Literature Review
 - Key Informant Interviews (KIIs)
- Research Findings
 - Barriers for zero-dose children
 - Interventions to reach zero-dose children
- Questions/Discussion



PROJECT TEAM



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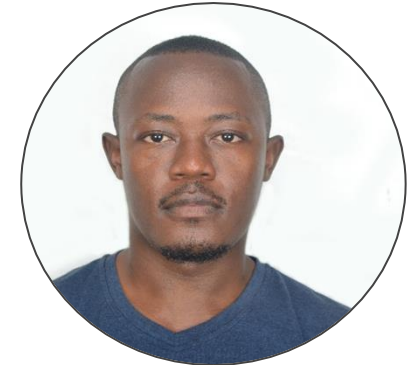
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START OVERVIEW



Leverages leading content expertise from across the University of Washington



Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers



Provides structured mentorship and training to University of Washington graduate research assistants

PROJECT BACKGROUND

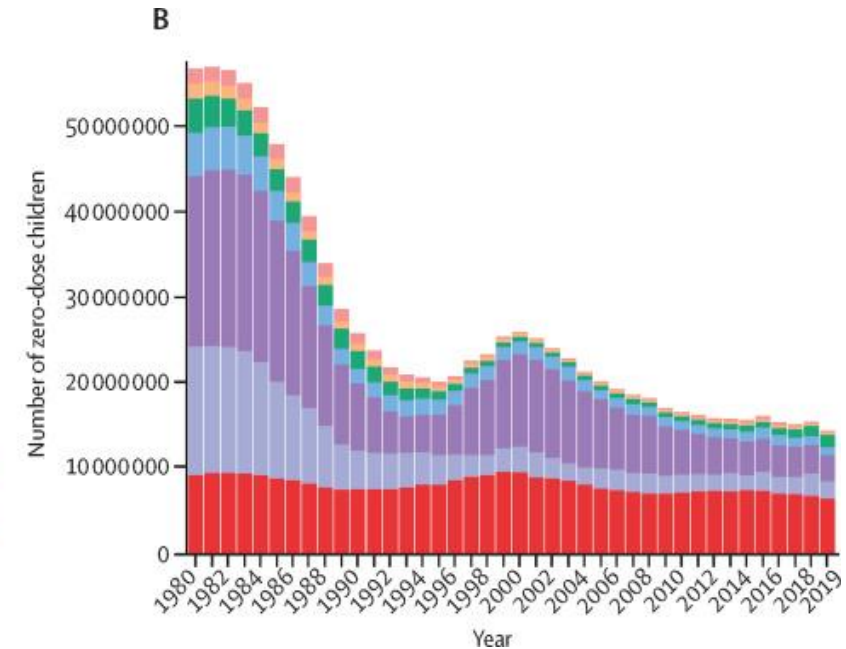
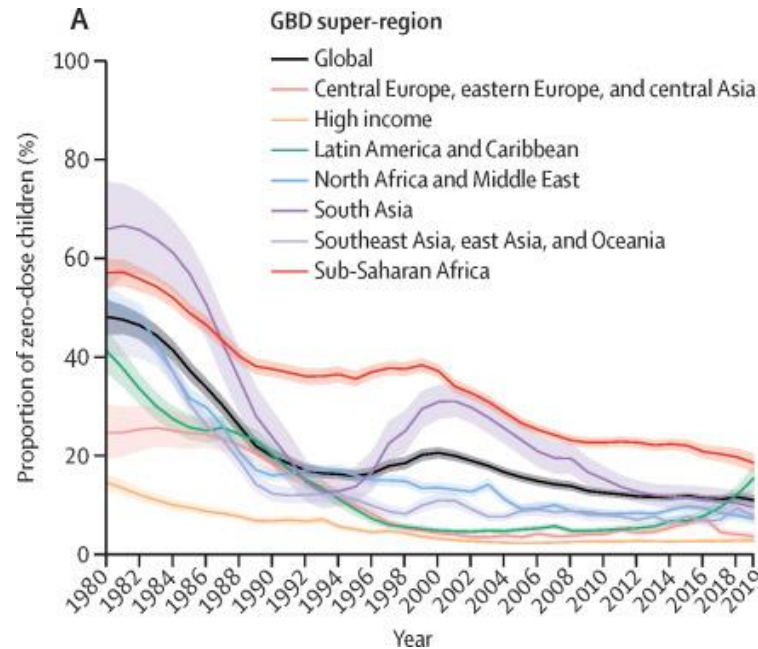
BACKGROUND

