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NISH
National Immunization Technical Advisory Group (NITAG) Support Hub

ZERO-DOSE CHILDREN AND MISSED COMMUNITIES: ENSURING THAT NO ONE IS LEFT BEHIND IN THE AFRICAN IMMUNIZATION AGENDA

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1. ZERO DOSE CHILDREN: WHAT ARE WE TALKING ABOUT?

Photo credit: PATH

WHAT DO WE MEAN BY A ZERO DOSE CHILD?

- A zero dose child refers to a child who **has not received any routine vaccinations through the national immunization program**. This term is commonly used in global health, especially by organizations like WHO, UNICEF, and Gavi, to identify **children who are completely unvaccinated**—meaning they **have not received even the first dose of basic vaccines like**:
  - BCG
  - DTP1
  - Polio
  - Measles-containing vaccine
- What additional risks does a ZDC face?

Reference:

ONE IN FIVE CHILDREN WORLDWIDE ARE NOW ZERO-DOSE OR UNDER-VACCINATED (UNICEF 2023)

- The story of the children who are not being vaccinated is one of **inequity, poverty and underserved communities.**
- **More than three out of four of the world's zero-dose children live in 20 countries.**
- They live in the **remotest of rural areas, urban slums, crisis-affected regions, and migrant and refugee communities.**
- These children urgently need to be reached with vaccines.

Right now, far too many children across the world are not getting the vaccines they need to protect them against death and serious disease. The COVID-19 pandemic severely disrupted childhood immunization, with 67 million children missing out entirely or partially on routine immunization between 2019 and 2021, leaving them vulnerable to a range of preventable diseases.

One in five children worldwide are now zero-dose or under-vaccinated, meaning they've missed out entirely or partially on routine immunization. Those are levels we've not seen since 2008.

Zero-dose children are those who have not received their first diphtheria-pertussis-tetanus vaccine (DTP1). Under-vaccinated children are those who received one dose, but not a third protective dose.

Diseases are now reappearing in countries where they had previously been controlled. Meanwhile, we're also seeing surges of cases in nations that hadn't yet eliminated the diseases. Those include cholera, measles and polio outbreaks.

Reference: https://www.unicef.org/reports/state-worlds-children-2023

WHAT CHARACTERISES ZERO DOSE CHILDREN?

Zero dose children are often:

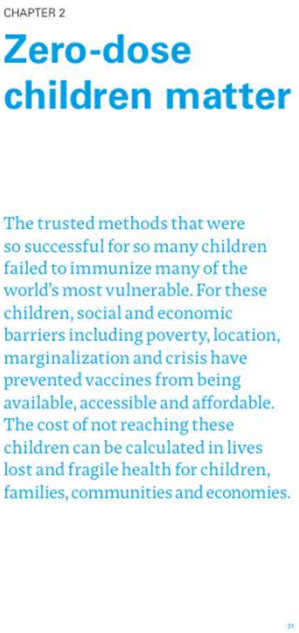
- Living in **remote, underserved, or conflict-affected areas**
- Part of **marginalized communities**
- Facing **barriers to healthcare access**, such as **poverty**, **lack of infrastructure**, or **social exclusion**
- What are some examples from Africa?

Reference:

THE STATE OF THE WORLD'S CHILDREN 2023
"FOR EVERY CHILD, VACCINATION"

- For the most part, the children left behind live in **complex contexts** and face **multiple deprivations**.
- They live in the **remotest of rural areas**, **urban slums**, **peripheral urban settlements**, **crisis-affected areas**, and **migrant and refugee** communities.
- They are confronted daily by **socioeconomic barriers** to immunization: **poverty, gender and ethnic marginalization, migration and crisis**.

"Poverty sits at the centre of a complex interplay of deprivations that determine whether a child is immunized against vaccine preventable diseases – or not."



CHAPTER 2

Zero-dose children matter

The trusted methods that were so successful for so many children failed to immunize many of the world's most vulnerable. For these children, social and economic barriers including poverty, location, marginalization and crisis have prevented vaccines from being available, accessible and affordable. The cost of not reaching these children can be calculated in lives lost and fragile health for children, families, communities and economies.

Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

GLOBAL STATISTICS ON ZERO DOSE CHILDREN (2024)

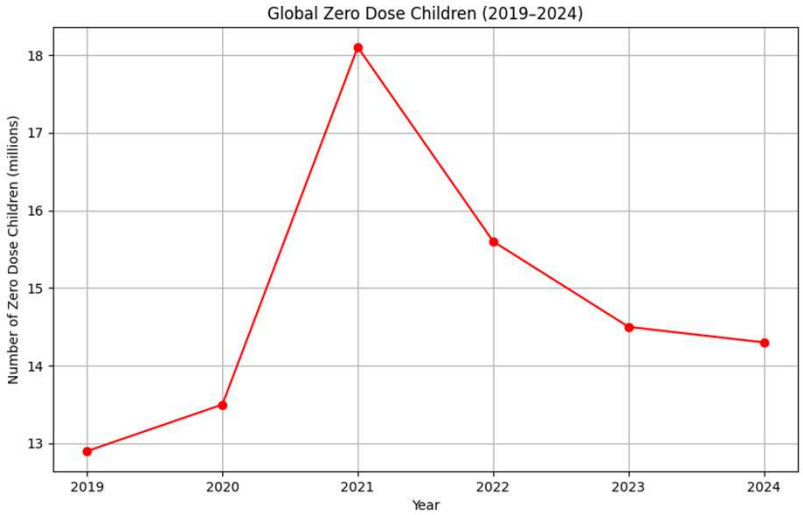
- **14.3 million infants worldwide** are classified as zero dose children.
- This is **1.4 million more than in 2019 (pre-pandemic baseline)**, and **4 million more than the 2024 target set under the Immunization Agenda 2030**.
- These children are primarily located in **low- and middle-income countries**, especially in **Africa** and **South-East Asia**.
- In **Gavi-supported countries**, about **1 in 7 children do not receive any routine vaccines**.
- **Gavi's strategic goal** was to **reduce the number of zero dose children by 25% by 2025 and 50% by 2030**.

- Over **half of all zero dose children live in just 10 countries**:
  - **Angola**
  - Afghanistan
  - **Democratic Republic of the Congo**
  - **Ethiopia**
  - India
  - Indonesia
  - **Nigeria**
  - Pakistan
  - **Sudan**
  - Yemen

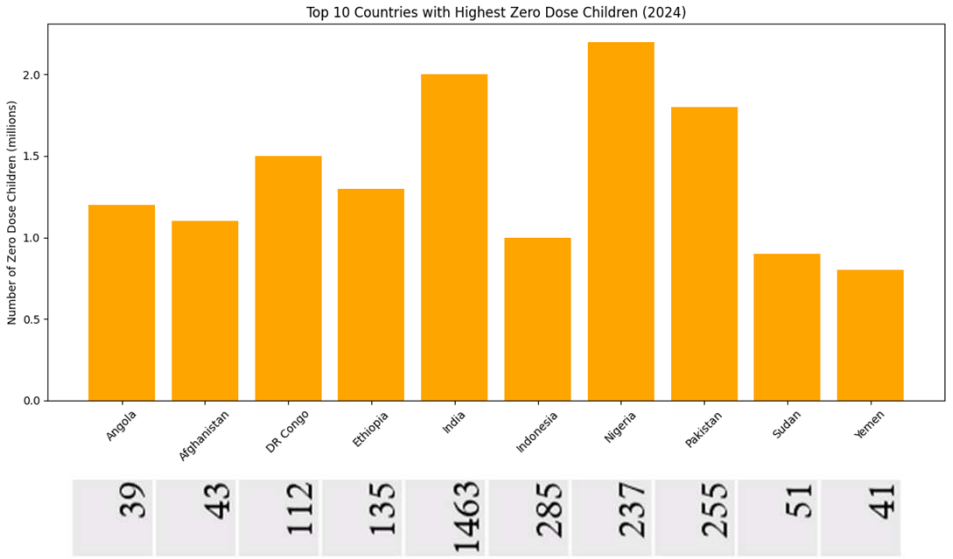
Reference:

TRENDS AND TOP 10 BY ABSOLUTE NUMBERS

Global Trend: Zero Dose Children (2019–2024)



Countries with the largest populations of zero dose children



Reference:

TRENDS AND TOP 10 BY ABSOLUTE NUMBERS

FIGURE 9

Countries ranked according to DTP1 coverage and absolute number of zero-dose children in 2023

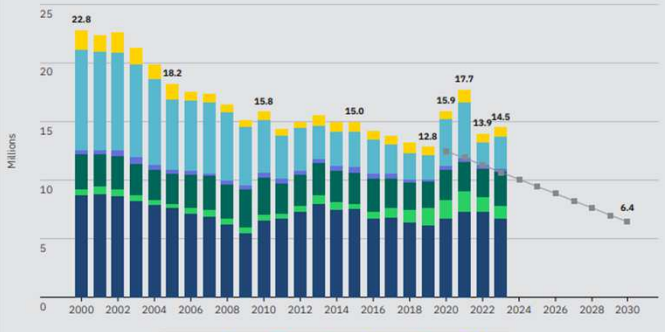
COUNTRIES	NO. OF ZERO-DOSE CHILDREN	TOP 20 RANK	COVERAGE (%)
DPRK	199,000	17	41%
PNG	137,000		45%
Somalia	359,000	11	52%
CAR	104,000		54%
Sudan	701,000	5	57%
Yemen	580,000	7	57%
Guinea	176,000	19	62%
Venezuela	147,000		65%
Afghanistan	467,000	8	67%
Angola	411,000	9	69%
Nigeria	2,134,000	1	70%
Bolivia	71,000		72%
Syria	144,000		72%
Gabon	18,000		73%
Ecuador	70,000		74%
Honduras	60,000		74%
Libya	32,000		74%
Madagascar	251,000	13	74%
Haiti	62,000		75%
South Sudan	75,000		76%
Ethiopia	917,000	3	77%
Mali	199,000	16	78%
DRC	839,000	4	80%
Myanmar	176,000	20	80%
Viet Nam	274,000	12	80%
South Africa	220,000	15	81%
Indonesia	662,000	6	85%
Mexico	222,000	14	89%
India	1,592,000	2	93%
Pakistan	396,000	10	94%
China	177,000	18	98%

Top 20 lowest coverage | Not top 20 lowest coverage | Top 20 zero-dose | Fewer than in 2022

Note: DPRK: Democratic People's Republic of Korea; CAR: Central African Republic; DRC: Democratic Republic of the Congo; PNG: Papua New Guinea.

