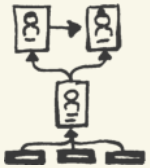
November 2021 v.4

VxData Insights
Cross-Country Report

This is the final report from the **VxData Insights study**, which aims to provide a deeper understanding of the root causes of underutilization of data in immunization programs and highlight priority areas for intervention.

This report focuses on global level insights. Country level learnings have also been documented through various reports, webinars and a blog series, which can be accessed through the project resource page.

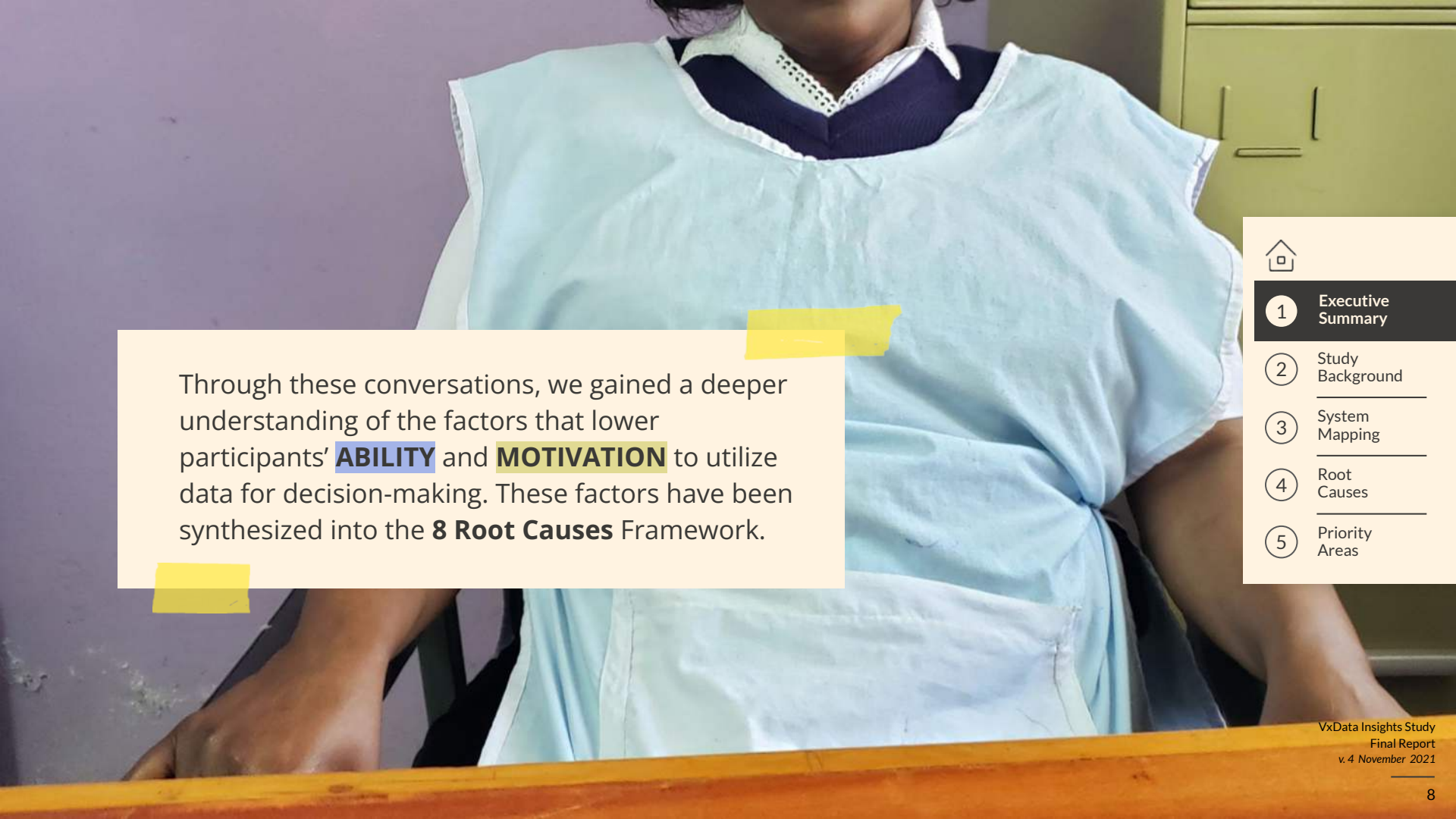


1 Executive Summary

Despite significant headway, routine immunization and new vaccine introductions still face strong **challenges related to collecting and using quality data for planning, management, and performance improvement.** Prioritizing and adequately addressing these challenges is difficult without understanding the full context in which they occur.

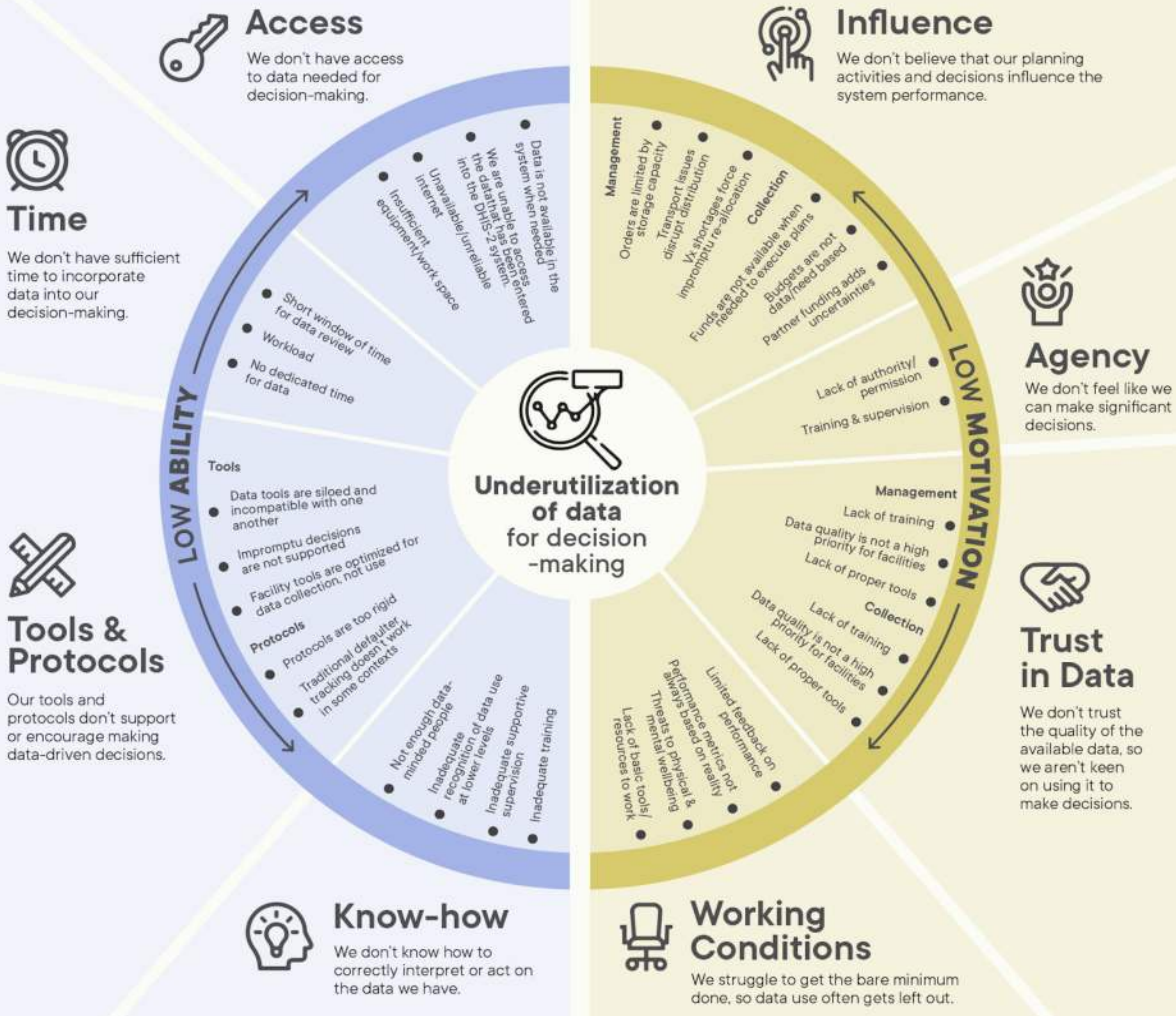
The VxData Insights study took a **Human-Centered Design** approach to gather the perspectives and data-specific **challenges of actors at all levels in the expanded immunization programs (EPI)** in three countries—Kenya, the DRC and Mozambique.

We conducted **198 in-depth, contextual interviews** with healthcare workers and managers from Community all the way up to National levels.



Through these conversations, we gained a deeper understanding of the factors that lower participants' **ABILITY** and **MOTIVATION** to utilize data for decision-making. These factors have been synthesized into the **8 Root Causes** Framework.

8 Root Causes Framework



Lastly, through a series of prioritization and co-creation activities with country stakeholders, these root causes were then used to generate seven **Priority Areas** for intervention.

Priority Areas for intervention

PEOPLE

1

Increase the **number and competencies of data-proficient personnel**, especially at lower levels of the system

Priority level:
K: ●● / M: ●● / D: ●

RESOURCES

2

Ensure steady availability of basic resources (such as reporting tools, airtime, transport, and internet) needed for recording, managing and accessing data

Priority level:
K: ●●● / M: ●● / D: ●●●

TOOLS

3

Redesign Facility-level tools to reduce workload & better support decision-making

Priority level:
K: ●● / M: ●● / D: ●●

4

Speed up data input and improve **data accessibility** in DHIS-2

Priority level:
K: ● / M: ●● / D: ●●

INTERACTIONS

5

Foster more frequent, **two-way interactions** around data and decision-making between actors at all levels

Priority level:
K: ●● / M: ● / D: ●

6

Improve supervision effectiveness, shifting away from one-off checklist visits and towards providing **continuous, constructive feedback** over time.

Priority level:
K: ● / M: ●● / D: ●

PLANNING

7

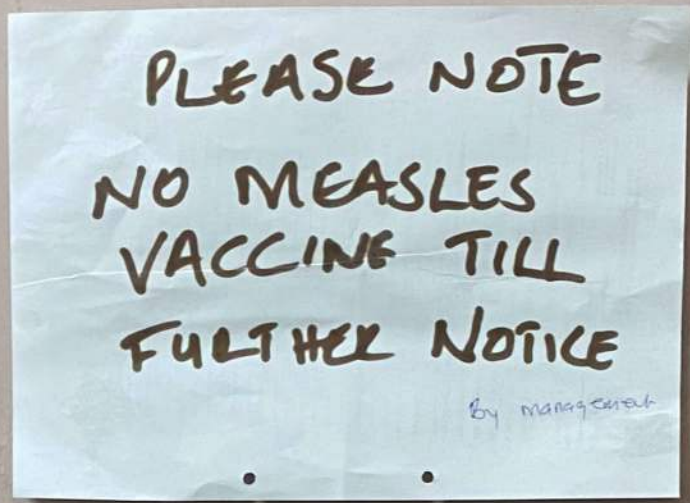
Improve the budgeting process by engaging political and administrative decision-makers and providing timely data on actual funds available