- Zero dose (ZD) children account for ~75% of under-vaccinated children
- Reaching these children is key to achieving equity and saving the greatest number of lives
- Recent work undertaken to understand
 - Who ZD children are
 - Where they reside (characteristics, distribution)
 - What efforts and tools exist, esp. focused on diagnostics and identification



CURRENT STATE OF ZERO-DOSE CHILDREN

- In 2020, 16.6 of the 17 million ZD children lived in LMICs
- More than 65% of ZD children lived in 10 countries of India, Nigeria, DRC, Pakistan, Ethiopia, Indonesia, Philippines, Angola, Mexico, and Brazil
- Differential geographic distribution of ZD children across LMICs (e.g., remote rural areas in Ethiopia and DRC, urban slums in Pakistan)



Proportion (A) and total number (B) of zero-dose children, globally and by GBD super-region, 1980–2019 (Source: GBD)

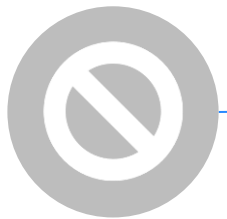
KEY PROJECT OBJECTIVES



To identify barriers to vaccination for communities with zero-dose children



To generate learning from different health and non-health sectors that successfully find and reach zero-dose children



To understand the cost-effectiveness and sustainability of these interventions

STUDY METHODOLOGY

Reviewed Literature on Barriers

- Search strategy developed in PubMed
- Search terms like “DTP-1”, “undervaccinated” and “unvaccinated” used as proxies for ZD children
- Over 1000 articles extracted for title and abstract review; 29 studies selected for full review
- Grey literature included Google search and unpublished literature on ZD children; also reviewed sources provided by BMGF

Reviewed Literature on Interventions

- Prioritized grey literature to identify solutions to reach ZD children
- Focused on both health and non-health interventions

Conducted Key Informant Interviews

- Followed a snowball approach to identify key experts
- Contacted lead authors of research articles on ZD children
- Contacted implementing organizations working on last mile delivery efforts for immunization

BARRIERS TO REACH ZERO-DOSE CHILDREN

BARRIERS TO REACH ZERO-DOSE CHILDREN

1

Health system barriers

2

Parental knowledge and attitudes

3

Socio-economic barriers

4

Other barriers by setting



1

HEALTH SYSTEM BARRIERS

	EVIDENCE FROM LITERATURE
Program cost	<ul style="list-style-type: none"> • Cost to reach a zero-dose child is found to be 3-4x higher than the cost to reach other children who are already being immunized • Since 2010, trends have shown that a large proportion of zero-dose children live in MICs that are not eligible for as much external funding as LICs
Access to affordable vaccines and related equipment	<ul style="list-style-type: none"> • Access to affordable, quality vaccines, and vaccine-related equipment are key barriers (<i>e.g., Uganda has vaccine stockouts, poor cold supply chains, lack of vaccination staff, and underequipped vaccination facilities</i>) • Limited financial and legal barriers result in sub-optimal procurement practices and further inhibits long-term planning and forecasting

