

FROM SUPPLY CHAIN ANALYSIS TO ACTION

Delivering Vaccines in Ethiopia

Big changes are happening in Ethiopia around how vaccines are distributed throughout the country. With a population of 94.1 million, Ethiopia is the second most populous country in Africa. Supplying hospitals, health centers, and health posts with safe supplies for routine immunization of the nearly 3 million infants¹ born each year is a complex endeavor, recently made more efficient through a vaccine management transition and a series of data-driven initiatives that are fundamentally changing how vaccines are distributed.

THE TRANSITION

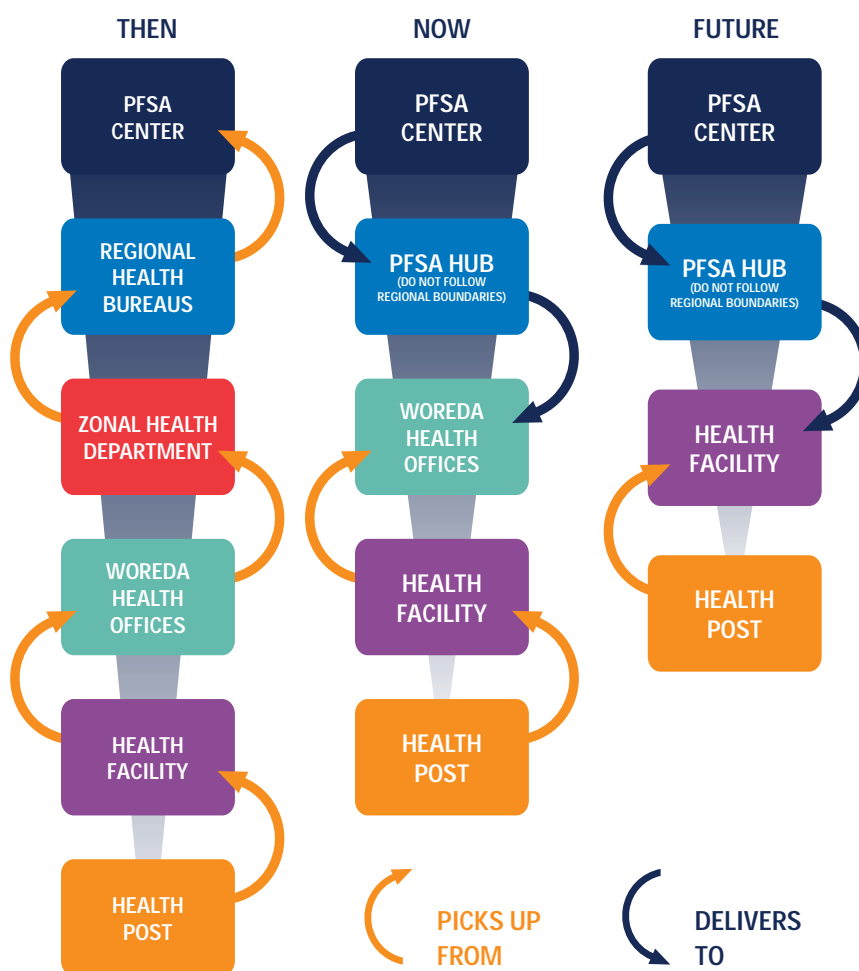
For years, staff at the regional, woreda, and lower levels of the health system have been responsible for picking up vaccine supplies from warehouses and transporting them back to their locations using cold boxes or vaccine carriers to maintain a safe temperature. **The journey from the facility to the warehouse can take a day or longer on tough-to-navigate roads, and trips were frequently made more than once a month to ensure sufficient supply of vaccine when mothers arrived with their infants.** Vaccines were distributed through a complex supply chain involving no fewer than six levels, as illustrated at right.

Starting in 2014, the responsibility for the routine vaccine supply chain began transitioning from the Federal Ministry of Health (FMOH) to the Pharmaceuticals Fund and Supply Agency (PFSA), an autonomous FMOH agency responsible for the entire essential medicine supply chain. This shift consolidated the national vaccine supply chain with the supply chain for essential medicines and vaccines used for campaigns, creating potential efficiencies but also bringing new challenges. The national transition is being implemented in a phased approach to minimize disruption and make sure vaccines are available at the point of care when they're needed.

PFSA was managing distribution of vaccine for campaigns before the vaccine transition. By May 2015, three of the 14 Hubs began to manage vaccine for routine immunization as well. The hubs now receive vaccines in refrigerated trucks each quarter, and are delivering vaccines to lower levels of the system. This saves travel time and expense previously being invested by lower levels to pick up vaccines, ensuring vaccine is delivered efficiently. Service providers can concentrate on what they do best—serving patients—while the logistics experts take charge of delivering supplies in good condition.

