



Guide for Promoting Equitable Health Product Access through Supply Chain Design

Last Updated: April 2020

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Overview

Expanding access to Primary Health Care (PHC) is critical to achieving Universal Health Coverage.

Immunization is a key pillar for PHC, but coverage has stagnated since 2009. Inequities in immunization, or “avoidable differences in immunization coverage between population groups that arise because barriers to immunization among disadvantaged groups”, appear to be contributing to stagnation in coverage rates.

Zero-dose and under-immunized children often live in clusters. There is a need to reach under-served populations with equity as the organizing principle.

Global trends straining current health systems:

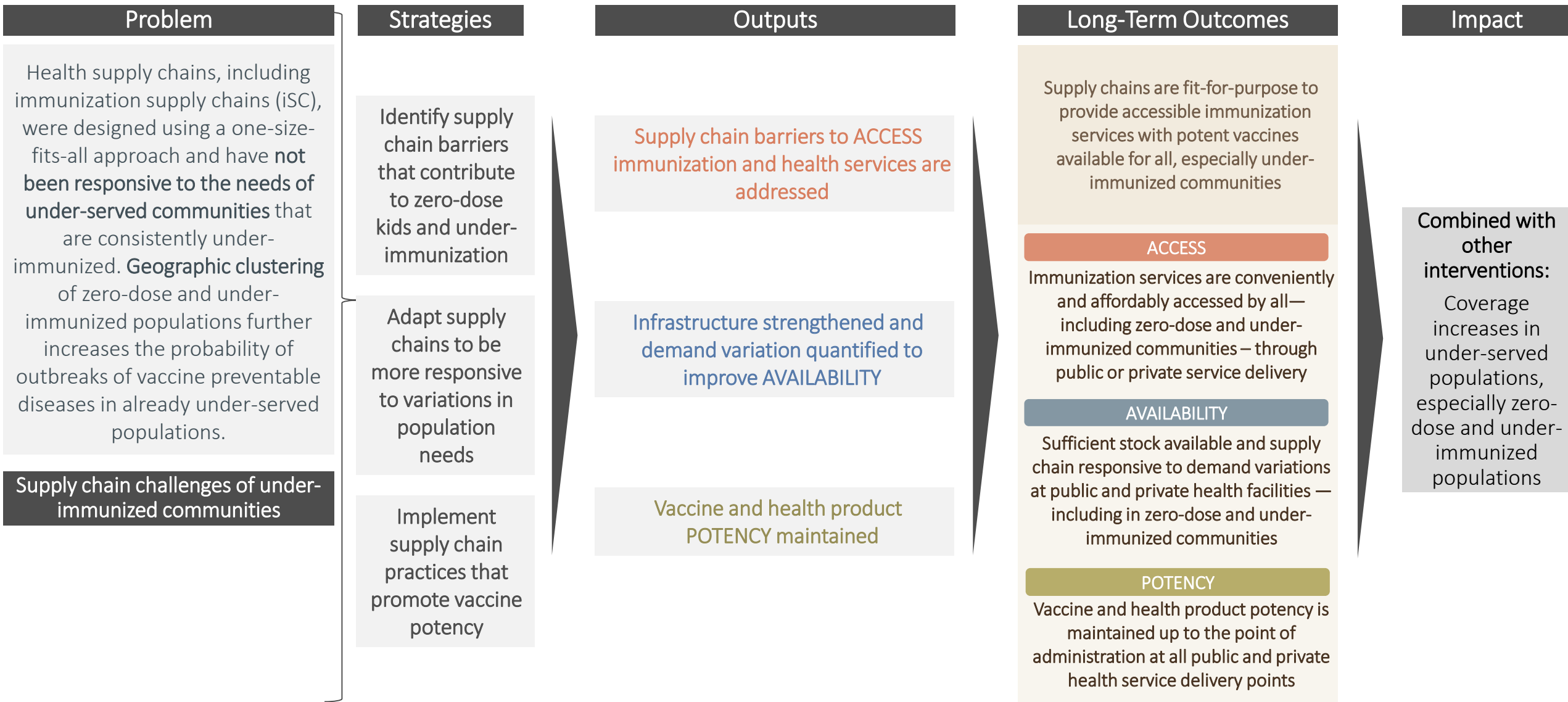
- 1.25bn more people in urban areas in Asia and 0.8bn in Africa by 2050
- Doubled number of conflicts since 2010 with 68.5million people displaced, with 85% in LMICs
- 1 million vaccine preventable deaths/year in children <5 linked to the environment
- New vaccine introductions in the next 5 years will strain the current system

Role of Supply Chains

To improve coverage, supply chains need to be resilient and responsive to ensure availability and access to potent health products for all.

This guide provides a four step approach to addressing inequities, and illustrates a Theory of Change.

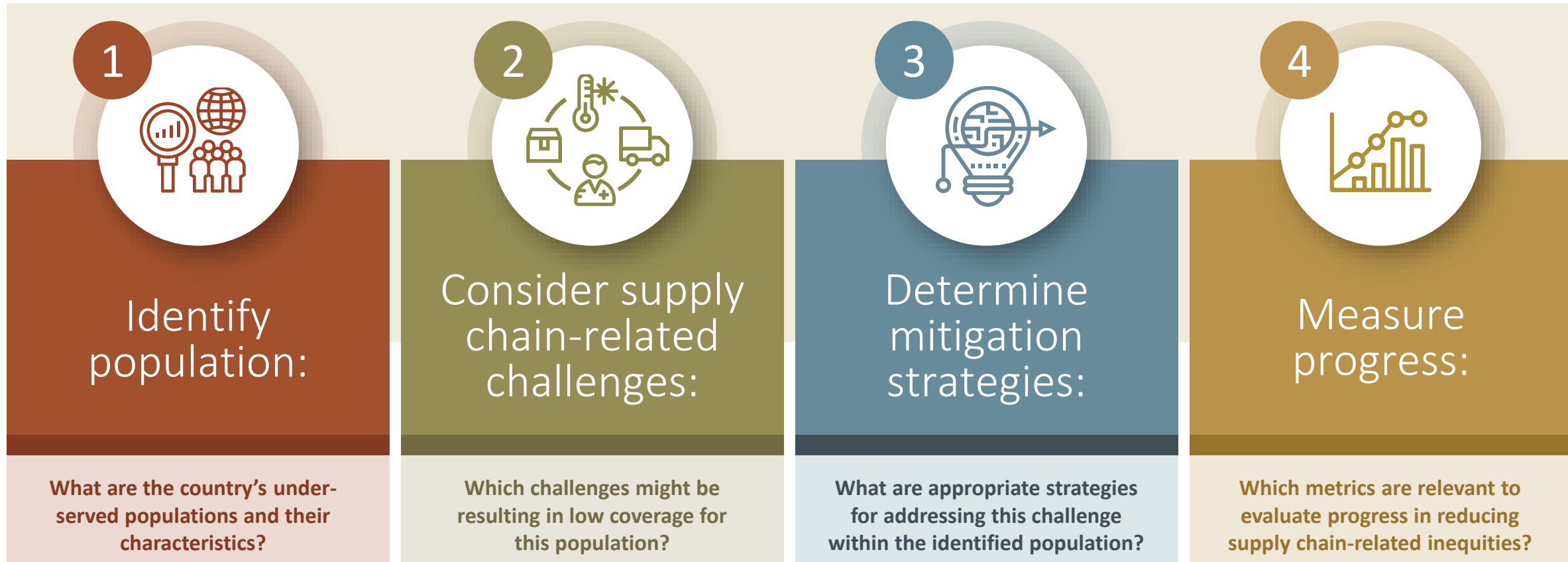
Theory of change: Supply chain factors impacting equity in immunization



Supply chain factors impacting equity in immunization: decision-making guide

Objective: Guide decision-makers to identify and address the supply chain barriers that limit access to health products, especially immunization, in under-served communities

A four-step guide to applying an equity lens:



Identify under-served population

Zero-dose populations have not received *any* doses of DTP-containing vaccines
Under-immunized populations have not received *three* doses of DTP-containing vaccines

Identify specific populations or communities in your country that are known or suspected to have low coverage rates

Each community faces unique challenges and, hence, strategies need to be tailored to promote equity. Review the guide for each under-served community.

This guide focuses on four under-served groups:

- Urban poor (“slums”)
- Remote, rural communities
- Populations in conflict or security-compromised areas
- Internal or cross-country migrant communities

**This guide has not included adolescents, even though they may be an under-served group in your community. Many of the indicators and associated strategies featured in this guide are relevant for adolescents, but you may consider implementing additional, more contextually specific strategies that better meet the needs of adolescent populations.*

Identify under-served population

It is important to understand context and factors impacting zero-dose and under-served populations

Fill information about the under-served population or community identified:

Name of the population	<i>Be specific, as this will help develop relevant tailored strategies. E.g. Urban poor in X city, a specific nomadic group, or a refugee population.</i>		
Population characteristics <i>(check all that apply and add other characteristics)</i>	<input type="checkbox"/> Urban poor (“slums”) <input type="checkbox"/> Remote/rural <input type="checkbox"/> Internal migrants/mobile/displaced <input type="checkbox"/> External migrants/refugees <input type="checkbox"/> Conflict or security-compromised area <input type="checkbox"/> Urban rich	<input type="checkbox"/> Unlikely to speak the official/common languages of the region where they live <input type="checkbox"/> Unlikely to be able to visit health centers during hours of operation <input type="checkbox"/> Likely for work to vary by season, e.g. in agriculture <input type="checkbox"/> Likely to require both parents or additional guardian to be present for immunization <input type="checkbox"/> Impacted by security challenges <input type="checkbox"/> Identified zero-dose children	Other characteristics:
Describe any outbreaks in this population, especially of vaccine preventable diseases	<i>What disease(s) and when? Was any information gathered about factors contributing to the outbreak (e.g. vaccine hesitancy, potency, poor availability of vaccines)? What was done to respond to the outbreak, was the response effective, and what lessons were learned from the response? Overall, does the under-served population have emerging vaccination health needs that are not currently being met?</i>		
Is this population served by outreach or mobile services?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes: How often are there outreach services intended for this population? How often are there mobile services intended for this population?	
Is this population served by private health services?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes: <i>Describe how private facilities interact with the EPI. Do they get vaccines from the EPI? Do they report data to the EPI? How are private facilities regulated by the public health system?</i>	
Which partners are working on improving health services?	Which, if any, community members who can be engaged?		
Resources to address supply-related inequities	<i>Consider: Given current resourcing, is there current capacity to meet the size/needs of the population? Can existing health services cover needs of population? Is there sufficient will to reallocate resources to cover under-served? If so, with whom can you partner and how can you build political will to address these needs?</i>		

Identify under-served population

Health supply chains, including immunization supply chain (iSC) systems, are usually designed using a one-size-fits-all approach and may **not be responsive to the needs of [the identified population]**, which has been consistently under-served

Does this apply to the under-served population selected?

