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Supply Chain Network and Cost Analysis of Health Products in Madagascar

Results

2015

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USAID | DELIVER PROJECT, Task Order 4
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Acronyms

AIDS	acquired immune deficiency syndrome
ARV	antiretroviral
CES	
CHRD	district pharmacies supply district hospitals
CHW	community health worker
CSB	basic health center
CSB1	Level 1 Basic Health Center
CSB2	Level 2 Basic Health Center
DPMLT	Directorate of Pharmacy, Laboratory and Traditional Medicine
ECAR	Development Bureau–Catholic Diocese
EMAD	district management teams
FISA	International Planned Parenthood Federation Madagascar branch (Fianakaviana Sambatra "Happy Family")
FJKM	Church of Jesus Christ in Madagascar
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV	human immunodeficiency virus
JSI	John Snow, Inc.
km	kilometer
LMIS	logistics management information system
LNME	National Essential Drugs List
MAHEFA	Madagascar Community-Based Integrated Health Project
MCH	maternal and child health
MOH	Ministry of Health
NACP	National AIDS Control Program
NGO	nongovernmental organization
OI	opportunistic infections
PASSOBA	project for assistance to basic health services
PhaGeCom	Pharmacie à gestion communataire (health center pharmacy)

PhaGDis	Pharmacie du gros du district (district pharmacy)
RC	cost recovery
RDT	rapid diagnostic test
RMA	monthly activity report
RTA	quarterly report
SAF/FJKM	Malagasy Protestant Church Health Department
SALAMA	Central Essential Drugs and Medical Consumables Purchasing
SALFA	Malagasy Lutheran Church Health Department
SDP	service delivery point
STI	sexually transmitted infection
UGP	Ministry of Health (Madagascar)
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
USAID	U.S. Agency for International Development
USG	United States Government

Introduction

Objective

This report presents the design of a pilot for integrating warehousing and distribution for all public health commodities, from the central level (SALAMA warehouse) down to the community health facilities.

To accomplish this task, two teams worked, simultaneously, refining the options for the pilot, based on a network analysis and costing; and, also, designing the logistics management information system (LMIS) and inventory control systems to support and facilitate the pilot.

During the first part of the network analysis, team members collected key datasets, costs, and assumptions; and stakeholders were engaged in both the buy-in and information needed for the proposed analysis. The data collected and assumptions identified were used to—

- assess the current supply chain and identify the key drivers and their impact on the current supply chain design
- evaluate the design options for the pilot to improve the supply of commodities from the SALAMA central warehouse to PhaGeCom
- collect and generate the costs for operations, warehousing, and transportation for running an integrated warehousing and distribution system.

During the second part, the network analysis and costing were validated and further refined. Options for the pilot design were presented at a meeting for key stakeholders—USAID, SALAMA, and the Ministry of Health (MOH)—where participants decided which options to select.

The network analysis results and costing informed key system design parameters, including inventory control (resupply frequency, maximum/minimum, etc.), warehousing requirements, and transportation requirements.

In addition to the network analysis, the team organized a three-day system design workshop. Participants included representatives from the various departments of the MOH, key government staff from the provinces, Marie Stopes International, PSI, USAID Madagascar Community-Based Integrated Health Program (MAHEFA)., USAID Mikolo, and the USAID | DELIVER PROJECT staff from both the home office and the Madagascar field office.

Methodology

Data collection

During the previous trip, the team collected essential data to set up the base model for the supply chain network optimization:

- list of all PhaGDis and PhaGeCom facilities
- GIS coordinates of SALAMA, PhaGDis, and PhaGeCom
- quantity and volume of product received by SALAMA (2013–2014)
- quantity of product distributed from SALAMA to PhaGDis (2013–2014)
- quantity of malaria and social marketing commodities (2013)
- frequency of deliveries from SALAMA to PhaGDis (2013–2014)
- frequency and distance of deliveries from PhaGDis to PhaGeCom (2013)
- mode of transport from SALAMA to PhaGDis to PhaGeCom
- list of hard-to-reach districts.

In further reviewing and analyzing the initial data collected, additional information was needed, and some data needed to be disaggregated.

The team collected the following additional information:

- warehousing/storage capacity (m3) of SALAMA
- number and size of trucks available at SALAMA
- SALAMA operational cost information
  - number of people involved in picking, packing, labeling, and loading
  - number of drivers and warehouse management staff
  - vehicles maintenance, insurance, cost, etc.
  - average salary of all warehousing and distribution staff.

Documents Review

To prepare for the logistics system design workshop, the team collected and reviewed the following documents to identify and document the various systems parameters across different programs (different types of inventory control systems, LMIS forms and reporting mechanism, flow of products, etc.):

- manual for managing health products at PhaGDis
- manual for managing health products at PhaGeCom
- manual for managing malaria products

- guide for managing TB drugs
- logistics guide for managing sexually transmitted infections (STIs) and HIV products.

Validation meetings

The team organized and facilitated a series of workshops to validate assumptions, share preliminary results, build consensus on selecting pilot regions, and design parameters for an integrated logistics system. The following specific meetings were organized:

Trip Schedule

Pre-trip

- Review data collected during the November trip and identify any data gaps; follow up with the in-country team to fill in these data gaps.
- Conduct network analysis using the data and assumptions gathered in-country related to public supply chain management in Madagascar.
  - Determine the drivers of the current supply chain design.
  - Run scenarios for different design options.
  - Identify possible geographic regions for pilot of logistics system.
- Prepare results and analysis for discussion with key partners in-country.
- Determine locations for pilot with USAID and key stakeholders.

In-country

Week 1:

- Conducted validation meetings with technical staff at SALAMA.
- Revised analysis based on inputs from the validation meetings and new data/information.
- Met with stakeholders—United Nations Population Fund (UNFPA) MOH, etc.—and updated them on the network analysis and costing.
- Met to present final options for pilot for discussion and decisions with key stakeholders.

Week 2:

- Three-day pilot planning workshop with key stakeholders
  - Day 1: System design/validation
  - Days 2 and 3: Operational plan and monitoring and evaluation plan.
- Revised analysis based on inputs from the pilot planning workshop and new data/information.

Week 3:

- Documented the final decisions; identified and explain in detail the elements of a plan of action for implementing the pilot, including developing the standard operating procedure manuals, training plan, and resource plan.
- Discussed with the USAID mission, USAID |DELIVER PROJECT, and relevant stakeholders plans for follow-up activities.

Network Analysis

Current State of the Supply Chain

Created in 1996, SALAMA's main mission is the central purchasing of essential medicines and medical equipment to supply all health facilities—public and private nonprofit—with good quality, affordable essential medicines and medical supplies. SALAMA has financial autonomy and does not receive a subsidy from the Ministry of Public Health (MinSanP) or the partners. Revenue comes mainly from the sale of cost recovery (RC) products or its services, such as the storage and distribution of pharmaceuticals.

SALAMA buys, sells, and delivers drugs on the National Essential Drugs List (LNME). They deliver them to the PhaGDis, which are wholesale pharmacies managed by private not-for-profit operators at the health district level. The PhaGDis supplies the community managed pharmacies (PhaGeCom) and pharmacies in basic health centers (CSBs). Each of these structures sells drugs under a defined profit margin.

