Understanding the Cold Chain Maintenance System in Niger

Using a Human-Centered Design Approach to Identify Innovative Solutions

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Contents

Acronyms

CCE	cold chain equipment
DIC	departmental immunization coordinator
EPI	Expanded/Essential Program on Immunization
FAD	Financial Affairs Department
IHC	integrated health center
iSC	immunization supply chain
JSI	JSI Research & Training Institute, Inc.
KII	key informant interview
MoH	Ministry of Health
PMT	polyvalent maintenance technician
RIC	regional immunization coordinator
RPHD	regional public health directorate
SERMEX	service operation supervisor
WHO	World Health Organization

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Context and Intent

Overview

How human-centered design can be used to support the redesign of the cold chain maintenance system in Niger.

MOMENTUM Routine Immunization Transformation and Equity:

MOMENTUM Routine Immunization Transformation and Equity (the project) applies best practices and explores innovations to increase equitable immunization coverage in USAID-supported countries. The project is USAID's flagship technical assistance mechanism for immunization working in 18 countries around the world. It works to build countries' capacity to identify and overcome barriers to reaching zero-dose and under-immunized children and older populations with lifesaving vaccines and other integrated health services, including rebuilding immunization systems adversely affected by the pandemic. It also supports COVID-19 vaccine rollout across countries with a wide range of circumstances and needs.

Project context:

As immunization programs expand with the introduction of new vaccines and technologies, the role of the supply chain becomes even more critical. Immunization supply chains (iSCs) consist of more than just the cold chain equipment (CCE) required to ensure vaccines are kept in their ideal temperature range. Human resources, data for action, transportation for distribution, cold chain maintenance, information management systems, and financial flows and management all help to ensure that potent vaccines are available when and where they are needed.

The results of assessments from 90 countries over the last 10 years indicate that many supply chains are unreliable, inefficient, and underperforming. One consistent trend is that performance worsens further down the supply chain. The supply chain is unreliable not only because CCE capacity is constrained, but also because of human resource or process weaknesses, including inconsistent or inadequate cold chain maintenance and inconsistent temperature monitoring.

Objectives:

The purpose of the work in Niger is to use a human-centered design approach to understand and redesign Niger's CCE maintenance system to be more effective and efficient.

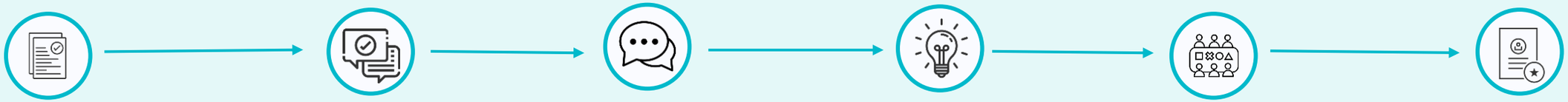
Objective 1: Understand the entrenched obstacles that limit a reliable and functioning cold chain maintenance system.

- Understand the current and potential barriers faced by Expanded Program for Immunization (EPI) managers, supply chain logisticians, and cold chain technicians at the national and subnational levels.

Objective 2: Design a forward-thinking managed CCE maintenance system.

- With stakeholders, co-create solutions to improve the national CCE maintenance system.

The Approach



Intent Meeting

An intent meeting was held with members of the project team from MOMENTUM Routine Immunization Transformation and Equity, JSI, and ThinkPlace.

The goal of this meeting was to define the project objectives, scope, and desired outcomes. After this meeting, the project developed a workplan.

Research Planning

The project team began planning data collection in Tahoua and Maradi, and developed and pretested detailed lines of inquiry.

The project team trained two local research assistants to conduct the human-centered design research.

Research

The project team conducted research in two phases. For the first phase, researchers travelled to Niger and conducted interviews in Tahoua Region.

Research assistants conducted the second research phase in Maradi Region, with remote support from the project.

Synthesis

The team conducted daily synthesis in the field during both research phases.

When fieldwork was completed, the research team transcribed all interviews and conducted an in-depth synthesis process to extract themes, trends, insights, and opportunities from the data.

Co-Creation

The team held two co-creation workshops. The first was an online session with the project, JSI, and global immunization supply chain (iSC) stakeholders. The second was a 2.5 day ideation workshop in Niamey with staff from Tahoua.

Because the Maradi team was unable to join in person, the project followed up the workshop by conducting an online session to get their input on the ideas developed during the co-creation workshop.

Recommendations and Reporting

The team synthesized insights from the research and ideas from the co-creation workshops into this report.

Personas

As part of our co-creation approach, the project developed different personas based on the research findings, to represent the experiences of the key government stakeholders in the cold chain maintenance system. Personas are fictional characters, which are created based on research in order to represent the different user types that might use the service, product, site, or brand in a similar way. Creating personas helps to better understand users' needs, experiences, behaviors and goals. While the government is ultimately responsible for cold chain maintenance, these stakeholders also noted the importance of partners to financially and materially support it. Details on the specific roles of stakeholders and the barriers they face can be found in the appendix.

Regional immunization coordinator (RIC)

"We make sure that everything works, because managing vaccines requires extra vigilance, as it is not in our interest for them to stop, which would result in considerable losses."

Regional service operation supervisor (SERMEX)

"Maintenance in the area of vaccine management is essential, we should really focus on this area, because if conservation is not done well, there are risks for the population."

Integrated health center head (chief IHC)

"Preventive maintenance allows us to maintain vaccine quality."

Regional Financial Affairs Department head (chief FAD)

"Everything that happens in the administrative and financial department is my responsibility."

Regional and Departmental Polyvalent maintenance technician (PMT)

"I am responsible for improving and controlling the cold chain in the district."

Departmental immunization coordinator (DIC)

"I am responsible for distributing vaccines each month at the integrated health center."

There are four levels in the Niger health system: national, regional, departmental, and facility level.

2

Research Overview

Research Overview

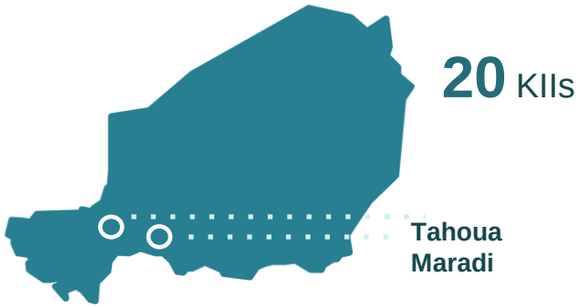
Who did we talk to?

In January and February, 2023, the team conducted six days of research in Tahoua and four days of research in Maradi followed by in-depth synthesis analysis.

How did we engage?

The research team conducted key informant interviews (KIIs) involving the stakeholders below*. Researchers used data collection guides with a series of open-ended questions and probes to understand challenges and barriers faced in the CCE maintenance system. Participants provided consent prior to the KIIs.

Chief IHC in her office in Tahoua. Photo: MOMENTUM Routine Immunization Transformation and Equity



Participants	Tahoua	Maradi
PMT (national/regional/departmental)	1	2
SERMEX (national/regional/departmental)	1	1
RIC (regional level)	1	1
DIC (district level)	2	2
Chief FAD (regional)	1	1
Financial manager (district level)	2	1
Health Facility In-Charge (facility level)	2	2
TOTAL	**10**	**10**

*UNICEF participated in report-back sessions during co-creation. KIIs focused on insights from technicians.