If **yes**, continue using this guidance

If **uncertain or agree partially**, continue using this guidance for supply chain factors that may lead to inequities in coverage

If **no**, consider other factors outside of supply that may be driving low coverage rates

Consider supply chain challenges for low coverage rates

The guidance highlights supply chain challenges that inhibit availability, potency, and accessibility of health products, especially vaccines, in under-served populations, such as zero-dose children and under-immunized communities

- Explore challenges that result in low coverage for the identified under-reached population
- Select strategies to mitigate the challenge, tailored to context
- Measure progress to achieve outcomes by selecting indicators and integrating in existing monitoring and evaluation plans

If very little is known about the specific challenges for the under-reached population, it may be necessary to gather information on challenges through focus group discussions or key informant interviews with community members before using this guidance

Note: There are many other challenges of low coverage and under-immunization related to demand and service delivery that are not the focus of this guidance. More Resources related to [Equity in Immunization can be found here](#)

Explore and click supply chain challenges for low coverage relevant to the under-served population

After clicking on a challenge you will see possible strategies to address that challenge and potential indicators for measuring progress

[“Click” on challenges in Reading or Slide Show mode on PowerPoint or PDF](#)

[Lack of accurate population and/or consumption data, resulting in inaccurate demand forecasting](#)

[Lack of functional or sufficient cold chain equipment \(CCE\) for storage and transport](#)

[Lack of transport and poor road infrastructure which limit, \(1\) resupplying stock and \(2\) accessing services](#)

[Lack of physical infrastructure at service delivery points, such as electricity or equipment](#)

[Weak procurement and distribution processes at national level, leading to stockouts](#)

[Delayed disbursement of and lack of transparency of use of funds resulting in delayed immunization activities](#)

[Siloed health programs result in \(1\) Missed Opportunity for Vaccination and \(2\) multiple trips by service delivery staff for resupply](#)

[High actual and opportunity costs \(long travel times/distance, long wait times, missed work\) for people to access immunization services](#)

[Weak regulation of and lack of integration of private service delivery points into EPI resulting in \(1\) limited oversight on procurement and \(2\) coverage data](#)

[Insufficient health workforce](#)

[Weak health worker motivation](#)

[Health workers at service delivery points are not regularly trained in immunization supply chain \(iSC\) & logistics](#)

[Insufficient funds for operating fixed, mobile and outreach service delivery, resulting in high costs for populations in accessing services](#)

[Compromised security area, resulting in lack of medical supplies and shortage of health workers](#)

[See complete list indicators](#)

Challenge: Lack of transport and poor road infrastructure which limit:

- Resupplying stock
- Accessing services

Strategies to help mitigate this challenge

- Assess and address road and traffic conditions from communities to public and private service delivery points
- Include private providers in iSC to provide consistent supplies at more locations
- Assess private logistics capacity and resources for outsourcing transportation
 - Outsource transport to private logistics company
- Assess financial resources and flows to ensure that service delivery points have funds for transport to obtain vaccines and provide outreach/mobile services
 - Integrate delivery of commodities
 - Ensure funding is available to transport products
- Direct delivery of immunization supplies to fixed service delivery points
- Increase routine buffer stock or pre-supply products in advance of anticipated adverse weather, ensuring there is adequate storage capacity

Outcomes

- **Access:** Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities
- **Access:** Private providers are supported to augment the reach of the iSC
- **Availability:** Sufficient and functional transport and storage infrastructure for vaccines is available
- **Potency:** Sufficient, reliable and functional CCE are available to transport and store vaccines

Indicators to measure progress

(click indicators for more information)

- [Estimated out-of-pocket cost to access routine immunization services](#)
- [Travel time for population to access routine immunization services](#) (priority for rural areas)
- [Resupply time for community health workers](#) (only relevant where CHWs administer vaccines)
- [Resupply time \(or distance\) for service delivery points](#) (priority for rural areas)
- [Resupply time \(or distance\) from district to its resupply store](#) (priority for rural areas)
- [Percentage of service delivery points unreachable at some point in a year](#) (priority for rural areas)
- [Percentage of days in the year when a vehicle was available to transport products](#)
- [Health facilities in district receiving disbursed operation funds for immunization activities on time](#)

[Return to Challenges](#)

Challenge: High actual and opportunity costs (long travel times/distance, long wait times, missed work) for people to access immunization services

Strategies to help mitigate this challenge

- Assess and address financial resources & flows for service delivery points (including mobile and outreach) to reduce patients' expenditures
- Communicate time and location of immunization services (fixed/mobile/outreach/community health workers) to caregivers (through TV, radio, social media etc.)
- Extend hours of service delivery to accommodate caregivers' schedule
- Assess road and traffic conditions from communities to public and private service delivery points
 - Place service delivery points in locations which are accessible and affordable to communities
- Assess health care financing mechanisms for supply chain delivery for service delivery point and community health workers, to reduce personal expenditure by health workers or cost recovery from patients
 - Integrate delivery of commodities
 - Ensure funding is available to transport products
- Allocate dedicated staff for operating mobile/outreach sessions according to plan
- License and train community members (esp. conflict areas) as vaccinators
- Collaborate with humanitarian aid orgs in conflict areas to provide supplies and services
- Set up service delivery at transit points with supplies to vaccinate at bus stops, borders, etc.

Outcomes

- **Access:** Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for zero-dose and under-immunized communities
- **Access:** Private providers are supported to augment the reach of the iSC

Indicators to measure progress

(click indicator for more information)

- [Estimated out-of-pocket cost to access routine immunization services](#)
- [Average wait times at service delivery points](#) (priority for urban and rural areas)
- [Travel time to access routine immunization services](#) (priority for rural areas)
- [Percentage of public service delivery point offering flexible hours of service](#) (priority for urban areas)
- [Percentage of outreach & mobile services conducted according to plan](#)
- [Health facilities in district receiving disbursed operation funds for immunization activities on time](#)

[Return to Challenges](#)

Challenge: Lack of accurate population and/or consumption data, resulting in inaccurate demand forecasting

Strategies to help mitigate this challenge

- Register newborns and find unregistered families in the community. Compare the number of children in the register with the official target population and with local population records
- Assess characteristics of under-immunized populations (socio-economic demographics, location of public and private service delivery points, community health workers, location of communities, location of resupply points, and mobile/outreach posts).
 - Quantitative strategies: micro-census, satellite imagery, headcounts
 - Qualitative strategies: Focus group discussions, key informant interviews
 - Develop master facility list with unique identifiers for each public and private facility
- Tailor buffer stock policies to account for uncertainty in demand/demand variation
- Improve end-to-end data visibility for accurate forecasting of demand
- Train health workers on vaccine stock management & handling, and refresh training regularly (e.g. training every 1-3 years, regular on-the-job training/supervision), including packing passive containers and temperature monitoring
- Strengthen leadership and governance by building capacity to assess data and respond to inequities
 - Establish VAN or IMPACT teams to collaboratively respond to inequities
- Pre-supply stock for emergency preparedness or anticipated migrants

Outcomes

- **Availability:** Supply chain policies are adapted to avoid stockouts by accounting for variation or uncertainty in demand
- **Availability:** Demand for immunization supplies in under-immunized populations is more accurately forecast
- **Potency:** Sufficient cold chain equipment is procured, deployed, and maintained to meet the needs of under-immunized populations

Indicators to measure progress

(click indicator for more information)

- [Stockout rate](#)
- [Demand-forecast ratio](#)
- [Percentage of facilities that received supervision visits according to schedule](#)

[Return to Challenges](#)

Challenge: Weak regulation and lack of integration of private service delivery into EPI resulting in:

- limited oversight of vaccines procured and delivered in private sector for quality and potency
- limited insight of coverage by private sector for under-immunized populations

Strategies to help mitigate this challenge

- Understand characteristics of under-immunized populations as related to care-seeking at public and/or private facilities (location of public and private service delivery points, community health workers, location of communities, location of resupply points, and mobile/outreach posts)
 - Quantitative strategies: micro-census, satellite imagery
 - Qualitative strategies: Focus group discussions, key informant interviews
 - Develop master facility list with unique identifiers for each public and private facility
- Include private providers in iSC to provide consistent, WHO pre-qualified vaccines at more locations and ensure safe vaccine handling during transport
- Improve end-to-end data visibility for accurate forecasting of demand by integrating private providers into LMIS
- Strengthen leadership and governance by building capacity to assess and respond to inequities
 - Establish VAN or IMPACT teams to collaboratively respond to inequities
- Contract with and provide vaccines to private service delivery points

Outcomes

- **Access:** Private providers are supported to augment the reach of the iSC
- **Potency:** Immunization potency is maintained up to the point of administration at all public and private health service delivery points

Indicators to measure progress

(click indicator for more information)

- [Reliable sourcing of products for private service delivery points](#) (priority for urban areas, only relevant where private service delivery is commonly used by under-immunized groups)
- [Percentage of private service delivery points reporting data to EPI](#) (priority for urban areas)

Challenge: Siloed health programs result in:

- Missed opportunities for vaccination (MOV)
- Multiple trips by service delivery staff for resupply

Strategies to help mitigate this challenge

- Understand comprehensive health needs of under-immunized populations to plan for integrated service delivery
 - Partner with private facilities to improve identification of under-immunized communities
- Placement of immunization service delivery points in locations where people are seeking other health services (e.g. TB treatment centers)
- Assess health care financing mechanisms for supply chain delivery to service delivery point and community health workers, to reduce personal expenditure by health workers or cost recovery from patients
- Selectively integrate transportation of products to service delivery points to minimize resupply trips
 - Ensure funding is available to transport products
- Strengthen leadership and governance by building capacity to assess and respond to inequities
 - Establish Terms of Reference for Logistics Working Group, and strengthen into a decision-making body
 - Operationalize Logistics Working Groups to respond to inequities
 - Establish VAN or IMPACT teams to collaboratively respond to inequities
- Direct delivery of immunization and other product supplies to health facilities