THE VACCINE SUPPLY CHAIN TRANSITION

The transition process has shifted how vaccine moves through the health system, moving towards a more efficient system.



¹Source: World Health Organization http://apps.who.int/immunization_monitoring/globalsummary/countries?countrycriteria%5Bcountry%5D%5B%5D=ETH&commit=OK

MAXIMIZING EFFICIENCY IN VACCINE DISTRIBUTION

Designing a vaccine distribution system is a complex undertaking. It requires understanding a number of variables, including

- **the capacity of the refrigerated trucks and vans being used for distribution,**
- **the available storage capacity at the receiving end of the distribution,**
- **and the travel time and distance required to distribute.**

“Network optimization” analysis seeks to identify the lowest-cost supply chain network that meets stakeholders’ performance objectives within the resource constraints.

For distribution or transportation networks, the focus of the analysis is primarily on variables related to distribution (routes, vehicles, etc.) and storage. With support from the Bill & Melinda Gates Foundation, the JSI team used this data to create living models of PFSA Hub supply chains, with the inputs and outputs illustrated below. The models evaluate different scenarios for distribution of routine vaccine.

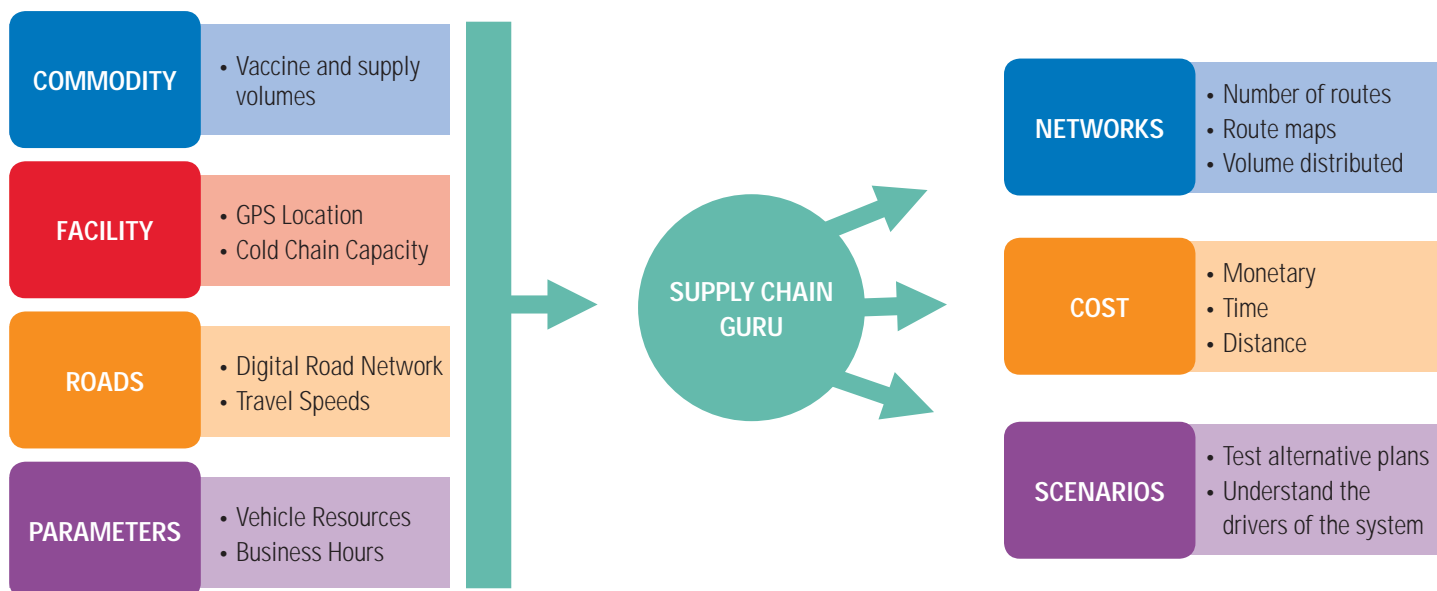
As part of the larger transition process, JSI has been conducting distribution and transportation analyses for each of the 11 regional PFSA hubs.

Llamasoft Supply Chain Guru software was used for the analysis, which relies on commodity, facility, road network, and related data inputs to generate estimates of possible distribution networks and affiliated costs. **The results of the analysis include optimized transportation routes** for delivering vaccine from the hubs to lower levels of the system, and provide a detailed analysis of the available cold storage capacity at various levels of the system. Understanding the volume of vaccine that can be safely stored is a key consideration in determining how much can be delivered in one distribution.

In the first phase of the transition, PFSA Hubs began delivering to zonal cold rooms, the next level down from regions. But, at the Mekelle Hub in the Tigray Region, the team was interested in quickly expanding delivery to the woreda cold rooms, skipping the first level of zonal distribution.