Research Overview

Developing our themes based on research insights

During data collection the team conducted daily synthesis of collected information. The team reviewed all cold chain assessments and improvement plans, including the 2019 Effective Vaccine Management assessment. When fieldwork was completed, the team transcribed all interviews and conducted an in-depth synthesis process to **extract trends, insights, and opportunities from the data.** The research team then grouped the insights into three major themes:

- **Theme 1: Agility of the system and optimization of available resources.**
- **Theme 2: Prioritizing cold chain.**
- **Theme 3: Knowledge sharing across the system.**

The themes with the respective insights served as the starting point for the co-creation sessions, which were held with the aim of finding solutions to the gaps and opportunities identified during research.

Co-creation starts with identifying challenges. However, framing challenges as negative statements can stifle imagination. To address this, designers convert problems into **design challenges by creating “how might we” questions.**

Prioritization is given to ideas that address specific needs, offer diverse solutions to a problem, and align with the context in which they will be implemented. The selected **concepts**, representing these prioritized ideas, articulate a tangible vision by **answering questions about what, how, when, and who.**

The subsequent slides elaborate on each theme, providing insights and referencing the concepts generated through co-creation. Treat the "Linked Concept" box accompanying each theme as a preview, offering a glimpse into the detailed concepts to be explored later in this report.

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Research Findings

Theme 1: Agility of the System and Optimization of Available Resources

One of the themes that came across strongly from the research was that Niger's cold chain management system and cold chain maintenance plan is based on a hierarchical organizational structure, which leads to internal communication challenges between various stakeholders, a lack of agility, and inefficient use of available resources.

Insights for this theme:

1—Dependence on external partners for cold chain maintenance creates a system that is rigid, slow, and unable to respond quickly and efficiently to maintenance needs.

2—Communication between key actors involved in the cold chain maintenance system lacks structure and is mostly ad hoc and inconsistent. This heavily contributes to the lack of agility to respond to CCE maintenance demands in a timely fashion.

3—The absence of clear guidelines on how to use temperature data contributes to the lack of optimization of available resources. This is particularly problematic because the health system, and by extension the cold chain, is already short on financial and human resources.

Research team at the regional hospital in Tahoua. Photo: MOMENTUM Routine Immunization Transformation and Equity

INSIGHT 1

Dependence on External Partners for Maintenance Activities Affects Agility

Dependence on external partners for cold chain maintenance creates a system that is rigid, slow, and unable to respond quickly and efficiently to maintenance needs.*

The cold chain system in Niger is highly dependent on external partners for financial and material support. In both Tahoua and Maradi, interviewees explained that the majority of funding for cold chain equipment maintenance comes from external partners such as UNICEF, GAVI, or the World Health Organization (WHO).

At the beginning of the fiscal year, the Ministry of Health (MoH) develops action plans at the regional, national, and district levels to describe the activities and needs for the year. The plans are then submitted to partners for funding. Those in charge of managing funds within the government (chief FAD and district financial managers) said that the availability of funding is tied to time, and priorities of partners for that fiscal year, which affects the cold chain and plans for maintenance. Sometimes requests are not fulfilled.

For example, in Tahoua, technicians said that detailed preventive maintenance should be done quarterly. This maintenance includes checking on vaporizers, condensers, and fans on fridges, which is key to preventing equipment breakdown. In 2022, this maintenance was only done once because funds were not available. For corrective maintenance, the effect is similar, so when equipment breaks down, parts need to be purchased from the central level and the wait time can be very long.

While the support from partners is key to cold chain functioning and maintenance, there is a bottleneck when urgent needs arise and there isn't time for efficient problem resolution.

?

HOW MIGHT WE…

…create a system that responds quickly and proactively to maintenance needs?

…more effectively use temperature data and reports to anticipate maintenance needs?

LINKED CONCEPT

C1 ONLINE PLATFORM

C4 REAL-TIME TRACKING SYSTEM

**Stakeholders involved in the funding system, such as the UNICEF, GAVI, WHO, etc. (This insight is based on data and information from interviewees, so may not reflect the full situation.)*

INSIGHT 2

Ad Hoc, Unstructured Communication is a Barrier to Agility

Communication between actors involved in the cold chain maintenance system lacks clarity and structure.

As noted earlier, the health system in Niger is hierarchal, with a clear chain of command. This hierarchy can be seen at the national, regional, and district levels, and extends to the cold chain system. However, in practice, it was found that despite this clear organizational structure, communication related to the cold chain was ad hoc and unstructured. Many interviewees said that when faced with problems they were often unsure who they should turn to. For example, the SERMEX is the direct superior of the PMTs, and should be the first point of contact when a PMT has a problem. Yet, the PMTs and SERMEXes that participated in the research said they were rarely in contact with each other.

Additionally, a PMT said that the lack of communication with colleagues makes their work more difficult. This interviewee mentioned that they are only notified about supervision activities at the IHC when there's a query related to equipment.

For the cold chain system to work effectively, there must be clear communication among all involved parties. In hierarchical systems, facilitating such communication can be challenging. Therefore, it's crucial to establish alternative communication channels that enable direct interaction among all stakeholders, bypassing the hierarchical structure.

?

HOW MIGHT WE…

…create effective communication channels between all actors involved in cold chain maintenance?

…promote knowledge sharing and assistance between PMTs?

LINKED CONCEPT

C1 ONLINE PLATFORM

INSIGHT 3

Temperature Data are Collected Daily, But Not Used to Optimize Resources

The absence of a clear system or guidelines on how to use temperature data contributes to the lack of optimization of available resources.

In Tahoua and Maradi, health center and hospital staff, usually led by the Chief IHC or the DIC, consistently gather daily temperature data and record it meticulously on a temperature monitoring sheet. These data are collated into a monthly report and kept on site. This report is shared only if regional or national staff conduct supervision activities.

Among staff at the IHC level, a clear understanding of the use of temperature data for maintenance purposes is lacking. The data are collected because it is a daily task, but they are not used. Additionally, remote temperature monitoring devices are used at the regional level and in certain districts to track temperature remotely, but are primarily used to detect power cuts or severe equipment malfunction.

In Tahoua and Maradi, technician shortages exist, and certain districts and communes lack a PMT. Enhancing awareness about the importance of temperature data at the district level and offering clear guidelines for making data actionable would prioritize maintenance needs at IHCs. This requires training in data-driven decision-making and adapting data formats. Facilitating easy access to temperature data for all staff through tablets or dashboards could boost its utility, reducing the workload on technicians and fostering an efficient maintenance system.

? HOW MIGHT WE…

…use temperature data and reports to anticipate maintenance needs?

---incentivize users at IHC level to do preventive maintenance?