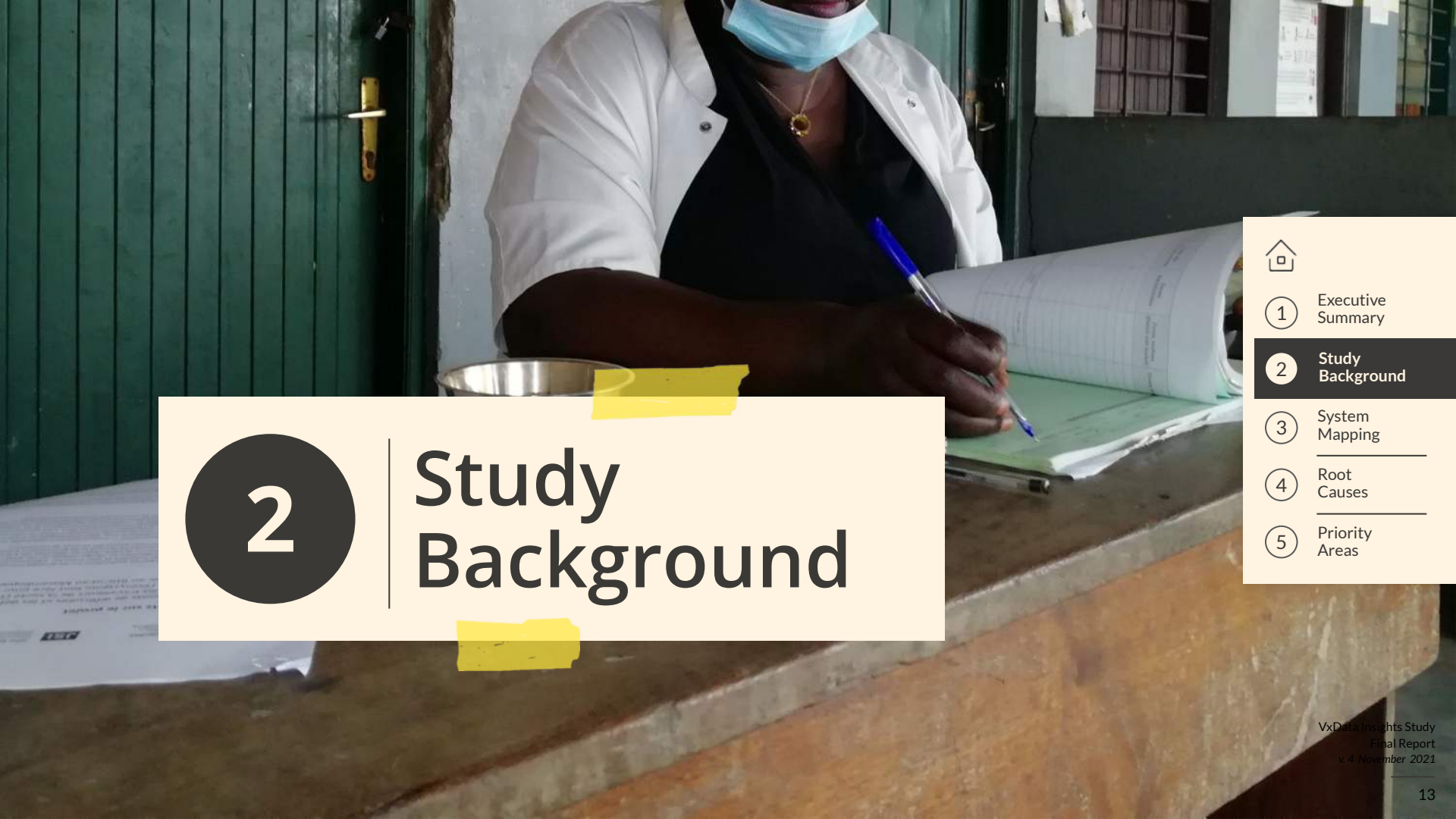
Priority level:
K: ●●● / M: ●●● / D: ●●●

KEY

●●● — Highest Priority
●● — High Priority
● — Medium Priority

K — Kenya
M — Mozambique
D — DRC





2 Study Background

Project Background

The VxData Insights study aimed to understand challenges around collection, management and use of data for decision making by health professionals at all levels of the system in Kenya, Mozambique and the DRC.

High-quality and timely immunization data are vital to inform decisions at the Subnational, National, and Global levels. This includes decisions about how to better reach children, successfully introduce new vaccines, document impact, monitor and improve immunization program performance, prioritize resources and activities, and engage in performance improvement (IDEA, 2019; SAGE, 2019). Global stakeholders and national governments acknowledge that routine immunization and new vaccine introductions still face strong challenges related to collecting and using quality data for planning, management, and performance improvement, yet few can identify which barriers matter most (Akhlaq et al., 2016; Dougherty et al., 2014).

We chose a Human-Centered Design approach to identify and further explore unique perspectives, behaviors, challenges and unmet needs of system actors at Facility, Subnational and National levels. We believe that by engaging with system actors as individuals and examining the program from their unique viewpoints, we were able to offer fresh perspectives on decades-old challenges.

Research Themes

Based on the secondary research and expert interviews, our research focused on the following thematic areas:

Day-to-day experiences

We sought to generate rich portraits of health care workers and managers at all levels of the system to understand their daily activities, priorities, needs, obstacles and challenges. This helped us to understand the wider backdrop against which the immunization work is happening and helped provide additional insight into the other research themes.

Decision--making

We aimed to gain a better understanding of the decisions that are currently being made at all levels of the system. We also wanted to define what information is currently being used, what information is inaccessible, not available at the right time, or missing entirely, and what information is collected but not used.

Moments of exchange

We sought to capture the key interaction points across the different levels of the immunization system to better understand how actors at various levels were interacting with each other and what information (immunization data, feedback, requests etc) is exchanged. Additionally, we explored how these interactions positively and negatively impact data collection and use.

Data culture and value

We wanted to gain a better understanding of perceptions and attitudes towards data collection and use. In particular, we explored how good quality data is defined by participants and how much value is being placed on collecting and using good data for decision making. We also sought to gauge the confidence levels in the data for the various system actors and the factors that influence how data is perceived.

Motivation

We aimed to better understand intrinsic and extrinsic drivers of behavior including financial and non-financial incentives that motivate health workers positively or negatively, barriers to following data-related protocols, desire and practice related to adaptation and problem solving, and other areas of behavior inherent in managing, reporting and using data for immunization programmes.

Timeline & Activities

1 Planning

Starting in late 2019, the Planning Phase gave the project team an opportunity to engage the Bill & Melinda Gates Foundation and other key global stakeholders and align on study objectives.

2 Discovery

The Discovery Phase consisted of a rapid literature review to generate country profiles and identify the gaps in the existing body of knowledge around immunization program data usage and collection, with a special emphasis on how data is being used for decision-making by various actors at all levels of the health system. Additionally, expert interviews were conducted to further explore current knowledge gaps. The data and insights uncovered through these activities informed the Research Themes (see previous page).

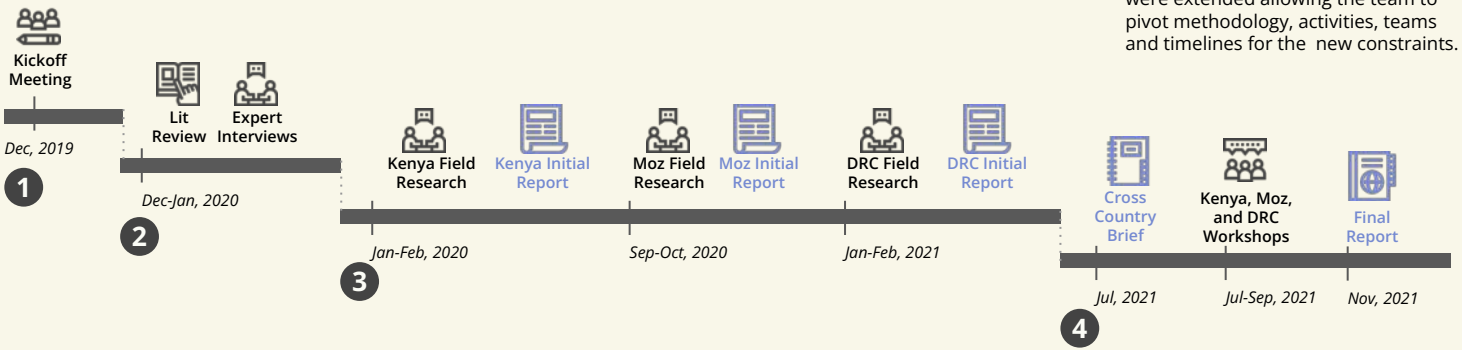
3 Field Research and Documentation

Beginning in early 2020, during the Field Research & Documentation Phase, country and global teams conducted in-depth qualitative research while respecting COVID-related safety protocols. At the end of the field research in each country, we completed an initial report that we distributed to stakeholders for feedback.

4 Synthesis and Dissemination

During the Synthesis and Dissemination phase, teams from the three countries identified common themes, root causes, challenges and differences across the countries. This information was captured in the Cross-Country Brief. Workshops held in each country, further validated our findings and generated specific opportunities for intervention. These are documented in this Final Report.

Due to the COVID-19 pandemic, which led to global lock downs, our timelines were extended allowing the team to pivot methodology, activities, teams and timelines for the new constraints.



Methodology

A Human-Centered Design approach allows for an empathetic perspective of the world, where the people we meet act as both the central source of direction and the key benchmark for developing solutions to their primary problems.

To be Human-Centered is to consider complex systems from the perspective of the people who will use or be affected by them. It also requires a collaborative approach, which is why the Sonder Collective, JSI, the National Immunization Programs and the Bill & Melinda Gates Foundation worked together to design and execute this context-specific research, ensuring that a representative and equitable variety of voices and perspectives were heard and understood.

By investigating the experiences, motivations, and painpoints of the individuals that make up the immunization data ecosystem, we aimed to gain grounded insights and understand the root causes behind challenges. Over a one year period, in Kenya, Mozambique and the DRC, we conducted contextual research activities at all levels of the system.

The following pages outline the specific methods that were used to collect and analyze the data in this study.

Research Methods

Contextual interviews

We conducted one-to-one in-depth interviews with healthcare workers and managers at all levels of the system. These interviews were mostly conducted at the participant's primary place of work (health facilities for healthcare workers and offices at the Sub National or National MoH offices* for managers) using semi-structured interview guides and visual tools to map participants' challenges and interactions.

**In Mozambique and the DRC, interviews were conducted outside, due to COVID-19 protocols.*

Observation and walkthroughs

During observations in multi-hour immunization sessions, we sought to understand interactions and roles of health workers, protocol adherence, formal and informal tool usage, as well as formal and informal data use and workarounds.

We also used the method of walkthroughs, where we asked actors to talk us through a particular scenario, activity or moment in time. Where possible, we asked actors to show examples or recreate events for researchers, allowing us to observe and ask questions at key intervenals.

Methodology *cont.*

Self-Documentation Study*

In Mozambique, in addition to our contextual and observational activities, and as part of our revised COVID-19 research approach, the team tested a WhatsApp-based, Self Documentation Activity to further explore key thematic areas and fill in gaps.

Using daily WhatsApp prompts over a 4 day period, our aim was to gather fragmentary clues about an individual's daily routines, value systems and external pressures and influences. This information is difficult to gather in the more formal in-person interview context, where time, work pressures, formal setting, and other distractions play a big role. While during the core study we aimed to be structured and comprehensive, here we aimed to be more hands-off, exploratory, and open-ended.

**This activity was only conducted in Mozambique to adjust for gaps in the revised COVID-19 protocol.*

Data Processing and Analysis

During our interviews, observation, and interactive activities, we collected data via voice/audio recorder (with the participant's written or verbal consent), and note taking, as well as through visual research tools.

This data was rigorously analyzed through a technique called insight generation. This Human-Centred Design approach to data analysis brings together researchers and stakeholders to interactively process the raw data collected into meaningful insights. From this analysis emerged patterns and themes, which were documented and further synthesized.

In Kenya, the team was able to meet in person during and after the research, to conduct synthesis and data analysis activities, culminating in an in-person workshop in Nairobi in February 2020.

However, with the onset of the COVID-19 pandemic, we had to redesign our approach to meet the challenges of reduced in-person contact and teams dispersed around the globe during research and analysis for Mozambique and the DRC.

At the end of each day of research, the researchers debriefed the international team members by phone relaying their takeaways, highlights and observations of the interview as well as insights on the study's themes.

At the end of each week, the research group came together, either in person or virtually, to dig further into the interviews, think of patterns and identify key areas to needing more probing. Notes were documented electronically during these sessions.

Study Sites and Participants

Using the Human-Centred Design methodology, the research approach sought to optimize the depth of the insights collected by increasing the level of qualitative rigor, rather than focusing on a larger number of participants.

As a result, site selection reflected small sample sizes consisting of strategically selected individuals. This allowed the team to conduct in-depth, rich engagements while still covering a broad range of stakeholders, geographies, and situations.

Selection of Participants

Participants were carefully selected, taking into consideration system level, role, education, work experience, work environment, gender and age.

Selection of Counties/Provinces/Districts

Study sites were strategically chosen in each country based on criteria such as level of urbanization, patient volume within facilities, level of performance, level of digitisation and ongoing interventions.

Taking these criteria into account, the geographies detailed on the next page, were selected.

Methodology *cont.*

Study Sites

Kenya

Mombasa County (Predominantly Urban)

Mombasa County is located in the South Eastern part of the Coastal region of Kenya. Mombasa is part of the JKP, an economic bloc which brings together the six coast counties in Kenya. It is home to the Coast General Level Five Hospital and its Immunization coverage in the County stands at 73%.

Kiambu County (Peri-urban)

Kiambu County is in the Central region, bordering Nairobi County to the south. In 2016, the County had immunization coverage of 89% among children under one years old.

Kakamega County (Predominantly Rural)

Kakamega County is located in the Western part of Kenya. It is the second most populous County behind Nairobi, with the largest rural population. 16.7% of the population is less than a kilometer away from the nearest health facility and about 62% of the children are fully immunized.

Mozambique

Maputo Province (Predominantly Urban)

Maputo Province is located in the south of the Country, Bordering South Africa. Maputo Province is small but densely populated, with an estimated 1.9 million inhabitants.