FIGURE 8

Trends in the numbers of zero-dose children (in millions) by WHO region



IA2030 GLOBAL PROGRESS REPORT 2024

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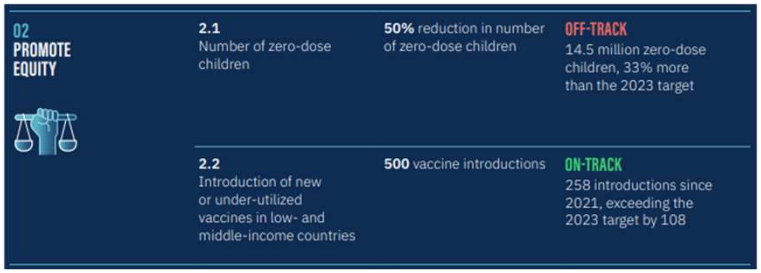
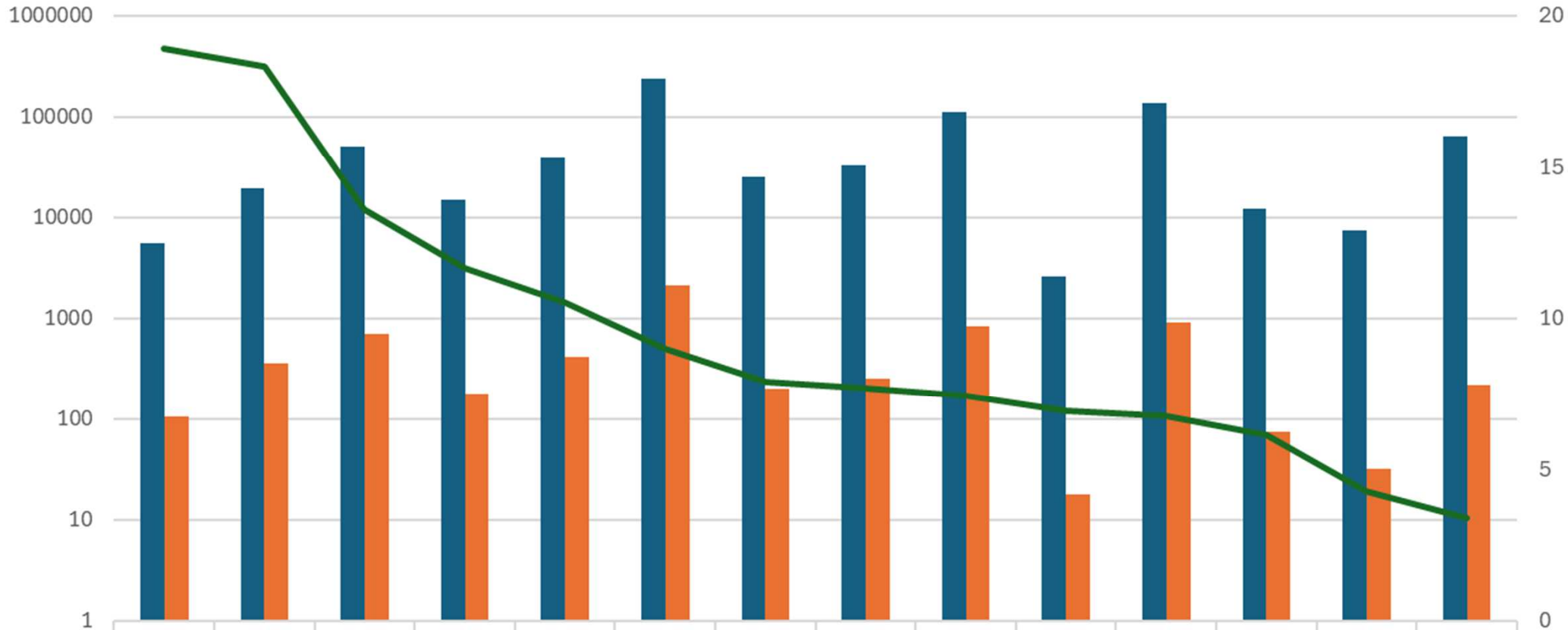


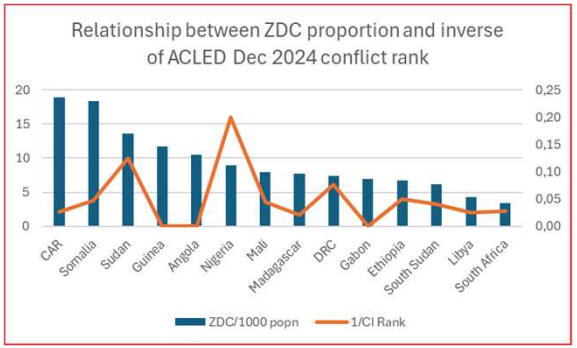
Reference: IA2030 GLOBAL PROGRESS REPORT 2024. https://www.immunizationagenda2030.org/images/documents/Immunization_Agenda_2030_Global_Progress_Report_2024_final.pdf

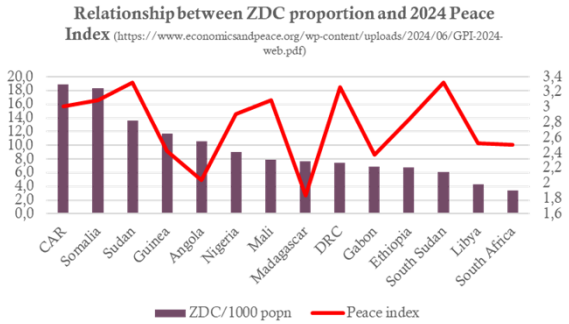
Proportion of # ZDC per 1000 population - 14 African countries in top 31 (by #ZDC) worldwide

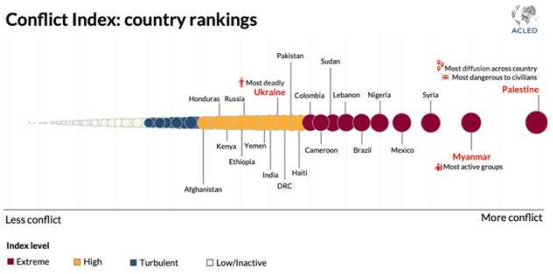


	CAR	Somalia	Sudan	Guinea	Angola	Nigeria	Mali	Madagascar	DRC	Gabon	Ethiopia	South Sudan	Libya	South Africa
Popn '000	5500	19600	51600	15100	39000	237500	25200	32700	112800	2600	135500	12200	7500	64700
ZDC '000	104	359	701	176	411	2134	199	251	839	18	917	75	32	220
ZDC/1000 popn	18,9	18,3	13,6	11,7	10,5	9,0	7,9	7,7	7,4	6,9	6,8	6,1	4,3	3,4

Popn '000 ZDC '000 ZDC/1000 popn







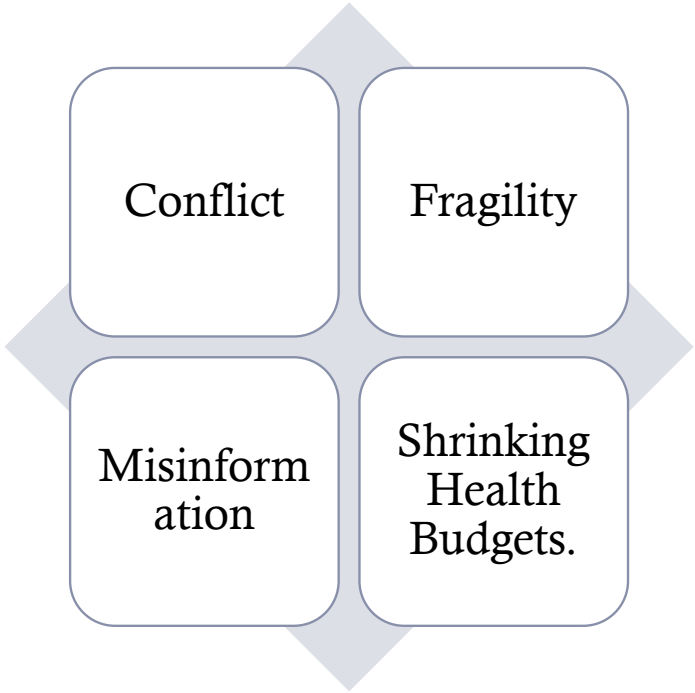
DOES THIS PERHAPS RELATE TO CONFLICT LEVELS?

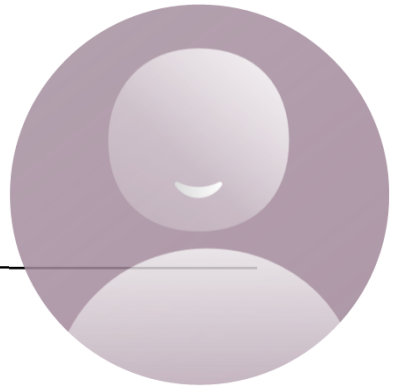
Doesn't correlate very well with either the Peace Index (see chart) or the inverse of the conflict rank

But intuitively it makes sense, although many other factors must be involved

References: (https://www.economicsandpeace.org/wp-content/uploads/2024/06/GPI-2024-web.pdf; https://acleddata.com/series/acled-conflict-index

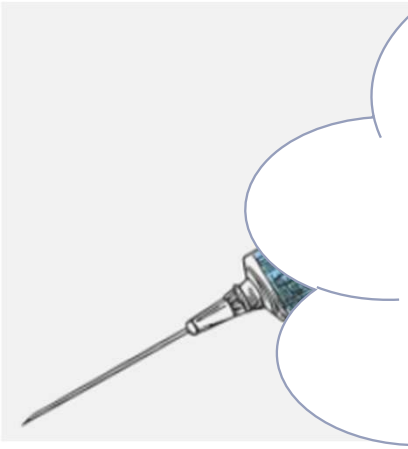
WHAT ARE THE KEY BARRIERS TO REACHING THESE CHILDREN?





Reference:

THE STATE OF THE WORLD'S CHILDREN 2023
"FOR EVERY CHILD, VACCINATION"



Press release

New UNICEF report shows **12.7 million children in Africa missed out on one or more vaccinations over three years**

COVID-19 caused service disruption, strained health systems, diverted scarce resources, while conflicts, climate change have driven this decline on the continent.

19 April 2023

One in five children worldwide are now zero-d
or under-vaccinated, meaning they've ed out entirely or partially on routine immuni ion. Those are levels we've not seen since 2008.

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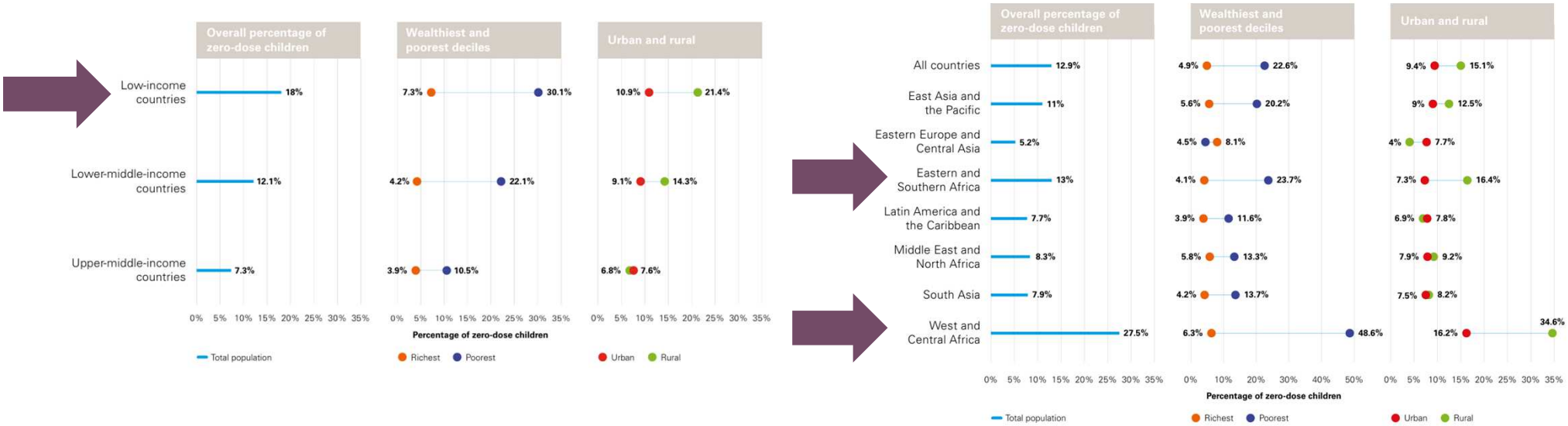
Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.
Victora, Cesar, and Aluísio Barros, 'Within-country Inequalities in Zero-dose Prevalence: Background paper for The State of the World's Children 2023', International Center for Equity in Health at the Federal University of Pelotas, Brazil, December 2022.