Outcomes

- **Access:** Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunization communities
- **Access:** Private providers are supported to augment the reach of the iSC
- **Availability, Potency:** Sufficient and functional transport and storage infrastructure for vaccines is available in the EPI

Indicators to measure progress

(click indicator for more information)

- [Average wait time at service delivery point](#) (priority for urban and rural areas)
- [Travel time for population to access routine immunization services](#) (priority for rural areas)
- [Temperature controlled transportation capacity](#)
- [Percentage of days in the year when a vehicle was available to transport products](#)
- [Health facilities in district receiving disbursed operation funds for immunization activities on time](#)

Challenge: Health workers at service delivery points are not regularly trained in immunization supply chain (iSC) & logistics

Strategies to help mitigate this challenge

- Train health workers on vaccine stock management & handling, and refresh training regularly (e.g. training every 1-3 years, regular on-the-job training/supervision)
- Train warehouse staff on vaccine storage, handling, packing, etc. and refresh training regularly (e.g. training every 1-3 years, regular on-the-job training/supervision), including packing passive containers and temperature monitoring
- Strengthen leadership and governance to build capacity for health workers
- Direct delivery of immunization supplies to health facilities

Outcomes

- **Potency:** Vaccinators know and implement best practices to protect and assess vaccine potency
- **Availability:** Sufficient stock available and responsive to demand variations at public and private health facilities —including in un- and under-immunized communities.

Indicators to measure progress

(click indicator for more information)

- [Percentage of service delivery points with an active, trained vaccinator](#)
- [Percentage of facilities that received supervision visits according to schedule](#)

Challenge: Lack of functional or sufficient cold chain equipment (CCE) for storage and transport

Strategies to help mitigate this challenge

- Train health workers on vaccine stock management & handling, and refresh training regularly (e.g. training every 1-3 years, regular on-the-job training/supervision), including packing passive containers and temperature monitoring
- Train warehouse staff on vaccine storage, handling, packing, etc. and refresh training regularly (e.g.. training every 1-3 years, regular on-the-job training/supervision)
- Complete cold chain inventory to inform gaps in CCE and new CCE deployment
- Allocate funding, human resources, and spare parts to ensure preventative maintenance and repairs of CCE
- Integrate CHWs in supply chain to ensure CCE (vaccine carriers etc.) and transport are available for CHWs
- Prioritize procurement and CCE deployment responding to needs of under-immunized populations
 - Ensure CCE is sufficient based on variable and invariable demand
- Prioritize supply of certain vaccines of highly prevalent or contagious vaccine preventable diseases in the area, or where migrants are coming from

Outcomes

- **Potency:** Human, financial, and material resources are available to maintain and repair CCE in under-immunized communities
- **Potency:** Gaps in cold chain coverage for under-immunized populations are identified
- **Availability:** Cold chain equipment is procured and deployed to meet the needs of under-immunized populations
- **Potency, Availability:** Sufficient, reliable and functional CCE are available to transport and store vaccines

Indicators to measure progress

(click indicator for more information)

- [Percentage of functional cold chain equipment](#)
- [Temperature controlled transportation capacity](#)
- [Percentage of facilities that received supervision visits according to schedule](#)
- [Health facilities in district receiving disbursed operation funds for immunization activities on time](#)

Challenge: Insufficient funds for operating fixed, mobile and outreach service delivery, resulting in high costs for populations in accessing services

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• Assess financial resources and flows to ensure that service delivery points have funds for transport to obtain vaccines and provide outreach/mobile services<ul style="list-style-type: none">• Integrate delivery of commodities• Ensure funding is available to transport products• Allocate budget and disburse government and donor funding and resources to regions/districts in a timely manner	<ul style="list-style-type: none">• Access: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities• Access: Private providers are supported to augment the reach of the iSC
	<p data-bbox="1090 482 2530 606" style="text-align: center;">Indicators to measure progress (click indicator for more information)</p> <ul style="list-style-type: none">• <u>Estimated out-of-pocket cost to access routine immunization services</u>• <u>Travel time to access routine immunization services</u> (priority for rural areas)• <u>Resupply time for community health workers</u> (only relevant where CHWs administer vaccines)• <u>Resupply time (or distance) for service delivery points</u> (priority for rural areas)• <u>Percentage of days in the year when a vehicle was available to transport products</u>• <u>Percentage of outreach & mobile services conducted according to plan</u>• <u>Health facilities in district receiving disbursed operation funds for immunization activities on time</u>

Challenge: Compromised security area, resulting in lack of medical supplies and health workers

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• Assess risk profile of area based on history of violence or other intelligence assessment to inform operational strategies• Provide security guidance for health care workers working in conflict-affected areas• Negotiate “days of tranquility” in conflict area for transporting supplies and rapid service delivery<ul style="list-style-type: none">• Rapidly mobilize and deploy resources necessary to cover targeted areas during a relatively short period• Collaborate with military or other security personnel to escort supplies or service delivery teams• Set up service delivery at transit points with supplies to vaccinate at bus stops, borders, etc.<ul style="list-style-type: none">• Train officials at border control to stock adequate supplies for immunization• Pre-supply stock during “days of tranquility” or safe periods, ensuring adequate storage capacity at facilities• Implement catch-up campaigns with flexibility around age and other criteria, to vaccinate birth cohorts that missed age-appropriate vaccines	<ul style="list-style-type: none">• Access: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities• Availability: Sufficient stock available for health workers operating in compromised security areas <div data-bbox="1090 506 2535 628"><p style="text-align: center;">Indicators to measure progress (click indicator for more information)</p></div> <ul style="list-style-type: none">• Number of transit posts set up in high risk areas region (priority for conflict areas or migrant communities)• Stockout rate• Number of health workers by population

Challenge: Lack of physical infrastructure at service delivery points, e.g. electricity or equipment

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• Engage local communities to provide physical infrastructure for supply chain equipment or health facilities• Engage key local stakeholders to prevent theft of equipment, such as solar panels for cold chain equipment (CCE)• Prioritize Solar Direct Drive (SDD) refrigerators for cold chain• Use cold boxes or vaccine carriers with long holdover times for areas with lack of electricity or other power sources• Analyze storage capacity and infrastructure of facilities to identify gaps	<ul style="list-style-type: none">• Access: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities• Potency, Availability: Sufficient, reliable and functional CCE are available to transport and store vaccines
	<p style="text-align: center;">Indicators to measure progress (click indicator for more information)</p>
	<ul style="list-style-type: none">• <u>Percentage of functional cold chain equipment</u>

Challenge: Weak procurement and distribution processes at national level, leading to stockouts

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• Apply one-dose strategy at service delivery level in order to immunize more people when there is limited stock• Implement catch-up campaigns with flexibility around age and other criteria, to vaccinate birth cohorts that missed age-appropriate vaccines• Expand immunization schedule to wider age group, to account for stockouts when vaccines are needed• Assess procurement lead-time, and design standard operating procedures (SOPs) to ensure timely procurement• Arrange and keep documents used in the procurement process for easy reference• Strengthen leadership and governance for procurement	<ul style="list-style-type: none">• Availability: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities
	<p data-bbox="1268 406 2535 521" style="text-align: center;">Indicators to measure progress (click indicator for more information)</p> <ul style="list-style-type: none">• Stockout rate• Percentage of procurements completed within time

Challenge: Delayed disbursement of and lack of transparency of use of funds resulting in delayed immunization activities

Strategies to help mitigate this challenge

- Assess financial flows to understand bottlenecks in flow of funds
- Distribute decision-making authority on use of funds to staff at downstream tiers of the system for immunization sessions and supervision
- Assess timeline for disbursement of funds at national and state/provincial level, to ensure timely release of funds from time of approval
- Streamline financial reporting process, by providing clear templates, timelines, and requirements
- Train staff at downstream levels to produce timely and accurate financial information based on government and donor requirements
- Assess and evaluate how well facilities comply with and adhere to relevant policies, laws, directions, plans, and procedures, usually carried by financial controllers at the Ministry of Finance

Outcomes

- **Access:** Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities

Indicators to measure progress

(click indicator for more information)

- [Percentage of facilities that received supervision visits according to schedule](#)
- [Percentage of outreach & mobile services conducted according to plan](#)
- [Health facilities in district receiving disbursed operation funds for immunization activities on time](#)

Challenge: Insufficient health workforce

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• Conduct a human resource analysis on the demography of current human resources in both the public and private sectors; the gaps in service provision; the extent to which task shifting is already taking place; and the existing human resource quality assurance mechanisms• License and train community members (esp. conflict areas) as vaccinators<ul style="list-style-type: none">• Issue work permits for cross-border refugees for health care• Partner with private sector providers to allocate health workers for services, where there are human resource gaps in public sector• Task shifting: re-distribute tasks from professionals/specialists to other categories of health workers or lay health workers<ul style="list-style-type: none">• Hire lay health workers or less specialized health workers• Assess existing policies to allow hiring of new cadre of health workers or enable less specialized health workers to deliver services	<p data-bbox="1248 228 2535 399">• Access: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities</p> <p data-bbox="1248 399 2535 521">Indicators to measure progress (click indicator for more information)</p> <ul style="list-style-type: none">• Number of health workers per population• Percentage of service delivery points with adequate frequency of immunization sessions• Percentage of service delivery points with an active, trained vaccinator

Challenge: Weak health worker motivation

Strategies to help mitigate this challenge	Outcomes
<ul style="list-style-type: none">• License and train community members (esp. conflict areas) as vaccinators<ul style="list-style-type: none">• Issue work permits for cross-border refugees for health care• Provide security guidance for health care workers working in conflict-affected areas• Implement non-financial incentives, e.g. opportunity for permanent employment or career progression, to increase retention of health workers• Train and ensure managers/supervisors provide regular technical support and feedback to health workers• Create mechanism for recognition of achievement and successes for health workers• Provide continuing education and training opportunities to allow health workers to gain skills, take on more demanding duties, and achieve personal career goals• Offer flexible work schedules (esp. for female health workers)• Train district staff on supportive supervision and ensure visits occur regularly for health workers	<p data-bbox="1274 235 2548 406">• Access: Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for under-immunized communities</p> <p data-bbox="1274 406 2548 528">Indicators to measure progress (click indicator for more information)</p> <ul style="list-style-type: none">• Percentage of health workers with job descriptions• Percentage of facilities that received supervision visits according to schedule