Nampula Province (Peri-urban and Rural)

Nampula Province is in the northern part of the country and is the most populous province of Mozambique with 5.8 million people. Nampula has a referral hospital servicing the province and north region.

Zambezia Province (Predominantly Rural)

Zambezia is in the center region of the country and is the second most-populous province of Mozambique. It has a population of 5.11 million (2017 census) and is considered a low performing province for the immunization program with coverage of 50% for fully immunized children.

DRC

Kinshasa Province (Predominantly Urban)

The developed territory of Kinshasa is the home to over 10 million inhabitants. Due to its demographics, the city-province of Kinshasa accounts for 34.2% of the entire urban population of the DRC.

Equateur Province (Peri-urban)

Located in the northwest of the DRC, the Equateur province covers 403,292 km^2 or 17% of the territory. It has over 6 million inhabitants, 10.7% of the national population.

Haut Katanga Province (Predominantly Rural)

Haut Katanga Province is an important crossroads, bordered by three provinces of the country. The population of Haut Katanga is estimated at nearly 5.7 million and is home to 5% of the total population and 18% of the urban population.

	KENYA	MOZ	DRC
Total	83	64*	64
National	3	4	3
County/ Province/ Antenne	11	8	15
Sub-county/ District/ Zone	37	23	15
Facility	30	16	28
Community	0	1	2
Observations & Self Doc.	2	12	1

Note: This table represents the number of interviews, not the number of individual participants.

**The Self-Documentation Study was conducted in Mozambique with 10 participants, who had already taken part in the study.*

A note on COVID-19 effects on this work

By March 2020, when the COVID-19 pandemic hit, the team had already completed all research in Kenya and an initial exploratory trip in the DRC. As with most ongoing work around this time, our planned activities had to be suspended due to the team's inability to travel and conduct in-person research at health facilities.

COVID-19 effects on research

With team members scattered across the globe, and increasingly strict travel bans in place, a new research approach was necessary to complete the DRC and Mozambique fieldwork. Since observations and interactive mapping activities are core to our work, conducting the research through video was deemed unlikely to produce desirable outcomes. Instead, our team decided to recruit and train a new team of local researchers to conduct the interviews, with the core team closely collaborating and guiding them remotely through the process. Daily debriefs between the local teams and core team members helped to ensure data quality.

Core project team taking the lead on the data synthesis ensured we stayed true to our objectives and maintained consistency with the already completed work.

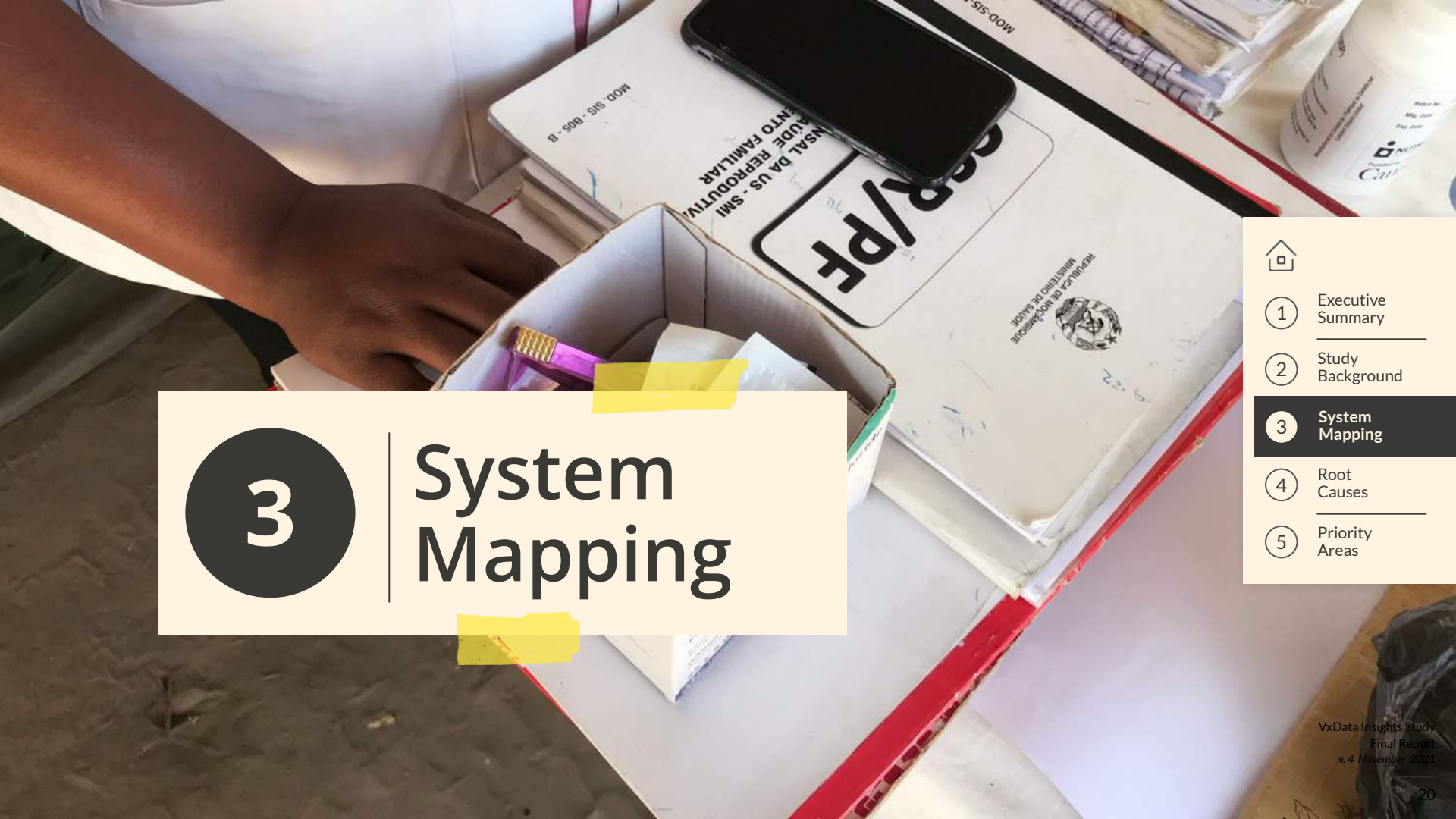
As the field work in Mozambique and DRC was conducted between September 2020 and February 2021, in the midst of the COVID-19 pandemic, it is important to note that our findings might be impacted. Due to preventative measures and additional pressures on the health system, healthcare workers and managers were more stretched than usual during the pandemic.

However, while the pandemic likely made certain challenges more acute, based on our team's experience working in Mozambique and the DRC, we believe the impact of the pandemic on study findings was minimal.

COVID-19 effects on co-creation

A major part of the Human-Centred Design approach is the co-creation process, which allows key stakeholders to actively participate in the validation of findings, the identification of opportunities and development of recommendations. These are usually done in in-person workshops. With COVID-19, the team for alternative ways to include stakeholders in the process.

Virtual workshops, spread over multiple days in two hour sessions, engaged key actors and stakeholders in the co-creation process, while not taking up too much time from their demanding workload. This made the co-creation process more intricate than usual and may have had an effect on the results garnered during these activities.



3 System Mapping

System Mapping Overview

This section provides a cross-country EPI system overview and highlights the key immunization program actors in each country.

System Overview

The System Overview diagram on the next page maps key actors that engage with immunization data in each country, with arrows indicating bottom-up reporting lines and significant interactions, provides clarity on intervention entry points that are often obscured when looking at a system broadly.

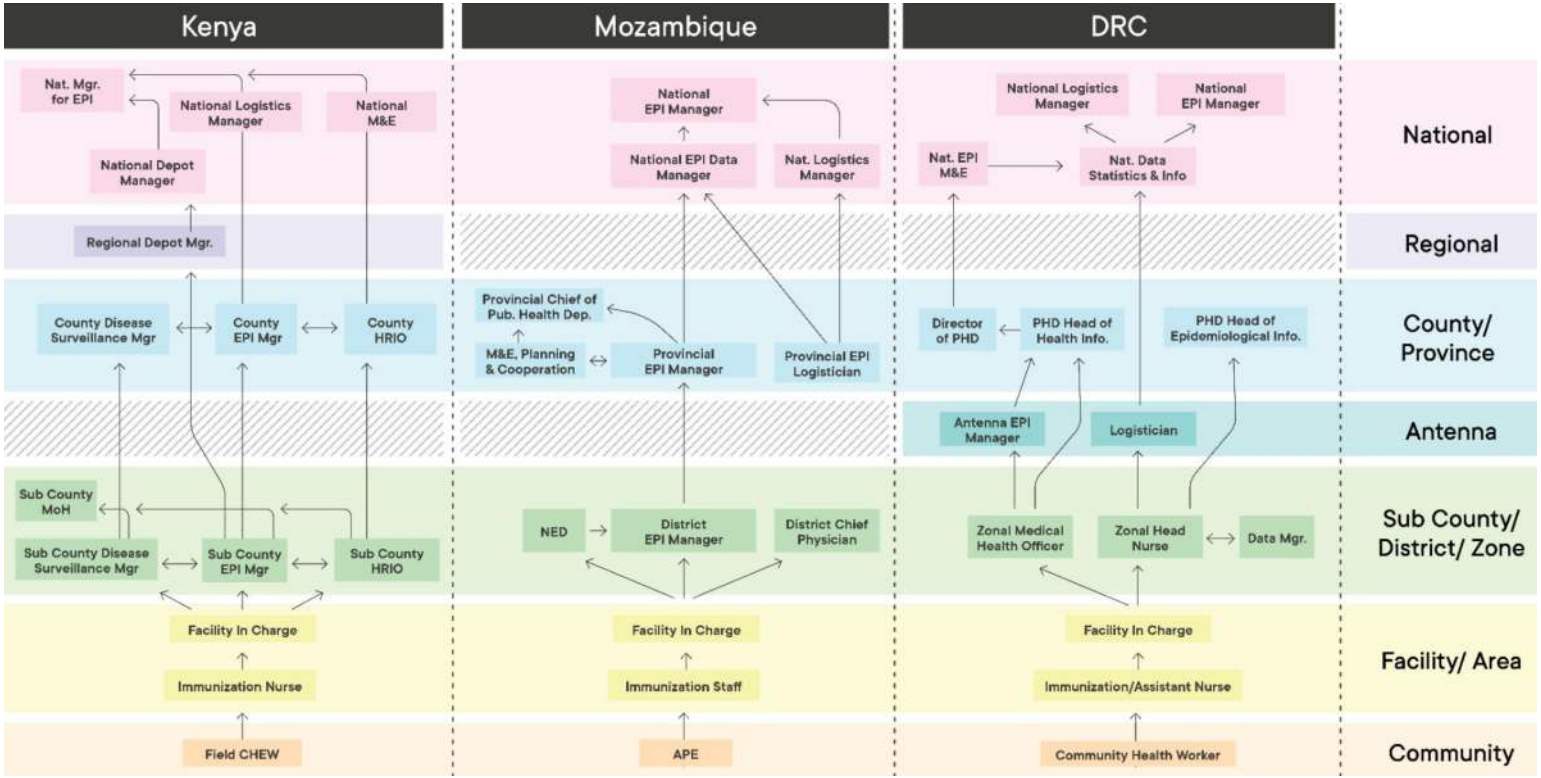
Kenya and the DRC are both decentralized systems, which is reflected in the more complex interactions within the Sub national levels. In Mozambique, where most decisions are made at the National level, data is more directly funneled to the top.

Actor Profiles

For each system level, actors key to the collection and utilization of EPI data were identified. Each actor profile includes a set of unique challenges, types of decisions made, data and tools used, as well as interactions with other system actors. The subsequent pages in this report include a synthesized, cross-country overview of the key actors, and the decisions they make.

For a more detailed view of each system, as well as in-depth profiles of each key actor, please refer to the country-level reports referenced on page 66 of this document. For additional discussion of the differences in the three geographies, please refer to the Priority Areas overview on page 41.

System Overview



Click to view

Click to view

Click to view

Community level *(cross-country)*

At the Community level, the primary focus is on engaging community members, collecting relevant data to help the Facilities understand their catchment area, as well as coordinate with the Facilities to implement outreach activities.

> *"When it's time to create the [monthly] report, there are many records to photocopy because one copy should stay with you, another should be in the pharmacy, and another with the Immunization Nurse. Sometimes we end up spending 30 to 40 mts [~$0.50]."*
> - Mozambique

KEY ACTORS

Community Health Worker

Goal: Ensure my community gets proper health services, making a link between the community and the facility.

Decisions:

- Which children are missing vaccines based on home visits to refer them to the clinic or let the clinic know to plan outreach
- Which households to track and follow up with
- What topics to cover in my community education session

KEY CHALLENGES

- Use of makeshift tools during community engagements, which ultimately reduces data quality
- Outreach activities are planned based more on who is funding them, rather than what is known about the community needs
- Some respondents noted a lack of community trust in the healthcare system.