VAST INEQUITIES EXIST FOR CHILDREN IN POOR COMMUNITIES AND COUNTRIES



Percentage of zero-dose children, percentage in highest and lowest wealth decile, percentage in urban and rural locations organized by world bank income classification (left) and by UNICEF programme regions (right)

Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

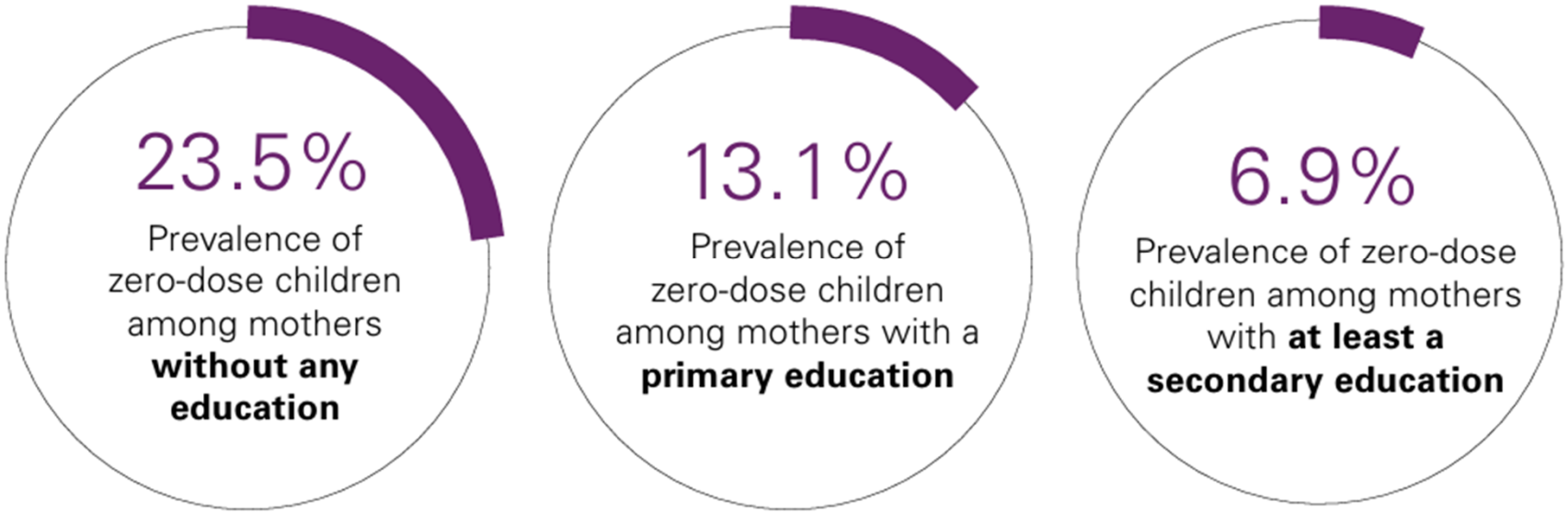
TEN COUNTRIES WITH THE LARGEST GAP IN ZERO-DOSE CHILDREN BETWEEN THE POOREST AND WEALTHIEST DECILES OF HOUSEHOLDS (LEFT); TEN COUNTRIES WITH THE LARGEST GAP IN ZERO-DOSE CHILDREN BETWEEN URBAN AND RURAL LOCATIONS (RIGHT) (AFRICAN COUNTRIES HIGHLIGHTED)

	Zero-dose prevalence %	
Country	**Poorest**	**Wealthiest**
Nigeria	65.2	3.8
Angola	54.6	5.5
Papua New Guinea	58.6	10.1
Central African Republic	62.9	12.7
Guinea	59.9	12.7
Ethiopia	46.9	21.5
Democratic Republic of the Congo	50.7	4.8
Lao People's Democratic Republic	45.6	11.4
Pakistan	33.4	13.6
Madagascar	38.3	12.5

	Zero-dose prevalence %	
Country	Rural	Urban
Angola	50.6	18.5
Nigeria	45.0	18.8
Central African Republic	52.5	28.3
Guinea	44.7	21.4
Papua New Guinea	38.7	17.8
Ethiopia	29.7	10.0
Democratic Republic of the Congo	41.8	22.6
Cameroon	22.5	9.1
Mali	20.6	7.9
Afghanistan	29.9	18.0

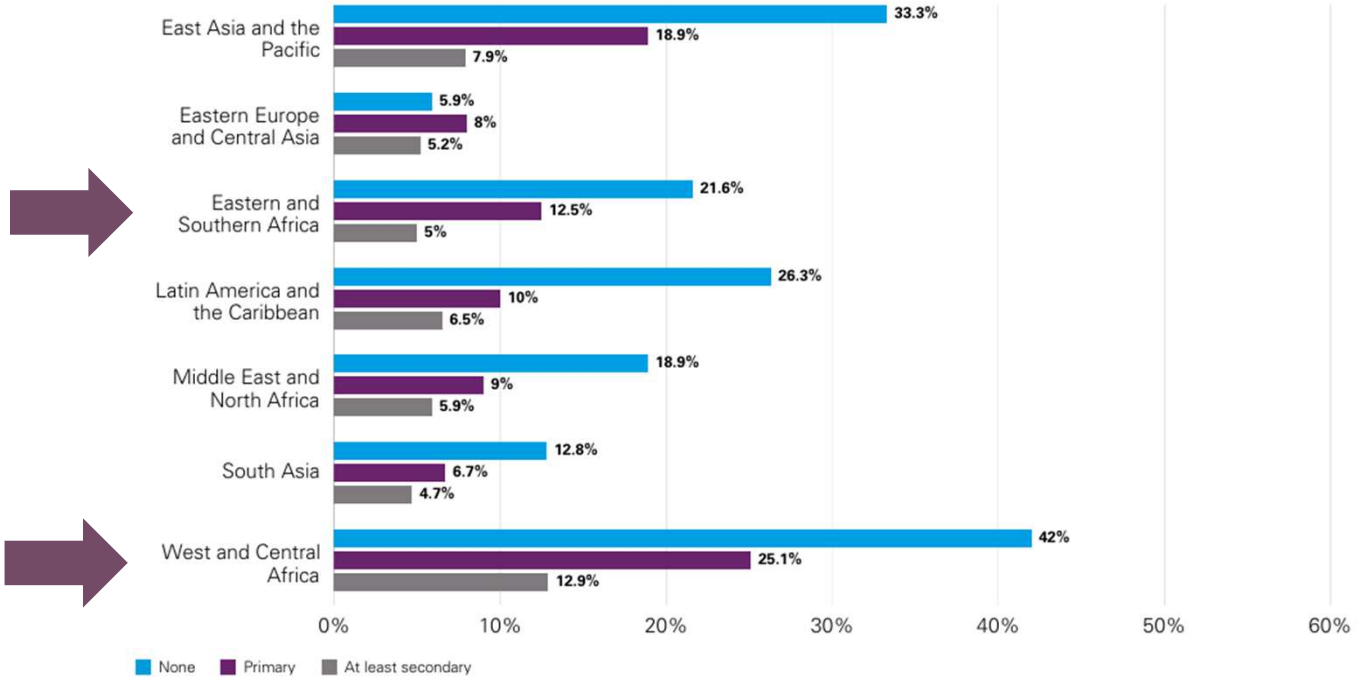
Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

THE PREVALENCE OF ZERO-DOSE CHILDREN DECLINED AS A MOTHER'S LEVEL OF EDUCATION INCREASED



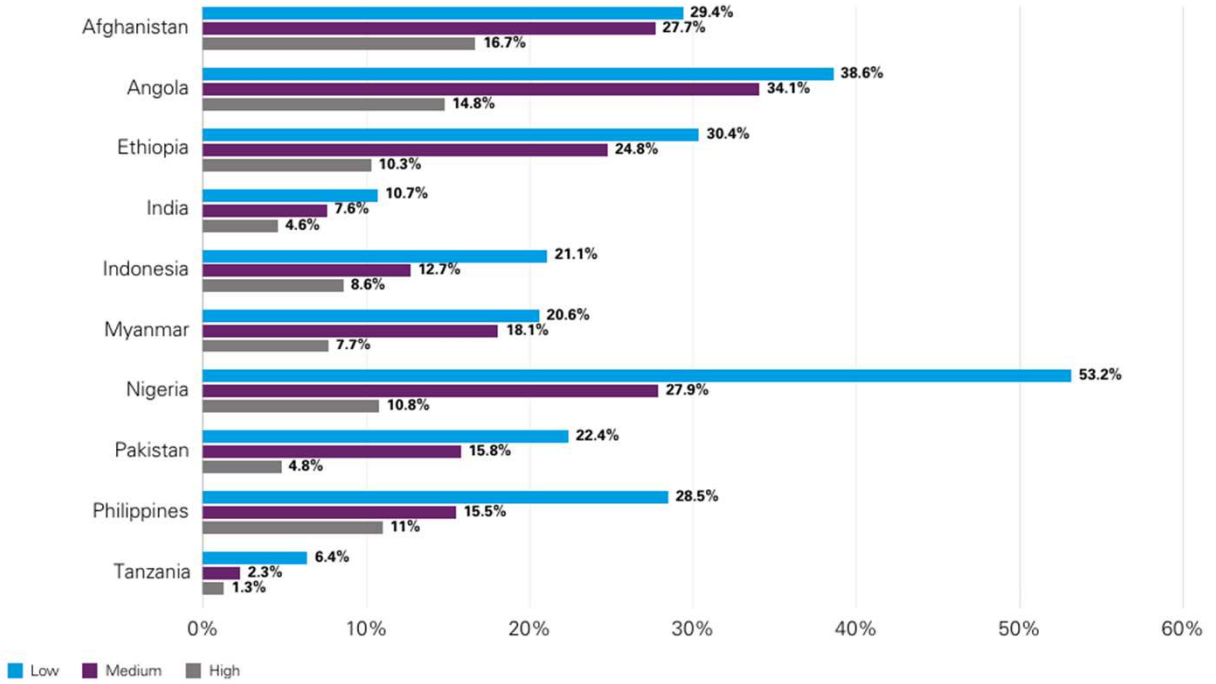
Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

CHILDREN WHOSE MOTHERS HAVE LITTLE EDUCATION ARE LESS LIKELY TO BE IMMUNIZED - WOMEN'S EDUCATION AND PREVALENCE OF ZERO-DOSE CHILDREN FOR 74 COUNTRIES BY UNICEF PROGRAMME REGION



Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

EMPOWERED WOMEN ARE MORE LIKELY TO VACCINATE THEIR CHILDREN - WOMEN'S EMPOWERMENT AND PREVALENCE OF ZERO-DOSE CHILDREN



Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023. Analyses of maternal empowerment were focused on the social independence domain of the SWPER (Survey-based Women's Empowerment) index.

ZDC DESERVE SPECIAL ATTENTION DURING VACCINATION CAMPAIGNS

Vaccinate every child through effective immunization programmes and catch-up campaigns

- Identify zero-dose and under-vaccinated children and understand their needs. By **gathering high-quality immunization data**, we can **identify and locate zero-dose children** and communities that have been missed.
- A key component of this work is **engaging with these communities** and their **leaders** to help identify barriers to children being vaccinated, and to develop approaches that meet the needs of these families.

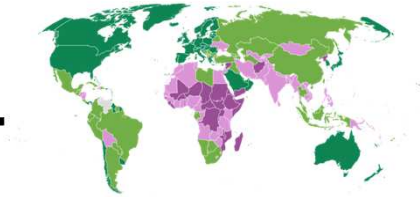
Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.

TECHNOLOGY CAN BE A GAME CHANGER FOR ZERO DOSE CHILDREN

Invest in emerging technology to increase vaccine accessibility and affordability.

- The COVID-19 pandemic shifted the vaccine landscape dramatically. Using **new advancements in vaccine technology**, including **messenger RNA (mRNA),** we were able to safely **develop vaccines at rapid speeds**.
- It's important that we **finance this innovation** moving forward.
- We can do this by **investing in regional vaccine hubs**, particularly in **low- and middle- income countries**.
- That will help to **increase both the accessibility and affordability of vaccines in the regions where the highest percentage of zero-dose children live.**

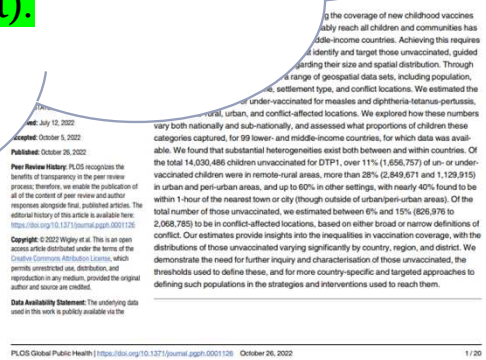
Reference: United Nations Children's Fund, The State of the World's Children 2023: For every child, vaccination, UNICEF Innocenti – Global Office of Research and Foresight, Florence, April 2023.



ESTIMATES OF THE NUMBER AND DISTRIBUTION OF ZERO-DOSE AND UNDER-IMMUNISED CHILDREN ACROSS REMOTE-R[illegible]ND CONFLICT-AFFECTED SETTI[illegible]ES

- Expanding routine immunization to reliably [illegible] in many LMICs. It requires vaccination str[illegible] unvaccinated, guided by the most cu[illegible]
- Through the integration and harn[illegible] vaccination coverage, travel-time, s[illegible]
- We estimated the numbers of children [illegible] pertussis, within remote-rural, urban[illegible]
- We explored how these numbers vary [illegible] of children these categories captured, for[illegible]
- We found that substantial heterogeneities exist both b[illegible]
- Of the children unvaccinated for DTP1, over 11% were in remote-rur[illegible] more[illegible] and peri-urban areas, and up to 60% in other settings, with nearly 40[illegible]o be within 1-hour of the nearest town or city.
- Of the unvaccinated, between 6% and 15% were in conflict-affected [illegible]cations, based on either broad or narrow definitions of conflict.