Indicators

Outcomes	Indicators	Priority populations
Access	Estimated out-of-pocket cost for routine immunization services	
Access	Average wait times at service delivery points	Rural and Urban areas
Access	Percentage of outreach & mobile services conducted according to plan	
Access	Percentage of public service delivery points offering flexible hours of service	Urban poor
Access	Travel time for population to access routine immunization services	Rural areas
Access	Number of health workers by population	
Access	Number of transit posts set up at high risk areas of the country	Migrants, Security-compromised areas
Access, Availability	Percentage of service delivery points with adequate frequency of immunization sessions	
Access, Availability	Percentage of private service delivery points reporting data to EPI	Urban poor
Access, Availability, Potency	Health facilities in district receiving disbursed operation funds for immunization activities on time	
Availability	Stockout rate	
Availability	Demand forecast ratio	
Availability	Reliable sourcing of products for private service delivery points	Urban poor, only where people access services by private providers
Availability	Percentage of procurements completed within time	
Availability, Potency	Percentage of days in the year when a vehicle was available to transport products	
Availability, Potency	Percentage of facilities that received supervision visits according to schedule	
Availability, Potency	Percentage of health workers with job description	
Availability, Potency	Percentage of service delivery points unreachable at some point in a year	
Availability, Potency	Percentage of service delivery points with an active, trained vaccinator	
Availability, Potency	Resupply time (or distance) for service delivery points	Rural areas
Availability, Potency	Resupply time (or distance) from district to its resupply store	Rural areas
Availability, Potency	Resupply time for community health workers	Only where CHWs administer vaccine
Potency	Temperature controlled transportation capacity	
Potency	Percentage of functional cold chain equipment	

Indicator: Estimated out-of-pocket cost for routine immunization services

Definition or Formula	The out-of-pocket costs incurred by a caregiver for taking their child for one visit for routine immunization, plus any base costs associated with being fully immunized (such as having to pay for an immunization booklet).	<i>Numerator: N/A</i>
	Base costs (e.g. booklet) + round trip travel cost to access immunizations + any costs associated with services provided	<i>Denominator: N/A</i>
Rationale	Financial burden can represent a significant barrier for accessing immunization services. Cost of paying for transportation and vaccination services (i.e. vaccination booklets) may be prohibitively high for consumers. The amount users pay for services should be considered when considering challenges and strengths of the iSC design to reduce costs. This indicator aims to estimate consumer costs in order to provide insights into if the cost of RI inhibits access to services. This indicator identifies areas where iSC strategies to reduce out-of-pocket costs should be prioritized. Adaptations to the iSC may help to alleviate some of the financial burden of immunization	
How to Measure	You can survey health workers on what fees, if any, are charged for immunization booklets and services provided, and whether they know what it generally costs for users to travel to and from the clinic. You may also survey caregivers taking a child for an immunization visit, and ask them what they spent to travel to and from the clinic and if they were charged anything for the booklet and services provided. In this case you might use the average travel cost reported.	
Target	Overall target depends on the individual costs included in this indicator, which are tailored to the country context. <i>Examples from previous studies are variable: Indirect cost of vaccination in Chad \$17.90; \$12.94 Rwanda; \$7.80 Congo; Treatment cost \$0.80; OOP travel cost 0.13 Mean cost per person per dose as % of minimum daily wage 0.27%; Rota \$194OOP 26% Average monthly income; \$0.02 travel cost clinic is close</i>	
Notes	It is difficult to measure all dimensions out-of-pocket costs such as lost wages, opportunity costs, and costs required to fully immunize a child over multiple visits. We therefore suggest calculating an estimate of base and service costs as a proxy for whether out-of-pocket costs might prohibit users from accessing vaccinations. If service cost exists and varies by vaccine type we suggest using the visit with the highest cost.	
Sources for more information	Ettling, M., Shepard, D., 1991. Economic cost of malaria in Rwanda. <i>Tropical Medicine and Parasitology</i> 42, 214 – 218.; Shepard, D., Ettling, M., Brinkmann, U., Sauerborn, R., 1991. The economic cost of malaria in Africa. <i>Tropical Medicine and Parasitology</i> 42, 199–203.; Chai, P. F., & Lee, W. S. (2009). Out-of-pocket costs associated with rotavirus gastroenteritis requiring hospitalization in Malaysia. <i>Vaccine</i> , 27, F112-F115.; Mogasale V, Kar SK, Kim J-H, Mogasale VV, Kerketta AS, Patnaik B, et al. (2015) An Estimation of Private Household Costs to Receive Free Oral Cholera Vaccine in Odisha, India. <i>PLoS Negl Trop Dis</i> 9(9): e0004072. doi:10.1371/journal.pntd.0004072	

Indicator: Average wait time at service delivery point

Definition or Formula	Average amount of time patient spends waiting to receive routine immunization services	<i>Numerator:</i> Patient ₁ wait time + Patient ₂ wait time...+ Patient _x wait time
		<i>Denominator:</i> Number of patients whose waiting time you totaled
Rationale	Long wait times (LWT) can represent a significant barrier for accessing immunization services. LWT may pose a "hidden cost" to patients as they must forego income-generating and personal/domestic activities while waiting for care. LWT may dissuade patients from accessing vaccination. This indicator is used to determine the extent to which waiting for care represents a burden to those seeking vaccination services. This indicator quantifies the time burden of care which is a measure of system efficiency indicating if the iSC infrastructure is sufficient to meet demand.	
How to Measure	Options: <ol style="list-style-type: none"> 1. Conduct an exit survey with caregivers/patients leaving the facility after immunization and ask how long they waited before receiving immunization services. 2. Observe a patient waiting room and track waiting times from when a patient arrived to when they were seen for immunization. 3. Conduct a survey with patients who previously accessed immunization services at a given location. Ask them how long they had to wait to receive services the last time they visited the health facility. 	
Target	30 minutes	
Notes	30 minutes is frequently cited in the literature as an appropriate target, but wait times cited can vary from 10 minutes to 3 hours.	
Sources for more information	Mogasale, V., Kar, S. K., Kim, J. H., Mogasale, V. V., Kerketta, A. S., Patnaik, B., ... & Maskery, B. (2015). An estimation of private household costs to receive free oral cholera vaccine in Odisha, India. PLoS neglected tropical diseases, 9(9), e0004072; Bosu, W. K., Ahelegbe, D., Edum-Fotwe, E., Bainson, K. A., & Turkson, P. K. (1997). Factors influencing attendance to immunization sessions for children in a rural district of Ghana. Acta Tropica, 68(3), 259-267.; Aldana, J. M., Piechulek, H., & Al-Sabir, A. (2001). Client satisfaction and quality of health care in rural Bangladesh. Bulletin of the World Health Organization, 79, 512-517.; Streefland, P. H., Chowdhury, A. M., & Ramos-Jimenez, P. (1999). Quality of vaccination services and social demand for vaccinations in Africa and Asia. Bulletin of the World Health Organization, 77(9), 722.; Mogasale, V., Kar, S. K., Kim, J. H., Mogasale, V. V., Kerketta, A. S., Patnaik, B., ... & Maskery, B. (2015). An estimation of private household costs to receive free oral cholera vaccine in Odisha, India. PLoS neglected tropical diseases, 9(9), e0004072.;	

Indicator: Percentage of outreach & mobile services conducted according to plan

Definition or Formula	Percentage of outreach and mobile services <i>conducted</i> compared to the number of outreach and mobile services <i>planned</i> for the community of interest in the previous month	<p><i>Numerator:</i> (number of outreach and mobile sessions conducted over X time period) x 100%</p> <p><i>Denominator:</i> number of outreach and mobile sessions that were originally planned for X time period</p>
Rationale	Outreach & mobile services brings providers to communities, particularly in instances where health infrastructure is sparse, insufficient and/or where geographic barriers are extreme. Individuals living in such settings may be less likely to access care. This indicator is used to provide insight into the extent to which an iSC facilitates access to care through outreach and mobile service units. It aims to determine the reach of immunization services for zero-dose and under-immunized populations.	
How to Measure	Track number of conducted sessions with standard monitoring, or institute a simple documentation plan if needed. Use microplanning documents to determine number of planned services	
Target	80% or all planned sessions are conducted (or country-defined target)	
Notes	If sessions are not conducted according to plan, investigate why so you can address the root issue(s): lack of funds? Lack of human resources? Lack of transportation equipment or cold boxes? Insufficient stock? Insufficient demand?	
Sources for more information	Igarashi, K., Sasaki, S., Fujino, Y., Tanabe, N., Muleya, C. M., Tambatamba, B., & Suzuki, H. (2010). The impact of an immunization programme administered through the Growth Monitoring Programme Plus as an alternative way of implementing Integrated Management of Childhood Illnesses in urban-slum areas of Lusaka, Zambia. <i>Transactions of the Royal Society of Tropical Medicine and Hygiene</i> , 104(9), 577-582. Chicago; Sasaki, S., Igarashi, K., Fujino, Y., Comber, A. J., Brunson, C., Muleya, C. M., & Suzuki, H. (2011). The impact of community-based outreach immunisation services on immunisation coverage with GIS network accessibility analysis in peri-urban areas, Zambia. <i>J Epidemiol Community Health</i> , 65(12), 1171-1178.; https://plan-international.org/case-studies/vaccinations-keep-children-healthy-and-mothers-happy ; Reaching Every District (RED), 2017 revision. Brazzaville: World Health Organization; 2017.Licence: CC BY-NC-SA 3.0 IGO https://www.afro.who.int/sites/default/files/2018-02/feb%202018_reaching%20every%20district%20%28RED%29%20English%20F%20web%20v3.pdf	