SALAMA is also responsible for managing products for the vertical programs, such as family planning, malaria, HIV and AIDS, child health, and maternal health. See appendix 1 for a list of program drugs. These products are usually distributed free of charge. The integration of these program drugs with the cost recovery drugs is not complete or fully integrated; the synergy between the two systems can cause problems and duplicated work in logistics management.

Since the constitutional change in 2009, the budgets allocated for the supplying medicines and consumables have been significantly reduced throughout the supply chain. The result is a disruption of supply, causing stockouts at the community level.

The prospect of resuming bilateral cooperation between the United States Government (USG) and the Government of Madagascar, and considering the impact of the crisis on the national supply chain, the design of a pilot to integrate the warehousing and distribution of all public health commodities, programs, and RC—from the central level (SALAMA) down to the community health facilities—is needed to ensure and sustain a better functioning supply chain that can deliver reliable and quality healthcare to the Malagasy population.

Volume and Quantity of Products

SALAMA provided the data used in this analysis from their central warehouse for both 2013 and 2014; it is the latest data available. The quantities were converted to volumes because it is the flow of volume that drives the supply chain.

Figure 1 shows the outflow of commodities from SALAMA to the PhagDis warehouse with its significant peaks and valleys. The peaks in the programs relate to the arrival of commodities at SALAMA, and then its movement out of the SALAMA warehouses, usually because of the limited program storage space at SALAMA for program commodities and the need to move the products out to the PhagDis.

The dip in September/October in RC commodities resulted from the funding cycle for RC commodities. PhagDis have limited orders during these months because the funds for ordering commodities are depleted. When funds are available again, they place orders that have accumulated. This is generally in November and December and is currently a regular cycle.

The impact of this type of schedule is a large variation in distributed volumes from SALAMA to PhagDis, which has consequences on the existing storage and transportation resources by creating both periods of resource constraints and diminished resources.

Figure 1. Total Volume Distributed by SALAMA, in 2013

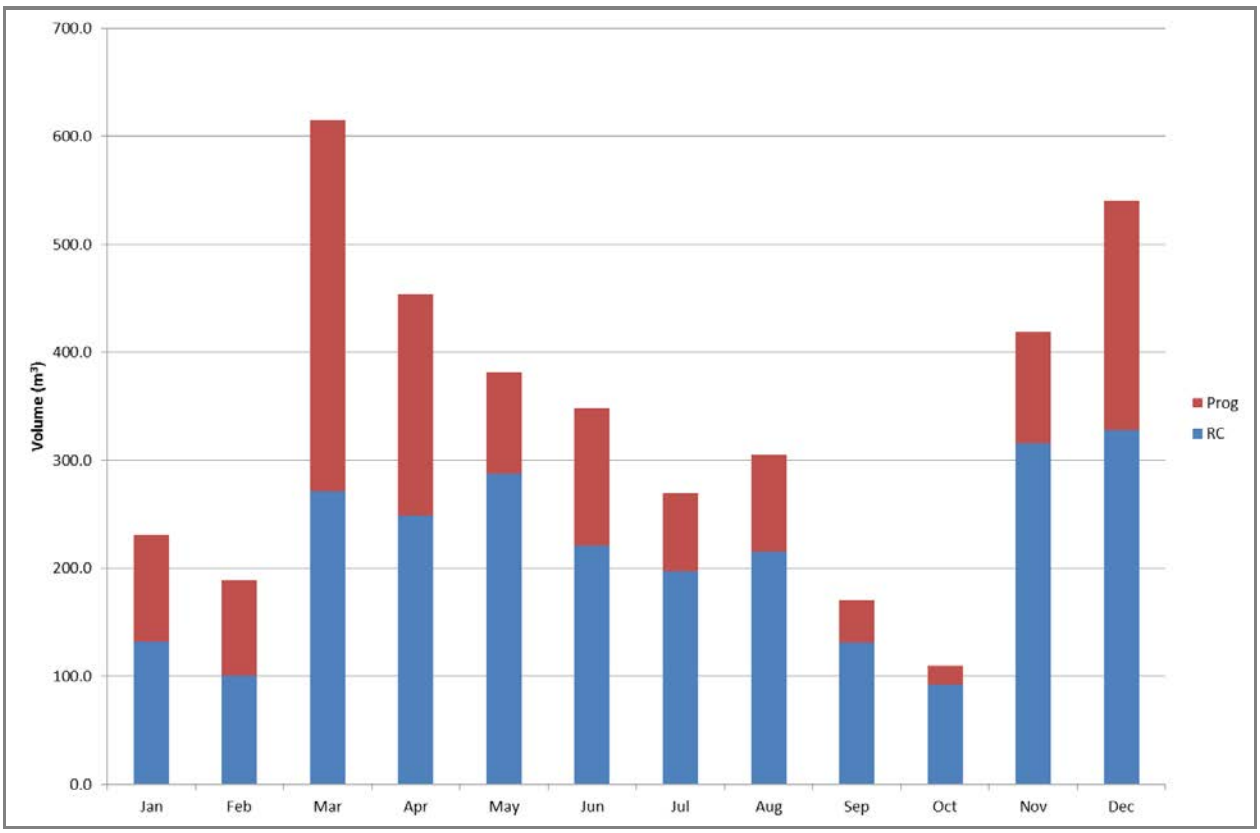


Figure 2 shows how timing impacts the incoming shipments on SALAMA storage and, therefore, distribution. In March, both main shipments form UNFPA and the Ministry of Health (Madagascar) (UGP) arrived at the same time, doubling the storage and handling needs for the program commodities. Also, note that the figure is incomplete because significant amounts of equipment provided by the programs in April, May, and June—beds, mattresses, scales, furniture, etc.—caused significant constraints on the storage and distribution.