Facility level *(cross-country)*

A primary goal at the Facility level is to provide timely and quality immunization services to all clients that come on any particular day and for the Facility to meet its annual performance targets. Recording immunization data and reporting it to the higher levels is also a responsibility, but it is considered a core function only as long as it can be tied back to the services the facility provides (ex. helping keep the vaccines in stock, ensuring all kids get vaccinated).

> *"Because it was an extrapolated population, the numbers were high, so it was 11,840, but when we did the count... the number went down to 11,424. We did this count, house by house... we were sure because we saw the targets, and there was no inconsistency in the data so the outliers are beyond us."* - DRC

KEY ACTORS

Immunization Nurse

Goal: Provide timely, quality service to clients and minimize defaulters through education and outreach.

Decisions:
- How to prioritize my daily activities, esp. how to manage the flow of children for vaccination
- When to log immunization data into the two different tools
- When to follow up on dropouts
- Where to conduct outreach and education

Facility In-charge

Goal: Ensure facility is running smoothly and delivering on targets.

Decisions:
- Outreach planning and how to track/reach dropouts
- Supervisory actions when guidelines are not followed
- Prioritization of resources
- How to troubleshoot emergencies like stockouts
- When to order vaccines (may be handled by someone I supervise)

KEY CHALLENGES

- Insufficient staff to conduct EPI activities leading to staff overload
- Insufficient transport, fuel and vehicle maintenance needed to conduct outreach efforts, pick up stock, etc.
- Lack of airtime and internet to communicate with other actors and communities
- Lack of office/facility infrastructure (e.g. air conditioner, water for cleaning and preparing ice packs, computers, electricity for fridges, etc.)
- Lack of sufficient staff training (e.g. on how to fill out tools correctly)
- Stockouts of materials and tools

Sub County/ District/ Zone level *(cross-country)*

This level plays a central role in the immunization program. All the Facility level data is digitized here. Easy and frequent access to the Facility In-Charges makes this level perfectly positioned to champion good data culture and course correct any undesirable practices. Additionally, this level also plays a key role in operationalizing the EPI policies put forth at the higher levels.

> *"Generally it's very tight, we don't analyze because there aren't many of us [data managers], for example [...] if it's really two people who have to analyze the data of 40 facilities, you can see how heavy the work is, and we have to do it on time, otherwise..."*
> - DRC

KEY ACTORS

EPI Manager/ Head Nurse

Goal: I am responsible for EPI activities at facilities and my goal is to ensure the EPI program is running smoothly in my area.

Decisions:
- Solutions to everyday stock management and immunization program challenges
- When to follow up on data discrepancies
- How to re-allocate stock if there are vx shortages
- What quantities of vaccines to issue to facilities
- Microplan

HIRO/ Data Manager

Goal: Ensure complete and accurate data is entered into the DHIS-2 on time and that the data is analyzed.

Decisions:
- Quality standards for data keyed into DHIS-2
- Which data to prioritize in analysis and reporting
- What data to notify the team about / act on
- What data to prioritize in reports during the monthly review meetings
- How to resolve data discrepancy issues with facilities

KEY CHALLENGES

- Insufficient transport vehicles and fuel to conduct supervision and outreach, pick up stock, etc.
- Lack of infrastructure (e.g. phone, computers, printers, internet, office space, electricity, etc.)
- Shortages of up to date paper tools
- Time consuming data validation and input process
- High facility staff turnover, which causes a need for more supervisory visits and oversight
- Lack of airtime/internet funds to communicate with other actors
- Lack of input into decision-making, fund allocations and feedback from higher levels

County/Province level *(cross-country)*

This level supervises, analyzes, and is to quality check the input of immunization data into DHIS2 from the lower levels and makes strategic decisions about the EPI program. Many funding decisions also happen at this level, especially in the more decentralized Kenya and the DRC, but are mostly out of the control of the technical immunization staff.

> *"One of the biggest challenge is trying to convene these meetings for three days. It's not very cheap so sometimes we lack the funds to bring the Facilities and Sub Counties together."*
> - Kenya

KEY ACTORS

EPI Manager/ Logistician*

Goal: Ensure a smooth running, well performing EPI program in my area.

Decisions:

- Identify which areas are underperforming and follow up with appropriate interventions and resources
- Distribute/re-distribute stock
- Help set targets

** This may be split into two separate roles, depending on context and need.*

HIRO/ Head of Health Information

Goal: Ensure data for my area is complete, accurate and analyzed for insights.

Decisions:

- When/where/how data quality checks should be carried out
- Which data sets to analyze and how to socialize the findings
- Help set targets

KEY CHALLENGES

- Insufficient staff and lack of technical and management training
- Lack of sufficient resources for outreach activities and supervision
- Frequent stockouts and issues with transportation for distributing stock
- Planning doesn't match the funds available, causing cooperation issues and impacts staff motivation/ performance
- Lack of infrastructure (e.g. phone, computers, printers, internet, office space, electricity, etc.)
- Lack of airtime credit/megas to communicate with other actors

National level *(cross-country)*

The National level drives planning activities such as setting annual targets. They also take on a monitoring role, reviewing data for trends and performance, and are in charge of the vaccine supply chain. Lastly, they work with Partners to secure funds and supplies.

> *"You have someone crying that they don't have vaccines in their Depot. When you open the system, it tells you that they have 1000s of vaccines so you are like... 'But I see from your CHANJO'. That's when someone will say 'NO! NO! NO. That has not been updated, my so and so is on leave.'"* - Kenya

KEY ACTORS

M&E/Data Manager

Goal: Monitor performance of the immunization program and tracking coverage rates

Decisions:

- How and when to analyze data to identify trends
- Identification of what data tools to review and reformat
- Help set the annual target and performance coverage numbers

KEY CHALLENGES

- Program funding is in part dependent on external partners, which creates parallel tools and processes and a power struggle over who makes strategic decisions and owns the data; internal funding processes are long and bureaucratic, which makes it difficult to accomplish basic tasks
- Official population numbers that must be used for planning, target setting and in DHIS-2 are are often extrapolated (and therefore inaccurate) and may be several years out of date (due to gaps in census)
- Lack of sufficient training on new indicators for the National level and management training for managers at all levels
- National vaccine stockouts beyond the control of the EPI program

4 Root Causes

8 Root Causes Framework

We identified 8 Root Causes **for underutilization of data for decision-making**: *Access, Time, Tools & Protocols, Know-how, Working Conditions, Trust in Data, Agency,* and *Influence*. These can be further organized around two factors—*Low Ability* and *Low Motivation* for use.

A comprehensive mapping of all causes and sub causes which contribute to the overall problem are represented as **fishbone diagrams,** which are summarized on the following pages. Dots placed next to individual causes indicate their relative importance from the point of view of our research and workshop participants. Contributing causes, which participants identified as highest priority to address, are discussed in more detail.

For additional details and information on how this framework was generated, please refer to the Cross-Country Brief Report and Miro board.

Click to view full scale framework

1 Executive Summary
2 Study Background
3 System Mapping
4 Root Causes
5 Priority Areas

Low **Ability**

Our ability to include or successfully utilize data in the decision-making process is limited by external factors as well as our own knowledge gaps.

Access

We don’t have access to data needed for decision-making.

Time

We don't have sufficient time to incorporate data into our decision-making.

Tools & Protocols

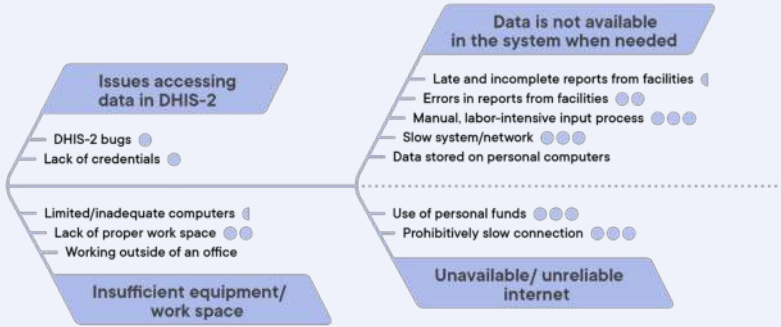
Our tools and protocols don't support or encourage making data-driven decisions.

Know-how

We don't know how to correctly interpret or act on the data we have.

Access

We don't have access to data needed for decision-making.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

Slow system/network

Network issues frustrate efforts to input data into the system. The DHIS-2 server also tends to be very slow, especially during peak times when everyone is trying to access it.

STORY FROM THE FIELD:

Janvier, the director of a Province's Health Division, oversees 18 health rural zones that do not have stable internet. This makes it extremely difficult for them to use DHIS-2. To enter their data, all zones need to either send someone to his central office or use mobile data to relay the information to his overworked team to input. At times, his office's own internet does not work, straining not only his ability to plan and manage his province but also his relation with the data office at the National level. *(DRC)*

Manual, labor intensive data input process

The handwritten paper reports are hard to read and occasionally get damaged, which requires Records Officers to follow up with facilities to verify data. Often updated pre-printed versions are delayed in their availability to all levels, requiring use of old forms or having to improvise with hand-drawn versions. Inconsistencies between the digital and paper systems also slow down the process, meaning data is not always available in the system when needed.

Use of personal funds

Managers may have to use their own funds to pay for the internet they need to do their job. When they are unable to afford it, they lose access to data.

Lack of proper work space

The office environment may not be conducive to working. Lack of electricity, loud noise, high heat, or inadequate furniture make it extremely difficult to concentrate on the task at hand.

DHIS-2 bugs

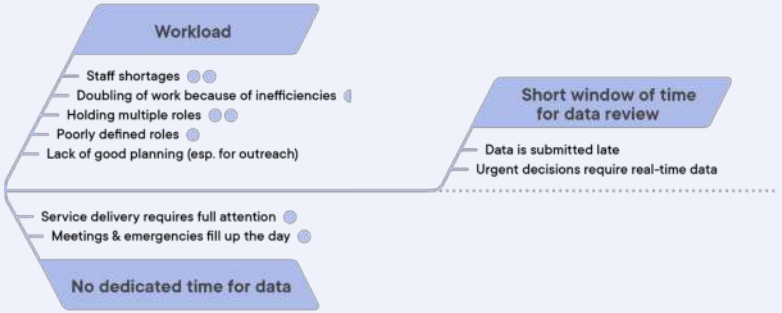
DHIS-2 system has issues, not always pulling up the correct data that has been entered in.

Lack of credentials

Managers don't have the credentials to access data directly and instead rely on "data people" to do it for them.

Time

We don't have sufficient time to incorporate data into our decision-making.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●

Staff shortages

Actors at all levels constantly have more work than time to complete it. Staff shortages and poorly defined roles mean they also take on additional responsibilities and have less time to complete core tasks.

●●

Holding multiple roles

At the subnational level, it's common for managers to hold multiple roles. They might spend part of the week as a manager and as a specialist in a hospital the rest of the week. This multitasking adds stress and reduces their ability to focus on data.

●

Meetings & emergencies fill up the day

Managers spend most of their time in meetings or dealing with emergencies, making it difficult to sit down and review data.

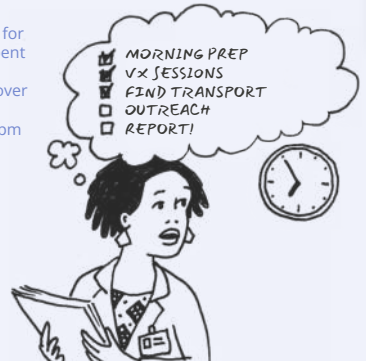
●

Service delivery requires full attention

At facilities, data review takes away from service delivery. If the workload is heavy, staff can only sit down to review data in the evenings or not at all.

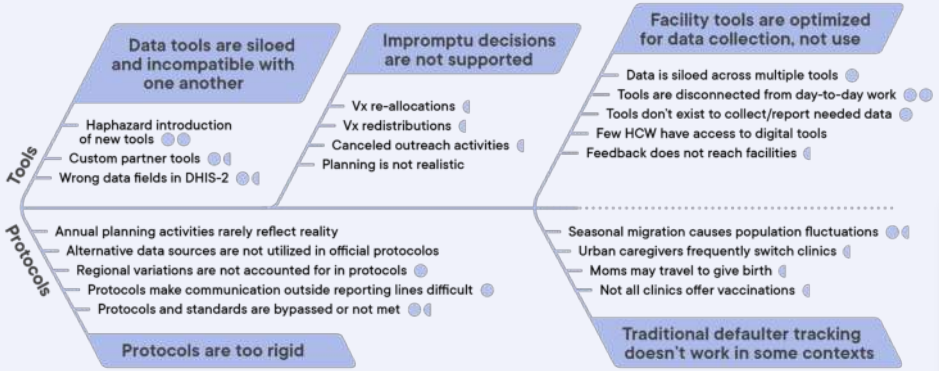
▸ **STORY FROM THE FIELD:**

Milagrosa, a District EPI Manager in Mozambique, has been trying to complete her district's monthly report for days now, and was hoping to finish today; but with an outbreak underway and a sick immunization nurse responsible for the mobile brigade, Milagrosa spent all day scrambling to find early transportation so that she can cover the nurse's activities in the community tomorrow around 2 pm and finally be back to start preparing the report in the afternoon. This isn't exceptional, even as someone whose core responsibility is to manage data, other health delivery or management activities keep making it difficult for Milagrosa to concentrate on it. (Mozambique)



Tools & Protocols

Our tools and protocols don't support or encourage making data-driven decisions.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●

Haphazard introduction of new tools

When new tools are introduced, old ones are not taken away or modified, creating a jigsaw puzzle that is difficult to navigate. Transitioning from one tool to another is also not easy because staff is not well supported in learning new formats and indicators and old templates might not be updated.