Indicator: Travel time for population to access routine immunization services

Definition or Formula	Estimated travel time between the population of interest and the nearest service delivery point (public or private) that provides routine immunization services	<i>Numerator:</i> N/A
		<i>Denominator:</i> N/A
Rationale	Long travel times (LTT) can represent a significant barrier for accessing immunization services. LTT may pose a "hidden cost" to patients as they must forego income-generating and personal/domestic activities while in transit to receive care. LTT may dissuade patients from accessing vaccination. This indicator is used to provide insight into the extent to which the iSC enables access to care through well placed and easy to access fixed facilities. It helps to show the physical accessibility of HF by estimating the travel time between fixed vaccination sites and target population.	
How to Measure	<p>Options:</p> <ol style="list-style-type: none"> 1. Ask key stakeholders (community leaders, etc.) how long it generally takes for people in the target population to reach the nearest health facility that offers immunizations 2. Conduct a survey with community members who live in the center of where the target population lives, and those who live on the outskirts, asking them about travel time to the nearest HF that offers routine immunization 3. Collect data on travel time from the center and outskirts to the nearest HF by traveling it yourself 	
Target	30 minutes (or country-defined target)	
Notes	<ul style="list-style-type: none"> -An estimate of travel time should suffice for a general understanding of whether the population faces long travel times; the level of effort required to determine an accurate average based on many data points may be unnecessary -Consider whether it is relevant for you to understand whether people are traveling on foot, by bicycle, vehicle, etc. -This indicator could be used as a proxy for average out-of-pocket costs to access routine immunization if cost information is not available, although this indicator does not capture non-travel-related aspects of access. -This indicator could be replaced by “average distance to access routine immunization services” if travel times are not available, although distances do not account for road conditions or traffic that may inhibit access in some areas. 	
Sources for more information	<p>Favin, M., Steinglass, R., Fields, R., Banerjee, K., & Sawhney, M. (2012). Why children are not vaccinated: a review of the grey literature. <i>International health</i>, 4(4), 229-238.;</p> <p>Okwaraji, Y. B., Mulholland, K., Schellenberg, J., Andarge, G., Admassu, M., & Edmond, K. M. (2012). The association between travel time to service delivery points and childhood vaccine coverage in rural Ethiopia. A community based cross sectional study. <i>BMC public health</i>, 12(1), 476.;</p> <p>Babirye, J. N., Engebretsen, I. M., Rutebemberwa, E., Kiguli, J., & Nuwaha, F. (2014). Urban settings do not ensure access to services: findings from the immunisation programme in Kampala Uganda. <i>BMC health services research</i>, 14(1), 111.</p>	

Indicator: Temperature controlled transportation capacity

Definition or Formula	Percentage of service delivery points equipped with adequate temperature controlled transport capacity	<i>Numerator:</i> (the number of service delivery points that have adequate temperature controlled transport capacity) x 100%
		<i>Denominator:</i> total number of service delivery points
Rationale	Reliable, end-to-end cold chain, including during transportation is critical for ensuring that potent vaccines are available at service delivery points. This indicator is used to provide insight into the extent to which an iSC facilitates availability of potent vaccines. It does this by quantifying the % of service delivery points that possess adequate equipment for temperature controlled transportation to transport immunization commodities while maintaining product potency.	
How to Measure		
Target	80% of service delivery points serving the population of interest or country-defined target	
Notes	Target is based on EVM standards. Note that if there are service delivery facilities for which you do not know whether there is adequate temperature controlled transport capacity, these service points should not be factored in to the numerator or the denominator.	
Sources for more information	Effective Vaccine Management https://www.who.int/immunization/sage/meetings/2014/april/2_EVM_JS_DraftStatement_5.2.pdf	

Indicator: Reliable sourcing of products for private service delivery points

Definition or Formula	Percentage of private service delivery points contracting with government for supplies	<i>Numerator:</i> (number of private service delivery points that contract with the government for supplies) x 100%
		<i>Denominator:</i> total number of private service delivery points
Rationale	<p>Private health facilities may not receive the same level of regulation, oversight, and support from the MoH as public facilities, and so may not meet the same standards and expectations to procure and administer quality vaccines. This indicator is used to provide insight into the extent to which private service delivery points have a reliable source of immunization commodities. It does this by quantifying the % of private service delivery points that have contracts with and receive their immunization commodities from governmental entities.</p> <p><u>Note:</u> this indicator may not be relevant in countries or regions where under-immunized communities do not go to private providers for routine immunization.</p>	
How to Measure	LMIS used by EPI to issue products to public and private service delivery points	
Target	This should be a country-defined target that reflects what percentage of private service delivery points you would like to be sourcing from the government.	
Notes		
Sources for more information	Balabanova D, Oliveira-Cruz V, Hanson K. , Health sector governance and implications for the private sector, 2008 Technical Partner Paper 9. Washington, DC: Results for Development Institute and the Rockefeller Foundation	

Indicator: Stockout rate

Definition or Formula	Percentage of service delivery points (SDPs) experiencing a stockout of a <i>specific</i> vaccine over a resupply period	<i>Numerator:</i> (Number of SDPs who experienced a stockout of the <i>specific</i> vaccine during X time period) x 100%
		<i>Denominator:</i> Total number of SDPs expected to offer the specific vaccine
	Percentage of service delivery points experiencing a stockout of <i>any</i> vaccine over a resupply period	<i>Numerator:</i> (Number of facilities who experienced a stockout of any vaccine during X time period) x 100%
		<i>Denominator:</i> Total number of facilities that offer routine immunization
Rationale	Immunization supply chain (iSC) should support product availability. Low stock availability may indicate iSC shortcomings. This indicator is used to provide insight into the extent to which immunization commodities are available at private and public service delivery points. It does this by quantifying the % of service delivery points that experienced a stockout in a resupply period.	
How to Measure	Options: <ol style="list-style-type: none"> 1. Visit facilities and check vaccine stock cards/ledgers of whether/which vaccines are stocked out during a point in time 2. Physical inventory/physical stock counts 3. Stockout reports from health facilities 4. Logistics management information system (LMIS) 	
Target	<20% of SDPs experiencing a stockout on any vaccine <10% of SDPs experiencing a stockout of a specific vaccine	
Notes	This indicator can be calculated using the observed stockout rate on day of the visit (e.g. on day of visit, 20% of facilities were stocked out of rotavirus), or recorded stockouts over a time period, such as one month (e.g. 40% of facilities experienced a stockout of rotavirus at some point in the last month). If there is not data for an SDP it should not be factored into the numerator nor the denominator.	
Sources for more information	Aina, M., Igbokwe, U., Jegede, L., Fagge, R., Thompson, A., & Mahmoud, N. (2017). Preliminary results from direct-to-facility vaccine deliveries in Kano, Nigeria. <i>Vaccine</i> , 35(17), 2175-2182. Chicago; Chukwuma Mbaeyi, Noor Shah Kamawal, Kimberly A. Porter, Adam Khan Azizi, Iftekhar Sadaat, Stephen Hadler, Derek Ehrhardt, Routine Immunization Service Delivery Through the Basic Package of Health Services Program in Afghanistan: Gaps, Challenges, and Opportunities, <i>The Journal of Infectious Diseases</i> , Volume 216, Issue suppl_1, 1 July 2017, Pages S273–S279; Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf ; WHO Service Availability and Readiness Assessment (SARA): Reference Manual Chapter 3	

Indicator: Resupply time for community health workers

Definition or Formula	Average travel time for community health workers (CHW) to travel and collect immunization supplies	<i>Numerator:</i> CHW ₁ travel time + CHW ₂ travel time...+ CHW _x travel time
		<i>Denominator:</i> Number of CHWs in the region of interest whose travel times you totaled
	Percentage of CHW's who travel 30 minutes or less for resupply	<i>Numerator:</i> number of CHWs in region of interest who travel 30 minutes or less for resupply
		<i>Denominator:</i> total number of CHWs in a region of interest who go for resupply (and whose time to reach resupply is known)
Rationale	CHWs improve access to healthcare by reaching the most inaccessible areas. The time CHW spend travelling to their resupply point for immunization supplies reduces the amount of time they have to allocate to other tasks; additionally, long travel times may negatively impact commodity potency. When CHWs face challenges travelling to a resupply point, this may negatively impact commodity availability and potency. This indicator is used to determine the extent to which CHWs may face challenges acquiring immunization commodities. This is done by quantifying the avg amount of time a CHW must travel in order to access their resupply point. Note: this is only relevant in countries/regions where CHW are authorized to administer vaccinations.	
How to Measure	Survey CHWs to ask how long it takes them to travel for resupply, one-way	
Target	Average travel time: 30 minutes for a one-way trip (or country-defined target)	
	Percentage traveling 30 minutes or less: 100% (or country-defined target)	
Notes	<ul style="list-style-type: none"> - Consider whether knowing the average travel time and a range, or knowing what percentage of CHWs travel 30 minutes or less, would be most informative for you. - Consider whether it is relevant to you whether they travel on foot, by bicycle, vehicle, etc. - The supply chain for CHW can be configured to reduce the logistics burden for the CHWs by ensuring that stocks are available at convenient locations, for example, at service delivery points rather than at districts. However, convenience should be balanced with storage capacity and supervision capacity, which may be greater at districts. <i>This indicator is only relevant when CHWs administer vaccines and go for resupply.</i> 	
Sources for more information	SC4CCM. Ethiopia Health Post Supply Chain Baseline Assessment Report. Arlington, VA: JSI Research & Training Institute, Inc., 2010.; SC4CCM. Rwanda Community Health Supply Chain Baseline Assessment Report. Arlington, VA: JSI Research & Training Institute, Inc., 2011.	