Figure 2. Volume of Program Product Incoming at SALAMA

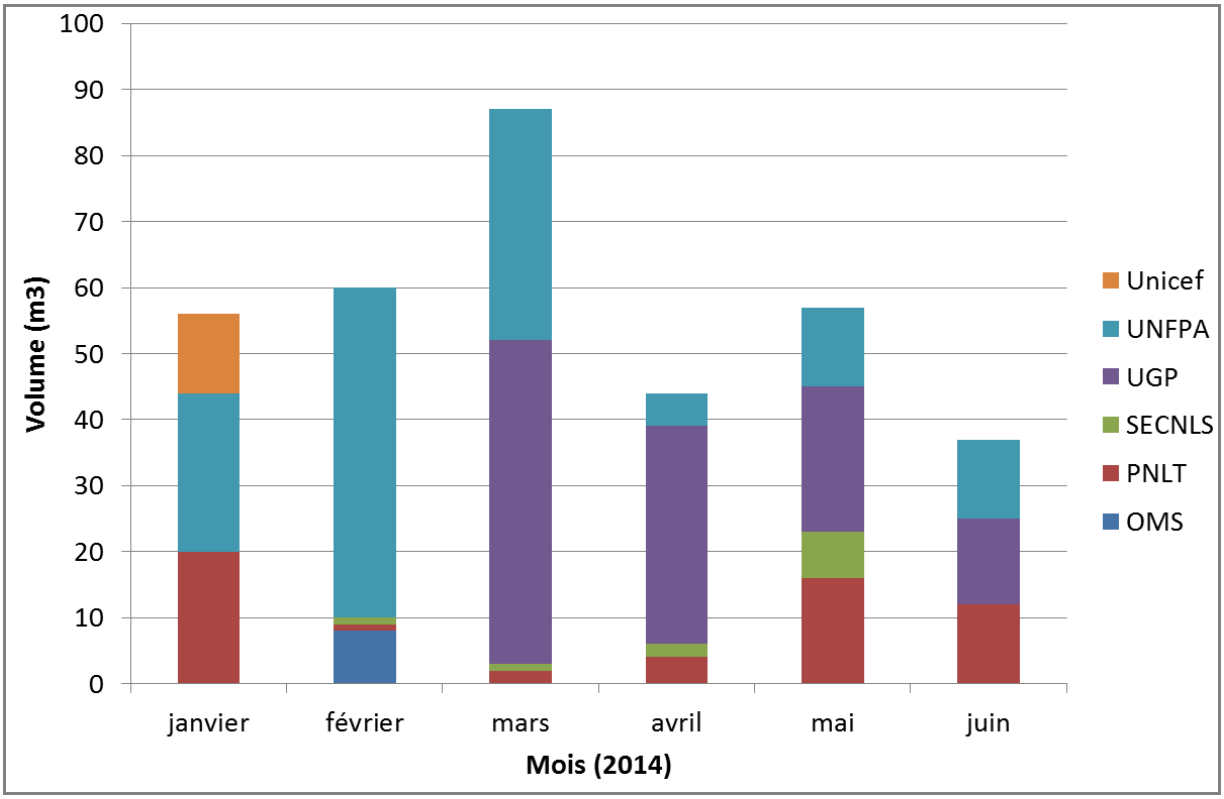
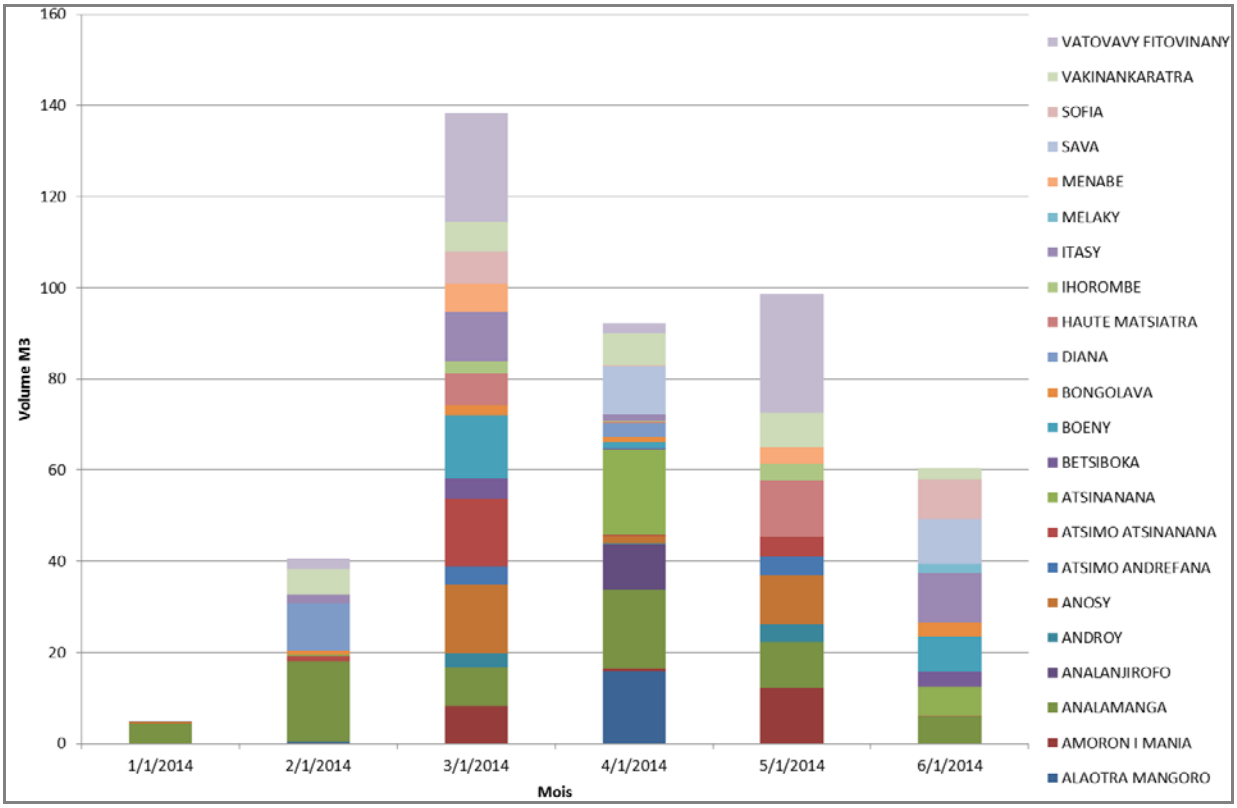


Figure 3 shows both the macro and micro variability in the distribution of RC products from SALAMA. The low in January was from stock counting; distribution is limited during this time. In March, the distribution peak, makes up for the limited distribution in January and February.
In each month, the significant variability in volumes being sent to the PhagDis is clear; not only with the volume, but also with the PhagDis served. For example, the Atsimo Atsinanana's PhagDis stores received products in February, March, and May; the Alaotra Mangoro PhagDis only received in April; and the Analamanga PhagDis receives stock every month from January to June.

Figure 3. Volume of Product Distributed by SALAMA to PhaGDis



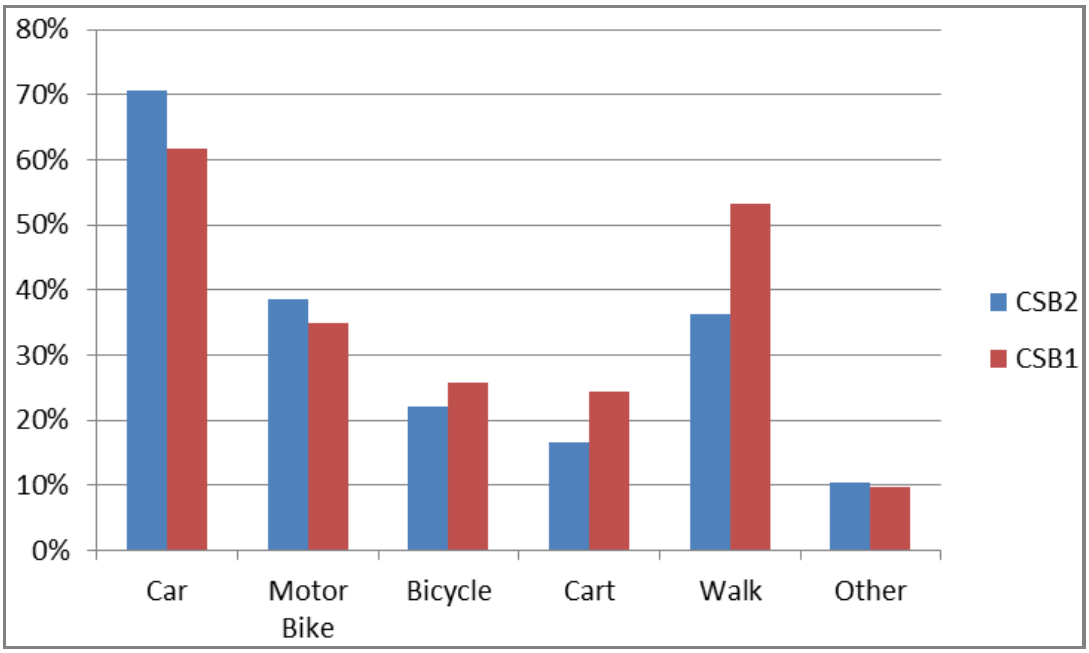
Overall, both macro- and micro-level in program and RC commodities vary significantly. At the macro-level, program distribution is driven by incoming variability and RC distribution is driven by the funding cycle. Because these factors are unlikely to change, any future design must work within these constraints.