Of the children unvaccinated for DTP1,
> 11% were in remote-rural areas
> 28% in urban and peri-urban areas
< 60% in other settings,
< 40% within 1-hour of nearest town.
6% - 15% in conflict-affected locations, (broad vs narrow definitions of conflict).



g the coverage of new childhood vaccines ably reach all children and communities has ddle-income countries. Achieving this requires l identify and target those unvaccinated, guided garding their size and spatial distribution. Through l range of geospatial data sets, including population, , settlement type, and conflict locations. We estimated the r under-vaccinated for measles and diphtheria-tetanus-pertussis, ral, urban, and conflict-affected locations. We explored how these numbers vary both nationally and sub-nationally, and assessed what proportions of children these categories captured, for 99 lower- and middle-income countries, for which data was available. We found that substantial heterogeneities exist both between and within countries. Of the total 14,030,486 children unvaccinated for DTP1, over 11% (1,656,757) of un- or under-vaccinated children were in remote-rural areas, more than 28% (2,849,671 and 1,129,915) in urban and peri-urban areas, and up to 60% in other settings, with nearly 40% found to be within 1-hour of the nearest town or city (though outside of urban/peri-urban areas). Of the total number of those unvaccinated, we estimated between 6% and 15% (826,976 to 2,068,785) to be in conflict-affected locations, based on either broad or narrow definitions of conflict. Our estimates provide insights into the inequalities in vaccination coverage, with the distributions of those unvaccinated varying significantly by country, region, and district. We demonstrate the need for further inquiry and characterisation of those unvaccinated, the thresholds used to define these, and for more country-specific and targeted approaches to defining such populations in the strategies and interventions used to reach them.

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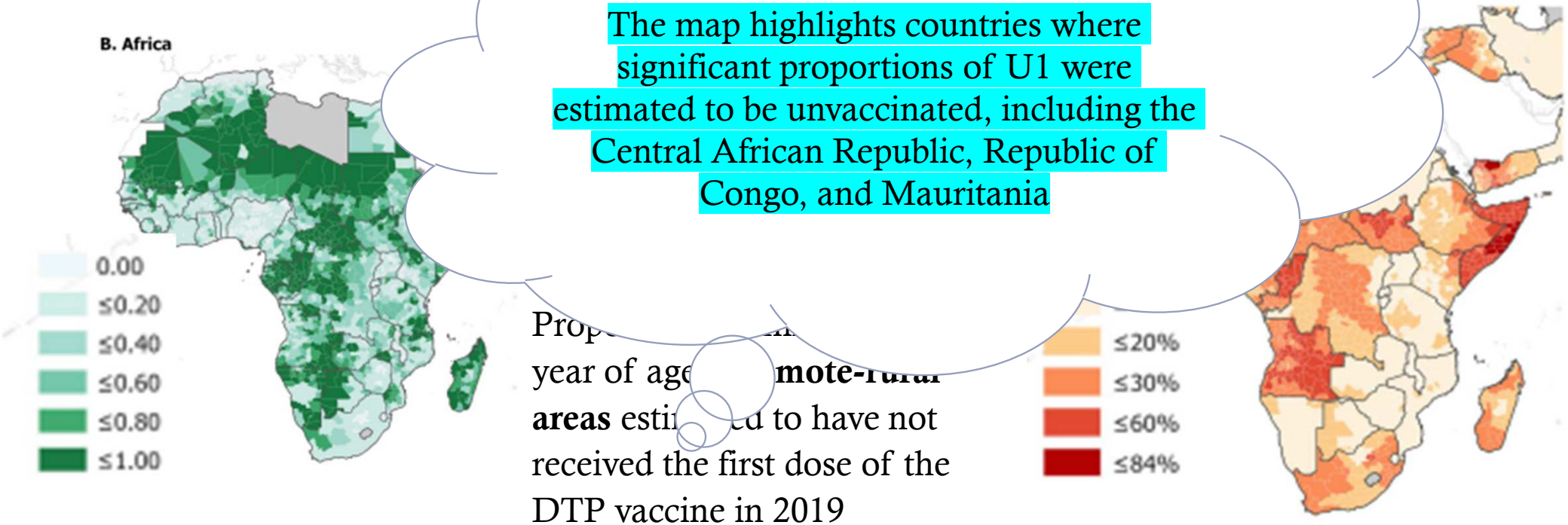
Data Availability Statement: The underlying data used in this work is publicly available via the

Reference: Wigley PLoS Glob Pub Health 2022

NUMBERS AND DISTRIBUTION OF UNVACCINATED CHILDREN ACROSS AT RISK SETTINGS

The map highlights countries where significant proportions of U1 were estimated to be unvaccinated, including the Central African Republic, Republic of Congo, and Mauritania



Prop… year of age… **areas** esti…d to have not received the first dose of the DTP vaccine in 2019

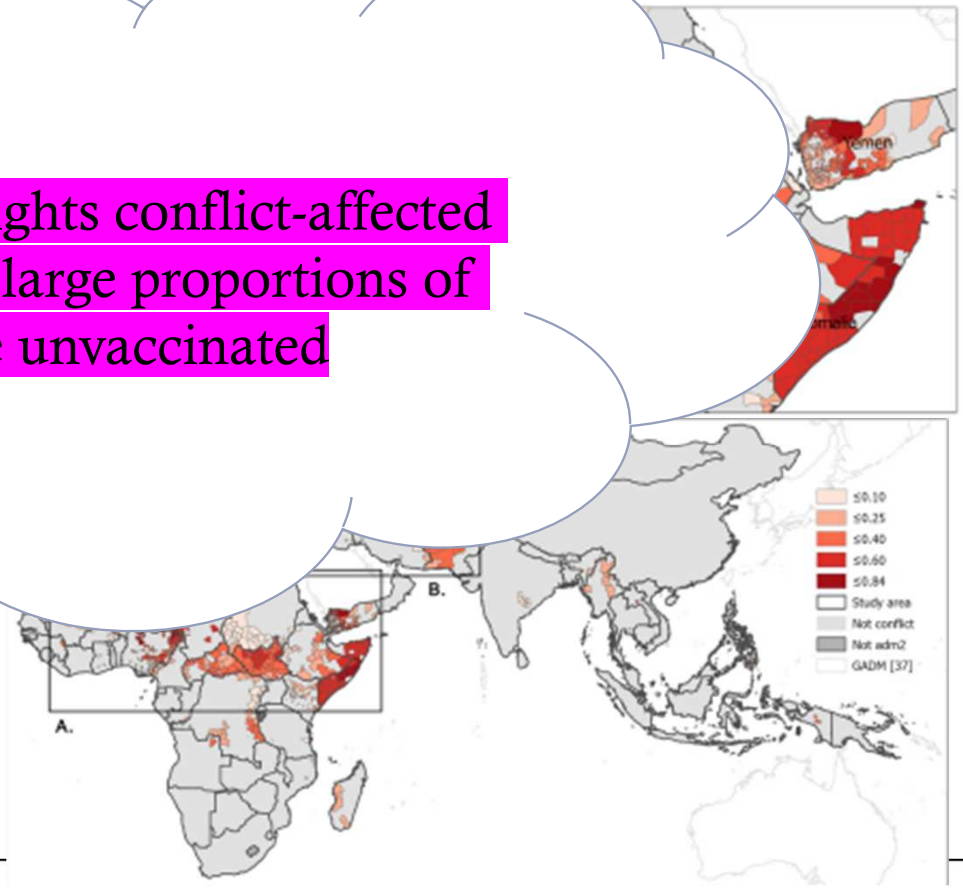
Reference: Wigley PLoS Glob Pub Health 2022

GADM = Global Administrative Area

NUMBERS AND DISTRIBUTION OF UNVACCINATED CHILDREN ACROSS AT RISK SETTINGS

- Proportion of childre
  age in **conflict-a**
  definition) estim
  received the first d
  vaccine in 2019 a
  administrative level
- Included much of **Somalia** (
  (46%), northeast **Nigeria** (34%), ar
  large parts of **Central African Re** **lic**
  (26%).

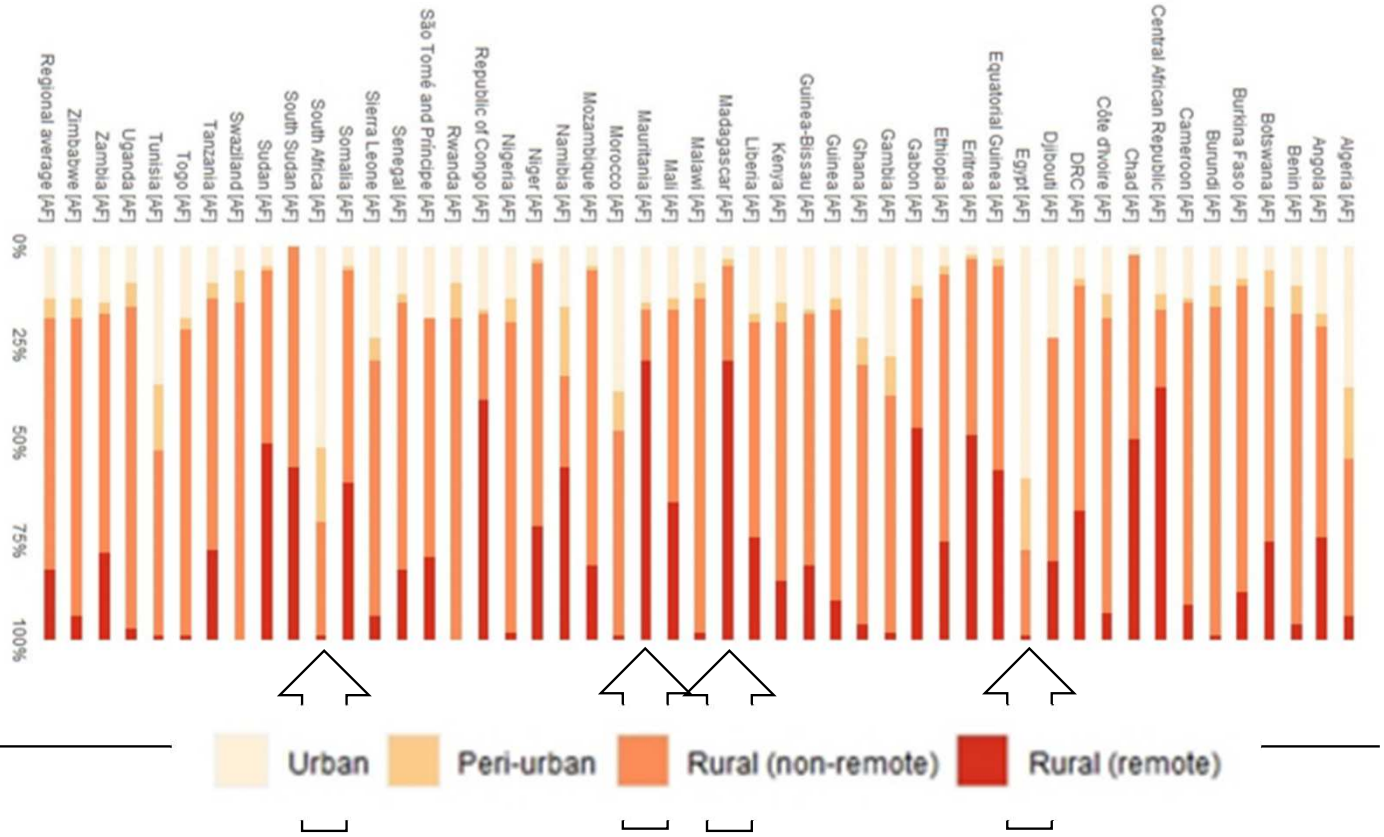
The map highlights conflict-affected regions where large proportions of U1 were unvaccinated



Reference: Wigley PLoS Glob Pub Health 2022

PLOT SHOWING THE ESTIMATED BREAKDOWN OF CHILDREN UNDER 1 YEAR NOT RECEIVING DTP1 IN 2019 BY URBAN / PERI-URBAN / RURAL (NON-REMOTE) / RURAL (REMOTE) CHARACTERISTICS, FOR ALL AFRICAN COUNTRIES IN STUDY AREA PLUS REGIONAL AVERAGE.