Indicator: Resupply time (or distance) for service delivery points

Definition or Formula	Average time (or distance) per one-way trip for products to get to a service delivery point (SDP) from the resupplying warehouse (usually the district)	<i>Numerator:</i> Warehouse to SDP ₁ travel time (or distance) + Warehouse to SDP ₂ travel time...+ Warehouse to SDP _x travel time
		<i>Denominator:</i> Number of warehouse to SDP resupply times (or distances) in the region of interest you totaled
	Percentage of service delivery points whose resupply time from warehouses is four hours or less	<i>Numerator:</i> (number of SDPs for which resupply travel time is four hours or less) x 100%
		<i>Denominator:</i> total number of SDPs in a region of interest for which their resupply time from warehouse to SDP is known
Rationale	When healthcare workers go to pick up products, the time spent travelling to their resupply point for immunization supplies reduces the time they have to deliver services. Long travel times also negatively impact commodity availability, as workers may not always have the resources (time, transport, money etc.) to pick up vaccines. Potency may also be impacted, as long travel distances put vaccines at greater risk of spoilage.	
How to Measure	Options: <ol style="list-style-type: none"> 1. Consult Ministry of Health records for recorded distances between SDPs and supplying warehouses 2. Use geo-coordinates on maps to get distance between SDP and supplying warehouse 3. Survey country-relevant staff (logisticians, cold chain managers, SDP managers, etc.) on how long it takes to travel from SDP to resupplying warehouse 	
Target	Average travel time: Four hours or a half-day for a one-way trip (to allow for a return trip in the same day), or country-defined target	
	Percentage of SDPs with four hours or less travel time from resupplying warehouse: 100% (or country-defined target)	
Notes	<ul style="list-style-type: none"> - Consider whether knowing the average travel time or distance and a range, or knowing for what percentage of SDPs the resupply travel time is less than four hours, would be most informative for you. - Consider whether it is relevant to you whether they travel on foot, by bicycle, vehicle, etc. - Travel time is preferred over distance when possible to account for road and traffic conditions. 	

Indicator: Percentage of functional Cold Chain Equipment (CCE)

<p>Definition or Formula</p>	<p>% of cold chain equipment (CCE) in the region of interest that are fully functional. CCE is defined as all refrigerators, freezers, passive storage devices, and walk-in cold rooms and freezer rooms designated for storing vaccines. CCE functioning can be measured at a point in time or over a particular period of time.</p>	<p><i>Numerator:</i> (number of cold chain equipment in the region of interest that are fully functional) x 100%</p> <p><i>Denominator:</i> total number of cold chain equipment in the region of interest</p>
<p>Rationale</p>	<p>Non-functional CCE poses a risk to maintaining potent vaccines. This indicator measures the operational status of CCE to determine the extent to which CCE functionality status poses a threat to vaccine potency.</p>	
<p>How to Measure</p>	<p>Options:</p> <ol style="list-style-type: none"> 1. Use existing data from the CCE inventory report that countries conduct periodically 2. On-site assessment of equipment functioning: visit facilities to see what CCE is functioning on the day of visit 3. CCE distribution plan 	
<p>Target</p>	<p>100%</p>	
<p>Notes</p>	<ul style="list-style-type: none"> - Cold chain equipment (CCE) functioning can be measured at a point in time or over a particular period of time, but point in time will be simplest and most realistic to gather data - This indicator could be measured only for the service delivery level, or could include warehouses at the district or provincial level. However, it should be disaggregated by level to identify bottlenecks in the cold chain. - Functional cold chain is equipment capable of maintaining a temperature between 2-8 degrees Celsius without excursions. 	
<p>Sources for more information</p>	<p>Ateudjieu, J., Kenfack, B., Nkontchou, B. W., & Demanou, M. (2013). Program on immunization and cold chain monitoring: the status in eight health districts in Cameroon. BMC research notes, 6, 101. doi:10.1186/1756-0500-6-101;</p> <p>EVM, (https://www.who.int/immunization/sage/meetings/2014/april/2_EVM_JS_DraftStatement_5.2.pdf);</p> <p>Gavi D4M Dashboard, https://www.technet-21.org/iscstrengthening/index.php/en/resources/indicator-reference-sheets;</p> <p>Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf;</p>	

Indicator: Percentage of service delivery points with an active, trained vaccinator

Definition or Formula	This indicator measures the percentage of service delivery points that are expected to offer immunization services, where at least one active health worker has been trained in immunization and logistics. An active healthcare worker is someone who is assigned to full-time employment at the service delivery point.	<i>Numerator:</i> (number of facilities in a region of interest with at least one trained vaccinator) x 100%
		<i>Denominator:</i> total number of facilities in a region of interest that offer routine immunization services
Rationale	In order for the population to receive safe, effective vaccinations and a consistent supply of vaccines, they need to have healthcare workers who are trained on safe vaccine administration, vaccine and syringe storage, stock-keeping, and record keeping. Without consistent, high-quality records to track demand, there is a risk of stockouts or wastage, and without safe storage practices, there is a risk to vaccine potency.	
How to Measure	Consult Ministry of Health records, EPI records or training records housed at service delivery points to determine number of facilities offering routine immunization and the number of them with a trained vaccinator.	
Target	100% of service delivery points that provide routine immunization	
Notes	You can choose to measure whether they have been trained at all, or whether they were trained within a specified time period (e.g., in the last two years)	
Sources for more information	Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf	

Indicator: Percentage of public service delivery points offering flexible hours of service

Definition or Formula	Percentage of government-run (public) service delivery points that offer routine immunization during flexible hours, such as beyond typical business hours (e.g. in the evenings or on weekends)	<i>Numerator:</i> (Number of service delivery points in a given region that offer flexible times for immunization) x 100%
		<i>Denominator:</i> Total number of service delivery points offering immunization in a given region
Rationale	Many caregivers must work during typical business hours (e.g. 8am-5pm) when service delivery points are open, which can prevent them from accessing services, particularly in urban areas where many people are employed in the formal and informal sector and must work the same times each day. In rural areas, however, flexibility in hours may also help caregivers access immunization services during busy seasons in the agricultural work (planting, harvest, market days).	
How to Measure	Survey healthcare workers at the given facilities to find out whether they offer flexible hours for immunization services.	
Target	<i>To be determined by country</i>	
Notes	<ul style="list-style-type: none"> - Country to determine how to define “flexible” given the country context, as that may mean offering multiple days for vaccination, offering vaccination in the evenings, and/or offering weekend vaccination sessions. - In urban poor areas of Pakistan, while mothers were available during hours of service, they were not able to visit health facilities without their spouse who were at work. Offering services after 5pm meant that fathers were home to escort mothers to health facilities for routine immunization 	
Sources for more information		

Indicator: Demand-forecast ratio

Definition or Formula	Ratio of actual consumption by product during a particular period compared to the forecasted consumption for the same period. Consumption includes vials administered and wasted, but not quantities ordered to keep the buffer stock.	<i>Numerator:</i> doses consumed per product in a period
		<i>Denominator:</i> doses forecasted per product for the same period
	Average forecasted demand ratio for a region	<i>Numerator:</i> sum of health facility forecasted demand ratio for a region
		<i>Denominator:</i> total number of health facilities in a region
Rationale	Demand-forecast ratio is used to determine demand planning, i.e. how well the actual demand matches the forecasted demand. This indicator can identify if the data was not accurate enough to forecast demand and make adjustment to the forecast for future periods.	
How to Measure	Consult logistics management information system (LMIS), monthly immunization reports, micro plans or stock ledgers/cards for: <ul style="list-style-type: none"> • forecasted demand/usage by products, and • consumption (i.e. administered and wasted doses) calculated: opening balance + receipts – closing balance of product 	
Target	Close to 1 implies that forecasted consumption matches actual consumption. Country to define range that is acceptable, e.g. +/-20% would be threshold between 0.8 and 1.2	
Notes	Forecast Accuracy Percentage as described in the <i>Recommended Indicators to Address In-Country Supply Chain Barriers (link below)</i> , can also be used. Demand forecast ratio below 1: actual consumption was less than the forecasted consumption for a given period Demand forecast ratio above 1: actual consumption was more than the forecasted consumption for a given period	
Sources for more information	Gavi D4M Dashboard https://www.technet-21.org/iscstrengthening/index.php/en/resources/indicator-reference-sheets ; Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf	

Indicator: Resupply time (or distance) from district to its resupply store

Definition or Formula	Average travel time or distance that products must travel to get to the district store from the level immediately above the district (typically the province).	<i>Numerator:</i> Higher level warehouse to district store ₁ travel time (or distance) + Higher level warehouse to district store ₂ travel time...+ Higher level warehouse to district store _x travel time
		<i>Denominator:</i> Number of district level store to higher level store in a region of interest for which the resupply time/distance is known
	Percentage of district stores whose resupply time from the higher level of the supply chain is four hours or less	<i>Numerator:</i> (number of districts of interest for which resupply time from higher level is four hours or less) x 100%
		<i>Denominator:</i> total number of districts of interest for which resupply time from higher level is known
Rationale	This metric examines the distance that vaccines must travel to a district from the store resupplying it in the supply chain. Districts far from resupply locations may be less responsive to outbreaks, emergency orders, or adverse weather. Also, when vaccines must travel further, they are more likely to be exposed to temperatures that put them at higher risk of spoilage. and long distances can be a barrier for vaccinators for picking up supplies, which may lead to stockouts.	
How to Measure	Options: 1. Consult Ministry of Health records for recorded distances between districts and supplying warehouses 2. Use geo-coordinates on maps to get distance between districts and supplying warehouse 3. Survey country-relevant staff (national EPI staff, cold chain managers, etc.) on resupply time or distance from district to next level resupply store	
Target	Four hours or a half-day for a one-way trip, to allow for a return trip in the same day.	
Notes	Travel time is preferred over distance when possible to account for road and traffic conditions.	
Sources for more information	https://www.villagereach.org/considering-equity-in-vaccine-supply-chains/	

Indicator: Percentage of service delivery points unreachable at some point in a year

Definition or Formula	The percentage of service delivery points that cannot be reached by the standard supply chain for some point of a year (e.g. rainy season)	<i>Numerator:</i> (number of service delivery points that generally cannot be reached at some point during a year) x 100%
		<i>Denominator:</i> total number of service delivery points in a region of interest
Rationale	This indicator can help identify barriers for specific service delivery points in receiving supplies so that target or season-specific supply plans can be developed for these locations. This indicator is also related to potency when poor road conditions lead to long travel times or vehicles can break down on poor quality roads.	
How to Measure	Discuss with relevant country staff (e.g. logisticians, cold chain managers, etc.) to find out how many service delivery points they have trouble reaching at any point, such as during a rainy season. Use regional or district records to find the denominator of how many facilities.	
Target	<i>To be determined by country</i>	
Notes	Appropriate vehicles and delivery mechanisms should be adopted depending on whether facilities cannot be reached at some point in the year	
Sources for more information	N/A	

Indicator: Percentage of days in the year when a vehicle was available to transport products