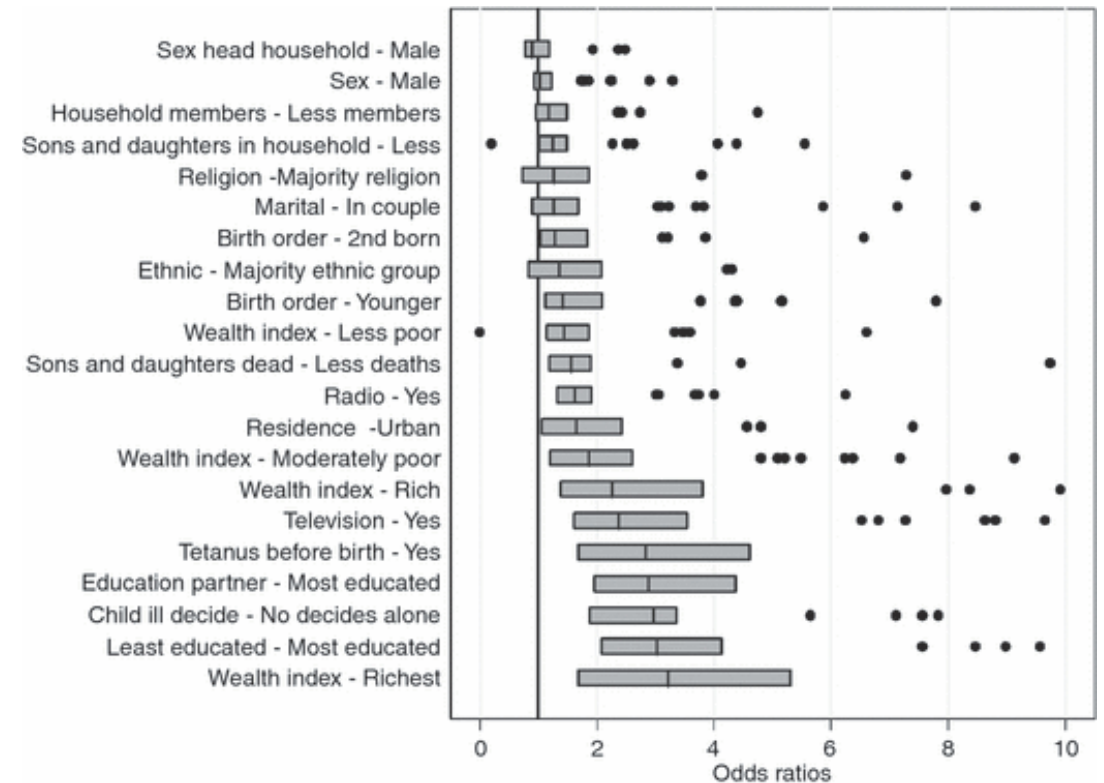
2

PARENTAL KNOWLEDGE AND ATTITUDES

	EVIDENCE FROM LITERATURE
Autonomy to make healthcare decisions	<ul style="list-style-type: none">• Lack of maternal autonomy to make decisions regarding vaccination of their children (e.g., <i>patriarchal societies in Nigeria, Afghanistan</i>)
Trust in institutions	<ul style="list-style-type: none">• Institutional mistrust (including head of state, parliament, electoral system, courts and local government) is negatively associated with the likelihood of immunization• Negative attitude from healthcare workers as well as conditions of the centers can limit vaccination uptake
Misconceptions and fears regarding vaccines	<ul style="list-style-type: none">• Fear of side effects of vaccination further impedes immunization of children

SOCIO-ECONOMIC BARRIERS

	EVIDENCE FROM LITERATURE
Religious beliefs	<ul style="list-style-type: none"> In India, Muslim children are 2.2 times more likely to be non-vaccinated compared to Hindu children Pakistan, Afghanistan and Nigeria faced setbacks in immunization rates as some religious leaders claimed that vaccination is a western plot to reduce their population
Education level	<ul style="list-style-type: none"> Low levels of education rate for the caregiver and caregiver's partner impedes vaccination rate
Poverty	<ul style="list-style-type: none"> Two-thirds of zero-dose children live in households subsisting on less than \$1.90 per day"



Odds Ratio by predictor

Mid-lines in boxes: median; lateral extremes in boxes: 20th and 75th percentiles; dots: individual surveys. Data from the unique or most recent DHS in each country.