LINKED CONCEPT

- C1 ONLINE PLATFORM
- C3 REGIONAL MAINTENANCE SUPERSTAR

Theme 2: Prioritizing Cold Chain

This theme is about the role of partners and funders within the cold chain system. As explained in Theme 1, the cold chain system in Niger is highly dependent on external partners. Those that fund the cold chain are involved in vaccination programs. These collaborations are essential to the functioning of the cold chain, but must be an independent priority for partners and national stakeholders.

Insights for this theme:

4—Effective collaboration is key to empower local staff and ensure that equipment is useful and adapted to the context.

5—Prioritization of cold chain as a key component of the health system requires equal importance as vaccination programs, particularly as it relates to training needs.

A research assistant in the SERMEX office at the regional hospital in Tahoua. Photo: MOMENTUM Routine Immunization Transformation and Equity

INSIGHT
4

Effective, Localized Collaboration

Effective, localized collaboration is key to staff empowerment and ensuring that equipment is useful and adapted to the context.

Partners are an integral part of the cold chain system in Niger. Their contributions are important and much needed, but a shift in collaboration methods is needed to optimize provided resources.

Many interviewees working at the local level (district or commune) felt that the partner contributions were too concentrated at the national and regional level. Additionally, from the perspective of those who manage funds (chief FAD, district financial managers) some of the processes put in place by partners are not ideal. For example, the chief FAD said that for corrective maintenance, partners prefer a grouped approach to purchases. For him, this is inefficient, particularly when a spare part needs to be purchased urgently.

Additionally, partners often bring new CCE to health centers but do not make sure it is adapted to or suitable for the local context. Collaborating closely with local staff and decentralizing CCE processes is key to increasing partnership efficacy.

? ***HOW MIGHT WE…***

…re-envision the role of partners as collaborators in the maintenance system?

**** No concepts were developed for this insight as participants prioritized other themes and insights during the workshop.***

INSIGHT 5

Cold Chain Management and Maintenance Need to be a Health System Priority

Prioritizing cold chain as a key component of the health system requires fully addressing its own unique needs, especially for training.

A common finding from the research is that cold chain management and maintenance is not seen as an independent priority of the health system. Rather, it is closely tied to vaccination programming. This link is logical considering that in health centers CCE is used primarily to store vaccines. However, in terms of staff training opportunities, this association turns cold chain maintenance into an after thought rather than a priority.

Interviewees said that the only cold chain maintenance training they received was as part of vaccination programs. None had ever received cold chain-specific training. Prioritizing cold chain maintenance and recognizing its critical importance means considering new ways to organize cold chain-specific trainings and make information related to maintenance easily accessible for all staff.

…create self-sustaining, locally managed training methods at the regional, county, and municipal levels?

LINKED CONCEPT

C2 BAYREY (a local word for knowledge)

Theme 3: Knowledge Sharing across the System

This theme focuses on knowledge sharing and training needs in the cold chain system. Some technicians expressed a lack of available training for cold chain maintenance, while non-technicians indicate that training is only accessible to technicians. This can result in frustration and tension. Resolving these misalignments between understanding of what training is available and to whom, and implementing consistent knowledge-sharing systems will enhance overall system efficiency.

Additionally, there needs to be a change in the language used to address and prioritize maintenance issues at all levels.

Insights for this theme:

6—Decision-makers and cold chain staff hold divergent expectations regarding knowledge sharing and training. Cold chain staff prefer customized training that focuses on specific aspects of cold chain maintenance, as well as guidance on repairing and replacing spare parts for the various cold chain models within the system.

7—Limited understanding of roles and responsibilities and the link between respective roles limits information sharing and overuses human resources.

A PMT in Tahoua shows that fridge fans are parts that break frequently. Photo: MOMENTUM Routine Immunization Transformation and Equity

INSIGHT 6

Misalignment on Knowledge Sharing Practices

There is a misalignment between decision makers, such as EPI managers and supply chain managers and logisticians, and cold chain staff about expectations for knowledge sharing and training.

Building on previous insights, there are discrepancies between the expectations staff have for training and knowledge sharing, and what is provided to them. All immunization staff at the regional and national levels receive cold chain training, even if it's not as a traditional seminar style training. However, technicians and staff at the district level do not receive adequate training on cold chain. Technicians say that they do not receive enough training and have to figure out repairs on their own. This can lead to frustration among staff and, by their own admission, they often use "bricolage," meaning they patch the equipment. This is rarely the correct way to fix equipment, but is quick.

It is important to have a common understanding of what training needs are, and to offer various forms (e.g., learning by doing, seminars, mentorship, peer learning) to meet everyone's needs.

Additionally, PMTs often rely on each other to solve problems. This knowledge sharing must be structured and institutionalized to create a peer learning network so that all staff working on cold chain maintenance have access to the information needed to maintain it.

…create self-sustaining, locally managed training methods at the regional, county, and municipal levels?

LINKED CONCEPT

C2 BAYREY

INSIGHT 7

Lack of Clarity on Roles and Responsibilities

Limited understanding of roles and responsibilities, and the link between different roles leads to limited sharing of information and overuse of human resources.

While staff understand their individual role within the cold chain system, the project found no clear connections between the different roles and how they support each other. For example, in Tahoua, both the SERMEX and PMT did not have access to temperature reports for the equipment that they are supposed to maintain. These reports remain with the DIC or the RIC. However, if temperature data are to be used to anticipate maintenance needs and track cold chain performance, the technicians should track these data as well. Where resources are limited and it is difficult for technicians to visit IHCs, effective use of these data will prevent overburdening PMTs by allowing them to prioritize the equipment that needs to be maintained.

Another example of this lack of clarity can be seen in preventive maintenance. In both Maradi and Tahoua, staff disagreed over who was responsible for preventive maintenance. Technicians say that the CCE users should be; IHC staff say it is the role of the technician.

These roles need to be clear to all staff involved in the cold chain to prevent tension and misunderstanding. Clarifying these roles and recognizing efforts will increase staff motivation.

…create a system that responds quickly and proactively to maintenance needs?

…more effectively use temperature data and reports to anticipate maintenance needs?

…incentivize users at IHC level to conduct preventive maintenance?

…develop a shared understanding of the respective responsibilities of different staff for cold chain maintenance?

LINKED CONCEPT

C3 REGIONAL MAINTENANCE SUPERSTAR

4

Co-Creation

From Research to Co-Creation

The project held two co-creation workshops and one validation meeting in March 2023. The first co-creation workshop was an online half-day session with the project, JSI global and in-country staff, and global iSC stakeholders. The second was conducted in Niamey over two days with the project, JSI staff, and people who had participated in the interviews. At the end of the two days, the project facilitated a half-day validation session, which added in government officials from the immunization program and partners (EPI manager, logistics manager, partners from UNICEF, and donor representatives).

Co-creation starts with identifying challenges. However, framing challenges as negative statements can stifle imagination. Instead, designers convert problems into design challenges by creating "how might we" questions. Once participants prioritize design challenges, ideation begins.

Ideas that meet needs, include different ways of solving an issue, and are aligned with the context in which they would be adopted are prioritized to develop into concepts. A concept is an idea that details the way it is foreseen in a tangible reality. It indicates ***what, how, when, and who?***

Participants at the co-creation workshop in Niamey. Photo: MOMENTUM Routine Immunization Transformation and Equity

Online co-creation workshop

Participants 14 | Questions 6 | Ideas generated 12

Objective: The co-creation workshop aimed to share research findings, highlight opportunities, and collaboratively explore solutions. The goal was to leverage the experience and expertise of global stakeholders, including those who couldn't attend the Niamey workshop.