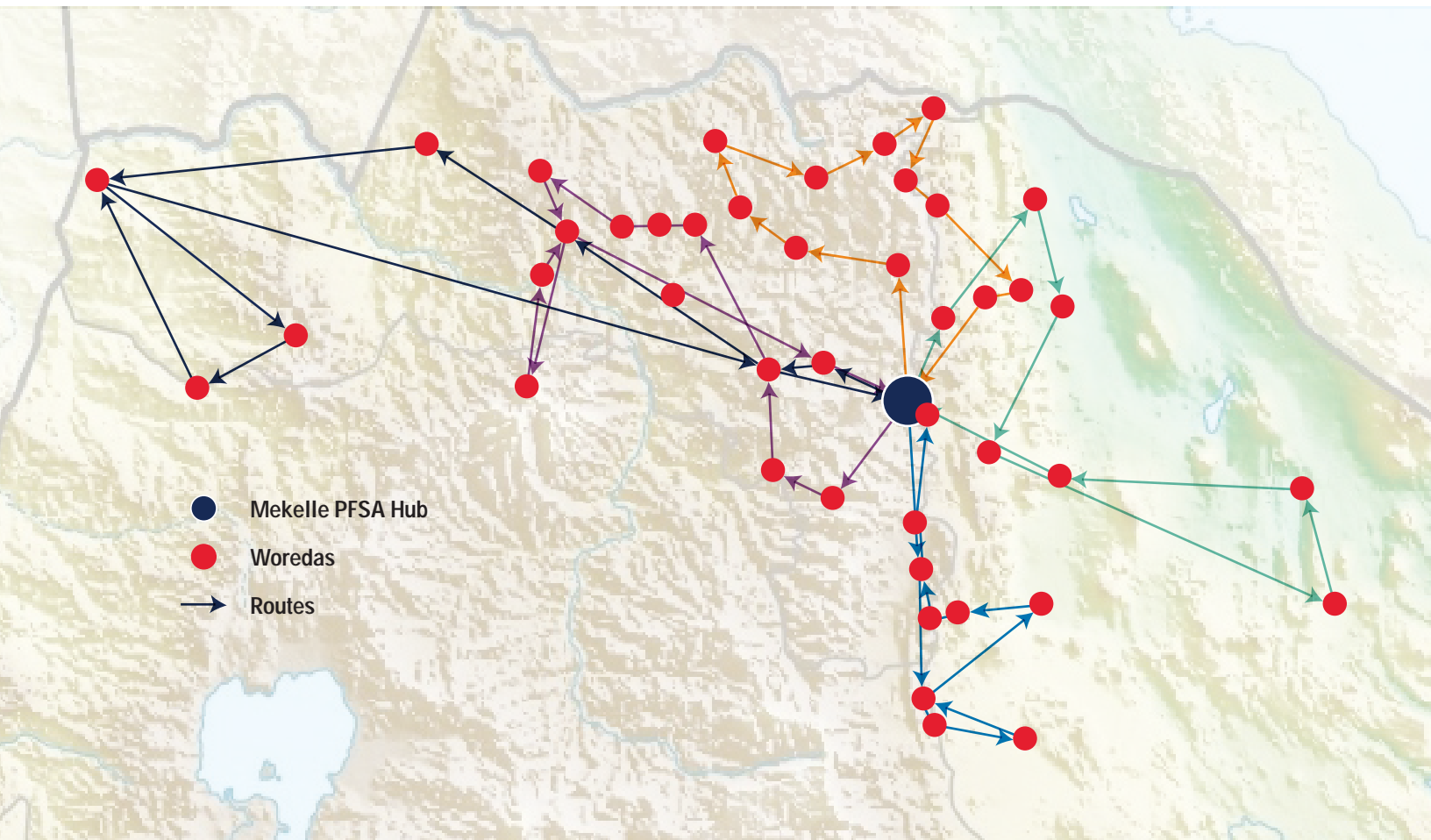
This eliminates a layer in the supply chain, reducing inventory levels, increasing efficiency and improving data visibility in how vaccine reaches the health facilities.

In Mekelle, there are 61 woredas compared to 10 zones. As a result, woreda delivery requires significantly more planning and resources to reach all of the sites. PFSA requested the results of the distribution analysis in order to determine the feasibility of distribution to the 61 woredas in Mekelle Hub’s catchment area, given current cold storage and transportation resources. The analysis included examining a number of delivery options, including monthly versus bi-monthly delivery and the impact of the opening of a new hub in Shire in western Tigray.