4

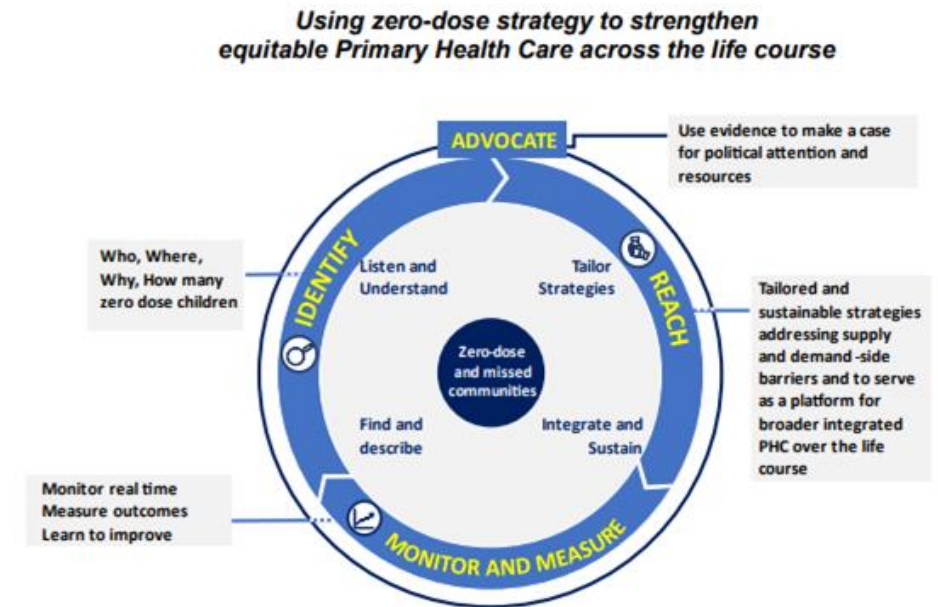
BARRIERS BY SETTING

	EVIDENCE FROM LITERATURE
Urban geography	<ul style="list-style-type: none"> Poor road conditions in peri-urban slums limits vaccine uptake both for caretakers to bring their children to immunization centers and healthcare workers to travel for community immunization outreach programs
Remote rural population	<ul style="list-style-type: none"> Remoteness in geographic accessibility and infrastructural development are key barriers Frequent mobility of women and children is a key factor to reduced uptake of routine vaccines (<i>e.g., Massai nomadic pastoralist community in Kenya</i>)
Conflict settings	<ul style="list-style-type: none"> Sharp declines in vaccine coverage suggest physical rather than social barriers (<i>e.g., DTP3 coverage in Syria went from 80% in 2010 to 47% in 2018 after conflict erupted</i>) Spread of information in these setting are often susceptible to misinformation due to silo sources of information (<i>e.g., Borno state in Nigeria</i>)

INTERVENTIONS TO REACH ZERO-DOSE CHILDREN

BACKGROUND

- Two subgroups account for the majority of ZD children:
 - 1) Those that have very little access to primary care services, as ZD children face systematic exclusion from most health services, and
 - 2) Those who refuse to get vaccinated due to mistrust of the health system, religious beliefs, or other reasons
- Proposed solutions to reach ZD children in line with Gavi's IRMMA Framework; in particular, integration with PHC services across the life course
- Technical solutions to fix supply chain issues and improve access are important. Example: using GIS technology, drones for supply of vaccines
- However, they must be accompanied with community-level interventions. Example: engaging CBOs/CSOs in the program delivery, identifying trusted voices in the community to build trust



*Gavi IRMMA Framework
(Identify- Reach- Monitor-
Measure- Advocate)*

INTERVENTIONS BY SETTING

Urban Slums



Source: ohcr.org

Remote Rural Population



Source : Unmask Africa

Conflict Setting



Source: Zaatari Refugee Camp, Jordan

URBAN SLUMS

Health Sector Interventions



	EXAMPLES FROM LITERATURE
Building trust & leveraging community assets	<ul style="list-style-type: none">• Working with community gatekeepers e.g., <i>religious leaders (Kenya, Kyrgyzstan, and India), chiefs (Chad), ASHAs (India), and slum health committees (Pakistan)</i>• Leveraging community members to identify where to hold services or find ZD children e.g., <i>networks of informants and influential community members (Ethiopia), survivors of vaccine-preventable disease (Kenya)</i>
Improving utilization of immunization services	<ul style="list-style-type: none">• Adjusting vaccination timing e.g., <i>moving vaccination outreach activities to weekends (Uganda), extending opening hours in immunization centers (Kenya, Bangladesh)</i>• Strategic positioning of vaccination centers e.g., <i>mapping using GIS tech, followed by redistribution of vaccine centers or deploying vaccinators near bus stops and transit areas between districts</i>
Integrating strategies	<ul style="list-style-type: none">• Myanmar: Combined microplanning and an open-source GIS application (the QGIS project)• Nigeria: Included outreach and mobile sessions for urban slums in its immunization session plans in line with the Reaching Every Ward (REW) micro-plan