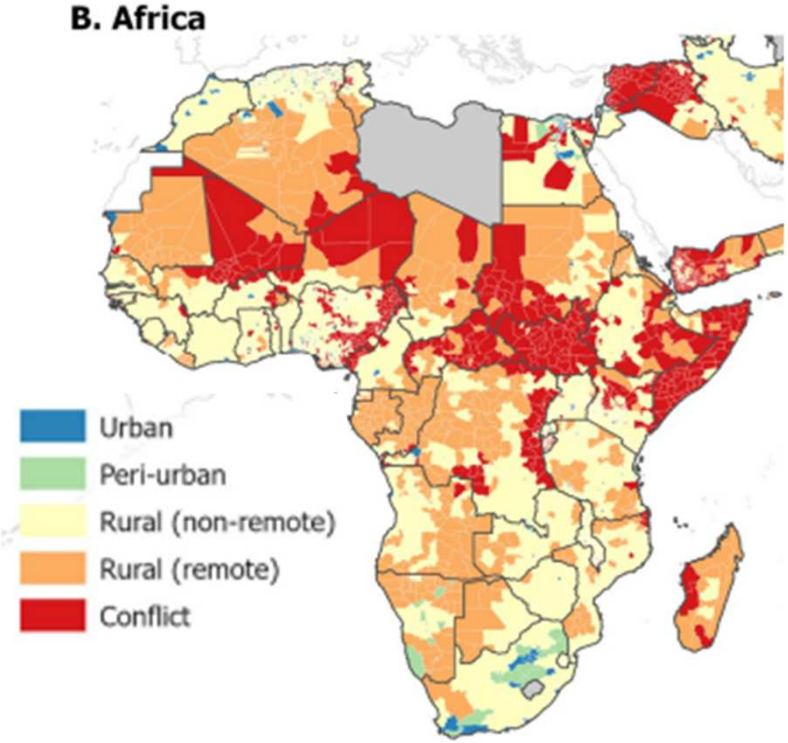
- Some countries (e.g. Egypt, South Africa) have the largest proportion of U1 not receiving DTP1 in **urban areas**
- Other countries (e.g. Mauritania, Madagascar) have substantial numbers in **remote-rural areas**



Reference: Wigley PLoS Glob Pub Health 2022

MAP HIGHLIGHTING THE GEOGRAPHICAL SETTING WITH THE ESTIMATED GREATEST NUMBER OF CHILDREN UNDER 1 YEARS OF AGE IN 2019 NOT RECEIVING DTP1 AT GADM ADMINISTRATIVE LEVEL 2

- In terms of **proportion**, *Madagascar, Mauritania, Central African Republic, and Republic of Congo* were in the top 5 ranked countries for DTP1, where around 60% to 70% of unvaccinated U1 were estimated to be in **remote rural** locations
- The **percentage distribution of U1 not receiving DTP1** (of the total unvaccinated) within **peri-urban areas:** there was a different pattern in the distribution of those unvaccinated compared to urban areas, with larger proportions observed across many areas throughout **South Africa** in particular



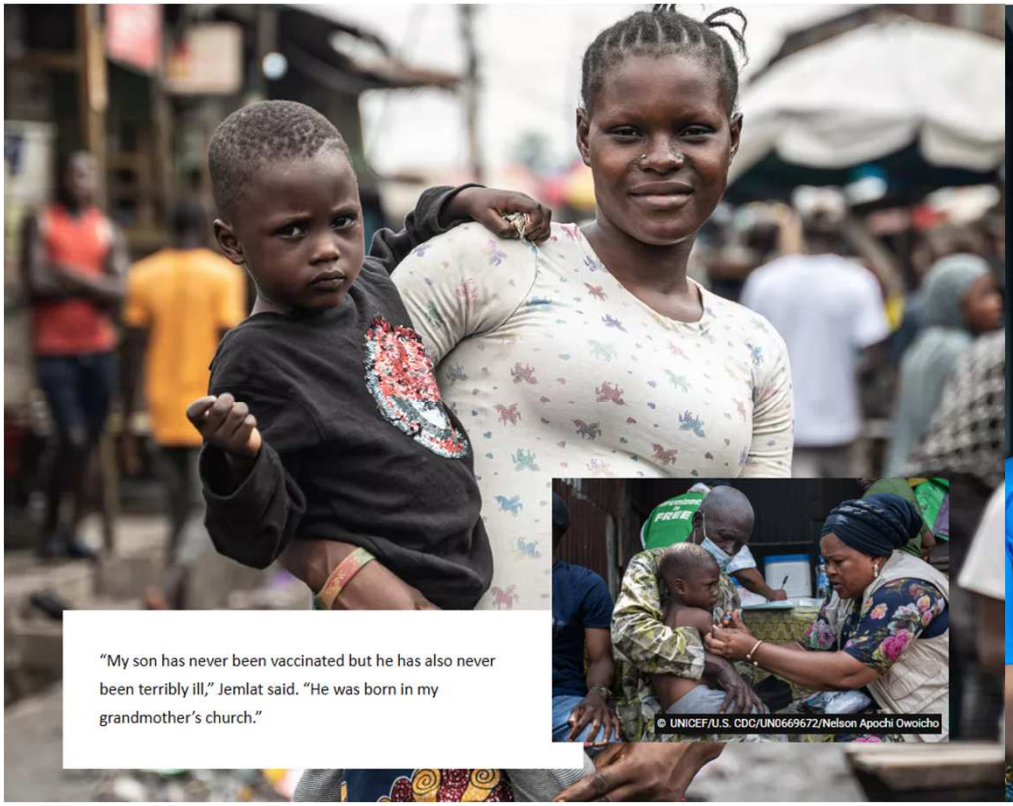
Reference: Wigley PLoS Glob Pub Health 2022

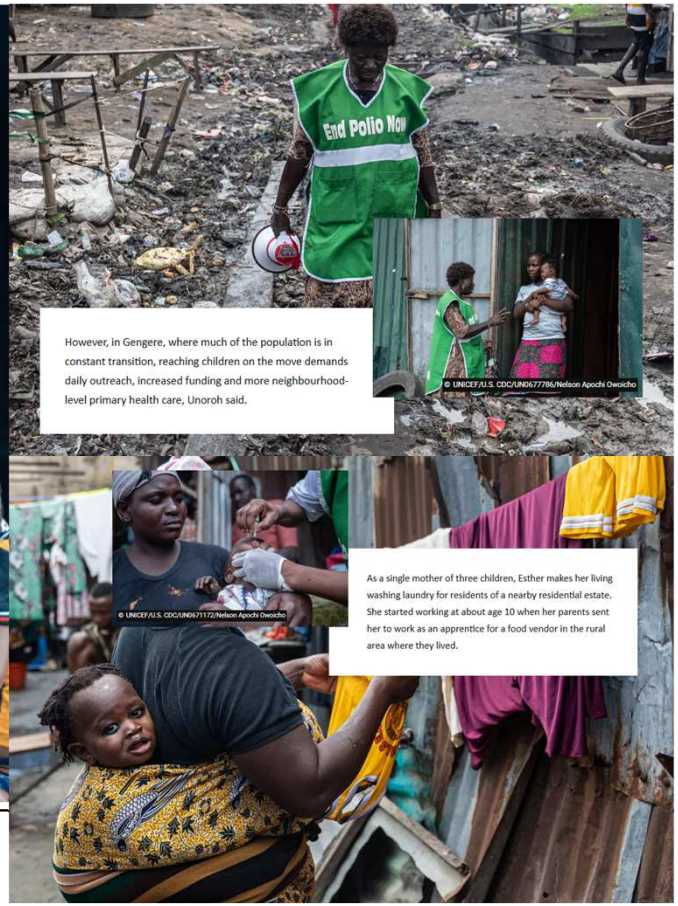
CASE STUDY FROM NIGERIA - UNICEF

- **Nigeria** is home to the second largest number of zero-dose children in the world. A **catch-up vaccination campaign** in one of the country's largest slums is reaching children in a community that faces **poverty, crime** and little **means to reach health services**.
- *"On a typical Tuesday morning, Jemlat would have been hard at work hawking bread on the crowded streets of Gengere, a shanty-filled neighbourhood at the end of the popular Mile 12 Market in Lagos. But one Tuesday, short of money to buy her inventory, Jemlat and her four-year-old son Fawaz took a slow disappointed walk home and happened on a life-saving opportunity: a team of health workers providing vaccines to protect children against potentially lethal diseases. Jemlat jumped at the opportunity. …"*

Reference: https://www.unicef.org/stories/sowc-2023/nigeria-vaccination-campaign-urban-slums

CASE STUDY FROM NIGERIA - UNICEF



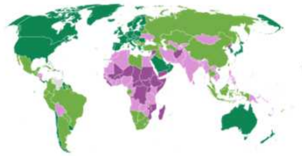


Reference: https://www.unicef.org/stories/sowc-2023/nigeria-vaccination-campaign-urban-slums

SOME RECENT EXAMPLES OF PUBLISHED WORK ON ZDC FROM AFRICA

Photo credit: GAVI, The Vaccine Alliance

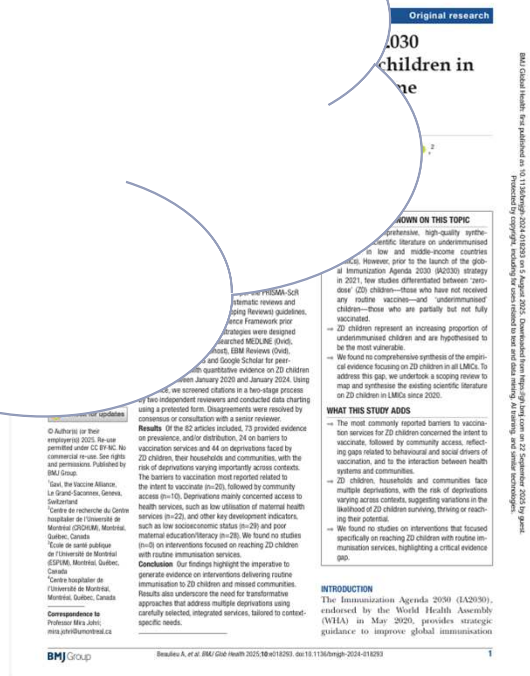
Reference:



THE IMMUNIZATION AGENDA 2030 STRATEGY TO REACH ZERO-DOSE CHILDREN IN LOW-INCOME AND M… ES: A SCOPING REVIEW

- Scoping review which maps and synth… income and middle-income countries…
- Of the **82 articles included**, 7… **barriers to vaccination servi… households and communities… contexts**.
- The **barriers** to vaccination mo… **community access** (n=10).
- **Deprivations** mainly concerned **acce… health services** (n=22), and other key develo… **status** (n=29) and **poor maternal education/litera…**
- **Imperative to generate evidence on interventions deliver… ine immunisation to ZD children and missed communities**.
- Results also underscore the need for transformative appro…es that address multiple deprivations using carefully selected, integrated services, tailored to context-specific needs.

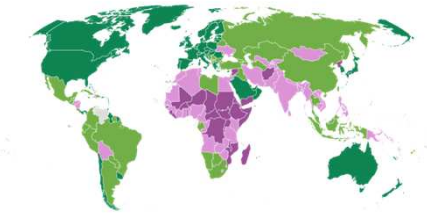
Biggest barriers to vaccination –
Intent to vaccinate,
Community access,
Health service access,
Poverty,
Maternal literacy and education


Original research

WHAT THIS STUDY ADDS

INTRODUCTION

Reference: Beaulieu, BMJ Global Health 2024



SCOPING REVIEW OF CURRENT COSTING LITERATURE ON INTERVENTIONS TO REACH ZERO-D[illegible]OU[illegible]AND MIDDLE-INCOME COU[illegible]

- A limited number of studies focus on [illegible] immunization coverage in low- and m[illegible]
- The objective of this review i[illegible] interventions to reach zero-d[illegible]
- Eleven articles met our inclusio[illegible]
- Interventions costs varied from [illegible] USD 67 per dose for cash trans[illegible]
- Most of the studies were from Sou[illegible] were from Africa (3) and Latin America (1).
- Most articles did not include a description of their cost[illegible]ds. [illegible]ir methods in detail.
- The wide variation in intervention costs underscores the [illegible] standardized costing methodologies to enhance comparability across studies.