Transport from PhaGDis to PhaGeCom

Currently, SALAMA is not responsible for transportation from PhaGDis to PhaGeCom. To address the potential new level of distribution being proposed from the PhaGDis to PhaGeCom, the primary concern was the accessibility between the two levels. Therefore, the focus at this level was the transport modes from PhaGDis to PhaGeCom.

The key factor shown in figure 4 is that only 60 percent of Level 1 Basic Health Centers (CSB1) and 70 percent of Level 2 Basic Health Centers (CSB2) are accessible by car at some time during the year. Thus, in planning distribution from PhaGDis to PhaGeCom, the study divided CSBs into accessible and inaccessible by car for the two districts: Atsimo Andrefana and Boen. These data were used during the last part of the analysis.

Figure 4. Modes of Transport to the CSB1 and CSB2



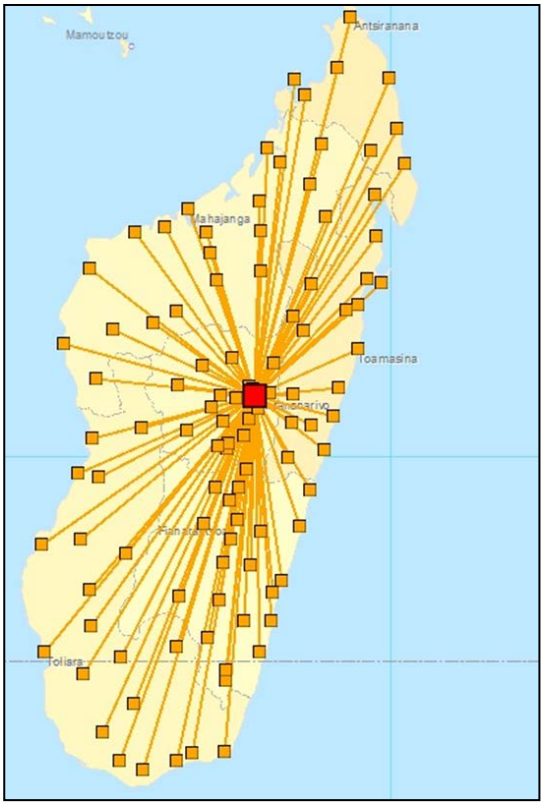
Supply Chain System Design Options

Options for Provincial Hub Storage

One option under consideration to help alleviate an overburdened SALAMA central warehouse is the proposal to open the provincial hubs, which would help reduce the storage burden on SALAMA and reduce the travel distance from SALAMA to PhaGDis. To do this, the team used a Greenfield analysis technique. Based only on the location of PhaGDis and the volume of commodity to be distributed to each PhaGDis, they identified the *ideal* location to place either one or two additional provincial hubs. The Greenfield analysis did not consider the existing road network or terrain; it only produces information from a supply chain perceptive about the ideal locations for additional hubs. Local knowledge and other known factors should still be considered.

See figure 5 for the location of the existing SALAMA central warehouse and the PhaGDis where it currently delivers.

Figure 5. SALAMA Central Warehouse to PhaGDis



Based only on the location of PhaGDis, and the volume of program commodity distributed to each PhaGDis, the Greenfield analysis indicates that having an additional warehouse in the south would serve SALAMA best; it would help evenly distribute the storage of commodities and reduce the overall travel distance because the larger volume of program commodities, overall, going to the southern PhaGDis warehouses. The approximate location can be seen in figure 6.

Based only on the volume of RC commodities and the PhagDis locations, the Greenfield analysis indicated that an additional warehouse in the north would be a better choice for SALAMA to store commodities and reduce the travel distance. The approximate location can be seen in figure 7.

Figure 6. One Additional Warehouse for Program Commodities—Ideal Location

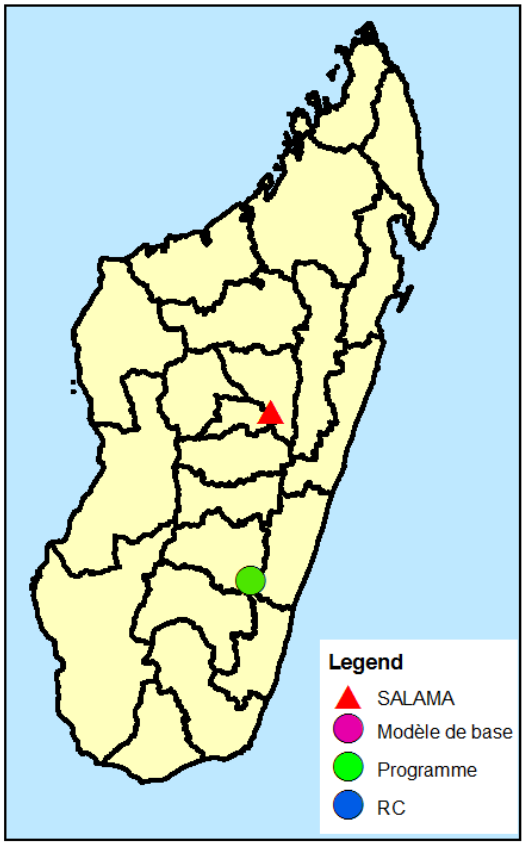
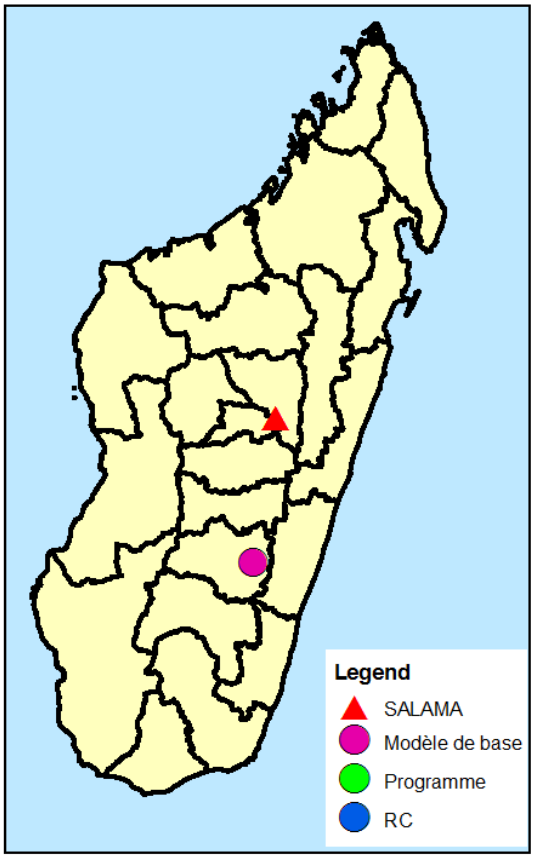