URBAN SLUMS

Non-Health Sector Interventions



Engaging the community in decision-making process

Child-led urban planning by *Humara Bachpan*: Slum dwellers identifying their challenging issues and where they would like services to be located



Hand-drawn maps from Humara Bachpan project in India

Leveraging art to increase vaccine uptake

- Street art: Partnership between UNICEF and GOAL to use street art to promote healthy practices against the spread of COVID-19
- Reaches everyone regardless of access to technology, literacy, or language barriers



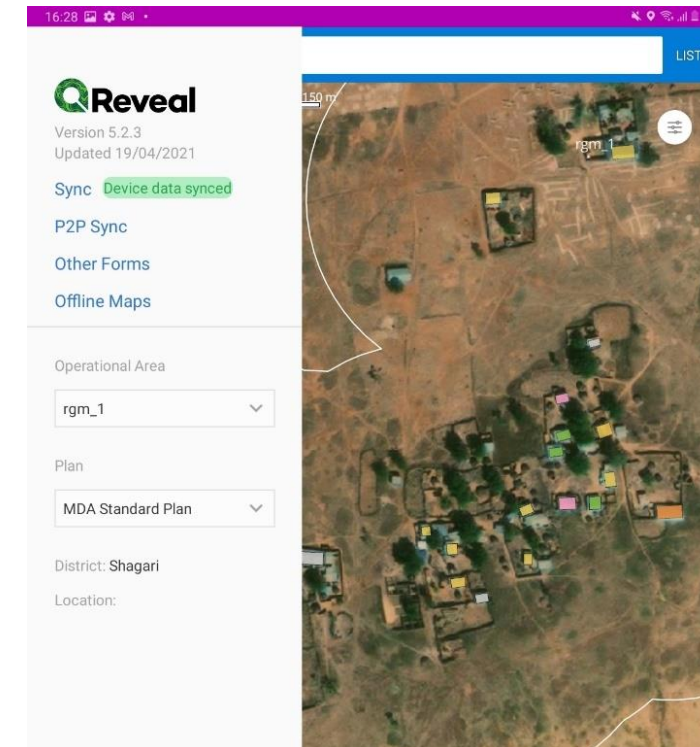
Outdoor media campaign using art murals in Zimbabwe
(Source: UNICEF Zimbabwe)

REMOTE-RURAL SETTING (1/3)

Health Sector Interventions



	EXAMPLES FROM LITERATURE
Innovation in vaccine delivery	<ul style="list-style-type: none"> • ColdTrace 5, a remote temperature monitoring (RTM) device: monitoring vaccine fridge temperature and reducing vaccine wastage (Tanzania, Kenya) • Thermostable vaccines: microarrays for high temperature regions; solar direct-drive refrigerators for electricity deprived areas • Drones: last-mile efforts in Ghana but not a full proof intervention ["jab and leave"]
Robust data collection	<ul style="list-style-type: none"> • GIS: REVEAL platform used to map zero dose children in Zambia • Electronic immunization registries for disaggregated data in registered children • Family Folders to record timely family data in Ethiopia



Reveal platform to locate zero-dose children

REMOTE-RURAL SETTING (2/3)

Health Sector Interventions

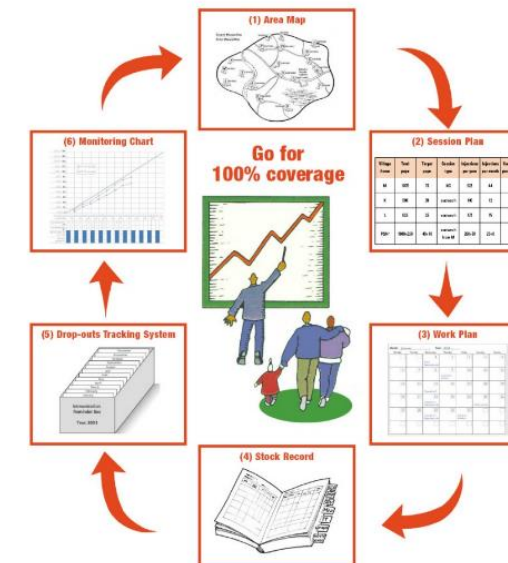
Health systems integrated services



- My Village My Home
- Reach Every District

My Village My Home tool to track immunization status of children in India

Put these R.E.D tools into action



RED strategy tools for micro-planning

REMOTE-RURAL SETTING (3/3)