Ideas developed during this workshop refined and guided the development of activities for the workshop in Niamey.

Niamey co-creation workshop

Participants 20 | Questions 6 | Ideas generated 15

Objective: The two-day workshop aimed to address challenges uncovered in the research phase and generate ideas for tackling them in a way that is efficient and tailored to the context. It involved engaging stakeholders from the Tahoua and Maradi districts to discuss insights and opportunities.

The second day of co-creation included a presentation of ideas developed in the workshops so that government stakeholders could consider the global system in which the chain operates.

Validation meeting

Participants 30

Objective

The validation meeting aimed to ensure that the ideas generated incorporated the opinions and needs of stakeholders at various levels of the supply chain.

Co-Creation in Depth

Online ideation session

In groups, participants developed 12 ideas to overcome the challenges by asking *how might we* questions. These ideas were the starting point of the co-creation session held in Niamey.

How might we incentivize users at the IHC level to do preventive maintenance?

IDEAS GENERATED

- Provide tablets to DICs that have apps with useful information about preventive maintenance (e.g., how to tips).
- Think of the fridge as a baby to create a bond between it and the DICs (similar to a *Tamagotchi,* a small electronic toy with a screen, programmed to behave as if it were a pet).
- Make maintenance a game by creating friendly competition.
- Incentivize the community to help with preventive maintenance through small gifts (e.g. sweets, chocolates).
- Create daily challenges and competition (e.g. show information on the neighboring health fridge).
- Encourage bundling different tasks together to help prioritization. (e.g. add the task of wiping the outside of the fridge after the task of writing daily temperatures in the monitoring chart).

How might we promote knowledge sharing and assistance between PMTs?

IDEAS GENERATED

- Create WhatsApp groups to promote information, new ways of doing things, and overall knowledge.
- Create short training videos for DICs on cold chain maintenance.
- Create an instructional video library (e.g. Village Reach and Bull City Learning in Malawi).

How might we more effectively use temperature data and reports to anticipate maintenance needs?

IDEAS GENERATED

- Use AI to determine/predict when equipment needs maintenance or spare parts.
- Develop a visual representation of preventive maintenance (e.g., throw dust on the panel to demonstrate how it slows down the CCE).
- Incorporate CCE data in reports and ask various levels of staff, including supervisors, to respond to issues.

Co-Creation in Depth

Niamey ideation session

In groups, participants developed 15 ideas to overcome challenges by asking *how might we* questions. These initial ideas were subsequently evaluated, prioritized, and refined to focus on those deemed most viable within the given context.

How might we create effective communication channels between all actors involved in maintenance?

IDEAS GENERATED

- Create Whatsapp groups to discuss and share opinions.
- Create an intranet network within regions for cold chain technicians.

How might we create self-sustaining, locally managed training methods at the regional, county, and municipal levels?

IDEAS GENERATED

- Identify different positions of responsibility at all levels.
- Organize targeted circumscribed trainings.

How might we more effectively use temperature data and reports to anticipate maintenance needs?

IDEAS GENERATED

- Ensure cold chain and equipment standard operating procedures are implemented after practical training for staff.
- Establish a maintenance management committee.

How might we create a preventive maintenance system that does not depend on PMTs?

IDEAS GENERATED

- Train all staff including regional and district staff on preventive cold chain maintenance.
- Have a coordination framework that PMTs and other stakeholders can use.
- Develop an efficient communication system.

How might we create an agile maintenance system that responds quickly and proactively to maintenance needs?

IDEAS GENERATED

- Creation of a system that allows equipment control in remotely and in real time.
- Establish a PMT focal point to coordinate activities.

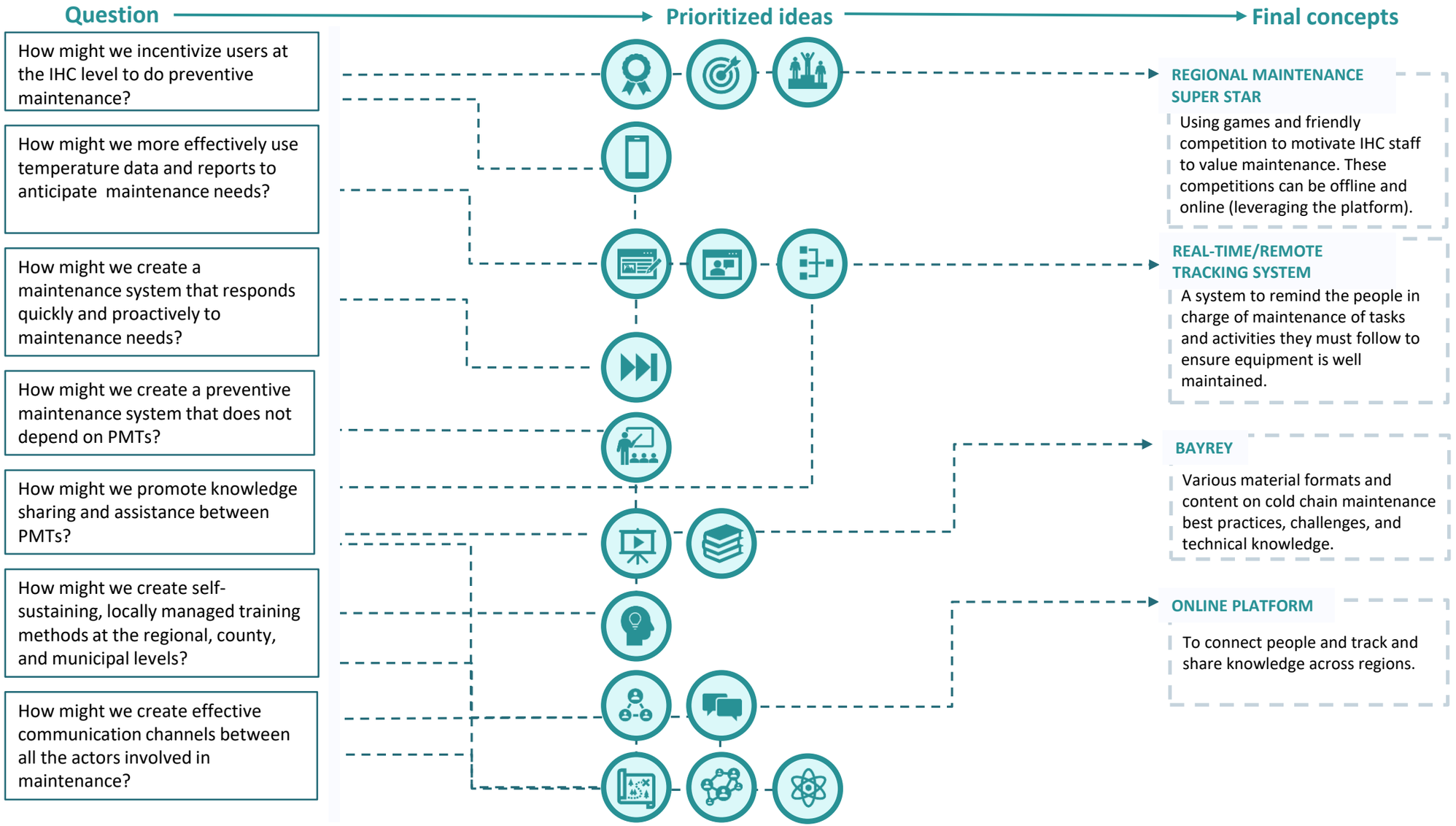
How might we promote knowledge sharing and assistance between PMTs?