Figure 7. One Additional Warehouse for RC Commodities—Ideal Location

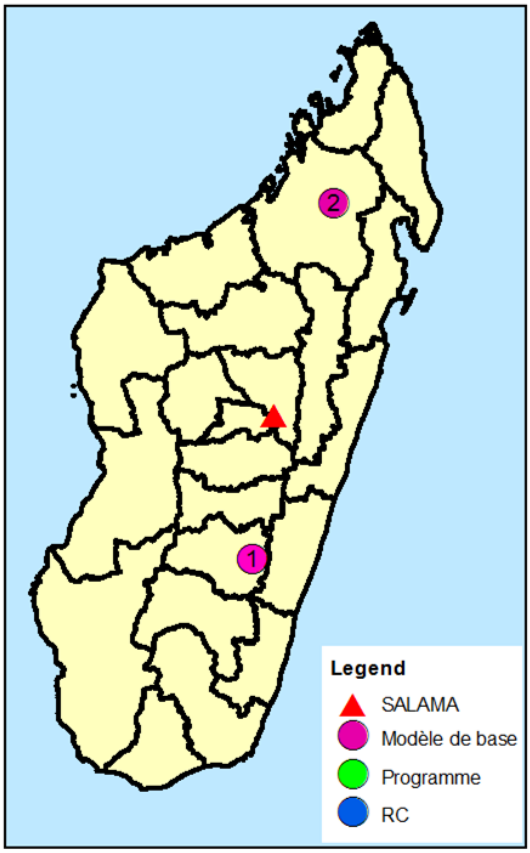
Based on the volume of both program and RC commodities, and the PhagDis sites, data indicates that having an additional warehouse in the south would distribute the storage of commodities better and reduce the travel distance. A larger volume of program commodities is being distributed at greater volume in the southern region than the northern region for both program and RC; this is the basis of recommending the addition of one southern warehouse.

Figure 8. One Additional Warehouse for Program and RC Commodities—Ideal Location



Based on the volume of both program and RC commodities, and the PhaGDis sites, data indicates that two additional warehouses in the south and in the north would distribute the storage of commodities and reduce the travel distance for SALAMA. If only one warehouse could be built, the southern location would take priority, because program volumes are significantly higher than RC volumes. After this need is resolved, the next priority is the northern area warehouse.

Figure 9. Two Additional Warehouses for Program and RC Commodities—Ideal Locations



The addition of two additional central stores to the north and south will—

- decrease the overall distance and distribution costs
- reduce the total time for distribution by storing the products closer to their delivery points
- reduce the volume of activities at the main central store.

Distribution System Design

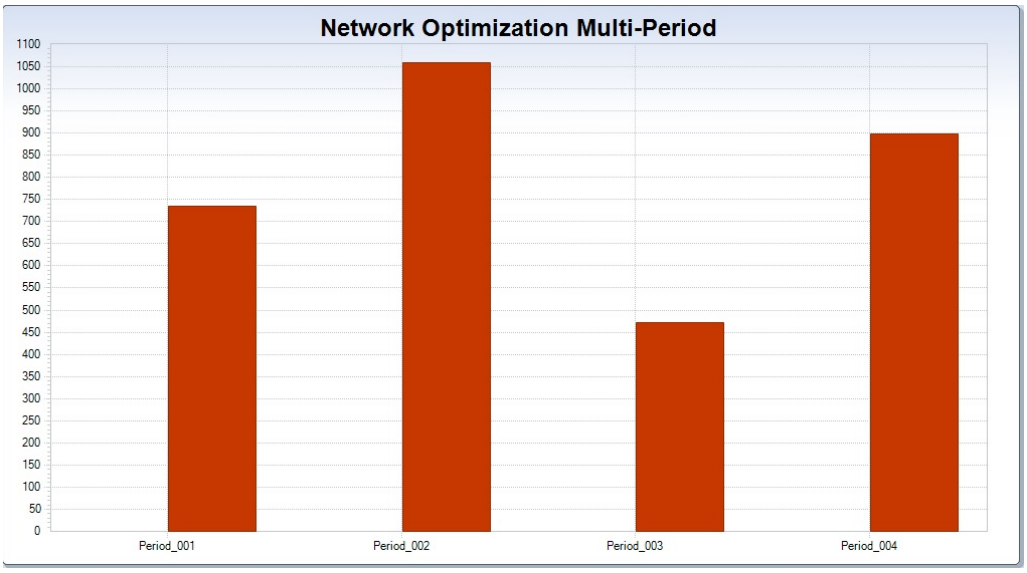
Network analysis, or supply chain modeling, is a software-based quantitative analysis that partners use to build *working abstractions* for a real world supply chain situation. The exact approach and scope are driven by the specific questions stakeholders want answered, but these analyses are typically used to support strategic and tactical decisionmaking by allowing stakeholders to envision real-world implications for management changes to the supply chain before actually piloting or implementing those changes. In this case, implementers are trying to determine the best distribution system design that would enable SALAMA to get both RC and program commodities to the PhaGeCom level. To the extent possible and reasonable, the models are built using specific data, but many elements can comprise stakeholder-generated assumptions, which can be tested later for their impact on final results.

Model Assumptions

To create the model, the following assumptions were made:

- Procurements happen regularly and all products are available.
- All products and volume are distributed to the PhaGeCom.
- Distribution is quarterly for accessible districts.
- Distribution is twice a year for inaccessible districts (see figure 10).
- Distances are based on the distribution plan.
- SALAMA continues to deliver directly to hospitals.

Figure 10. Volume Variation, by Quarter



Variations in volumes can be seen by the quarter because SALAMA only distributes to inaccessible areas twice a year (quarters 2 and 4).

Cost Assumptions

A modeling analysis can also identify the lowest-cost network that meets the partners' objectives. The approach can rapidly compare potential networks in the number of system tiers, number of facilities, location of facilities, service areas, and inventory policies. To include costs as part of the analysis, due to limitations in data availability and collection, some assumptions on cost had to be made.

- Costs in this analysis only include warehousing and distribution, but not management.
- Total distance and transportation costs are based on deliveries to all sites.
- Number of additional vehicles is based on using a 40m3 truck for each delivery.

Cost Considerations

In addition to the assumptions above, the following considerations were the constants when costing out the distribution system options.

1. To determine the length of the distribution system, the team entered the known locations of SALAMA and the PhaGDis and PhaGeCom. Because the road network was unavailable at the time of the analysis, the software used a straight line with a curve adjustment to calculate the distance between these points—this accounted for the fact that not all roads run a direct and straight path.

   The totals were—
   a. 191,151 km SALAMA to PhaGDis
   b. 386,281 km PhaGDis to PhaGeCom.

2. With the complete volume analysis, including all program and RC commodities during the year, the annual volume through SALAMA was calculated to be 4343m^3.

Cost Inputs

With the assumptions and the overall distance of the supply chain levels and the volume being transported complete, calculating the cost of new system was the next step. To do this, the cost per kilometer of distribution was calculated by collecting inputs, such as salaries, per diem, fuel, truck cost, and insurance. This sum was divided by the average number of kilometers (km) SALAMA currently travels to make distributions to the PhaGDis. Table 1 shows the cost inputs and the cost per km for each input, with a total cost per km for distribution of AR 3,325. The costs in table 1 are from the SALAMA expenses for 2013.