SMS reminders – USD 0.08 / additional dose
Cash transfers – USD 67 / additional dose


MDPI

Interventions
Income

Keywords: immunization; cost; coverage increase; zero-dose; vaccination; LMICs

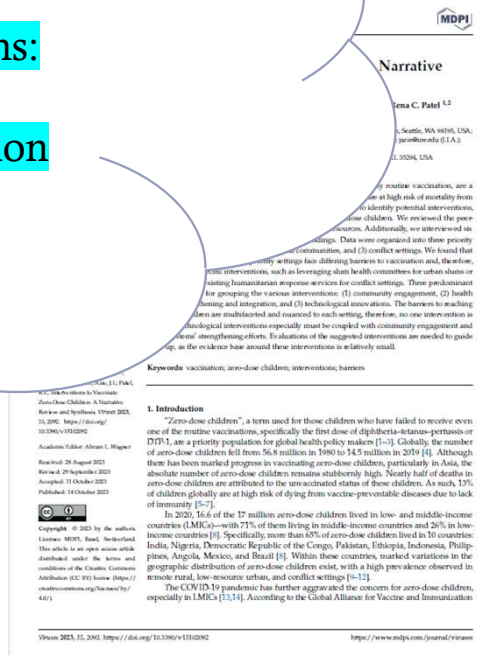
1. Introduction

Reference: Levin, Vaccines 2024

INTERVENTIONS TO VACCINATE ZERO-DOSE CHILDREN: A NARR SIS

- **Narrative review** to identify potential interventi children. Reviewed literature and interviewed si
- Three **priority settings**:
  - urban slums,
  - remote or rural communities
  - conflict settings.
- **Differing barriers to vaccination which** committees for urban slums or integrati
- **Three predominant themes for interven**
  - **community engagement**,
  - **health systems' strengthening and integration**
  - **technological innovations**.
- No one intervention is enough.
- Technological interventions must be coupled with community engageme alth systems' strengthening efforts.
- Evaluations of interventions are needed to guide scale-up, as the evidence base is relatively small.

Three predominant themes for interventions:
Community engagement,
Health systems' strengthening and integration
Technological innovations.


MDPI

Narrative

Zena C. Patel [1,2]

Keywords: vaccination; zero-dose children; interventions; barriers

1. Introduction

"Zero-dose children", a term used for those children who have failed to receive even one of the routine vaccinations, specifically the first dose of diphtheria–tetanus–pertussis or DTP-1, are a priority population for global health policy makers [1–3]. Globally, the number of zero-dose children fell from 56.8 million in 1980 to 14.5 million in 2019 [4]. Although there has been marked progress in vaccinating zero-dose children, particularly in Asia, the absolute number of zero-dose children remains stubbornly high. Nearly half of deaths in zero-dose children are attributed to the unvaccinated status of these children. As such, 13% of children globally are at high risk of dying from vaccine-preventable diseases due to lack of immunity [5–7].

In 2020, 16.6 of the 17 million zero-dose children lived in low- and middle-income countries (LMICs)—with 71% of them living in middle-income countries and 26% in low-income countries [8]. Specifically, more than 65% of zero-dose children lived in 10 countries: India, Nigeria, Democratic Republic of the Congo, Pakistan, Ethiopia, Indonesia, Philippines, Angola, Mexico, and Brazil [8]. Within these countries, marked variations in the geographic distribution of zero-dose children exist, with a high prevalence observed in remote rural, low-resource urban, and conflict settings [9–12].

The COVID-19 pandemic has further aggravated the concern for zero-dose children, especially in LMICs [13,14]. According to the Global Alliance for Vaccine and Immunization

Viruses 2023, 15, 2092. https://doi.org/10.3390/v15102092 https://www.mdpi.com/journal/viruses

Reference: Ingle, Viruses 2023

IMMUNIZATION COVERAGE, EQUITY, AND ACCESS FOR CHILDREN WITH DISABILITIES: A [illegible] REVIEW OF CHALLENGES, STRATEGIES, AND LESSONS LE[illegible]UMBER OF ZERO-DOSE CHILDREN

Barriers: healthcare infrastructure, provider training, follow-up services, stigma, misconceptions around disability and vaccines.

Strategies: Mobile units, Tailored interventions, School-based programs, Community engagement re stigma.

[illegible], are often overlooked in r[illegible]

[illegible] equity for these child[illegible]omes.

- **Factors [illegible]utcomes: maternal education, logistica[illegible] and usin[illegible]-sensory, inclusive vaccination settings**.
- **Effectiv[illegible]rategies** included **mobile vaccination units, tailored interventi[illegible] distraction or sedation techniques), school-based immunization programs, and[illegible]st community engagement to address stigma**.
- **Lessons learned: importance of flexible, individualized care plans** and **empowering families through transparent communication**.

MDPI

, and Access for Children with
of Challenges, Strategies,
the Number of

Zindoga Mukandavire [illegible], Tapiwa Dhliwayo [illegible],
[illegible]inamarira [illegible]

Abstract: Background: Children with disabilities, particularly in low- and middle-income countries (LMICs), face heightened risks of vaccine-preventable diseases due to a range of systemic and social barriers. Although immunization is a fundamental human right and a proven public health intervention, this vulnerable group is often overlooked in policy and practice. Understanding the factors compromising vaccine equity for these children is critical to reducing zero-dose prevalence and improving health outcomes. **Methods**: This scoping review examined peer-reviewed, gray literature from 2010 to 2024. Searches were conducted in PubMed, Google Scholar, and relevant organizational reports (WHO, UNICEF). Studies addressing children with disabilities and focusing on immunization barriers, interventions, or lessons learned were selected. English-language publications were screened in title/abstract and full-text stages. Key data extracted included population, barriers, and immunization outcomes. Since this review focused on articles in English, this is a key limitation. Results were synthesized thematically to identify recurring patterns and to guide improved interventions and policies. **Results**: Twelve articles met the inclusion criteria. Key barriers identified were inadequate healthcare infrastructure, insufficient provider training, limited follow-up services in rural regions, societal stigma, and pervasive misconceptions around both disability and vaccines. Factors such as maternal education, logistical support for caregivers, and using low-sensory, inclusive vaccination settings were consistently linked with better outcomes. Effective strategies included mobile vaccination units, tailored interventions (e.g., distraction or sedation techniques), school-based immunization programs, and robust community engagement to address stigma. Lessons learned underscored the importance of flexible, individualized care plans and empowering families through transparent communication. **Conclusions**: Children with disabilities continue to experience significant gaps in immunization coverage, driven by intersecting barriers at the individual, health system, and societal levels. Scaling tailored interventions, inclusive

Vaccines 2025, 13, 377 https://doi.org/10.3390/vaccines13040377

Reference: Musaka, Vaccines, 2025

ZERO- OR MISSED-DOSE CHILDREN IN NIGERIA: CONTRIBUTING FACTORS AND INTERVENTIONS TO OVERCOME IMMUNIZA

- Globally, more 22.7 million children a
  estimated 3.1 million (~14 %) reside i
- Scoping review to synthesize
  missed-dose children in Nige
- Identified 127 papers, including
  (n = 34); both risk factors and in
  recommendations only (n = 9).
- Most frequently reported factors
  - maternal factors (n = 77), particularly in
    perinatal care (n = 19);
  - heterogeneity between different types of communities
    religion, population composition, and other challenges (
  - access to vaccination, i.e., proximity of facilities with va nd vaccinators (n = 37); and
  - awareness about immunization – including safety, effic mportance, and schedules (n = 18).

Factors influencing childhood uptake:
Maternal education, access to ante- and perinatal care;
Heterogeneous communities –location, region, wealth, religion, composition;
Access to vaccination - proximity of facilities;
Awareness about immunization safety, efficacy, importance, schedules.

Contents

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   2.1. Literature search 5434
   2.2. Data extraction and evaluation, and draft development 5434
3. Results 5435
   3.1. Summary of papers identified in scoping review 5435
   3.2. Summary of risk factors for zero- or missed-dose children in Nigeria 5435

Reference: Mahachi Vaccine 2022

IMPLICATIONS OF CONFLICT ON VACCINATION IN THE SAHEL RE

Analysis

BMJ Global Health

Implications of conflict on vaccination in the Sahel region

Majdi M Sabahelzain, Harriet Dwyer, Seye Abimbola, Julie Leask

ABSTRACT

The Sahel region is a geographical belt in Africa that stretches from the Atlantic Ocean to the Red Sea, between the Sahara Desert in the north and the Savannah in the south. It is characterised by challenging environmental crises and conflicts. This analysis highlights the potential implications of conflict on vaccination across five Sahel countries, including Burkina Faso, Chad, Mali, Niger and Sudan, from 2015 to 2023. It also presents recommendations to improve vaccination coverage in these settings. The WHO Immunisation Data Portal was used to extract data about vaccination coverage and disease outbreaks. With the increasing complexity of humanitarian access in the Sahel, there has been an accumulation of the number of zero-dose and underimmunised children. In 2023 alone, most of these countries had a significant proportion of zero-dose children, particularly Sudan (43%), Mali (22%) and Chad (16%). Nearly half of children in Sudan (49%), 33% in Chad and 23% in Mali are underimmunised. Measles vaccine coverage was consistently below 90% in these countries, except for Burkina Faso. The trend of polio outbreaks (circulating vaccine-derived poliovirus) across these countries showed fluctuations in the number of cases, with Niger having reported several cases over this period, and Chad having 101 cases reported in 2020 alone. Despite relatively high coverage, there were significant outbreaks of polio in Burkina Faso, Sudan and Mali in 2020, which reflects the potential impact of the COVID-19 pandemic. Lessons can be learnt from past diplomatic and programmatic successes, while investments in innovative and flexible approaches may help increase the reach of vaccination programmes in inaccessible areas.

SUMMARY BOX

- The Sahel region is experiencing impacts of [illegible] on health systems and infrastructure alongside breaks of vaccine-preventable disease and con[illegible] ing rates of zero-dose children.
- Local, regional and global health insecurity is evident from the emergence and circulation of genetically linked polio variants within the region. This may be attributed to the mobility and transnationalism of the population within the Sahel region, either as nomads, refugees or internally displaced populations including unvaccinated and undervaccinated populations.
- Providing vaccination and other health services in the Sahel region is challenging due to non-state armies controlling significant areas. Ministries of Health need to be supported by wider political processes drawing on broader diplomatic channels, new multilateral frameworks for vaccination in inaccessible areas and stronger funding for community-level infrastructure to engage with trusted intermediaries and political figures.
- The lack of real-time data and the poor quality of the available data on vaccine-preventable diseases make it difficult to understand the real situation in the Sahel. Greater investment in improved data collection and analysis, and innovations to address data gaps are urgently needed to inform and tailor effective vaccination interventions.
- The region needs innovative approaches to overcome the context-specific threats caused by instability, including using advanced methods such as geographical information systems, exploring co-delivery of vaccinations, and investing in building community and political trust in vaccines.