IDEAS GENERATED

- Set up an inventory and maintenance follow-up system and create exchange groups for maintenance workers.
- Develop a national spare parts supply plan (according to mapping priorities).
- Create exchange groups between PMTs.

From Ideas to Concepts

Prioritizing ideas and developing concepts. The project clustered ideas generated during co-creation and developed them into concepts. These concepts addressed and answered questions that guided the initial research stage.



Concept 1: Online Platform

C1

How might we create effective communication channels for all actors involved in maintenance? How might we promote knowledge sharing and assistance between PMTs? How might we more effectively use temperature data and reports to anticipate maintenance needs?

Online platform to connect people and track and share knowledge across regions.
The platform will connect people across regions and ensure that knowledge is shared and that communication between different actors happens in a tailored way. The platform should contain:

- *Individual profiles where people can upload content and communicate with each other.*
- *Accessible discussion forums.*
- *Video library with cold chain-specific content.*
- *Frequently asked questions and a link to contacts for further questions.*

OPPORTUNITY

This platform will allow stakeholders to gather all information related to the cold chain in one place, ensuring not only good documentation, but a more agile and individualized approach to accessing resources, whether content or people.

It will facilitate engagement and motivation to collect and share information because it is customizable and accessible to all.

ASSUMPTIONS

* People have access to internet and devices to access it.
* People will be excited to upload their own content.

KEY ASPECTS

PLATFORM ARCHITECTURE

A clear definition of key sections to be included on the platform is essential for its success. According to the project's research and ideation, the platform should incorporate different sections:

- Internal communication opportunities across regions in the form of private messaging or discussion forums.
- Knowledge sharing.
- Questions and answers on challenges/problems.
- Tracking and storing data related to maintenance in an easily accessible format.

TRAINING USERS

Once the platform is in place, people must be trained to use it. Consider a theoretical and practical training on the usability of the platform and its objectives and benefits.

ENGAGING USERS

The platform's value is in its daily use. Create ways to engage people daily.

Conduct a prioritization exercise with different stakeholders to define and design sections that meet the needs of users on the platform.

Concept 1: Online Platform

C1

What did we learn?

Our research shows that communication is a struggle between cold chain stakeholders (insight 2). In addition, information accessibility is a problem for stakeholders at the local level. In the co-creation workshop in Niamey, the idea of a digital platform came up in response to several '*how might we'* questions. While each group had different ideas on the type of information that should be on the platform, the common goal was an easily accessible digital tool to centralize all information. This platform can also be a channel for several other concepts included in this report such as the maintenance videos and the maintenance superstar competition. It can be presented as both a website and a mobile application.

How will this solve the problem?

As mentioned, communication among actors and knowledge sharing is ad hoc and unstructured. The use of a digital platform puts the information at the fingertips of all who need it, without any of the problems associated with communication methods such as email and WhatsApp.

A participant in the co-creation workshop presents his group's idea. Photo: MOMENTUM Routine Immunization Transformation and Equity

Consider the following when testing this idea:

1. **Start small:** launch the platform in one region first.
2. **Test the user experience:** is the platform easy to navigate? Is the information on it relevant to all stakeholders? Use the personas developed (see appendix) to ensure the needs of all stakeholders are considered. Test the platform or a mockup with each stakeholder to see what s/he wants from the platform.

LINKED TO INSIGHTS 1 2 3

Concept 2: Bayrey (local word for knowledge)

C2

How might we create a preventive maintenance system that does not depend on PMTs? How might we promote knowledge sharing and assistance between PMTs? How might we create self-sustaining, locally managed training methods at the regional, county, and municipal levels?

Different material formats and content on cold chain maintenance best practices, challenges, and technical knowledge.

Develop material and trainings for people to access information related to the use of equipment, solve problems, and update their cold chain maintenance knowledge.

Physical material: Printed and physical materials to be used on a daily basis to ensure people know how to better maintain CCE (e.g., check list with frequency and activities to conduct, dos and don'ts, visual representation of how to do maintenance).

Videos: Videos are a more interactive way to share knowledge and can be created based on new equipment, technologies, and challenges faced by equipment maintainers. Short videos can be shared and stored on the online platform for easy access.

Training: Whenever new people or new equipment arrives, training is necessary. A training manual with theoretical and practical knowledge and activities on maintenance would help ensure that knowledge is passed along and people are confident to do their job.

OPPORTUNITY

- Ensure that people have access to information and ways to solve problems.
- Guarantee that knowledge is shared and that locally held knowledge is leveraged and valued.

ASSUMPTIONS

* Varied training opportunities will accommodate different learning styles.
* Stakeholders will use the different materials.

KEY ASPECTS

PHYSICAL MATERIALS

The materials developed should be highly visual and in line with the primary gaps noted in the research. For example, a simple visual that shows the parts of the fridge that should be checked during preventive maintenance. For this, it will be important to make sure the materials are tailored to the needs of each role, using the personas as a basis.

VIDEOS

The creation of videos ties to concept 1 because they can be uploaded to the platform. Ideally, these videos should be developed by different stakeholders. For example, PMTs can create short videos demonstrating preventive maintenance; a DIC can develop videos on how to read, understand, and use temperature data. Based on feedback from participants in the co-design workshops, videos should be very short, because people are unlikely to watch long videos and short videos use less mobile data.

TRAININGS

Combine different forms of trainings such as buddy systems, videos, and physical resources to accommodate all needs. Hold trainings led by local stakeholders that leverage internal knowledge rather than waiting for national trainings.

Organize short, focused sessions with different stakeholders to test the various resources before scaling up this idea.

C2

Concept 2: Bayrey

What did we learn?

Knowledge sharing across the system is a significant barrier in optimizing cold chain maintenance, as explained in insights 6 and 7. The difficulty accessing knowledge and information causes those responsible for maintenance to feel unassisted and obliged to seek alternatives to solve eventual equipment failures.

In both co-creation workshops, participants attested that training was a necessity, not only to update employees, but also when new equipment is installed. However, training itself is not a solution. Varied formats of training that are easily accessible and organized at a local level are needed.

Although there is a lack of stakeholder alignment about training formats, there is agreement on the need for access to materials that provide knowledge for staff to operate and repair equipment when necessary. Furthermore, the lack of access to resources often results in employee-developed solutions, which is an opportunity for internal knowledge sharing.

How will this solve the problem?

The creation and dissemination of content in different formats in an accessible language enables not only people responsible for cold chain maintenance to access materials that they understand and that give them necessary information, but also allows them to share valuable knowledge and ideas developed within the system itself.