Table 1. Cost Inputs for Calculating SALAMA Distribution, per Kilometer

Transportation	Total Cost (2013)	Cost/Km
Driver salary (average)	Ar 43,264 per day	Ar 169*
Handler salary	Ar 28.672 per day	Ar 112*
Driver per diem	Ar 5,888 per day	Ar 23*
Handler per diem	Ar 3,072 per day	Ar 12*
Fuel	Ar 763,356	Ar 574
Truck cost (depreciated)	-	-
Transports costs SALAMA & program	Ar 360,319,635	Ar 1,885
Insurance	Ar 105,324,201	Ar 551
Total	**Ar 3,325**	

*Based on SALAMA's 2013 average of driving 256 km per day.
*Based on the 191,151 km total distance of SALAMA's current distribution network.

To calculate the storage capacity of SALAMA's two warehouse warehouses, the team counted the total number of pallet spaces available; it was estimated at 5594m3.

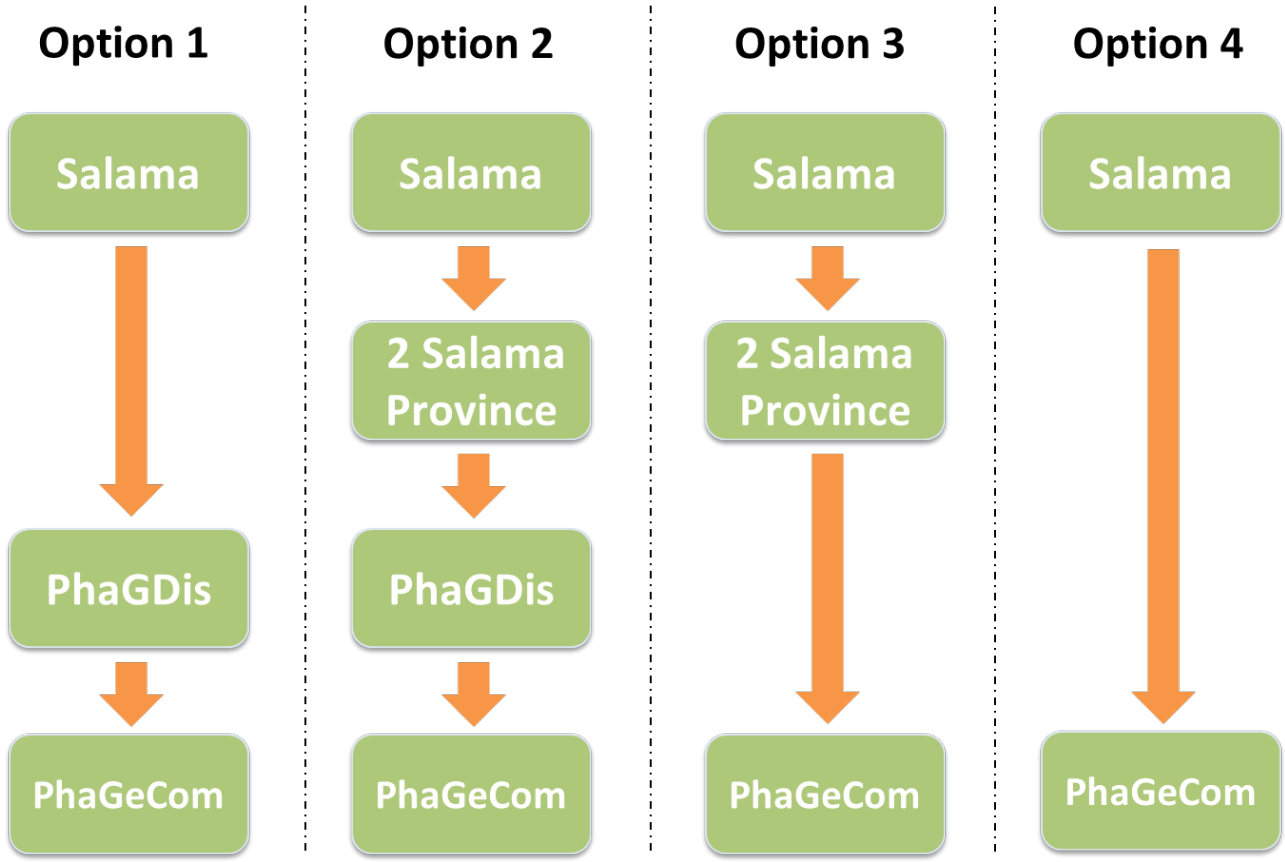
Table 2. Cost Inputs for Calculating SALAMA Warehouse Cost per m3

Volume	Total Cost (2013)	Cost/m3
Warehouse employees (27)	Ar 142,792,444	Ar 25,526
Stock space	Ar 474,013,184	Ar 84,736
Total	Ar 616,805,628	**Ar 110,262**

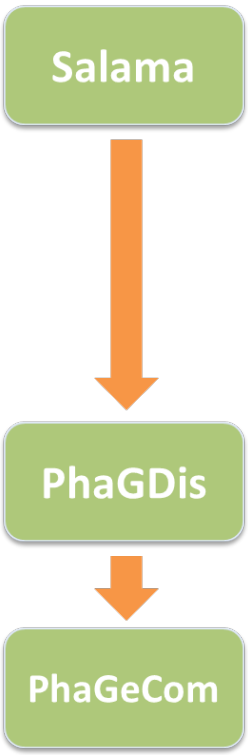
Distribution Options

Figure 11 displays the four possible distribution options that SALAMA could use to transport product from their central warehouse down to the PhaGeCom level. Options 2 and 3 use the proposed provincial warehouses, which are still being considered. For the best comparison, each option was costed out using the inputs determined and explained in the previous section of this report.

Figure 11. SALAMA to PhaGeCom Distribution Options



Option 1: SALAMA to PhaGDis to PhaGeCom (current system in use)



For option 1, the team costed the current system in use—SALAMA distributes to the PhaGDis and continues the distribution to the PhaGeCom. Figure 12 illustrates the distribution.

SALAMA → PhaGDis

As determined by the modeling work, approximately 191,251kms are traveled between the SALAMA central warehouse and all the PhaGDis locations. Based on the per km cost, calculated at Ar 3,325 per km, the cost to transport the products from SALAMA to PhaGDis is Ar 635,944,003. The volume transported between SALAMA and the PhaGDis is 4,343 m^3. Again, based on the per m^3 cost calculated at Ar 11,262 per m^3, the cost to store and manage the commodity volume is Ar 478,866,339. To fully execute this option, at least five additional trucks that can carry 40m^3 will be needed.