▸ **STORY FROM THE FIELD:**

The DHIS-2 system is being rolled out throughout the DRC, and Grégoire, who works in EPI surveillance at the national level, remains skeptical about the tool's relevance. To him, DHIS-2 produces "mute data" which hampers triangulation, analysis, and overall decision-making. For example, in the current DHIS-2, while a case of tetanus is reported, the age of the child can't be included, making it impossible to differentiate neonatal tetanus from the one affecting young children, and impeding on taking appropriate action. Fortunately, Grégoire has nurtured informal networks over the years that he can call on to access this data in the paper documents. (DRC)

●●

Tools are disconnected from day-to-day work

Facility level staff feel a disconnect between "the paperwork" and the wellbeing of the patient.

●

Seasonal migration causes population fluctuations

Populations fluctuate with seasonal labor migration, affecting coverage rates.

●

Data is siloed across multiple tools

Facilities lack tools that give them a client-centered view and make it easier to know what their actual needs are.

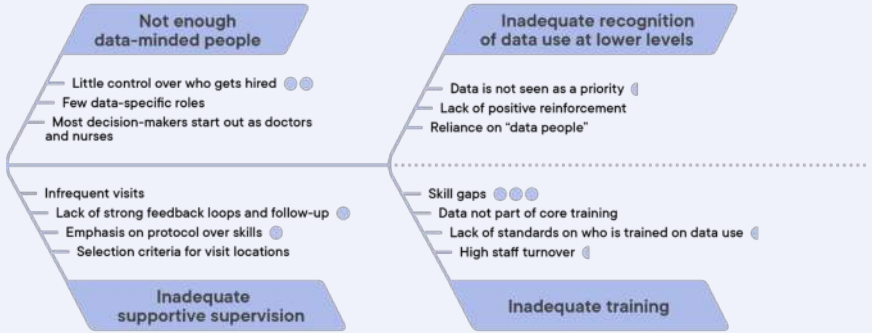
●

Regional variations are not accounted for in protocols

Protocols, especially around timing, don't account for regional factors which may require an alternative approach.

Know-how

We don't know how to correctly interpret or act on the data we have.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●●

Skill gaps

Many skill gaps exist, especially at the subnational and facility levels, which are not currently being addressed by training.

▸ **STORY FROM THE FIELD:**

Nestor is a kind and hardworking 34 year old vaccinating nurse who enjoys making a difference. Yet, even with 2 years working at his urban facility he is unable to complete the required stock card with the data he collects throughout the month. He was never trained by his busy manager, nor was the protocol indicating that the zonal team give him feedback on his stock cards before delivering the vaccines ever respected. Unclear about what postponement, entry, stock, exit and balance numbers represent, Nestor doesn't know how to link data with a consequential output. (DRC)

●●

Little control over who gets hired

Decisions about who to hire are often a few levels removed from the actual work being performed, making it very difficult to make complementary teams. Skills such as data literacy are frequently overlooked.

●

Emphasis on protocol adherence over skills

During the supportive supervision visits, evaluators focus on whether or not healthcare workers follow protocols rather than evaluating skills and decisions.

●

Lack of strong feedback loops and follow-up

The results of the supportive supervision visits are frequently not shared back with those concerned, which limits opportunities for professional growth.

Low **Motivation**

Our motivation to include or successfully utilize data in the decision-making process is limited by our perceptions of data and our role within the system, as well as external demotivating factors.

Working Conditions

We struggle to get the bare minimum done, so data use often gets left out.

Trust in Data

We don't trust the quality of the available data, so we aren't keen on using it to make decisions.

Agency

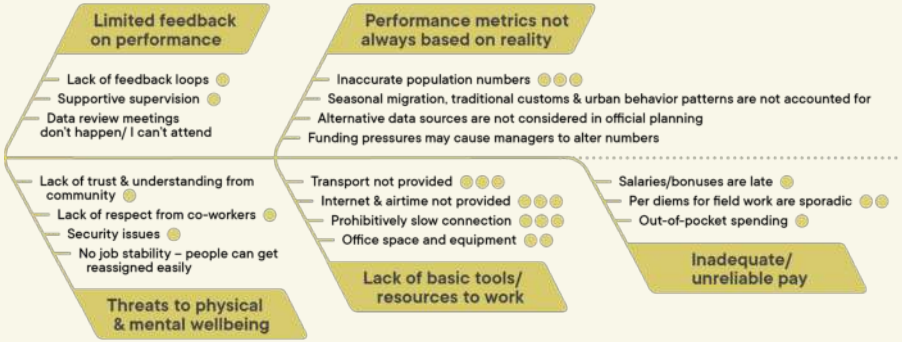
We don't feel like we can make significant decisions.

Influence

We don't believe that our planning activities and decisions influence the system performance.

Working Conditions

Our working conditions make it difficult to accomplish basic tasks, frustrating our efforts and lowering our standards. We struggle to get the bare minimum done, so data use often gets left out.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●●

Transport not provided

Reliable transportation to carry out data checks, supervision, and outreach is not available.

●●●

Internet & airtime not provided

Internet/airtime needed to submit, input, access or follow up on data is not reliable or requires staff to pay out-of-pocket.

●●●

Prohibitively slow connection

Internet connection is too slow to conduct routine tasks. This requires staff to go looking for a better connection or waste hours on something they are expected to get done in a few minutes.

●●

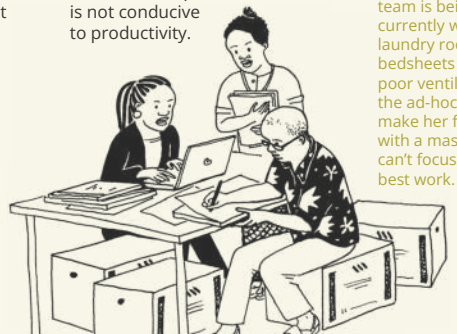
Per diems for field work are sporadic

Per diems for outreach activities are mostly funded by partner funding, which is only available for the duration of the project, meaning staff don't always get compensated.

●●

Office space & equipment

The physical working space, whether the quality of the facilities or the access to tools such as a computer is not conducive to productivity.

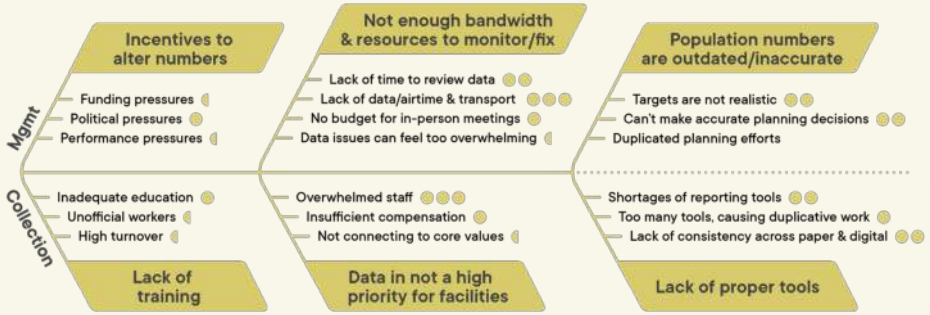


▸ STORY FROM THE FIELD:

Tawila is nervous about going into work. As a District EPI Manager, she needs to access an office with a computer, internet and facility reports. Unfortunately, the roof of this office is caving in, meaning her team is being moved around. They currently work out of a hospital's old laundry room where gear and bedsheets were once washed. The poor ventilation of the space and the ad-hoc arrangement do not make her feel comfortable, even with a mask. She feels her team can't focus and accomplish their best work. (Mozambique)

Trust In Data

We don't trust the quality of the available data, so we aren't keen on using it to make decisions.



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●●

Overwhelmed staff

Staff, especially at the Facility level, are overwhelmed and prioritize service delivery over data collection and reporting.

●●

Lack of time to review data

Managers, especially at higher levels, don't have time to review all of the data. Instead, they tend to focus on data with higher visibility or funding implications.

●●

Shortages of reporting tools

Shortages of reporting tools are demotivating and force Facilities to improvise, which causes errors and increases work for other actors in the system. At times, facilities have to spend their own money to copy forms or manually recreate them in notebooks.

●●

Lack of consistency across paper & digital

Tools used by the facilities are out of date or the current tools have not been updated to reflect changes made in the DHIS-2.

●●

Can't make accurate planning decisions

Managers can't make accurate planning decisions or identify inconsistencies based on inaccurate population numbers

▸ **STORY FROM THE FIELD:**

John, who works at the National level, receives calls from subnational offices asking for vaccines, although, in the system, it shows them as fully stocked. The data in the system is unreliable and rarely updated in time for when he needs to make vaccine orders, forcing him to use old and outdated estimates for ordering. He wishes he could speak to the Sub Counties one by one to confirm stock data before making his national stock orders because that would be the only way to fully trust the numbers. However, with 300 Sub Counties below him, it would be impossible. (Kenya)

Agency

We don't feel like we can make significant decisions.

Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

Hierarchy/status

Only individuals in certain roles or education levels are considered decision makers. While facility staff may regularly make decisions as part of their work, they would hesitate to label them that way or call themselves "decision makers".

▸ **STORY FROM THE FIELD:**

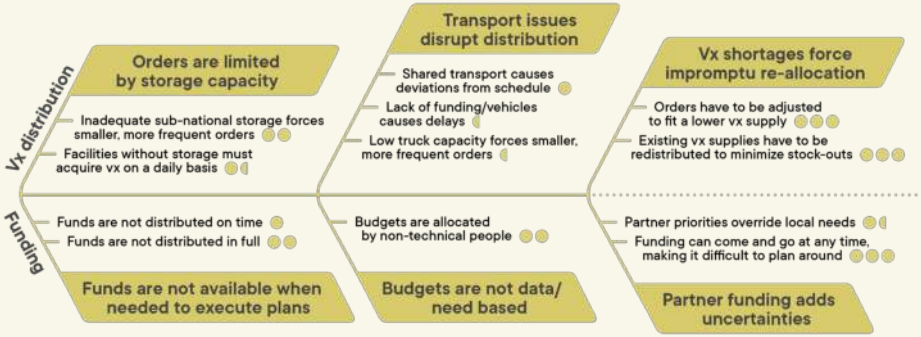
Marcy, an immunization Nurse at a facility, has adopted the working culture notion that what she considers "decisions" are made at the higher levels. Her job is to make "choices" in the day-to-day delivery of her work, to pass information to those above her for them to make the decisions, and to participate in collective decision-making, such as spreading out vaccination days to avert vaccine wastage, which is done with all the nurses. She knows that she will not be evaluated based on decisions, but rather on if she adopted the proper protocol. (Kenya)

Checklist culture

During training, especially as nurses, there is a strong emphasis on following protocols and checklists. Staff are taught how to execute instructions, not make decisions on their own.

Influence

We don't believe that our planning activities and decisions have significant influence on the system performance (even if their quality/accuracy improves).



Click for more detailed fishbone.

KEY CONTRIBUTING CAUSES:

KEY: ●●● — Highest Priority ●● — High Priority ● — Medium Priority

●●●

Existing vx supplies have to be redistributed across the system to minimize stock-outs

When vx orders cannot be fulfilled on time, managers may need to move vx stock around the system to avoid stock-outs in higher demand areas.

●●●

Orders have to be adjusted to fit a lower vx supply

When vx orders cannot be fulfilled in full, managers are forced to quickly determine who should get how much rather than relying on official forecasts.

▸ **STORY FROM THE FIELD:**

Raquel, a Provincial EPI Manager, faces frequent issues with vaccine stockouts and original distribution schedules are rarely followed. Unfortunately, the Ministry lacks funds to send the vaccine stock she needs via air and does not have enough trucks for each Province. Her province is dependent on the same truck as two other provinces, which means trucks are fuller and that she has to put orders to restock every month instead of the protocol quarterly approach. (Mozambique)

●●●

Funding can come and go at any time, making it difficult to plan around

Partner funding is not guaranteed and can disappear, making it difficult to plan around.