Health Sector Interventions



	EXAMPLES FROM LITERATURE
Community engagement	<ul style="list-style-type: none"> Traditional change agents- women groups, political leaders Drum Beating as culturally appropriate awareness method Program <i>Keluarga Harapan</i> as direct cash transfer and other non-monetary incentives <p>Drumbeating initiative to improve immunization timeliness in India</p>

REMOTE-RURAL SETTING

Non-Health Sector Interventions




	EXAMPLES FROM LITERATURE
Integration with animal health and agricultural services	<ul style="list-style-type: none">• Chad: cost-effective and higher coverage of vaccination services targeting both human and animals among pastoralist communities• OneAcre Fund: using agricultural supply chain vendors for last-mile vaccine delivery• Digital Green: farmers literacy through community videos and health products delivery
Leveraging communication channels	<ul style="list-style-type: none">• Radio shows: Social behavior change communications, vaccine literacy (Nivi in Kenya)• SMS reminders+ compliance-linked incentives (RCT in India)
Public-private partnerships	<ul style="list-style-type: none">• Project Last Mile: leverages Coca-Cola's network system to deliver medicines to "last mile" communities in Africa; private sector market strategies for uptake of public health services• Tech Mahindra: vaccine ledger project for global supply chain of vaccines (COVID)

CONFLICT SETTINGS (1/2)

Health Sector Interventions




	EXAMPLES FROM LITERATURE
Monitoring and data sharing	<ul style="list-style-type: none">• Village Reach's Electronic Immunization Registries (EIR) program• IRC's mReach tracing data platform enables health workers to register children and track their immunization status (e.g., <i>Somalia, Thai-Myanmar border</i>)• Biometrics like iRespond have been used in Myanmar, Senegal, and Sierra Leone, and by the WFP that used iris scanning for food ration distribution in Jordan  <p><i>Use of biometrics in refugee camps by WFP</i></p>
Monitoring facilities	<ul style="list-style-type: none">• Health Resources and Services Availability Monitoring System (HeRAMS) is a system being used and developed by the WHO to monitor health systems and facilities functioning to facilitate supply chain demands and prevent escalation of stockouts

CONFLICT SETTINGS (2/2)

Health Sector Interventions



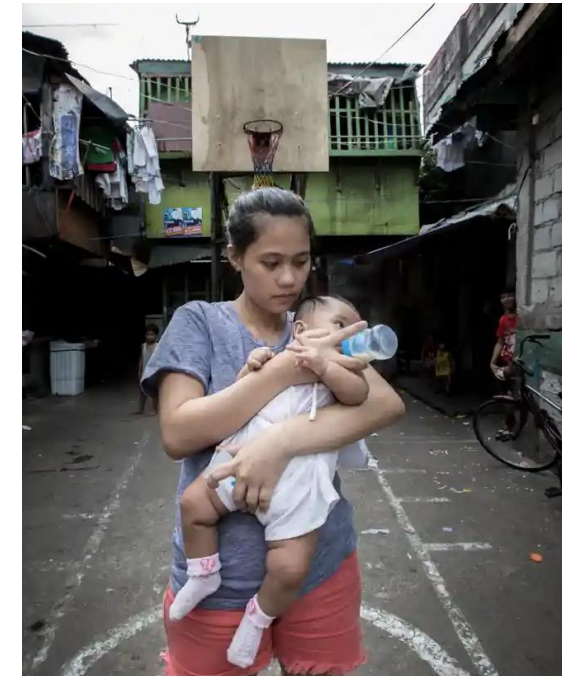
	EXAMPLES FROM LITERATURE
Mobile money transfers to healthcare workers	<ul style="list-style-type: none">To mitigate fears and overcome financial instability caused by conflict, mobile money transfers for healthcare workers willing to work in conflict settings (<i>e.g., mStar mobile money transfers in Liberia</i>)
Engaging local influencers	<ul style="list-style-type: none">Engaging religious leaders like “<i>mobile mullahs</i>” in Afghanistan to explain that vaccination is permissible under Islamic religious law and help counter anti-vaccination rumors <div data-bbox="1679 789 2206 1173"></div> <p><i>"Mobile Mullah" Supporting Polio Vaccination in Kandahar</i></p>