INTRODUCTION

Over the last two decades, the Sahel region in Africa (the Sahel) has experienced drought, famine and desertification as a consequence of climate change. Amid these environmental crises, security challenges in the region have become increasingly complex. Simmering localised ethnic conflicts have escalated alongside the widespread presence of light weapons, the growth of organised crime and criminal networks, and the emergence of extremist armed groups.[1]

The Sahel is a vast geographical area with a semi-arid climate that spans several countries. Appearing on maps as a belt that stretches from Mauritania and Senegal in the west, all the way to Sudan and Eritrea in the east, the region is situated between the Sahara Desert in the north and the Savannah in the south (figure 1).[2] Culturally and historically, *Sahel* is a word of Arabic origin that means coast or shore. It is also defined in some literature as the southern edge of the Sahara Desert.[3] This region represents an interface between the Middle East and sub-Saharan Africa, with Arabic, Islamic and nomadic cultures from

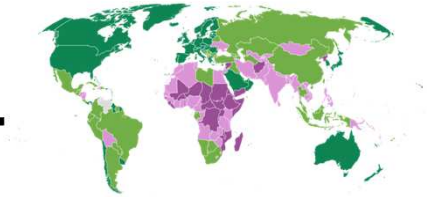
5 SAHEL countries = Burkina Faso, Chad, Mali, Niger and Sudan

ZDC 2023: Sudan (43%), Mali (22%) and Chad (16%)

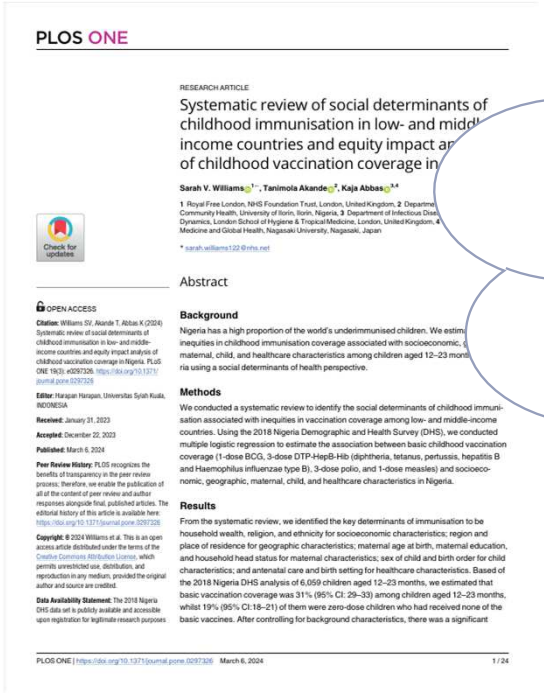
UIC 2023: Sudan (49%), Chad (33%) Mali (23%)

- [illegible]ion
- [illegible]er and
- [illegible]hel, there
- [illegible]nder
- In 202[illegible] a significant proportion of zero-dose children, [illegible]ularly [illegible]), Mali (22%) and Chad (16%).
- Nearly half of [illegible]ren in Sudan (49%), 33% in Chad and 23% in Mali are under immun[illegible]d.

Reference: Sabahelzain, BMJ Glob Health, 2024



SYSTEMATIC REVIEW OF SOCIAL DETERMINANTS OF CHILDHOOD IMMUNISATION IN LOW- AND MIDDLE-INCOME COUNTRIES AND EQUITY IMPACT ANALYSIS OF CHILDHOOD VACCINATION



PLOS ONE

RESEARCH ARTICLE

Systematic review of social determinants of childhood immunisation in low- and middle-income countries and equity impact analysis of childhood vaccination coverage in

Sarah V. Williams, Tanimola Akande, Kaja Abbas

Abstract

Background

Nigeria has a high proportion of the world's underimmunised children. We estim... inequities in childhood immunisation coverage associated with socioeconomic, ... maternal, child, and healthcare characteristics among children aged 12–23 mont... ria using a social determinants of health perspective.

Methods

We conducted a systematic review to identify the social determinants of childhood immunisation associated with inequities in vaccination coverage among low- and middle-income countries. Using the 2018 Nigeria Demographic and Health Survey (DHS), we conducted multiple logistic regression to estimate the association between basic childhood vaccination coverage (1-dose BCG, 3-dose DTP-HepB-Hib (diphtheria, tetanus, pertussis, hepatitis B and Haemophilus influenzae type B), 3-dose polio, and 1-dose measles) and socioeconomic, geographic, maternal, child, and healthcare characteristics in Nigeria.

Results

From the systematic review, we identified the key determinants of immunisation to be household wealth, religion, and ethnicity for socioeconomic characteristics; region and place of residence for geographic characteristics; maternal age at birth, maternal education, and household head status for maternal characteristics; sex of child and birth order for child characteristics; and antenatal care and birth setting for healthcare characteristics. Based of the 2018 Nigeria DHS analysis of 6,059 children aged 12–23 months, we estimated that basic vaccination coverage was 31% (95% CI: 29–33) among children aged 12–23 months, whilst 19% (95% CI:18–21) of them were zero-dose children who had received none of the basic vaccines. After controlling for background characteristics, there was a significant

Lower odds of basic vaccination in Nigeria associated with:.
Poorest households,
Fulani ethnicity,
Born in home settings,
Young mothers
No formal education
No antenatal care

with

% (95%

.87 (2.21, 3.72), p <

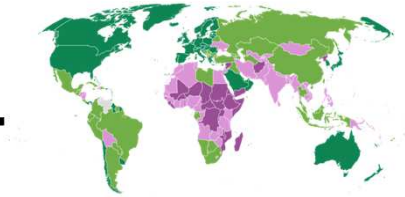
06),

(1.46, 3.49), p < 0.001), and

pared to no formal education (AOR: 1.79 (1.39, 2.31), p < 0.001).

- Children from th households, of Fulani ethnicity, who were born in home settings, and with young mothers formal education nor antenatal care, were associated with lower odds of basic vaccination in N a.
- Recommend a proportionate universalism approach for addressing the immunisation barriers.

Reference: Williams SV, PLoS One, 2024



PRIVATE SECTOR ENGAGEMENT FOR IMMUNISATION PROGRAMMES: A PRAGMATIC SCOPING REVIEW OF 25 YEARS OF EVIDENCE ON GOOD PRACTICE IN LOW-INCOME AND LMIC

- Conducted a pragmatic scoping review to i
  practices in PSE for vaccination.
- Using a new analytical framewor
  engagement mechanisms.
- Level of PSE was mixed, rangin
- Promising practices for PSE included
  and including them in programme e
- Planning and monitoring efforts w
  standards for services, reporting and
- Information systems were effective when they in
  surveillance.
- Challenges identified included ensuring compliance with natio es and g
  financial exclusion.
- Few studies documented successful public–private partnership mo ner innovative financing models.
- Stronger PSE can potentially reach zero-dose and underimmunis pulations in low-resource settings and
  build resilient systems.
- Untapped opportunities exist for more structured testing of approaches to inform global guidance.

Level of Private Sector Engagement for immunisation programmes ranged from 3% to >60%.

Stronger PSE could reach zero-dose and under immunised populations in low-resource settings and build resilient systems.


Original research

pragmatic
vidence
and

Folake Olayinka

INTRODUCTION

Reference: Sharma G, BMJ Global Health, 2024

INFORMAL HEALTH SECTOR AND ROUTINE IMMUNIZATION: MAKING THE CASE FOR HARNESSING THE POTENTIALS OF PATENT MEDICINE VENDORS FOR THE BIG CATCH-UP TO R… IN SUB-SAHARAN AFRICA

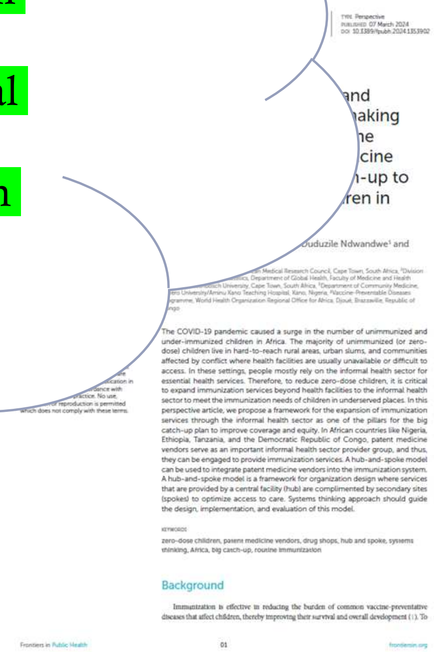
- The COVID-19 pandemic caused a s… immunized children in Africa.
- The majority of unimmuni… slums, and communities aff… difficult to access.
- In these settings, people mostl…
- To reduce zero-dose children, i… facilities to the informal health sector.
- In African countries like Nigeria, Ethiopia, Tan… serve as an important informal health sector provider gro… can b… …de immunization services.
- A hub-and-spoke model can be used to integrate patent …icine vendors into the immunization system.

Unimmunized (or zero-dose) children: hard-to-reach rural areas, urban slums, conflict, health facilities unavailable or difficult to access

Rely on the informal health sector for essential health services

Expand immunization services beyond health facilities to the informal health sector

Integrate patent medicine vendors into the immunization system



Reference: Adamu A, Front Public Health, 2024

HIGH PREVALENCE OF ZERO-DOSE CHILDREN IN UNDERSERVED AND SPECIAL SETTING POPULATIONS IN ETHIOPIA USING

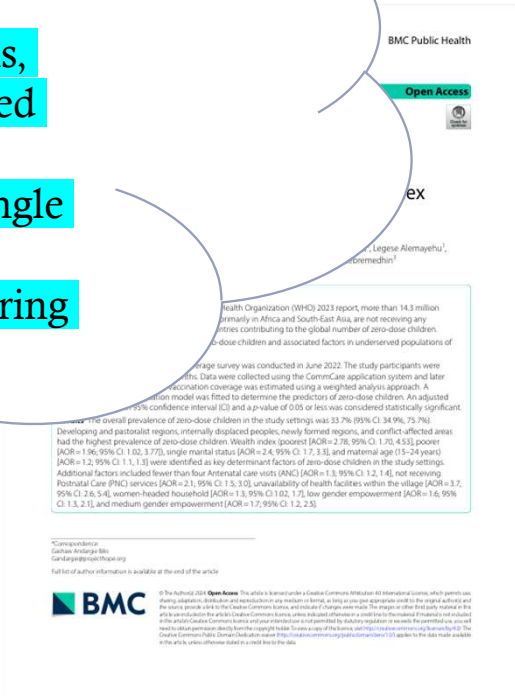
Overall prevalence of zero-dose children in the study settings was 33.7%

Highest in developing/pastoralist regions, internally displaced peoples, newly formed regions, conflict-affected areas

Key determinant factors: Wealth index, single marital status and maternal age

Recommended: immunization sessions during evening/weekend in cities

- More than 14.3 million children in LM
  any vaccinations.
- Ethiopia is one of the top ten c
- Study aimed to estimate the p
  populations of Ethiopia.
- Cross-sectional vaccine coverage s
- Overall prevalence of zero-dose
- Developing and pastoralist region
  affected areas had the highest prevalenc
- Wealth index, single marital status and maternal
  factors.
- Additional factors included fewer than four Antenatal care vis eceiving Postnatal Care (PNC) services, unavailability of health facilities within the village, eaded household, low gender empowerment and medium gender empowerment.
- Recommended targeting a tailored integrated and context-specific service delivery approach and extending immunization sessions opening hours during the evening/weekend in the city administrations to meet parents' needs.


BMC Public Health

Open Access

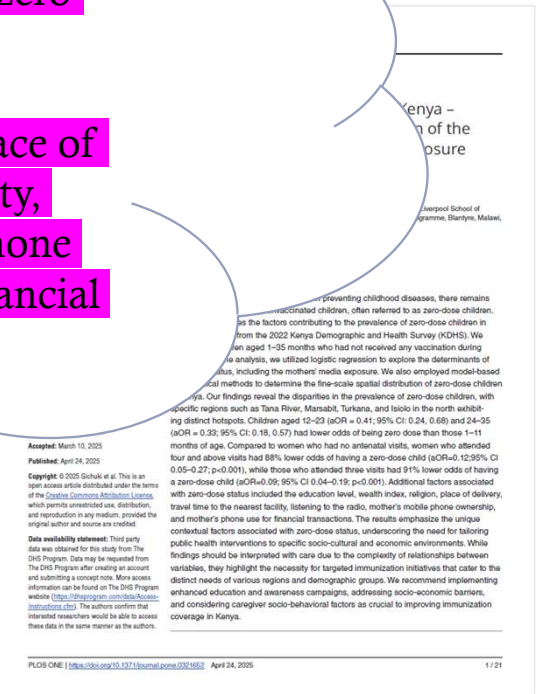
BMC

Reference: Biks, GA. BMC Public Health, 2024

MAPPING ZERO-DOSE CHILDREN IN KENYA – A SPATIAL ANALYSIS AND EXAMINATION OF THE SOCIO-DEMOGRAPHIC AND MEDIA EXPOSURE DETERMINANTS

- Study examines the factors contributing
  from the 2022 Kenya Demographic and
- We included all children aged 1
- Children aged 12–23 and 24–
- Compared to women who had n
  88% lower odds of having a zero-
  of having a zero-dose child.
- Additional factors associated wit
  religion, place of delivery, travel ti
  phone ownership, and mother's phone use fo
- The results emphasize the unique contextual facto
  the need for tailoring public health interventions to specific soc
  environments.
- Findings highlight the necessity for targeted immunization in
  various regions and demographic groups.
- Recommend enhanced education and awareness campaigns, addressing socio-economic barriers, and considering caregiver socio-behavioral factors as crucial to improving immunization coverage in Kenya.