●●

Budgets are allocated by non-technical people

The people who ultimately decide how much money the program gets are not technical and are unlikely to consider or even see program data to inform their decisions.

●●

Inadequate sub-national storage forces smaller, more frequent orders

Subnational storage is often insufficient or broken, meaning managers make more frequent, smaller orders than planned.

●

Shared transport arrangements cause deviations from schedule

To save cost, transport is shared with other programs with competing priorities and different distribution cycles.

5 Priority Areas

Priority Areas: Background

The 8 Root Causes framework was shared with stakeholders in each country during a series of co-creation workshops. Based on input during these workshops, the team identified 7 Priority Areas for intervention that cut across all three geographies.

The Priority Areas are made of many root and sub causes, mirroring the complexity of challenges facing the system today.

The remainder of this document discusses each Priority Area in detail and outlines some ideas for interventions. While the research focused on 3 target geographies, it was designed to assist stakeholders globally in strategic priority setting. By emphasizing the realities of localized immunization activities, the project's outputs hope to enhance and evolve already existing data efforts and interventions, both locally, regionally and globally.

Country variations

To account for variations in priorities across the three geographies, we created a scale to assess the relative importance of the Priority Areas for each country. Notable differences include:

- **Technology:** The internet and technology infrastructure in Kenya is more advanced than in Mozambique and the DRC, where more pronounced issues with equipment, computer literacy, and connectivity make improving accessibility to DHIS-2 more of a priority. While the use of the DHIS-2 system is well established in Kenya, it is still being rolled out across the DRC, leading to unique challenges around transitioning from or working around older systems, such as the phonie. Similarly, the use of communication technologies like WhatsApp is much more prevalent among Facility and Community level workers in Kenya.
- **Interactions:** The more bureaucratic and hierarchical nature of work in Mozambique and in the DRC means that interactions between system levels are less frequent and structured, leading to greater need for interventions in this area.
- **Money and resources:** While lack of basic resources to perform work is a common thread across all of the geographies, financial insecurity is particularly pronounced in the DRC, where staff may have to rely on unofficial income channels to get paid.
- **Other factors:** The concept of fairness in how resources and responsibilities are distributed was identified as very important in Mozambique. In the DRC, where individuals often rely on parallel systems to secure most basic resources, job and financial security is a driving factor. In Kenya, the need for professional and personal fulfillment came out more strongly.

Additional considerations

- The Priority Areas are the result of research intended to understand challenges from the point of view of the system actors. As such, the team's priority has been to accurately represent these viewpoints. Although it was beyond the scope of this project, it would be beneficial to explore which proposed initiatives have been tried in each country and to what effect.
- In compiling these Priority Areas, we did not focus on what's new, rather we set out to identify what is most impactful for change. **This means we evaluated all of the Root Causes and Sub-causes to identify the ones that were both high priority to the system actors and relatively less difficult to solve.** As such while some of the Priority Areas may not be new, we believe they are important to highlight, so that stakeholders may continue to work at addressing these long standing Priority Areas.
- For each of the Priority Areas, we have indicated the relative priority level for the three geographies, based on the extensive qualitative data completed during this project with over 211 interviews and observations across our target geographies and feedback from stakeholders' in interviews and during co-creation workshops. We recommend further engagement with country EPI programs to validate and incorporate this work into existing and future efforts.

Priority Areas: Overview

PEOPLE

1

Increase the **number and competencies of data-proficient personnel**, especially at lower levels of the system

Priority level:
K: ●● / M: ●● / D: ●

RESOURCES

2

Ensure steady availability of basic resources (such as reporting tools, airtime, transport, and internet) needed for recording, managing and accessing data

Priority level:
K: ●●● / M: ●● / D: ●●●

TOOLS

3

Redesign Facility-level tools to reduce workload & better support decision-making

Priority level:
K: ●● / M: ●● / D: ●●

4

Speed up data input and improve **data accessibility** in DHIS-2

Priority level:
K: ● / M: ●● / D: ●●

INTERACTIONS

5

Foster more frequent, **two-way interactions** around data and decision-making between actors at all levels

Priority level:
K: ●● / M: ● / D: ●

6

Improve supervision effectiveness, shifting away from one-off checklist visits and towards providing **continuous, constructive feedback** over time.

Priority level:
K: ● / M: ●● / D: ●

PLANNING

7

Improve the budgeting process by engaging political and administrative decision-makers and providing timely data on actual funds available

Priority level:
K: ●●● / M: ●●● / D: ●●●

KEY

●●● — Highest Priority
●● — High Priority
● — Medium Priority

K — Kenya
M — Mozambique
D — DRC

Priority Areas: People

PRIORITY: Kenya: ●● *(High)* / Moz: ●● *(High)* / DRC: ● *(Med)*

1

Increase the **number and competencies of data-proficient personnel,** especially at lower levels of the system

"When it comes to employing health workers, we are very quick to determine that we need nurses and doctors. We forget the data people, yet they are very important"

County EPI Manager, Kenya

ROOT CAUSES addressed:

Know-how

- Not enough data-minded people
- Inadequate training

Time

- Workload
- No dedicated time for data

Trust in Data

- Not enough bandwidth and resources to monitor/fix
- Data is not a high priority for facilities
- Lack of training

Priority Areas: People

1 *Cont.*

While there is a growing emphasis on improving data quality and utilization, few data-specific roles exist within the system, especially at the lower levels. Most data collection, reporting, and review work is done by personnel who don't consider it to be a core part of their job. Meaning the work is often rushed, deprioritized, or outsourced to unofficial workers.

At the Facility level, immunization nurses tend to focus all of their energy on delivering health services, often forced to choose between following reporting protocols and serving all of their clients. With barely enough time to collect and compile the required data, they are unlikely to review or analyze it. They are also unlikely to feel comfortable working with data, as most training is limited to what they have been able to pick up on the job. Majority of the nurses in our study felt that more complex reporting tasks should be performed by a "data person" who is good with numbers, and, more importantly, can dedicate their full attention to reviewing and analyzing data.

In facilities with an embedded HIRO, nurses reported feeling more confident about their data quality, knowing that someone has compiled and reviewed it on a regular basis as opposed to rushing through everything at the end of the month. They also had more headspace and time for service delivery and facilities could more easily utilize their data for planning and operations.

At the Subnational level, most managers are hired from within the system. As nurses and doctors by training, they may not have all the required data skills needed to manage the immunization program. Additionally, since many are still practicing physicians or technicians, carving out time for data away from more pressing emergencies may be a challenge. As a result, they are likely to rely on the Records Officer to pull and interpret data for them, adding to the HIROs already heavy workload.

Adding or developing additional data-proficient personnel throughout the lower levels of the system, as well as carving out dedicated time for completing specific tasks will help to establish data as a priority and create opportunities for more meaningful utilization of data by all actors.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

Understaffed, facilities cut corners to collect data without compromising service delivery

Denia, an Immunization Nurse, works in a facility where she and other nurses adopted a non-official strategy to reduce their morning workload. They need to document the vaccine stock in addition to

Priority Areas: People

1 *Cont.*

performing their vaccinating duties, but the administrative activities are time-consuming (the two main documents take 30 minutes each to fill out) and are not as important according to her. She records the vaccines taken from stock on a piece of paper in short form and only transfers the required information to the official tools in more detail in the afternoon, when the whole staff can review and sit down with their lot of vaccine quantities together. This may increase the errors but it makes their health service delivery more streamlined and efficient. (Moz)

HIROs create their own tools to track locally relevant data

Marie-Louise has been an HRIO at the Provincial level for over twenty years and over this time the team has grown and developed specific tools adapted to her provinces' needs. For instance, she finds the official tools to be too generic to resolve her province's specific priorities. She created an excel database to track specific diseases (MAPEPIs) in addition to the 22 pathologies she needs to track for the National level. Her team is able to present strong visual graphs during the provincial surveillance meetings based on her expanded database. Recently, this has helped convince the provincial medical authorities to launch a yellow fever vaccination campaign. (DRC)

Managers usually fill two or more roles, leaving them with very little headspace for data

Charles is a Sub County Medical Health Officer who wears many hats as part of his role. He wishes he had more time for data related activities, but as his responsibilities and exhaustion pile up over the week, he rarely has any time to dive in. On top of managing a level 5 hospital in a busy urban area, he also is a specialist gynecologist who performs surgeries once a week, does daily ward rounds, and 8 supportive supervision visits a month. Being the only gynecologist, Charles is on 24/7 call in case of emergencies, adding to the exhaustion he experiences from just completing his specific day to day responsibilities. While he wants to focus on his administrative duties like the data review meetings, ordering, reporting, and budgeting, he lacks the time and space necessary to be in front of a computer, which doesn't currently fit his "on the go," work routine. (Kenya)

TAKE ACTION:

- Expand the **Facility Records Officer role** to encompass all facilities, either on a full-time or rotational basis.
- Work with training and accreditation institutions (as well as within the immunization pre-service and on-job monitoring and mentoring) to **raise the level of data-proficiency of graduates**. Actively recruit for these skills in new hires.
- Ensure all decision-makers are trained on and have **access to a HMIS (such as DHIS-2)**. Conduct continuous monitoring and skills building to troubleshoot problems.
- Identify **unofficial workers currently performing data tasks** at the Facility and Community levels and ensure they have the necessary guidance/training and resources to do this work correctly.

Priority Areas: Resources

PRIORITY: Kenya: ●●● *(Highest)* / Moz: ●● *(High)* / DRC: ●●● *(Highest)*

ROOT CAUSES addressed:

2

Ensure steady **availability of basic resources** *(such as reporting tools, airtime, transport & internet)* needed **for recording, managing, and accessing data**

"When it's time to create the report, there are many records to photocopy because one copy should stay with you, another should be in the pharmacy, and another with the Immunization Nurse. Sometimes we end up spending 30 to 40 MZN [of our own money]."

Community Health Worker, Mozambique

Working Conditions

- Lack of basic tools/ resources to work

Trust In Data

- Not enough bandwidth and resources to monitor/fix
- Lack of proper tools

Access

- Data is not available in the system when needed
- Unavailable/unreliable internet

Priority Areas: Resources

2 *Cont.*

Some managers and healthcare workers have data skills and appreciate the value of good data, yet are unable to perform their basic data-related duties due to a lack of funds for airtime, internet, and transport or reporting tools.

At the Facility level, insufficient supply of blank reporting tools is considered one of the biggest demotivators for data collection. Facilities are often forced to pay for photocopies of official forms, use outdated ones, or improvise by recording data in notebooks. Without the paper forms, HIROs find it extremely difficult to hold facilities accountable for data. The use of outdated or ad hoc forms also introduces data gaps and errors.

At the Sub County/DIstrict/Zone level, managers frequently need to interact with facilities directly to follow up on late reports, fill gaps, and correct data inconsistencies. This can be largely done over the phone but, in the case of more complicated cases or recurring issues in-person visits may be required. When possible, managers grudgingly cover the expenses for these activities out of their own pocket. Still, it is not uncommon for steps to be missed or data to go into the system unvalidated due to lack of funds for airtime or transport. Lack of a stable wifi connection or internet data also makes it difficult to input and access data into the DHIS-2.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

HIROs may not able to follow up on data issues because of airtime and transport

Serge is a Zonal (Sub County) Head Nurse in a fluvial area of the DRC. 2 years ago, a new Immunisation Nurse started in one of his facilities and ever since then, the facility's monthly data has been submitted with inconsistencies, specifically overestimating how many vaccinations he has administered. When Serge follows up with the nurse via SMS, she tends to be abrasive and avoid providing an explanation. Unfortunately, Serge does not have funds to create a better rapport with the nurse: he does not have a smartphone for WhatsApp, lacks the funds to make lengthy phone calls, and the nurse's facility is on a fluvial axis that his zone does not have the transportation to access. (DRC)

Shortages of data collection tools demotivate and lower data quality

Facility level staff do not always have access to the data collection tools that they need to complete their activities. In many instances, when facilities run out of specific MOH issued tools, replacements are not issued, and the staff create workarounds by photocopying a blank original copy and either binding it and creating their own, or using plain lined notebooks to capture data in. They reproduce the original tool, by drawing in the same

Priority Areas: Resources

2 *Cont.*

fields and columns, but add new data fields that feel more relevant to their decision making (such as next vaccination date and contact numbers). For the Sub County HRIO, the lack of tools at the Facility level causes delays in their ability to collate and submit the end of month report. (Kenya)

Staff often pay out of pocket to perform basic duties

Becoming a nurse and keeping her community and its children healthy was a calling for Julia. She feels incredibly lucky to be fulfilling it since graduating. Soon after, she started working in a rural facility as an Immunization Nurse where she was responsible for EPI and Community Health. Six years in, she has been relocated to a new facility where she is responsible for the EPI program. She still loves working and has a knack for creating trust within the community to spread the importance of immunizations. The dedication she has to her job means that Julia is willing to buy her own phone credit to communicate with her bosses and other community health workers. Despite this passion, she feels not only underpaid but also that she must invest her own funds to appropriately do her job. (Moz)

KENYA SPOTLIGHT:

Spotlights are examples of intervention ideas that may be introduced to address a priority area. They are informed by the research, synthesis and co-creation workshops with users and stakeholders.