<p>Definition or Formula</p>	<p>This indicator measures the amount of time (in percentage) during the last year that a facility (district or service delivery point) had at least one vehicle available to transport products. Vehicles are considered unavailable when all the facility’s vehicles are out of service or unavailable. This indicator applies to facilities that maintain any type of vehicle used for product collection or distribution (e.g., car, truck, boat, motorcycle, bicycle).</p>	<p><i>Numerator:</i> (Total number of days in a year that facility (district or service delivery point) operates, minus the total number of days in which no vehicles were available to transport products) x 100%</p>
		<p><i>Denominator:</i> Total number of days in a year that facility operates</p>
<p>Rationale</p>	<p>The availability of the vehicles is an indication of the condition of the fleet overall and reflects how the vehicles are being maintained and utilized. Low vehicle availability can impact delivery performance and, ultimately, product availability at health facilities. When averaged across facilities, this indicator can help assess the condition of the fleet across a geographic area or facility type.</p>	
<p>How to Measure</p>	<p>Consult vehicle logs and maintenance records to determine how many days vehicles were out of service.</p>	
<p>Target</p>	<p>Available 80-95% days that the facility (district or service delivery point) operates (some vehicles may be out of service for short periods for routine maintenance, so full availability is not expected)</p>	
<p>Notes</p>	<ul style="list-style-type: none"> - This indicator only applies to facilities with vehicles assigned to them for transporting health commodities. For example, some facilities may instead rely on another level to deliver/collect supplies, outsource transportation, or rely on public transportation. - Note that this indicator refers to the facility level. If interested in understanding from a district or regional level you could average the various data points, and/or reframe the indicator to “Percentage of facilities in the district (or region) who had a vehicle available at least 80% of the days that the facility operates” - Consider whether reframing the indicator from “percentage of days available” to “percentage of deliveries/collections for which vehicle was unavailable” would be more meaningful for the country context (e.g. does it matter if the vehicle was unavailable Day 5 of the month if deliveries do not need to happen until Days 10, 15, and 20 of the month?) 	
<p>Sources for more information</p>	<p>Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf</p>	

Indicator: Percentage of facilities that received supervision visits according to schedule

<p>Definition or Formula</p>	<p>This indicator measures the percentage of health facilities in a district who received supportive supervision visits with written feedback that occurred as planned per quarter.</p>	<p><i>Numerator:</i> (number of facilities that received supervision visits according to schedule, in a quarter) x 100%</p>
		<p><i>Denominator:</i> total number of facilities</p>
<p>Rationale</p>	<p>Supervision visits are an opportunity for managers to observe vaccinators’ supply chain management skills and to refresh them on best practices in managing stock and recording consumption data. Ultimately, if vaccinators learn and maintain skills in best practices, they will be better poised to assess and protect vaccine potency and to properly report consumption and wastage to higher levels.</p>	
<p>How to Measure</p>	<p>Consult MOH records to understand how many supervision visits are expected during the given time period and consult facility and/or MOH records to determine how many supervision visits were in fact conducted.</p>	
<p>Target</p>	<p>100% (or country-defined target)</p>	
<p>Notes</p>	<ul style="list-style-type: none"> - Countries may have different expectations for how often supervisions should be conducted and this indicator allows for this, using planned sessions (regardless of how many that may be) as the denominator - This indicator only tracks whether or not a supervision visit occurred and does not monitor what was discussed or the quality of the visit, but it can serve as a proxy for whether vaccinators are receiving supervision - Reaching Every District (RED) recommends that health facilities received at least one supportive supervision visit with written feedback, per quarter 	
<p>Sources for more information</p>	<p>Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf; Reaching Every District (RED), 2017 revision. Brazzaville: World Health Organization; 2017.Licence: CC BY-NC-SA 3.0 IGO https://www.afro.who.int/sites/default/files/2018-02/Feb%202018_Reaching%20Every%20District%20%28RED%29%20English%20F%20web%20v3.pdf</p>	

Indicator: Percentage of private service delivery points reporting data to EPI

Definition or Formula	This refers to the private service delivery points who contract with the government for supplies, and what percentage of those are reporting data (coverage or consumption) to EPI.	<i>Numerator:</i> (number of private service delivery points who receive supplies from government that report their data to government) x 100%
		<i>Denominator:</i> total number of private service delivery points who contract with the government for supplies
Rationale	The more data decision-makers have from sites, the better equipped they are to make decisions regarding resupply orders or inventory management. This data also helps EPI assess zero-dose kids and under-immunized communities, who may be accessing services in the private sector. This data is important, even if the private service delivery points are not sourcing supplies from EPI.	
How to Measure	Consult MOH reports or electronic logistics management information system (eLMIS) reports coverage or consumption data.	
Target	100%	
Notes	Consumption is a better measure, and should be used. However, it is often easier to collect coverage data and calculate demand	
Sources for more information	Recommended Indicators to Address In-Country Supply Chain Barriers http://www.lifesavingcommodities.org/wp-content/uploads/2014/08/Key-UNCoLSC-SCM-perform-indicators_final-links.pdf	

Indicator: Number of health workers by population

Definition or Formula	Number of health care workers per 10,000 population (also known as Health Workforce Index)	<i>Numerator:</i> Number of health workers within certain geographic location (e.g. province, city) x (factor for the denominator to equal 10,000)
		<i>Denominator:</i> (Number of people living in the area) x (factor for the denominator to equal 10,000)
	Number of vaccinators per 10,000 children under the age of 5	<i>Numerator:</i> Number of vaccinators within certain geographic location (e.g. province, city) x (factor for the denominator to equal 10,000)
		<i>Denominator:</i> (Number of children under the age of 5 living in the area) x (factor for the denominator to equal 10,000)
Rationale	<ol style="list-style-type: none"> 1. This is a relatively easily found indicator to monitor whether there is sufficient health workforce to meet the needs of the population. This metric serves as a proxy for whether there is an adequate number of vaccinators for the population size. Sufficient immunization workforce supports supply chain and delivery of immunization services to ensure access, availability and potency. 2. This measures whether there are enough vaccinators, specifically, to meet immunization needs of a population. By using children under 5 in the denominator we can understand how the number of vaccinators compares to the size of the demand. 	
How to Measure	<p>Options:</p> <ul style="list-style-type: none"> - Use data from WHO Service Availability and Readiness Assessment (SARA) survey, if available - Facility surveys - Numerator: Consult with the MOH or use National Health Workforce Accounts, or labor force surveys to get the number of health workers registered within the catchment area; Denominator: local or national statistic data (e.g. Department of Statistics) to estimate population 	
Target	23 health workers per 10,000 population (based on WHO Service Availability and Readiness Assessment), or country-defined target	
Notes	<p>Healthcare workers can be physicians, non-physician clinicians, nurses, midwives, community health workers.</p> <p>Number of vaccinators/health workers required may vary depending on the number of children living in the country/area</p>	
Sources for more information	<p>WHO Service Availability and Readiness Assessment (SARA): Reference Manual Chapter 3; Thompson R, Kapila M. Healthcare in Conflict Settings: Leaving No One Behind. Doha, Qatar: World Innovation Summit for Health, 2018, http://www.wish.org.qa/wp-content/uploads/2018/11/IMPJ6078-WISH-2018-Conflict-181026.pdf;</p> <p>WHO Immunization in Practice: A practical guide for health staff, 2015 update, https://apps.who.int/iris/bitstream/handle/10665/193412/9789241549097_eng.pdf; WHO, National Health Workforce Accounts, https://www.who.int/hrh/statistics/nhwa/en/; MEASURE Evaluation Family Planning and Reproductive Health Indicators Database: https://www.measureevaluation.org/prh/rh_indicators/health-systems/hss/number-of-health-workers-per-10-000-population-by</p>	

Indicator: Number of transit posts set up in high risk areas of the country

Definition or Formula	Number of posts per 1000 sq. miles of the high risk area within the country	<i>Numerator:</i> Number of posts set up x (factor for the denominator to equal 1000)
		<i>Denominator:</i> sq. miles of the high risk area x (factor for the denominator to equal 1000)
	Number of transit posts per 100 miles along the most commonly used borderline /busy borderline	<i>Numerator:</i> Number of transit posts set up along the border x (factor for the denominator to equal 100)
		<i>Denominator:</i> miles of border x (factor for the denominator to equal 100)
Rationale	People living in conflict-affected areas or migrants are likely to move to different areas of the country or move to another country. Transit posts at entry/exit points, bus stops offer great opportunities to reach out for health service delivery.	
How to Measure	Consult with relevant local or national government staff, or technical partners (Ministry of Health, Department of Finance, WHO, USAID, CDC, etc.) to find out how many transit posts have been set up in certain geographical area.	
Target	Country-defined target	
Notes	<p>Examples of high-risk populations and areas: people coming from areas that were controlled by armed parties, busiest border crossing points, areas with current disease outbreaks. Extra temporary posts can be set up when the high number of people are on the move (e.g. for Pakistan and Afghanistan the peak is usually in October)</p> <p>e.g. for Pakistan 340,509 sq. mile has set up 350 posts, i.e. about 1 post per 1,000 sq. mile</p> <p>e.g. of Pakistan and Afghanistan cross-border transit post: 17 cross-border teams along the 712 miles Pakistan-Afghanistan, i.e. ~2-3 permanent transit posts per 100 miles of border</p>	
Sources for more information	<p>Reaching the Hard to Reach: Ending Polio in Conflict Zones (2017), http://polioeradication.org/news-post/ending-polio-in-conflict-zones/;</p> <p>WHO, A million Afghans on the move: vaccinating every child, http://www.emro.who.int/afg/afghanistan-infocus/a-million-afghans-on-the-move-vaccinating-every-child.html</p>	