Factors contributing to the prevalence of zero-dose children
Women who had no antenatal visits
Education level, wealth index, religion, place of delivery, travel time to the nearest facility, listening to the radio, mother's mobile phone ownership, and mother's phone use for financial transactions



Reference: Gichuki J, PLoS One, 2025

BEYOND INDIVIDUAL FACTORS: DISENTANGLING CONTEXT FROM COMPOSITION IN ZERO-DOSE CHILDREN AND THE THREE DELAYS TO VACCINATION IN SUB-SAHA

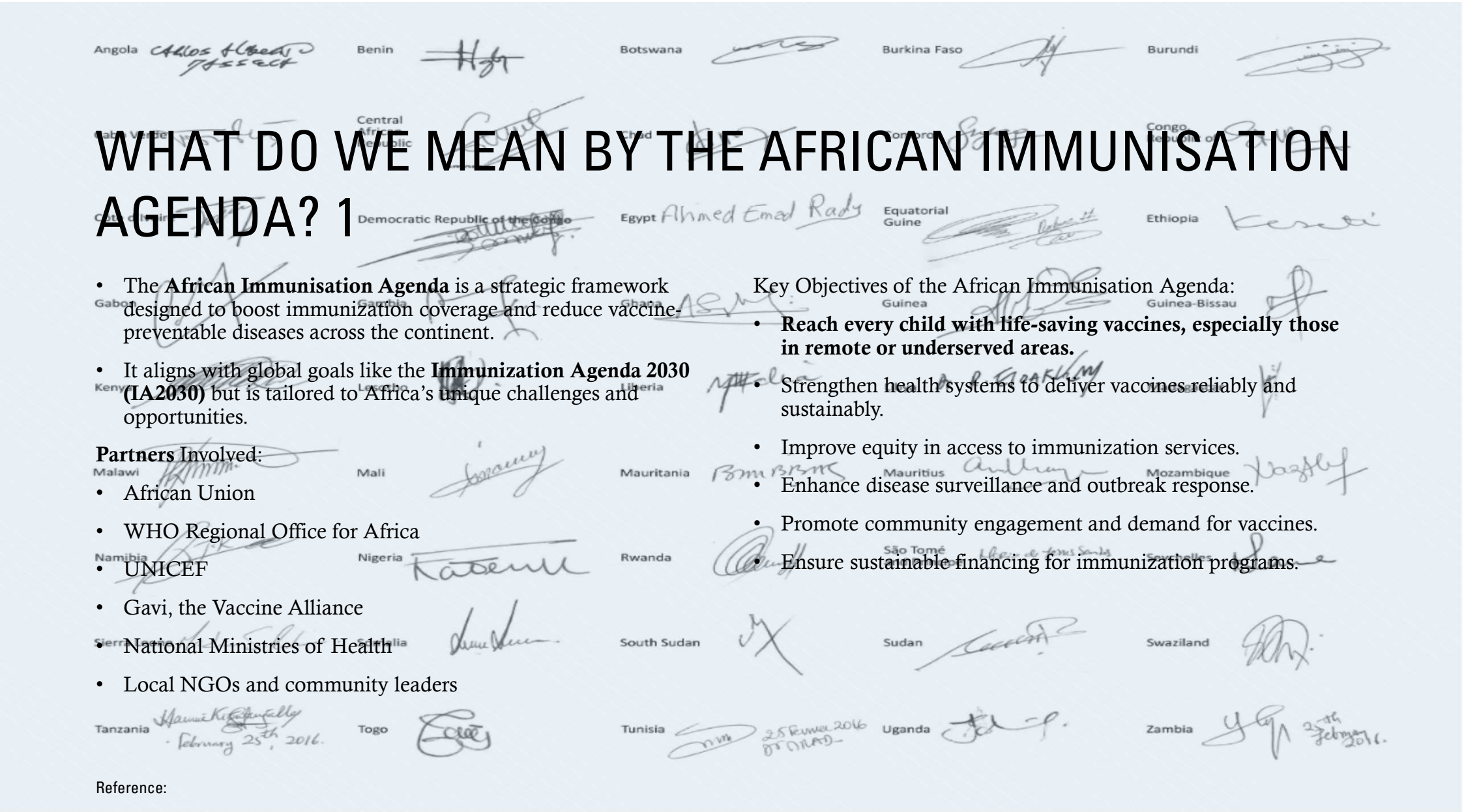
- Applied the "Three Delays Model" to e
  in sub-Saharan Africa.
- Analyzed data from 59,211 ch
  using Demographic and Heal
- Examined individual-, commun
  Model framework.
- Overall zero-dose prevalence wa
  from 0.43% in Rwanda to 42.29%
- Poor maternal health-seeking behavior show
- Maternal education demonstrated a clear gradient e
  education showing nearly doubled odds of being zero-dose.
- Maternal empowerment factors were significant, including la ision-making power and no
  media access.
- Community illiteracy rates and low country-level health expenditure were associated with increased
  zero-dose prevalence.

Overall zero-dose prevalence was 10.7%, ranging from 0.4% in Rwanda to 42% in Chad
Associations: Poor maternal health-seeking behaviour, Maternal education, Maternal empowerment, Community illiteracy rates, low country-level health expenditure

Reference: Wiysonge C, Preprint, 2025

2. THE AFRICAN IMMUNISATION AGENDA

Picture credit: UNICEF



WHAT DO WE MEAN BY THE AFRICAN IMMUNISATION AGENDA? 1

- The **African Immunisation Agenda** is a strategic framework designed to boost immunization coverage and reduce vaccine-preventable diseases across the continent.
- It aligns with global goals like the **Immunization Agenda 2030 (IA2030)** but is tailored to Africa's unique challenges and opportunities.

Partners Involved:

- African Union
- WHO Regional Office for Africa
- UNICEF
- Gavi, the Vaccine Alliance
- National Ministries of Health
- Local NGOs and community leaders

Key Objectives of the African Immunisation Agenda:

- **Reach every child with life-saving vaccines, especially those in remote or underserved areas.**
- Strengthen health systems to deliver vaccines reliably and sustainably.
- Improve equity in access to immunization services.
- Enhance disease surveillance and outbreak response.
- Promote community engagement and demand for vaccines.
- Ensure sustainable financing for immunization programs.

Reference:

WHAT DO WE MEAN BY THE AFRICAN IMMUNISATION AGENDA? 2

Focus Areas:

- **Addressing zero dose children**
- Integrating immunization with primary healthcare
- Tackling logistical and infrastructure barriers
- Responding to emerging health threats like outbreaks and pandemics

Reference: https://www.afro.who.int/health-topics/immunization/the-addis-declaration-immunization

Note: The declaration does not specifically mention ZDC

3. HOW DO WE ENSURE THAT NO CHILD IS LEFT BEHIND?

Picture credit: WHO AFRO

Marginalised communities

- Social exclusion
- Migrants
- Refugees
- Ethnic marginalization
- Stigma
- Internally displaced communities
- Illiterate and sem-literate communities

Conflict-affected areas

- Broad vs narrow definitions
- Focus on high conflict / high ZDC countries e.g. Burkina Faso, Chad, Mali, Niger, Sudan

Underserved areas

- Remote rural areas
- Urban slums
- "Peripheral urban settlements"
- > 1h from nearest town
- Poor access to health services, esp. ante-/peri-natal care - ? Evening/weekend opening hours
- Developing / pastoralist areas

Socioeconomic barriers to immunization

- Gender
- Mothers' level of education and literacy
- Single mothers, maternal age
- Women empowerment
- Crime
- Religion

Poverty

- Cash transfers

Lack of infrastructure

- General
- Healthcare
- "Tackling logistical and infrastructure barriers" (AIA)

High ZDC number African countries

- Angola, DRC, Ethiopia, Nigeria, Sudan

Health system strengthening

- Provider training
- Follow up services
- Reduce number and % of home births
- ? Partner with private sector
- Reduce reliance on informal health sector?
- OR: Partner with the informal health sector for EPI e.g. patent medicine vendors ??
- Integration of PHC and EPI

POTENTIAL TARGETS, BASED ON THE LITERATURE 1

Reference:

“Fragile” communities

- Engage with communities and their leaders

Misinformation

- Low intent to vaccinate
- Misconceptions around e.g. disability and vaccines (contraindications)
- Awareness about immunization safety, efficacy, importance, schedules

Shrinking health budgets

- Inequity
- Low country level health expenditure

Outbreaks and epidemics such as COVID, other “crises”

- Service disruption, strained health systems, diverted scarce resources

Climate change

Improving our immunisation data

Using improved vaccine technology

- mRNA vaccine development
- Finance for innovations
- Investment in regional vaccine hubs in LMICs
- SMS reminders, radio, mobile phones

Reduce vaccine costs in regions with highest % of ZDCs

POTENTIAL TARGETS, BASED ON THE LITERATURE 2

Reference:

QUESTION: WHICH OF THESE CAN WE REALISTICALLY DO ANYTHING ABOUT?

Do we have the resources?

Do we have the time?

Who takes responsibility and drives the process?

Reference:

GAVI ZIP INITIATIVE

**Geneva, 21 June 2022 **– Gavi, the Vaccine Alliance today launched the Zero-Dose Immunization Programme (ZIP), a new innovative initiative that will provide two consortia of partners with up to US$ 100 million to identify and reach zero-dose children living in displaced communities and fragile and conflict settings. Zero-dose children are those that have not received a single shot of a routine vaccine.

_ International Rescue Committee (IRC) - Horn of Africa
World Vision (VW) - the Sahel regions

In the Sahel region, World Vision will head up a consortium of organisations including the African Christian Health Association Platform (ACHAP), Food for the Hungry, CORE Group and other local partners to shine a light on immunisation blind-spots across Burkina Faso, Cameroon, Central African Republic (CAR), Chad, Niger, Nigeria and Mali.

Reference: Greg Hussey

Gavi Zero-Dose Immunization Programme (ZIP)

General

- 2022 initiative to reach "zero-dose" children in fragile, conflict-affected, and displaced communities.
- Unlike Gavi's usual method of working through national governments, ZIP operates in hard-to-reach areas using non-governmental consortia led by partners such as the International Rescue Committee and World Vision.

Objectives and implementation

- **Target population**: The program focuses on the estimated 12.4 million zero-dose children globally, with a particular focus on those in the Sahel and Horn of Africa.
- **Funding**: ZIP was launched with US$100 million in funding.

Operational structure:

    - **Horn of Africa**: The International Rescue Committee leads a consortium called REACH (Reaching Every Child in Humanitarian Settings).
    - **Sahel region**: World Vision leads a consortium called RAISE 4 Sahel.
- **Innovative approach**: The program partners with organizations that have existing relationships and negotiating expertise in insecure areas. This approach allows for vaccination in places where national health systems cannot reach.

Impact and results

According to Gavi's January 2025 progress update, from December 2022 through June 2024, ZIP:

- **Administered doses**: Provided 845,000 first doses and 479,000 last doses of vaccines to infants and children.
- **Built systems**: Focused on establishing sustainable immunization services rather than just one-off vaccination drives.
- **Maintained neutrality**: Successfully negotiated and sustained access to populations in difficult areas, including those held by armed groups.

Gavi Zero-Dose Immunization Programme (ZIP)

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Five things to know about Gavi's humanitarian partnership immunising children in conflict zones

Delivering vaccines in hostile environments requires a blend of immunisation programming and neutral, humanitarian work.

20 January 2025 · 4 min read · by Priya Joi Republish this article

Cover image: READO staff on their way through Walaag 1 IDP camp in Somalia to the outreach facility to begin administering vaccinces. Gavi/2024/Mohamed Abdihakim Ali

Reference:

Reference:

Picture credit: WHO AFRO

THANK YOU!

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