Immunization-focused, local data user empowerment initiative at County, Sub-Country and Facility levels

An initiative to demonstrate the value of providing data/airtime/transport to support supervision, data correction and management to clearly assess what is the impact on program performance? And how much would it cost to do this (probably not much)?

Consider: It's hard for any intervention to be Country-wide because of devolution/decentralization (particularly if operational costs such as the printing of forms or airtime are to be resourced at County/District/ Provincial levels depending on country). This example from Kenya provides some learning.

Scale is important: If an intervention is designed, it should be at scale, to really see a difference within the larger system and ensure sustainability and local solutions.

TAKE ACTION:

- **Review current policies regarding basic resources** and see if there is a way to increase, prioritise or reassess priorities to further this agenda.
- **Review EPI's previous expenditures**, and identify areas of waste or overspend, to be reallocated to the program's basic resources.
- **Increase and earmark funds for basic resources** such as airtime, internet, and transport for data-related tasks such as reporting, managing and accessing data. These resources should be locally managed.
- **Make the availability, printing and distribution of up-to-date paper reporting tools at all facilities a priority**. This includes stock management protocols to enable systematic alerts on low supply along with assurance of proactive resupply from higher levels (as applicable) before stock out.

Priority Areas: Tools

PRIORITY: Kenya: ●● *(High)* / Moz: ●● *(High)* / DRC: ●● *(High)*

3 Redesign Facility level **tools** to reduce workload & better support decision-making

"... it is better to register each antigen's stock levels in the afternoon, when we can review and each of us sits down with their lot of vaccine quantities... We take down the numbers — the quantity of each vaccine, the batch and expiration date and on each vaccine there's a small sticker with the VVM status."

Immunization Nurse, Mozambique

ROOT CAUSES addressed:

Time
- Workload

Tools & Protocols
- Facility tools are optimized for data collection, not use
- Impromptu decisions are not supported
- Data tools are siloed and incompatible with one another

Access
- Data is not available in the system when needed

Trust In Data
- Lack of proper tools

Priority Areas: Tools

3 *Cont.*

Facility level tools are siloed according to how the data needs to be used at higher levels and not designed with facility workflows or the data-needs of frontline healthcare workers in mind.

There are many tools at the Facility level that do not fit into the facilities' current workflow. As such they duplicate efforts by collecting the same information, over multiple tools, and making room for unnecessary errors. These tools often serve the decision-making needs of those at the Sub National/Zonal level, while at that level these same duplications make data validation and entry into the DHIS-2 system equally time-consuming.

Furthermore, the current tools don't necessarily capture the data needed to make operational decisions at the Facility level, nor present it in a way that is easy for facility staff to monitor, analyze and, ultimately, use it. To address this need, motivated facilities create workarounds and informal tools to support their decision-making.This increases their autonomy and accountability with regards to operational decision-making.

Similarly, while digital tools hold the long term promise of reducing workload, they are frequently not easily accessible at Facility levels (particularly where internet, electricity and/or data access are limited or where download and printing are not possible). This means data can be 'lost in a computer' making it difficult to reference and resulting in the need for hand drawn forms, aka parallel records to be maintained by staff.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

Facilities make their own defaulter tracking tools

Joyce, an Immunization Nurse, uses a lined notebook to trace parents and guardians of children for follow up visits. She fills this book, an informal defaulter register, with the names of those who came to the clinic and the dates of their original appointment, why they did not show up as well as when they planned

Priority Areas: Tools

3 *Cont.*

to return. Joyce feels that the official tools do not support the decision-making and management of immunization services at her level, which is why she needs to record additional data points. (Kenya)

Reporting tools are not optimized for facility use

During immunization sessions at the Facility level, there are many data collection tools that are used to collect information throughout the process including registration, confirmation and vaccination. Tools, such as the patient register, mother and child booklet, tally sheets and vaccine ledgers, all are updated during a routine immunization session. Additionally, if there is a particular vaccine campaign, a separate tool may be created to collect that data, as it will be closely tracked by County and National. These tools are often cumbersome, so lighter and portable informal tools are also created during vaccinations in high volume maternity wards, for example, at the beginning of each day. These tools, both formal and informal, contain a significant amount of overlap with each other and have the opportunity to be condensed, streamlined and redesigned to meet facility needs and reduce their workload significantly and increase data quality. (Kenya)

TAKE ACTION:

- **Simplify the data input fields and align reporting tools** to reduce redundancy and to account for the fact that Immunization Nurses are multitasking. This requires local analysis of facility needs for name-based tracking and understanding of hybrid paper and electronic systems, as applicable.
- Capture data in an order that fits into **existing facility workflows**.
- **Provide a holistic patient view in a single tool** (e.g. for facility use) to eliminate duplication of data and to better inform decision-making. Ensure also availability of paper home-based records/cards for clients, to support individual tracking and help clients have access to their immunization data long-term.
- **Build-in guidance for planning and decision-making** that includes understanding of how the different reporting tools relate and are used. (This tool is an example that has been used in the DRC).
- Ensure HMIS (such as DHIS-2) is updated to **reflect paper tool changes** and that there is support for monitoring and use of hybrid electronic and paper tool systems that still exist in many facilities.
- **Provide additional support for defaulter tracing and outreach**, including to align home based records/cards, community health worker forms, and Facility registers for tool availability and competency-building in their triangulation and use.

Priority Areas: Tools

PRIORITY: Kenya: ● *(Med)* / Moz: ● ● *(High)* / DRC: ● ● *(High)*

ROOT CAUSES addressed:

4

Speed up data-input and improve data **accessibility** in DHIS-2

"[DHIS-2] system is failing us. We have sometimes gone in, found that there's no report and you have done your report. And from your heart, you know you did the work."

Sub County HIRO, Kenya

Time

- Workload
- No dedicated time for data
- Short window of time for data review

Tools & Protocols

- Data tools are siloed and incompatible with one another

Access

- Issues accessing data in DHIS-2
- Data is not available in the system when needed
- Insufficient equipment/ work space

Priority Areas: Tools

4 ***Cont.***

DHIS-2 faces many product and implementation challenges that impact how users utilize the system. The current DHIS-2 system experience for users is poor, often the result of bugs or system lags that hinder their ability to input, manage or retrieve data. Inconsistencies between the data fields in paper reports and DHIS-2 significantly slow down data input and, at times, can introduce errors.

During peak usage times, when HIROs are racing against the clock to meet their deadlines, the system can get very buggy, with lag times that make it almost impossible to use. HIROs, even with a good internet connection, may be locked out of the system for hours, or report losing data they have already entered. In the DRC, where DHIS-2 is just recently being rolled out, protocols do not take into account that some areas never have a stable enough connection to use the system, forcing staff to travel long and costly distances to input data.

Retrieving data already in the system can be equally as challenging. Managers may spend the majority of their work days shuttling from meeting to meeting, unable to sit down in front of a computer. Others, especially at the Facility level, may not have access to a computer or internet at all, meaning they rely exclusively on others to pull data for them.

Modernizing and debugging DHIS-2 could mean significantly less time spent on data entry and more time for data verification and analysis. Leveraging existing DHIS-2 apps to provide access to data on mobile devices (with more efficient offline capability and, clear guidance on interoperability when computers and internet are available) could also make data more accessible to busy managers and Facility level staff. Finally, creating context-appropriate protocols and providing the necessary training is key to ensure buy-in and proper use of any digital solution.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

HRIOs struggle with inconsistencies between paper and digital tools and a digital system plagued with bugs and accessibility issues

Joseph, a Sub County HRIO, faces a multitude of data collection and reporting issues while trying to complete his data responsibilities.

During busy reporting periods, Joseph faces a regular challenge while trying to input data into DHIS-2. There are inconsistencies between the data fields on the paper reports from facilities, and the DHIS-2 system fields. For example, there is a mismatch between the age field required for Vitamin A on the paper tools at the Facility level and what can be entered into the digital system. While on the paper tools, you are able to indicate a 1 year old, the DHIS-2 does not allow for anyone below 2 years of age.

Priority Areas: Tools

4 *Cont.*

Additionally, the DHIS-2 has many bugs that sometimes doesn't allow for the retrieval of previously inputted information. Joseph, who listed the "system" as one of his major challenges, has had instances of reports going missing, not being accessible or being shown as not having ever been entered, when they had. The system does not often sync up with what has been entered for all users, with one level seeing different data from the managers of DHIS-2.

This is further compounded by the system lags that Joseph experiences when operating within DHIS-2, coupled with spotty and unreliable internet. A new wifi system, however, has just been installed in the urban Sub County office where he works and he has high hopes that it will make his job a lot less about getting the data into the system, and more about analyzing it. Up until now, a lot of his week was struggling with the internet to input data. He and his colleagues need to buy internet credit to power a modem within their office, because the administrators explained there was no money for internet, even though they expected them to enter in and submit the data before their deadlines. It isn't only a financial problem, it was also a problem of timing. The quality of the connection means he often comes back to the office when connections are stronger, like on weekends, even after church.

These compounding challenges leave Joseph with mismatched tools and a digital system that hinders his ability to report data in a timely and efficient manner. By streaming and syncing paper and digital tools and increasing the usability and accessibility of DHIS-2, Joseph's already taxing job would be made that much easier and more effective. (Kenya)

DHIS-2 rollout in the DRC does not consider the realities on the ground

Like many Zonal Data Managers, Gustave was both excited and nervous about the new mandatory use of DHIS-2 to report data. While this internet-based digital tool is meant to facilitate and streamline analysis of data—and improve consistency and accuracy—the internet in his office is often unavailable and when the training took place the mock-tool wasn't working, so he doesn't feel like he mastered the process.

Priority Areas: Tools

4 *Cont.*

For years he and his team have relied on an excel document called the DVD-MT for their analysis. He is more comfortable with this format because it is obviously more familiar, but also because it has a more complete breadth of immunization indicators to facilitate real-time analysis with his Head Zonal Nurse. Together they have noticed inconsistencies between the results on the two platforms, which makes them nervous of letting go of their old system. This combination of factors means his work has doubled — he continues to complete the DVD-MT and fulfills the required DHIS-2 — without solving the fundamental problems of data quality and decision-making. (DRC)

TAKE ACTION:

- **Identify and fix system bugs** and usability issues in DHIS-2.
- **Identify and fix system bottlenecks**, which slow down performance, especially during peak usage times.
- Ensure **consistency and interoperability with paper tools**, including a protocol for implementing future changes. The order and processes in which information is captured and shared is just as important as the accuracy of the data fields themselves. Also, equity-based considerations and localized solutions are needed for facilities that have consistent difficulty accessing electronic systems and therefore continue to rely on paper-based reporting.
- Build out/scale up existing apps for **accessing data on mobile devices** (with both Facility level and managers on-the-go in mind). Also ensure data minutes and technologies (such as availability of smartphones and tablets and reliability of electricity and wifi/cellular signal)
- Before/as DHIS-2 rolls out, create **realistic transition plans** that consider local constraints and available resources to avoid parallel systems and the need for workarounds.
- **Leverage the HISP global network to prioritize and fast-track** the fixes and features that need to be developed most for immunization programs on the ground.

Priority Areas: Interactions

PRIORITY: Kenya: ● ● *(High)* / Moz: ● *(Med)* / DRC: ● *(Med)*

5

Foster **more frequent, two-way interactions around data** and decision-making between actors at all levels

"I have no decision to make, except to give feedback to the boss, who at his level has the right to make a decision for the men who are submitting their data."

Provincial Data, DRC

ROOT CAUSES addressed:

Working Conditions
- Limited feedback on performance

Know-how
- Inadequate recognition of data use at lower levels
- Inadequate training

Tools & Protocols
- Protocols are too rigid

Agency
- Training & supervision

Priority Areas: Interactions

5 *Cont.*

Interactions between system levels tend to be sparse and one-way, with data primarily moving up from the Community and Facility levels. Insights from the collected data rarely make their way back to the facilities and feedback is given only when data is missing or inaccurate.

As a result, Facility and Community level personnel are disconnected from the decision-making process and may not have enough context to understand why data is important and how their day-to-day operational decisions impact the overall system.