LINKED TO INSIGHTS 1 5 6 7

WHAT TO TEST

Consider the following when testing this idea:

1. **Focal point:** Define who will be responsible for creating the materials. An important part of this idea is to have a person/area responsible for not only creating the different materials and trainings, but also for ensuring that they disseminated.
2. **Low-fidelity materials:** Create drafts of the different materials and show them to various stakeholders to make sure that the final products meet people's needs and expectations
3. **Format of materials:** To avoid overwhelming staff with too many options, test several forms but prioritize those that are best suited to the context.

C3

Concept 3: Regional Maintenance Super Star

How might we incentivize users at the IHC level to do preventive maintenance?

Using games and friendly competition to motivate IHC staff to value maintenance. These competitions can be offline and/or online (leveraging the platform).

Weekly challenges: Weekly challenges can be created in each district or region using different formats. Challenges can include quizzes on maintenance, creating videos, collecting temperature data, or completing a task checklist. All challenges should be tied to preventive maintenance and the specific tasks to be done at the IHC level.

The scores of the various IHCs can be shown on a platform dashboard throughout the week, with a winner chosen at the end of the week.

Offline events: At the end of the year, everyone involved in cold chain maintenance will be invited to an event to nominate a regional 'maintenance superstar.' This event will be an opportunity to convene all stakeholders and motivate district-level staff and recognize their efforts. Those who are chosen as maintenance super stars can then become points of contact for others struggling and create videos or tools to help.

OPPORTUNITY

- Motivate staff by recognizing their effort.
- Leverage competition to motivate staff participation.

ASSUMPTIONS

* People are motivated by competition and recognition.
* Recognition from colleagues and decision makers is important to staff.

KEY ASPECTS

CREATING THE COMPETITION CRITERIA AND CHALLENGES

The definition of the weekly challenges should be based on the gaps identified in the research, such as understanding preventive maintenance and use of temperature data. Nominate staff responsible for creating these challenges, ideally technicians (SERMEX and PMTs) because they have a good understanding of the needs at the IHC level.

Another important aspect of the competition is bringing it to the online platform as a way of making it more accessible, interactive, and competitive. On the platform, there can be a scoreboard with the positions of each participant. Extra challenges such as "help a buddy" or "upload a content video" can increase engagement and promote platform use.

HOLDING THE EVENT

The maintenance superstar event should be organized at the regional level and used as an opportunity to celebrate and recognize staff. It could take many forms based on the context, but should be fun and interactive.

To develop this concept, we recommend starting in one region and running a short session with staff to understand the type of competition that would interest them.

C3

Concept 3: Regional Maintenance Super Star

What did we learn?

The limited understanding of roles and responsibilities and the utility of collected data can lead to a lack of IHC commitment to conduct preventive maintenance and other cold chain-related tasks.

Reward is a well-known behavioral improver and during the co-creation workshops, participants cited it, along with recognition, as a possible way to fill the motivational gap on data collection and use.

How will this solve the problem?

A system that supports data collection, sharing, and use can make the process easier for the people involved and ensure greater understanding of each one's individual responsibilities.

Holding weekly competitions is a way to maintain commitment and information. An annual in-person celebration is a way to strengthen ties between stakeholders and motivate individuals to remain committed to information collection because they will be recognized and valued if they do.

Participants at the co-design workshop in Niamey. Photo: MOMENTUM Routine Immunization Transformation and Equity

LINKED TO INSIGHTS 3 7

Concept 4: Real-time Tracking System

C4

How might we more effectively use temperature data and reports to anticipate maintenance needs? How might we create a system that responds quickly and proactively to maintenance needs?

A system to remind the people in charge of maintenance of the tasks and activities they need to complete to maintain CCE.

The tablets can be set to ring at a certain time of day to remind staff to perform tasks such as collecting temperature data, cleaning fridges, and removing dust. The tablet can also include visuals on how to perform certain tasks.

Additionally, the tasks can be tracked remotely, allowing the chief IHC to ensure they are completed in their absence.

OPPORTUNITY

- Ensuring that people in charge of maintenance are performing the needed tasks and have access to information to do so.
- Creating a more structured system to guarantee that the activities and tasks needed to maintain the cold chain are performed on time.

ASSUMPTIONS

* People will know how to use the tablet.
* Reminders will motivate people to perform maintenance tasks in a timely manner.

KEY ASPECTS

MAKING A LIST OF THE ACTIVITIES

- List activities and tasks to be performed to maintain different CCE.
- Organize information, taking into consideration important aspects such as materials needed and frequency.

SETTING UP THE TABLET

Set alarms on the time, day, and frequency needed with the activity title, accompanying visual, and explanation on how to perform it.

TRAINING ON TABLET USE

Develop and facilitate a training on how to use the tablet. Make sure to prepare physical materials that can be kept at the IHC so that all staff involved in cold chain can access it.

Map the tasks that should be completed for each type of CCE to ensure the reminders are relevant.

C4

Concept 4: Real-time Tracking System

What did we learn?

The participants in the codesign workshop in Niamey came up with several ideas linked to real-time monitoring of equipment. To them, having tools that allow them to track equipment in real time and receive reminders to conduct tasks is key to creating an efficient cold chain.

In this concept, the various elements proposed by the workshop participants are brought together to create a digital solution. Participants proposed using tablets to monitor equipment and having an interface that allows the chief IHC to remotely ensure that tasks are being completed.

How will this solve the problem?

This concept leverages tools that are already familiar to staff to create an easy, user friendly solution to a common problem. The use of a tablet will also allow us to integrate various functionalities such as a camera, instructional videos, and an alarm to allow for real-time, remote tracking of CCE.

A participant in the co-creation workshop presenting his group's idea. Photo: MOMENTUM Routine Immunization and Equity

WHAT TO TEST

Consider the following when testing this idea:

1. **User experience/interface**: Is a tablet the best option? Do staff know how to use it?

LINKED TO INSIGHT 1

5

CONCLUSION

CONCLUSION

What did we learn?

This study revealed underlying causes of known challenges to the CCE maintenance system that were not previously well understood in Niger. Importantly, CCE technicians and health workers co-designed innovative, tailored, and responsive ideas to address challenges faced by personnel when managing and maintaining CCE. These ideas have the potential to have impact and be effective to address system challenges.

What are the next steps?

Niger's immunization program is currently pursuing opportunities for funding to prototype and test the developed concepts.

6

APPENDIX

Personas for Cold Chain Maintenance System

Regional Immunization Coordinator (RIC)

I make sure that the cold chain is working properly so that the vaccines are well preserved.

“ We make sure that everything works, because managing vaccines requires extra vigilance, as it is not in our interest for them to stop, which would result in considerable losses. ”

My work

- Ensure the proper functioning of CCE.
- Responsible for developing the quarterly maintenance plan.
- Take inventory of equipment.
- Manage vaccination campaigns.
- Control the proper functioning of the generator and restart it in case of power failure.
- Follow up on oil change, filter change, evaporator maintenance, condenser maintenance, storage control, and fuel supply management.
- Conduct field visits and assess equipment condition.
- Study temperature data.
- Responsible for updating or validating maintenance policy documents.
- Develop contracts with external service providers to support the internal technical team.
- Authorize maintenance expenditures.
- Evaluate equipment diagnostics, map all repairs, and track purchase requests and spare parts orders.