Transport	191,251 km	Ar 635,944,003
Volume	4343 m^3	Ar 478,866,339
Trucks*	5 (40m^3)	-

* Additional trucks needed by SALAMA

PhaGDis → PhaGeCom

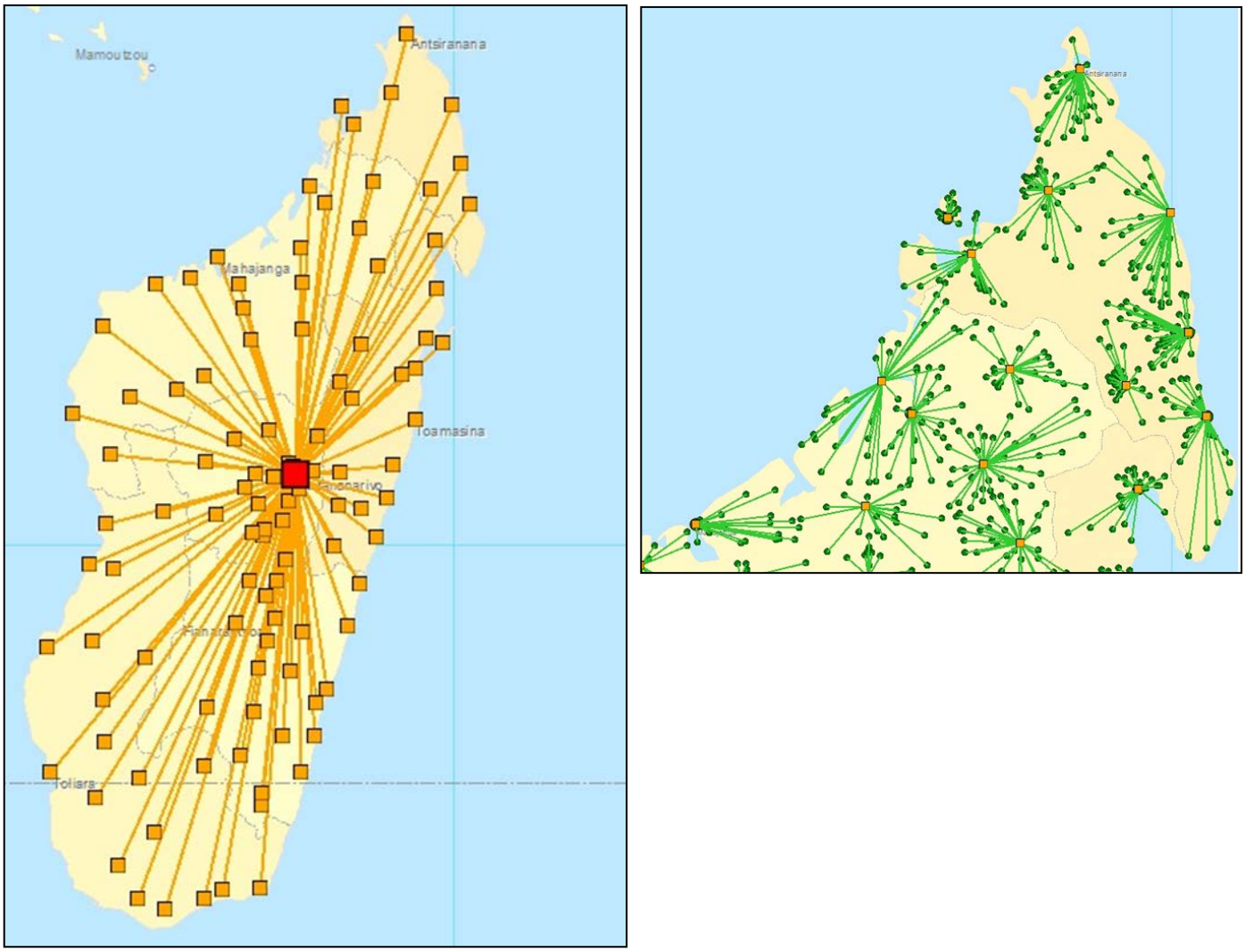
To calculate the costs for the next level down—from PhaGDis to PhaGeCom—the same per km costs were used to determine the total cost of transport at this level. The volume costs were not included because SALAMA would not incur the cost to store and manage product at the PhaGDis level. To fully execute option 1, the truck must be able to carry 3.5m^3 per district.

Transport	386,281 km	Ar 1,284,453,861
Volume	3166 m^3	---
Trucks	1 per district (3.5m^3)	

For option 1, the total cost would be—

Total Cost: Ar 2,399,264,203

Figure 12. Distribution from SALAMA to PhaGDis to PhaGeCom



Option 2: SALAMA to Two Provincial Warehouses to PhaGDis to PhaGeCom

For option 2, the team costed the addition of two SALAMA provincial warehouses, in addition to their current central-level warehouse. From these three warehouses, SALAMA would distribute to the PhaGDis, then continue the distribution to the PhaGeCom. Figure 13 illustrates the distribution.

SALAMA → Provincial Warehouses

As determined by the modeling work, approximately 676 kms are traveled between the SALAMA central warehouse and the two provincial warehouses.

Based on the per km cost, calculated at Ar 3,325 per km, the cost to transport the products from SALAMA to the provincial warehouses is Ar 2,247,821. The volume transported between SALAMA and the provincial warehouses is 1,567 m^3. Again, based on the per m^3 cost calculated at Ar 11,262 per m^3, the cost to store and manage the commodity volume is Ar 172,780,003. To fully execute this option and transport all the products in a reasonable time to the provincial warehouse, at least one additional truck that can carry 40m^3 will be needed.

Transport	676 km	Ar 2,247,821
Volume	1,567 cm^3	Ar 172,780,003
Trucks	1 (40m^3)	---

Province → PhaGDis

For the next level down, approximately 103,392 kms are traveled between SALAMA's central warehouse and the two provincial warehouses, and all the PhaGDis locations. Based on the per km cost calculated at Ar 3,325 per km, the cost to transport the products from these three warehouses to PhaGDis is Ar 343,797,012. The volume transported between the three warehouses and the PhaGDis is 4,343m3. Based on the per m3 cost calculated at Ar 11,262 per m3, the cost to store and manage the commodity volume is Ar 478,866,339. To fully execute this option, at least four additional trucks that can carry 40m3 will be needed.

Transport	103,392 km	Ar 343,797,012
Volume	4,343 cm^3	Ar 478,866,339
Trucks	4 (40m^3)	---