With the integration of more streamlined, flexible and individualized interactions between levels, we can increase and promote involvement and ownership, accountability, sharing, appreciation and use of data. This can also promote better data understanding and awareness across levels and transform currently passive interactions into more engaged, trusted and useful ones.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

Facility staff feel removed from decision-making, and are not sure what happens to the data they collect

Staff at the Facility level appreciate knowing when and how the data they collect is being used. Karen, a County HRIO, says that within the healthcare system there is a culture, where at any level you prefer accepting decisions being made above you, even though they may not work for you and your priorities, as everyone tries to avoid disruptions. She thinks that including people in the decision-making process could motivate staff in collecting better data as they comprehend the bridge between their collection and analysis activities, and the decisions that are made about their priorities, ressources, etc. She sees it as her duty to involve the Sub County and facilities in decisions, in the hope that, in turn, they will feel comfortable to involve her in their decision making, when needed. (Kenya)

WhatsApp groups can promote interactions outside of regular reporting structures

The Mashako Plan, a nation-wide routine immunization revitalization initiative, has encouraged the use of smartphones, specifically through WhatsApp groups. Henri, a Zonal Medical Health Officer in a semi-rural health zone near Kinshasa, noted that to transfer data faster, send reminders in case of delays, communicate new guidelines or share

Priority Areas: Interactions

5 *Cont.*

knowledge it was very useful; however, since not all of his heads of facility had received the promised money to cover their internet plans, some of his data was still untimely and lacked the necessary back and forth for quality control. (DRC)

Regular face-to-face interactions can have a big impact on morale and performance

Zenab, an urban Sub County MOH, is looking for support to reinstate the routine data review meetings. In the past, they were supported by partners, and brought all 4 Sub Counties together to have integrated data reviews, where they would present their performance data, and provide feedback and input into each other's work. These reviews used to happen every 3 months, and the benefits were high: comparing performances to others was motivating for the teams, increased a sense of accountability, and was an opportunity to share ideas and learn best practices with each other. These meetings haven't happened for the last 5 months because of lack of partner funding, but Zenab is determined to bring them back. (Kenya)

KENYA SPOTLIGHT:

Spotlights are examples of intervention ideas that may be introduced to address a priority area. They are informed by the research, synthesis and co-creation workshops with users and stakeholders.

One-on-one calls with facilities

A mix between in person and digital one and one conversations between facilities and sub national to increase data understanding and awareness from both levels. Through regular conversations, we can understand each other's needs better and forge a relationship. This will promote involvement and ownership, accountability, sharing, appreciation and use of data.

TAKE ACTION:

- **Create frequent and informal, two-way interactions** with Facility and Sub National level staff (such as more direct telephone or hotline conversations, WhatsApp or other fora, electronic 'chat' opportunities)
- Allow for the interactions to be **flexible to budget and timing constraints as well as technology-related challenges** and realities (particularly with more remote Facilities)
- **Involve facility staff more in the decision-making** and data management process (interactive not punitive or 'top down')
- **Provide continuous supportive supervision and monitoring opportunities** (that can also occasionally be done remotely via telephone or WhatsApp or chat, as needed based on resource realities) rather than infrequent evaluation visits

Priority Areas: Interactions

PRIORITY: Kenya: ● *(Med)* / Moz: ● ● *(High)* / DRC: ● *(Med)*

ROOT CAUSES addressed:

6

Improve supervision effectiveness, shifting away from one-off checklist visits and towards providing **continuous, constructive feedback** over time.

"Supervisions like monthly reviews are means of control and monitoring that we use to judge the quality of vaccination data in health areas."

Zone Head Doctor, DRC

Know-how

- Inadequate recognition of data use at lower levels
- Inadequate training

Agency

- Training & supervision

Working Conditions

- Limited feedback on performance

Priority Areas: Interactions

6 *Cont.*

With limited resources and time, current Supportive Supervision activities are mainly geared towards enforcing protocol and catching major issues. Because the visits are infrequent and not EPI-specific, the emphasis is put on going down the checklist to take the "facility vitals" over building skills and having meaningful interactions with staff.

Feedback is also not well documented or shared with staff, so instead of building on work done before, each visit is a one-off evaluation. Not surprisingly, healthcare workers tend to see themselves as protocol-followers, not decision-makers.

With more emphasis placed on skill-building and better documentation and continuity between visits, Supportive Supervision activities and opportunities for mentoring and coaching (such as via well-facilitated and interactive review meetings and facility monthly exchanges that include community representatives) have the potential to improve healthcare worker motivation and agency.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

Nurses may not consider themselves to be decision-makers

Mercy, an Immunization Nurse in a facility, has adopted the working culture that people at her level don't make decisions, they just follow protocol. Decisions only get made at the higher levels, while her job is to pass on information for decisions to be made by those above her. She makes choices, in the day to day delivery of her work, but "decisions" cannot be made alone. Decisions made in regards to spreading out vaccine days onto specific days to avert vaccine wastage, for instance, are made collectively, with all the nurses. She knows that she will not be evaluated based on decisions, but rather on if she adopts the proper protocol. (Kenya)

Supportive Supervision visits are not well documented, which minimizes their impact

Currently the information collected during supportive supervision activities is paper based, and lives at either the Sub County, County or National level and not with the health actors being assessed.

Priority Areas: Interactions

6 *Cont.*

The purpose of the joint supportive supervision that Rachida, a national level employee, and her County level counterparts sometimes do at the Sub County level is to collect information and evaluate the Sub County's abilities regarding financing, logistics, vaccines numbers, evaluation of documentation tools, catchment populations and if they know how to set targets. She finds these to be important exercises for the superior levels to understand where there are potential gaps in the system; but she also believes, the documentation collected should be digitized and shared as part of the process, so that the learnings which are usually used to further the supervisors activities, help the lower level's growth. (Kenya)

TAKE ACTION:

- **Shift the emphasis of Supportive Supervision away from checklists and critique, towards skill development and support** via dialogue and exchange, using Human-Centered Design techniques and blended learning approaches (such as mentoring, coaching, open conversation, etc.).
- **Document visits and capture feedback in continuous living documents** accessible to all staff and supervisors (as well as community representatives, at Facility level).
- Ensure **feedback is shared directly** with the relevant staff.
- **Introduce accountability mechanisms** for supervisors to ensure Supportive Supervision goals are met and train accordingly.

Priority Areas: Planning

PRIORITY: Kenya: ●●● *(Highest)* / Moz: ●●● *(Highest)* / DRC: ●●● *(Highest)*

ROOT CAUSES addressed:

7

Improve the budgeting process by engaging political and administrative decision-makers and providing timely data on actual funds available

"Making a work plan is one thing, getting the money is another. This annual year, we are supposed to get 100 vaccine carriers. We are already through half of the year, nothing has come."

Sub County, Kenya

Influence

- Budgets are not data/need based
- Funds are not available when needed to execute plans
- Partner funding adds uncertainties

Working Conditions

- Lack of basic tools/ resources to work

Tools & Protocols

- Protocols are too rigid

Priority Areas: Planning

7 ***Cont.***

A lot of time and resources, especially at the Subnational level, are dedicated towards official, data-based planning procedures such as generating work plans and annual budgets, intended to help utilize immunization program resources more strategically. Unfortunately, these activities frequently fail to reflect the reality on the ground, as the data used in the planning is not always accurate nor based on at least annual local census or community-engaged population calculations.

Furthermore, those ultimately responsible for allocating money towards the immunization program don't always have the necessary context to set appropriate priorities nor are they able (due to time or resource constraints) to collaborate closely with facilities to help them create contingency plans and mobilize local resources, e.g. when there are insufficient funds or cutbacks.

Plans are made based on optimistic anticipated government allocations and/or partner funding that may not materialize. When funding does arrive, it is usually less than projected and frequently delayed (particularly for at least the first three months of the fiscal year and sometimes longer). Local managers therefore run out of resources and/or are forced to abandon their long-term plans to address more immediate needs such as paying overdue bills and taking care of emergencies.

Political and administrative decision-makers (such as the Executive Committee and Assembly members) need to be more proactively engaged to ensure that funding priorities are guided by data and that more accurate funding information is available and clearly communicated for planning purposes. Partner funding mechanisms also need to be more predictable and timely, so they can be incorporated into the official planning work.

STORIES FROM THE FIELD:

Below are excerpts of stories the research team heard on the ground in Kenya, Mozambique and the DRC (participant names changed to maintain privacy)

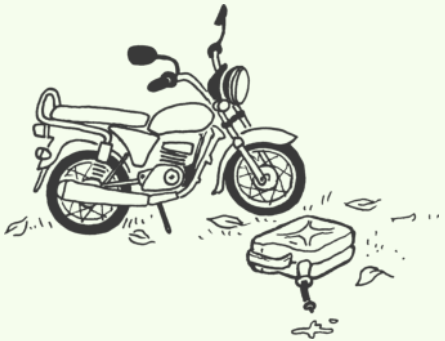
Annual planning efforts use up a lot of resources and are not always effective

Annual planning, including budgeting or target setting activities, take up time, resources, many iterations, multiple meetings and numerous approvals from each level of the system before they are sent up the chain for final approval or amendments. The hope is that at the end of the process managers like Julie, a rural Sub County Public Health Nurse, will have the resources she needs for her Sub County and facilities within the timeframe that they are needed, but also expected. But after many years of these cyclical efforts, Julie is demotivated because she does not have control of what resources or budget her Sub County will ultimately be allocated, or when they will arrive. For instance she is often put in the position where she can't get the vaccines, when her facilities need them,

Priority Areas: Planning

7 ***Cont.***

but people at the Facility level will blame her for this gap, without realising it's a County or National issue that is beyond her control. (Kenya)



Partner funding can come and go, yet programs rely on it for core activities

Nestor is a Zonal Head Nurse in a rural geography of the DRC. He laments the lack of transportation available for him to access his facilities to verify data or give feedback. When their area was a "red zone," because of the Ebola outbreak, they received motorcycles and funding for gas, which he thinks improved the data quality greatly; but now that the epidemic has been resolved and their area "declassified," partner aid has stopped rolling in and he is unable to accomplish his required two monthly "retro-information" (feedback sessions). This feels like a punishment and leaves Nestor nervous that all the efforts put into improving data quality will go to waste. (DRC)

Resource allocation is not always needs based, with non-technical people, such as legislators, making the final decisions

For Margaret, a Sub County Public Health Nurse, a major challenge for the system is that politicians are too powerful in Kenya, especially at the grassroots level such as MCA's (Members of the County Assembly) and governors. The power for funding and the allocation of resources lies in the hands of legislators, who pass or amend budgets, and yet she feels these legislators' plans do not follow through with action because the needed budgets never come into fruition. She feels that their role should be to make sure existing systems are strengthened so that the resources actually end up where they are needed. (Kenya)

DRC SPOTLIGHT:

Spotlights are examples of intervention ideas that may be introduced to address a priority area. They are informed by the research, synthesis and co-creation workshops with users and stakeholders.

Include administrative authorities in health interventions, and make data use easier through visual and simplified tools

Relocating health decision-making to the local level in collaboration with administrative authorities can result in the development of a stronger data culture at the Community level, encouraging a habit of defining and solving community problems through its own solutions and resources.

As there will be a lack of data expertise at that level, data will be made more accessible through

Priority Areas: Planning

7 ***Cont.***

simple visual and digestible data tools to aid in decision-making.

These tools can be utilised during monthly/biannual meetings with the community, the community health workers (called Relais Communautaire), administrative authorities, and nurses. Community level budgets will be mobilized to disburse the necessary resources (financial, human, internet, manpower, education, logistics expertise, transport, etc.) to assist in this initiative and ultimately, lead to community empowerment, accessible data and increase of the use of data for decision-making.

TAKE ACTION:

- **Provide more accurate and timely estimates of actual funds available** and engage in a dialogue throughout the planning processes to communicate funding estimates/ parameters and make planning activities more realistic at all levels. Consider how partner funding can be restructured to support this goal.
- **Work with elected and administrative authorities** at all levels to ensure health sector priority-setting and spending are guided by available performance, program processes, and local population census data.
- Give technical managers and local stakeholders more **visibility and control over how the budgets allocated to them are spent** to leverage their knowledge of the local needs and promote local innovations.
- Improve the **accuracy of population numbers** that are used for target setting/funding, either by triangulating current numbers with community driven data or via alternate means.
- Improve the **visibility and accuracy of current or expected stock numbers** to assist in vaccine redistribution and allocation activities.

Other reports
from the VxData research study:

Cross-country Brief

July 2021

This brief is a summary of the cross-country synthesis performed at the conclusion of all the country-level field research.

Kenya Report

May 2020

This report contains a summary of our initial insights from the fieldwork conducted in Kenya in early 2020.

Mozambique Report

Jan 2021

This report contains a summary of our initial insights from the fieldwork conducted in Mozambique in late 2020.

DRC Report

May 2021

This report contains a summary of our initial insights from the fieldwork conducted in Kenya in early 2020.