Pain points

- Insufficient financial resources for proper implementation of the maintenance plan.
- Records are often neglected.
- Not enough partners to finance maintenance.
- Insufficient budget for spare parts.
- Irregular parts supply.

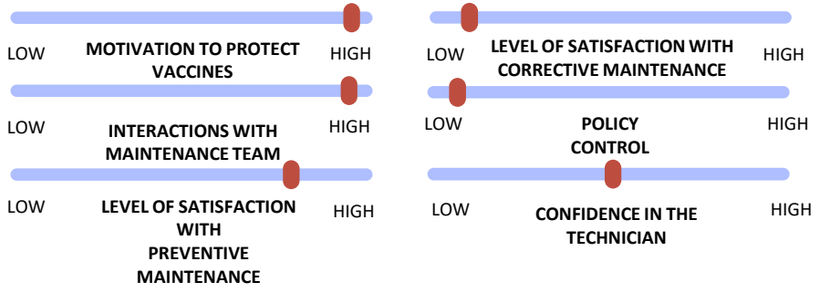
What does success look like in my role in relation to maintenance?

- ✔ Meeting the needs and proper functioning of the equipment.
- ✔ Vaccines are kept in good condition.
- ✔ Visits can be carried out under good conditions.
- ✔ Logistical, financial, and material shortfalls are addressed.
- ✔ Breakdowns and maintenance requests are dealt with in a timely manner.
- ✔ Parts are available on site.

The tools or supports I use in my work.

- Automatic alarm system: email, text message.
- FridgeTag.
- Beyond Wireless, PARSYL.RTMD
- Phone call.
- Inventory sheet and material tracking sheet.
- Maintenance history.
- Temperature report.
- Maintenance follow-up sheet.
- Failure report form.
- Annual maintenance plan
- Strategic action plan.

Experience



Service Operation Supervisor (SERMEX)

My role is to manage the entire cold chain at the regional level in the regional public health directorate (RPHD), I am responsible for all the infrastructure and equipment of the chain.

> “Maintenance in the area of vaccine management is essential, we should really focus on this area, because if conservation is not done well, there are risks for the population.”

My work

- Assist the PMT with equipment breakdowns and installation.
- Supervise the cold chain in all districts.
- Monitor and analyze temperature records.
- Diagnose the equipment in case of failure and find solutions.
- Provide information on the actions taken during a breakdown.
- Write a maintenance report taking into account the actions taken, breakdowns or interventions made at the site level.
- Make quarterly maintenance reports.
- Responsible for recording oil and filter changes.

Pain points

- Preventive maintenance is irregular.
- Insufficient manpower.
- Supervision is irregular.
- Temperature reports are not always provided.
- Lack of maintenance tools and equipment.
- Lack of spare parts and tools and technological upgrades.

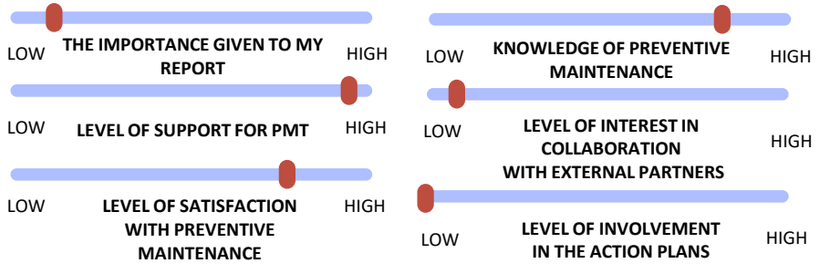
What does success look like in my role in relation to maintenance?

- ✔ Machines are functional and well installed.
- ✔ Entire cold chain in the region is functioning properly.
- ✔ All repairs made on a machine are listed in the failure history.
- ✔ Breakdowns can be taken care of.

The tools or supports I use in my work.

- Automatic alarm system: email, text message.
- FridgeTag.
- Beyond Wireless, PARSYL.RTMD
- Phone call.
- Maintenance Report.
- Maintenance history.
- Temperature report.
- Maintenance follow-up sheet.
- Failure report form.

Experience



Head of Integrated Health (Chief IHC)

I am the nurse in charge of the integrated health center.

“Preventive maintenance allows to maintain the quality of the vaccines.”

My work

- Control temperatures in the morning and evening.
- Manage the vaccine stock register.
- Manage the input and output of vaccines.
- Ensure the supply of vaccines during activities.
- Verify viral and non-viral vaccines.
- Clean the cold chain.
- Inform the DIC of health facility status.

Pain points

- Vaccine breakage.
- Limited knowledge of preventive maintenance.
- Troubleshooting requests are not processed in a timely manner.
- Lack of tools.
- Equipment is old and often breaks down.

What does success look like in my role in relation to maintenance?

- ✔ There is no vaccine rupture.
- ✔ Preventive maintenance is performed daily with the help of temperature recording tools.
- ✔ The vaccines are kept in good condition.
- ✔ Breakdowns and maintenance requests are handled in a timely manner.
- ✔ Parts are available on site.

The tools or supports I use in my work.

Automatic alarm system: email, text message.

FridgeTag.

Beyond Wireless, PARSYL.RTMD

Phone call.

Maintenance report.

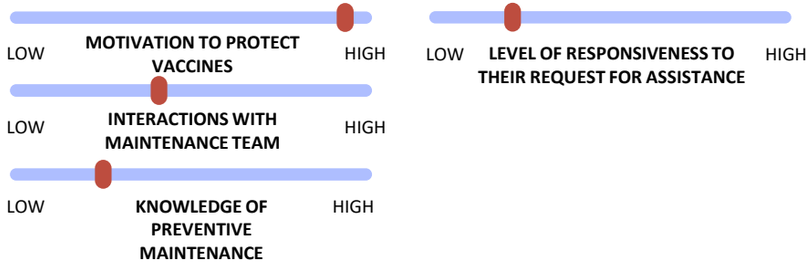
Maintenance history.

Temperature report.

Maintenance follow-up sheet.

Failure report form.

Experience



Financial Affairs Department Head (Chief FAD)

"My role at the RPHD is the administrative, financial, and material management at the level of the RPHD. Everything that happens in the administrative and financial department is my responsibility."

My work

- Maintain RPHD bank records, journals, and an annual inventory of department equipment and store.
- Meet with technical maintenance departments to discuss implementation of activities.
- Draft administrative correspondence.
- Monitor compliance with budget execution activities.
- Verify the archiving of incoming and outgoing mail.
- Verify the justification of expenses incurred, transmit supporting documents to partners.
- Collect and analyze supporting documents from health facilities, districts and regional offices.
- Participate in the supervision of the standard operating procedures.
- Participate in the staff meeting.
- Record the movement of inputs; collect and distribute inputs.
- Monitoring the completion and implementation of activities.
- Manage material, financial, and logistical resources; monitoring and evaluation.
- Participate in collaborative meetings; organize staff and coordination meetings.
- Prepare financial monitoring reports; ensure permanence of the service on holidays and non-working days.
- Coordinate mass campaign activities.