²PFSA are currently opening several new hubs. At the time of writing two additional hubs have opened with five more scheduled in the coming months

MAP OF THE PROPOSED ROUTES FROM THE DISTRIBUTION ANALYSIS AT THE MEKELLE PFSA HUB



USING THE ANALYSIS RESULTS TO FAST-TRACK DISTRIBUTION

The transportation analysis results clearly showed that the PFSA Mekelle Hub could deliver directly to the woredas on a monthly basis using existing resources. While distribution every other month was also considered, there was insufficient cold storage capacity at woredas to support that approach—there simply wasn't space for that volume of vaccine to be stored safely and the reliability of cold chains at some woredas was questionable. JSI shared five routes that could be used for distribution (see map above). After reviewing the five routes developed through the analysis process, PFSA used its local knowledge of the transportation network to develop three specific routes for moving vaccine from the regional cold room to the woredas.

The Mekelle Stock and Distribution Manager and JSI Tigray Regional Manager who worked together to support the transition agreed that the distribution analysis results were essential to accelerating progress at the hub.

Previously, data on cold storage capacity of the Mekelle Hub and at the woredas had never been analyzed and presented in a meaningful way for the team, and transportation routes for delivery weren't required under the previous system. Now, the team at the hub uses three specific routes developed for transportation of vaccine each month when the trucks transport vaccines to the woreda cold rooms.

DISTRIBUTION EFFICIENCIES CREATE IMPACT THAT RIPPLES THROUGH THE REGION

The biggest impact of this decision is evident at the woreda level. The first monthly distribution from the hub to the woredas in Mekelle was conducted in July 2015, and EPI Officers at the woreda health offices are already seeing an impact on their work.



Seifu Shiferaw at the Hinatato Majerat Woreda is responsible for storage and distribution of vaccines to seven health centers, which serve more than 108,000 people in his catchment area. After the first month, he reflected that

“the [new process] is a very nice system because it reduces a lot of work and saves transport...At the health centers, there won't be stockouts because of the timely delivery of vaccine from the region to the woreda.”

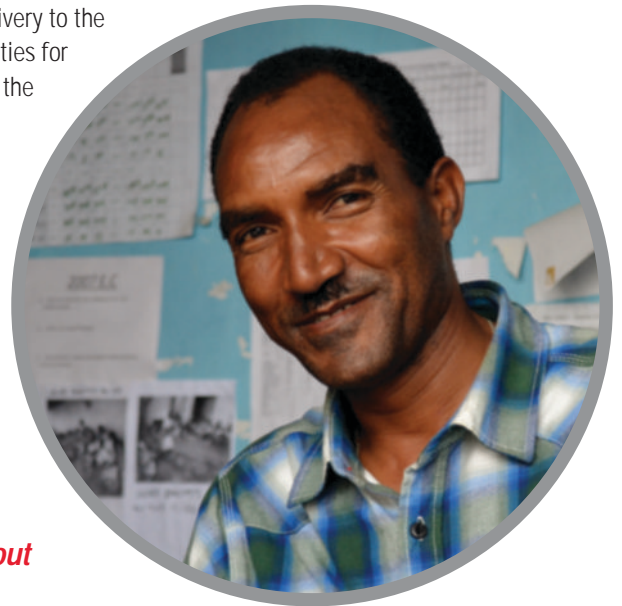
By ensuring the woreda is appropriately stocked each month, the health center staff will also avoid repeat trips within a month to pick up vaccines due to intermittent stockouts at the woreda.

The increased efficiency in the system is impacting more than just the ease and speed of moving vaccine between levels. Delivery to the woreda reduces the opportunities for vaccine to be left outside during the offloading process by eliminating a stop at the zonal level. Having vaccine

delivered also saves time and money for the woreda each month, resources originally spent traveling to pick up the vaccine from the regional cold room. These funds came from a fixed transportation budget for each month; now those funds can be allocated to other important activities such as supervision and maintenance of cold chain equipment.

At the Kilte Awalaelo Woreda, EPI Officer Solomon Teka shared how their team is using the funds to support the five health centers in his woreda.

“The new system creates a positive impact on the health centers. Our woreda has a fixed expense for per diem and transport each month. Now, more money can be used for visits to health center about vaccine or for supervisory visits.”



LOOKING FORWARD

By December 2015, distribution analyses will be complete for 11 of the PFSA Hubs, providing valuable insight into storage capacity and potential for optimizing routes for vaccine delivery with the refrigerated trucks.

It is expected that most hubs will be able and willing to bypass zonal delivery and deliver directly to most, if not all, woredas in their catchments. PFSA is also interested in extending the analysis in the coming year, to

determine what resources would be needed to deliver directly to health facilities – the ultimate goal of vaccine supply chain transition.

As the transition moves forward and new hubs are established, the distribution analyses will be valuable tools in supporting the transition process and ensuring vaccines are delivered safely and efficiently across the country.