Indicator: Percentage of health workers with job descriptions

<p>Definition or Formula</p>	<p>Percentage of health workers in a facility or district that have written job descriptions. A job description is considered a file or document with the job title, responsibilities, direct supervisory relationships with other staff, and skills and qualifications required for the position</p>	<p><i>Numerator:</i> (Number of health workers in the facility that have a job description) x 100%</p>
		<p><i>Denominator:</i> Total number of health workers registered within the health facility</p>
<p>Rationale</p>	<p>Motivation in the context of work is typically defined as “willingness to exert and maintain an effort towards organizational goals.” This represents the percentage of health workers working within the facility that are provided with clear job descriptions, as a proxy for motivation. Job descriptions provide health workers with better guidance on how to perform and manage their jobs, which ultimately may impact their motivation. Clear job descriptions also improve accountability across health workers.</p>	
<p>How to Measure</p>	<p>Ask each health worker whether they have a written job description, or ask the health facility in-charge how many of the health facility staff have written job descriptions. Consider asking to see them for verification.</p>	
<p>Target</p>	<p>100%</p>	
<p>Notes</p>	<p>This is a proxy measurement for health worker motivation, given that it requires relatively low effort compared to holistic investigations into health worker motivation..</p>	
<p>Sources for more information</p>	<p>Franco LM, Bennett S, Kanfer R (2002). Health sector reform and public sector health worker motivation: a conceptual framework. Soc Sci Med. 54(8):1255–1266. doi:10.1016/S0277-9536(01)00094-6; George A, Scott K, Govender V, editors. Health policy and systems research reader on human resources for health. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/alliance-hpsr/resources/publications/HRH_Chapter5.pdf?ua=1; Sato M, Maufi D, Mwingira UJ, Leshabari MT, Ohnishi M, Honda S (2017) Measuring three aspects of motivation among health workers at primary level health facilities in rural Tanzania. PLoS ONE 12(5): e0176973. https://doi.org/10.1371/journal.pone.0176973;</p>	

Indicator: Percentage of service delivery points with adequate frequency of immunization sessions

Definition or Formula	Percentage of service delivery points (SDPs) that planned an adequate number of immunization sessions (including fixed, mobile and outreach), according to WHO best practices on frequency of sessions (based on population size and number of vaccinators)	<i>Numerator:</i> Number of SDPs whose planned number of immunization sessions is adequate based on the catchment area population
		<i>Denominator:</i> Total number of SDPs
Rationale	It is important to offer the appropriate number of immunization sessions in order to increase access to immunization for children in each catchment area.	
How to Measure	Refer to monthly SDP reports that will generally include number of planned sessions. To see if this is actually the appropriate frequency, consult local or national statistic data or health facility records for catchment area population, and then reference WHO guidance for how many sessions should be held each week/month based on this size and based on how many vaccinators are present for each session (e.g. an SDP with a catchment size of 5,000 people and 2 vaccinators per session should hold monthly immunization sessions). If the frequency of planned sessions is equal to or greater than the frequency suggested by the WHO guidance, then include this SDP in the numerator.	
Target	100%	
Notes	<p>A maximum workload of about 30 infants per vaccinator per session.</p> <p>Define target based on population and number of vaccinators, e.g.:</p> <ul style="list-style-type: none"> - for 6000 people and an immunization team with two vaccinators per session, session frequency should be every two weeks - for 3000 people and an immunization team with one vaccinator per session, session frequency should be monthly - for 500 people and an immunization team with one vaccinator per session, session frequency should be quarterly. 	
Sources for more information	<p>WHO Immunization in Practice: A practical guide for health staff, 2015 update, https://apps.who.int/iris/bitstream/handle/10665/193412/9789241549097_eng.pdf;</p> <p>Reaching Every District (RED), 2017 revision. Brazzaville: World Health Organization; 2017.Licence: CC BY-NC-SA 3.0 IGO</p> <p>https://www.afro.who.int/sites/default/files/2018-02/Feb%202018_Reaching%20Every%20District%20%28RED%29%20English%20F%20web%20v3.pdf</p>	

Indicator: Percentage of procurements completed within time

Definition or Formula	<p>This indicator measures the procurement cycle time, and the percentage of procurements completed (placed) within standard time guidelines, annually.</p>	<p><i>Numerator:</i> Number of purchase orders or contracts completed within the procurement cycle time guideline x 100%</p>
		<p><i>Denominator:</i> Total number of purchase orders or contracts awarded in a designated time</p>
Rationale	<p>Delays in procurement timelines, can lead to delayed distribution and stockouts at service delivery points. The procurement cycle time is measured for contracts and purchase orders using historical data. It measures the number of days required to complete the procurement cycle, beginning with the date a requisition is submitted until the date the contract or the purchase order is issued to the selected vendor.</p>	
How to Measure	<p>Steps:</p> <ol style="list-style-type: none"> 1. Review the standard procurement process from the submission of the requisition for approval to the contract or purchase order issue; and identify the key transactions that occur during this period 2. Review procurement records, and calculate average procurement cycle 3. Set target for standard guideline 	
Target	<p>100%</p>	
Notes	<p>Procurement process includes: planning the procurement, requisition approved, preparing bid documents, advertising bid, bidding process initiated, bidding closed, evaluating bids, selecting supplier, approving contract, awarding contract, etc.</p>	
Sources for more information	<p>USAID DELIVER PROJECT, Task Order 4. 2012. Procurement Performance Indicators Guide—Using Procurement Performance Indicators to Strengthen the Procurement Process for Public Health Commodities. Arlington, Va.: https://apps.who.int/medicinedocs/documents/s20157en/s20157en.pdf; Procurement strategies for health commodities, USAID (2006), https://pdf.usaid.gov/pdf_docs/PNADH233.pdf; The Supply Chain Manager’s Handbook: A practical guide to the management of health commodities, Ch6: Health commodity procurement, https://supplychainhandbook.jsi.com/wp-content/uploads/2017/01/JSI_Supply_Chain_Manager's_Handbook_Chpt.6_Final.pdf</p>	

Indicator: Health facilities in a district receiving disbursed operation funds for immunization activities on time

Definition or Formula	Percentage of health facilities in a district that received funds for immunization activities on time	<i>Numerator:</i> Number of health facilities in the district who received funds on time x 100%
		<i>Denominator:</i> Total number of health facilities in the district who are supposed to receive funds for immunization activities
Rationale	It is important that health facilities receive necessary funds on time so they are able to hold the necessary immunization activities on time. Delays can result from budgeting, disbursement, reporting, or other financial process.	
How to Measure	Consult MOH records or ask health facility staff to understand whether disbursement occurred on time for each facility	
Target	Country-defined target	
Notes	WHO Reaching Every District guidance recommends assessing on a quarterly basis	
Sources for more information	Reaching Every District (RED), 2017 revision. Brazzaville: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO https://www.afro.who.int/sites/default/files/2018-02/Feb%202018_Reaching%20Every%20District%20%28RED%29%20English%20F%20web%20v3.pdf	

Resources related to Equity in Immunization

- Equity Reference Group: <https://sites.google.com/view/erg4immunisation/home>
- Urban Immunization toolkit: <http://gotlife.gavi.org/wp-content/uploads/2018/12/Urban-immunization-toolkit.pdf>
- Promoting equity in immunization coverage through supply chain design in Pakistan: <https://doi.org/10.12688/gatesopenres.13121.1>

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Theory of Change: Supply Chain Factors Impacting Equity in Immunization

Problem

Health supply chains, including immunization supply chains (iSC), were designed using a one-size-fits-all approach and have **not been responsive to the needs of under-served communities** that are consistently under-immunized. **Geographic clustering** of zero-dose and under-immunized populations further increases the probability of outbreaks of vaccine preventable diseases in already under-served populations

Supply chain challenges of under-immunization

- Lack of **transport** and poor **road infrastructure** for resupplying stock and accessing services
- **High actual and opportunity costs** (long travel, long wait times, missed work) for people to access immunization services
- Lack of **accurate population and/or consumption data**, resulting in **inaccurate demand forecasting**
- Weak **regulation of private SDPs** and lack of **integration of private SDPs** into EPI
- **Siloed health programs** result in MOV and multiple trips by SDP staff for resupply
- **Insufficient health workforce**
- **Health workers** at service delivery points (SDPs) not regularly trained in iSC & logistics
- **Weak health worker motivation**
- Lack of **functional or sufficient cold chain equipment** (CCE) for storage and transport
- **Insufficient funds** for operating fixed, mobile and outreach SDPs
- **Lack of physical infrastructure** at SDPs
- **Weak procurement** at national levels
- **Delayed disbursement of and lack of transparency of use of funds**
- **Compromised security area**, resulting in lack of medical supplies and health workers

Strategies

Identify supply chain barriers that contribute to zero-dose kids and under-immunization

Adapt supply chains to be more responsive to variations in population needs

Implement supply chain practices that promote vaccine potency

Outcomes

Supply chain barriers to ACCESS immunization and health services are addressed

- Vaccination services (fixed, mobile, outreach) are provided at accessible places, times, and languages for zero-dose and under-immunized communities by public and private providers
- Private providers are supported to augment the reach of iSC

Infrastructure strengthened and demand variation quantified to improve AVAILABILITY

- Supply chain policies are adapted to avoid stockouts by accounting for variation or uncertainty in demand
- Demand for immunization supplies in zero-dose and under-immunized populations is more accurately forecast, inc. urban poor, migrants, and people living in conflict
- Sufficient and functional transport and storage infrastructure for health products (including vaccines) is available

Vaccine and health product POTENCY maintained

- Gaps in cold chain coverage for zero-dose and under-immunized populations are identified
- Cold chain equipment is procured and deployed in public and private service delivery points to meet the needs of zero-dose and under-immunized populations
- Sufficient, reliable and functional cold chain equipment is available to transport and store vaccines
- Health workers (e.g. vaccinators) know and implement best practices to protect and assess vaccine potency
- Human, financial, and material resources are available to maintain and repair cold chain equipment in zero-dose and under-immunized communities

Long-Term Outcomes

Supply chains are fit-for-purpose to provide accessible immunization services with potent vaccines available for all, especially zero-dose and under-immunized communities

ACCESS

Services are conveniently and affordably accessed by all— including zero-dose and under-immunized communities – through public or private service delivery

AVAILABILITY

Sufficient stock available and supply chain responsive to demand variations at public and private health facilities —including in zero-dose and under-immunized communities.

POTENCY

Vaccine and health product potency is maintained up to the point of administration at all public and private health service delivery points

Impact

Combined with other interventions:

Coverage increases for under-served populations, especially zero-dose and under-immunized populations

Assumptions

Health program stakeholders, especially immunization, are able to identify zero-dose and under-immunized populations in their countries, even if detailed data on these populations are not available. Improved availability, access and potency of vaccines are critical for improving immunization coverage rates by ensuring that iSC-specific barriers do not limit people from accessing and receiving potent immunizations. While a well-performing supply chain is a critical component of an immunization program, other service delivery and demand-side factors must also be addressed to improve equitable coverage.

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