Pain points

- Insufficient resources for corrective maintenance.
- Insufficient budget.
- Not enough partners to fund maintenance.
- Partners not based in the region.
- Insufficient budget for spare parts.
- Parts supply is not regular.

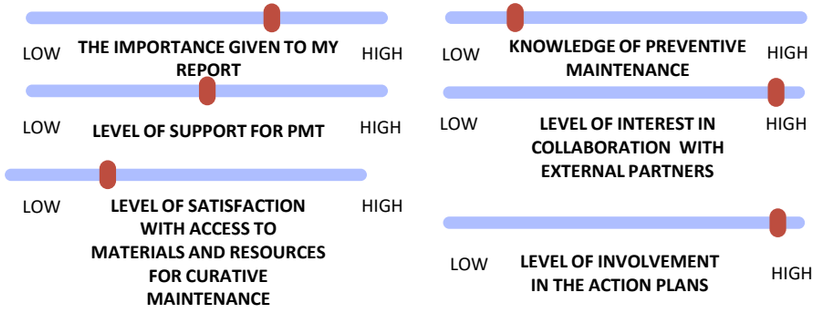
What does success look like in my role in relation to maintenance?

- ✔ Follow plan established at the beginning of the year to control the cold chain maintenance.
- ✔ Access to financial resources.
- ✔ Build new external partnerships.
- ✔ Strengthen existing external partnerships to ensure availability of material and financial resources.
- ✔ Provide resources in a timely manner when needed.
- ✔ Have the budget available for maintenance and not use it for another activity.

The tools or supports I use in my work.

- Phone call.
- Inventory sheet and equipment.
- Tracking sheet.
- Maintenance history book.
- Maintenance follow-up sheet.
- The annual maintenance plan and the strategic action plan.
- Bank account log.
- Automatic alarm system by e-mail, SMS.
- Failure report.

Experience



Polyvalent Maintenance Technician (PMT)

My role is to manage the distribution of vaccines, but I am also responsible for the entire cold chain system of the IHC including preventative maintenance.

"I am responsible for everything that has to do with improving and controlling the cold chain in the district."

My work

- Verify and evaluate the maintenance performed by the maintenance teams.
- Implement the quarterly equipment maintenance plan.
- Visit districts and iSCs to monitor maintenance activities.
- Respond to requests from the iSC manager.
- Monitor CCE operation.
- Install equipment.
- Monitor and learn during equipment installation.
- Follow up on materials.
- Respond to requests for curative maintenance of structures at the district and IHC levels
- Solve simple and complex problems
- Work with the assistance of a Sermex technician or an external technician.
- Make requests for spare parts to the central level.

Pain points

- Lack of ability to operate certain equipment.
- Inconsistent access to materials and spare parts.
- Obsolete stock of spare parts.
- Responsibility for maintaining a high number of iSCs and the cold chain.

What does success look like in my role in relation to maintenance?

- ✔ Feel confident using the equipment and tools in place to do their job.
- ✔ Have access to materials and equipment that are in good condition for use.
- ✔ Have constant access to training/capacity building on new tools and technologies.
- ✔ Be in charge of a reasonable number of ISCs and cold chain so they don't feel overwhelmed when stressed.

The tools or supports I use in my work.

Automatic alarm system: email, text message.

The annual maintenance plan and the strategic action plan.

Installation guide.

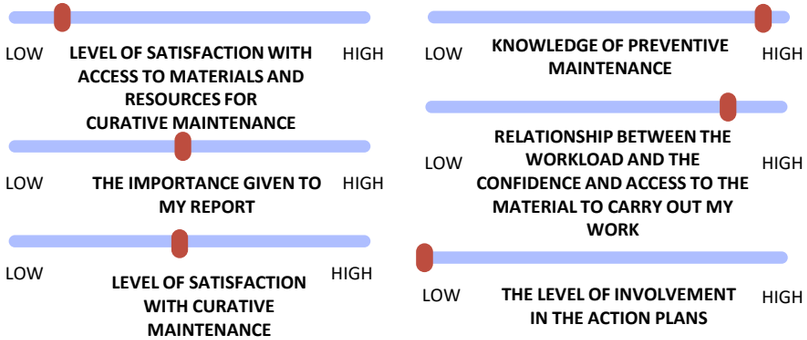
Phone call.

Inventory sheet and equipment tracking sheet.

Maintenance history book.

Maintenance tracking sheet.

Experience



Departmental Immunization Coordinator (DIC)

My role is to manage the distribution of vaccines, but I am also responsible for the preventive maintenance and the entire cold chain system of the IHC.

“I am responsible for the distribution of vaccines each month at the IHC.”

My work

- Ensuring the quality of vaccines.
- Securing vaccines.
- Evaluate and manage logistical loads for distribution.
- Coordinate the distribution of vaccines to the various facilities.
- Collect temperatures, analyze data and follow up, check the temperature of vaccines every morning and evening.
- Follow up on corrective maintenance requests (manager).
- Supervise the PMT and receive supervision from the region.
- Perform physical inventory at the end of each month.
- Participate in the development of the contingency plan for the implementation of activities.
- Dusting of the room and the solar panel.
- Cleaning and defrosting of refrigerators.

Pain points

- Cold chain space: limited, very small, and restricted.
- Lack of a permanent maintainer to provide assistance.
- Lack of training on maintenance.
- Lack of a better structure to prevent dust from entering the equipment.
- Lack of feedback from the immunization department on cold chain temperature data reported to them.
- Availability of funds and resources.
- Not all districts have cold storage facilities.

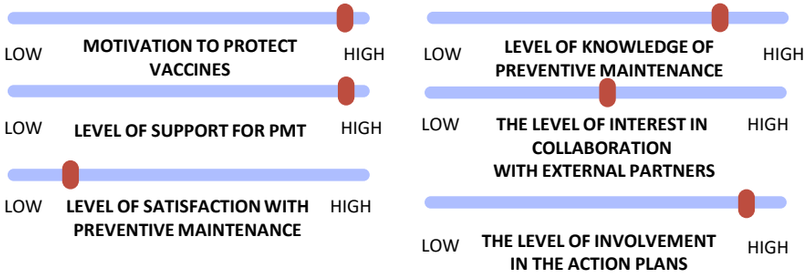
What does success look like in my role in relation to maintenance?

- ✔ Not losing vaccines due to difficulty in maintaining them safely in the cold chain.
- ✔ Have access to the infrastructure and equipment to support their work and the maintenance of the cold chain.
- ✔ Be able to work more collaboratively with all districts.
- ✔ Have access to funds and resources if they need to fix something.

The tools or supports I use in my work.

- Thermometer.
- Temperature report.
- Temperature sheet.
- Vaccine/cooler holder.
- Electric refrigerator.
- Automatic alarm system: e-mail, SMS.
- Refrigerator label.
- Maintenance follow-up sheet.
- Breakdown report form.
- Inventory form and equipment tracking form.

Experience



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