CONFLICT SETTINGS

Non-health Sector Intervention

Leveraging Existing Humanitarian Pathways

- Vaccines have much in common with infant formula; both are needed by similar demographics and the need increases during times of conflict and instability
- Increases in conflict-related casualties are associated with a significant decline in breastfeeding and an increase in use of substitutes like infant formula
- Provision of infant formula has the potential to provide a route for the supply of other health interventions and increase engagement with the health supply and support system
- Furthermore, access to infant formula may further incentivize a trip to receive an immunization



Infant formula milk companies targeting mothers in Philippines (Source: Save the Children)

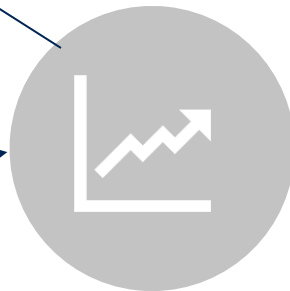
SUMMARY (1/2)



Reaching ZD communities requires a broad-based approach to address non-access barriers such as community demand and trust (*e.g., engaging religious leaders, women's groups, trusted community leaders*)



It is also crucial to have substantial investments in primary health care and investing in health workforce to reach ZD children to address the access barriers (*e.g., mobile money payments for HCW, using microplanning tools, using GIS to identify ZD children*)



Given limited evidence on scalability and cost of innovative interventions, it is critical to incorporate M&E along with cost-effectiveness studies at the outset to design tailored delivery strategies to reach ZD children

SUMMARY (2/2)

It is important to consider adaptation of interventions to the local context to be more effective in reaching zero-dose children, particularly by type of setting

Broadly generalizable

- Application of GIS
- Use of drones
- Use of biometrics
- Cold chain innovations/vaccine design
- Electronic immunization registries
- Job aids for community health workers (e.g., My Village My Home)
- Microplanning tools
- Incentives [monetary and non-monetary]
- Training vaccine deliverers
- Leveraging community assets and influential leaders
- Community mapping
- Radio broadcasts/SMS reminders
- Leveraging commercial sectors (Project Last Mile/Tech Mahindra)

Context-specific

- **Urban Slums**
 - Integrated service referrals
 - Redistributing vaccination centers around transit points
 - Art for public health messaging
 - Drumbeating
- **Remote rural population**
 - Partnering with delivery of agricultural supplies
 - Vaccination campaigns targeting both humans and animals
 - Art for public health messaging
 - Drumbeating
- **Conflict setting**
 - Emergency humanitarian response pathways
 - HeRAMS monitoring facility stockouts and safety (could be scaled up in other settings too)

QUESTIONS?

THANK YOU



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APPENDIX

SEARCH STRATEGY IN PUBMED

Search terms

("child"[MeSH] OR child* OR "pediatrics"[MeSH] OR pediatric* OR paediatric*)

AND

(challenges OR barriers OR obstacles OR disparity OR inequity OR coverage)

AND

(vaccination OR vaccines OR immunization OR immunisation OR vaccin* OR immuniz* OR immunis*)

AND

("zero dose" OR "zero-dose" OR "DTP1" OR "DTP-1" OR "DPT1" OR "DPT-1" OR unvaccinated OR undervaccinated)

AND

(2000:2021[pdat])

Concept

Children as target group

Challenges

Vaccination

Zero-dose

Time period

1,004 search results

KEY INFORMANT INTERVIEWS

Name	Title	Group/Affiliation
Dr. Gagandeep Kang	Professor	Christian Medical College, Vellore, India
Dr. Mira Johri	Professor in the Department of Health Management, Evaluation and Policy	University of Montreal School of Public Health
Emily Lawrence	Senior Manager- Research, Evidence and Learning	Village Reach
Dr. Emmanuel Mugisha	Director- Typhoid Vaccine Acceleration Consortium & Senior Technical Advisor for Immunizations	PATH- Uganda
Dr. Alyssa B. Sharkey	Lecturer in Global Health and Senior Health Specialist, Implementation Research	Princeton University
Dr. Naveen Thacker	Leading IPA Vaccine Trust Project, ex-CSO representative on Gavi Board,	International Pediatric Association