PhaGDis → PhaGeCom

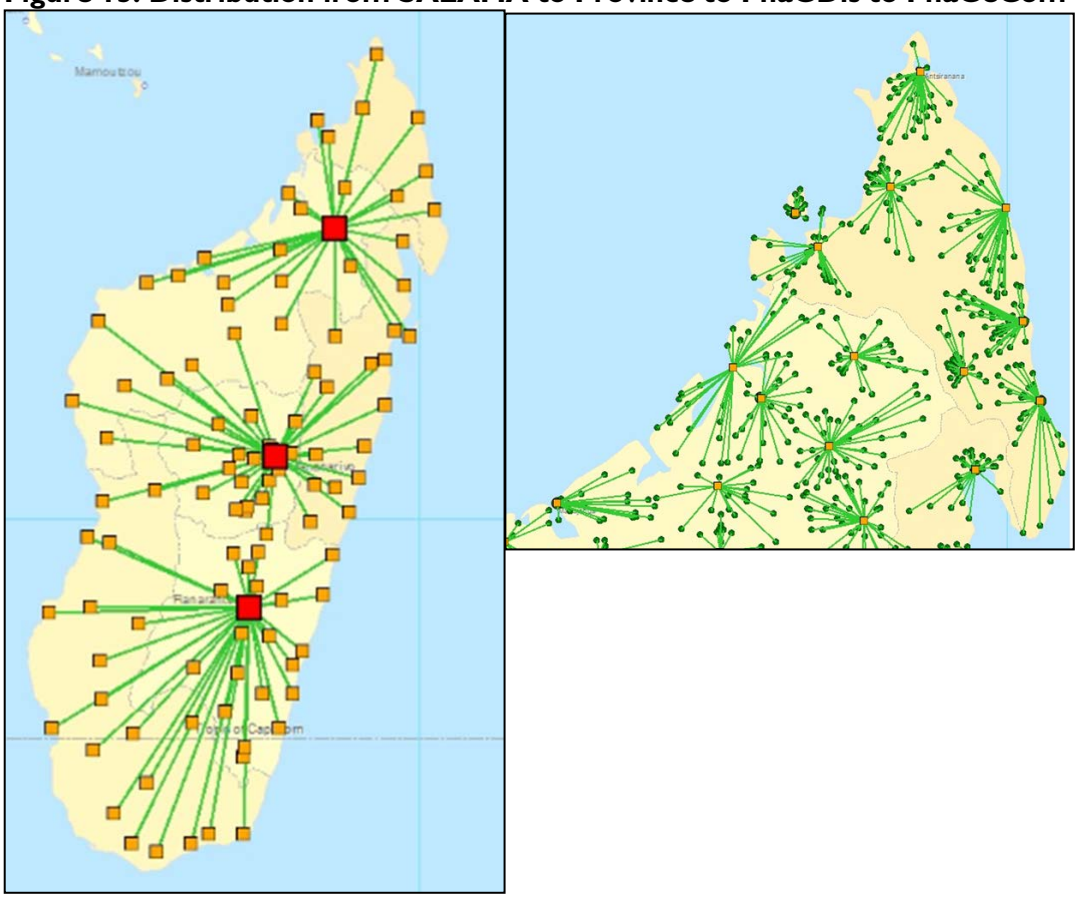
The costs for the final level down, from PhaGDis to PhaGeCom, the same per km costs were calculated to determine the total cost of transport at this level. The volume costs were not included because SALAMA would not incur the cost to store and manage product at the PhaGDis level. To fully execute this option, one truck that can carry 3.5m^3 per district will be needed.

Transport	386,281 km	Ar 1,284,453,861
Volume	3,166 cm^3	---
Trucks	1 per district ($3.5m^3$)	---

For option 2, the total cost has been calculated as:

Total Cost: Ar 2,282,145,036

Figure 13. Distribution from SALAMA to Province to PhaGDis to PhaGeCom



Option 3: SALAMA to Two Provincial Warehouses to PhaGeCom

For option 3, the team costed the addition of two SALAMA provincial warehouses, in addition to their current central-level warehouse; then distributing directly from these three warehouses to the PhaGeCom, skipping the PhaGDis. Figure 14 shows the distribution.

SALAMA → Provincial Warehouse

Just like option 2, approximately 676 km are traveled between the SALAMA central warehouse and the two provincial warehouses. Based on the per km cost, calculated of Ar 3,325 per km, the cost to transport the products from SALAMA to the provincial warehouses is Ar 2,247,821. The volume transported between SALAMA and the provincial warehouses is 1,567m^3. Again, based on the per m^3 cost calculated at Ar 11,262 per m^3, the cost to store and manage the commodity volume is Ar 172,780,003. To fully execute this option and transport all products in a reasonable time to the provincial warehouse, SALAMA will need at least one additional truck that can carry 40m^3.

Transport	676 km	Ar 2,247,821
Volume	1567 cm^3	Ar 172,780,003
Trucks*	1 (40m^3)	---

* Add

Provincial Warehouse → PhaGeCom

The costs for the final level down, from the central and provincial warehouses directly to the PhaGeCom, the same per km costs were used to calculate the total cost of transport at this level. To fully execute this option, nine additional trucks that can carry 40m^3 will be needed.

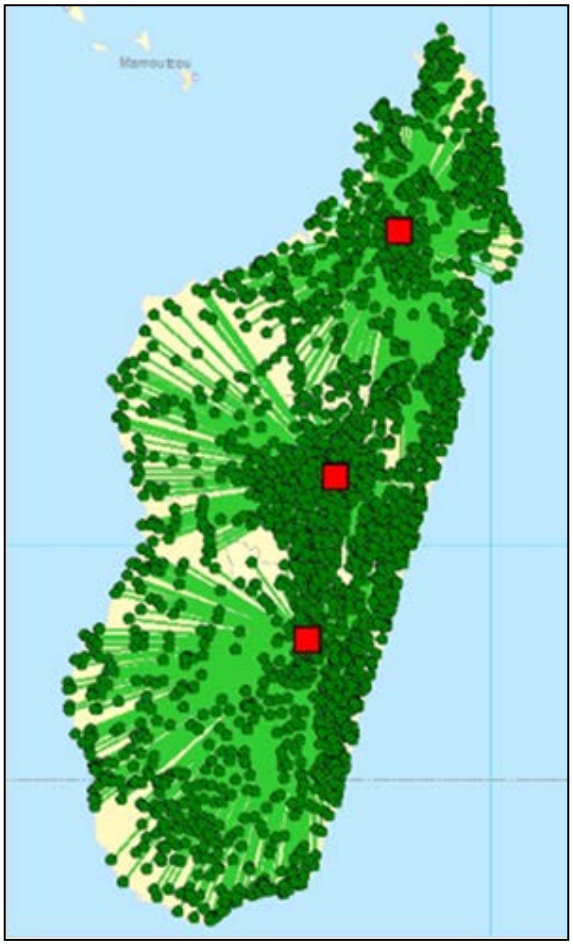
Transport	386,281 km	Ar 7,571,401,642
Volume	3166 cm^3	Ar 478,866,339
Trucks*	9 (40m^3)	---

* Additional trucks needed by SALAMA

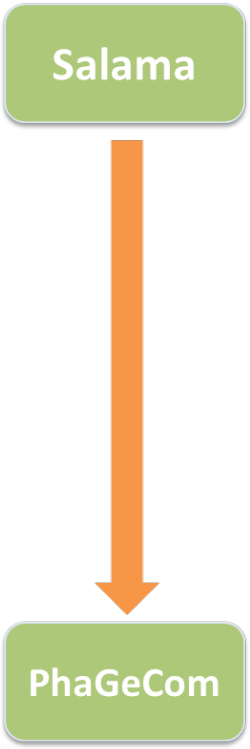
For option 3, the total cost has been calculated as:

Total Cost: Ar 8,225,295,805

Figure 14. Distribution from SALAMA to Province to PhaGeCom



Option 4: SALAMA Central Warehouse Direct to PhaGeCom



For option 4, the team costed the SALAMA central warehouse distributing directly to the PhaGeCom, skipping the PhaGDis. Figure 15 illustrates the distribution.

SALAMA → PhaGeCom

As determined by the modeling work, approximately 4,470,629 km are traveled between SALAMA central warehouse and all the PhaGeCom. Based on the per km cost of Ar 3,325 per km, the cost to transport the products from SALAMA to the PhaGeCom is Ar 14,497,774,889. The volume transported between SALAMA and the provincial warehouses is 4,343m^3. Based on the per m^3 cost, calculated at Ar 11,262 per m^3, the cost to store and manage the commodity volume is Ar 478,866,339. To fully execute this option and transport all products in a reasonable time to the PhaGeCom, a minimum of 16 additional trucks that can carry 40m^3 will be needed.

Transport	4,470,629 km	Ar 14,497,774,889
Volume	4343 cm^3	Ar 478,866,339
Trucks*	16 (40m^3)	---

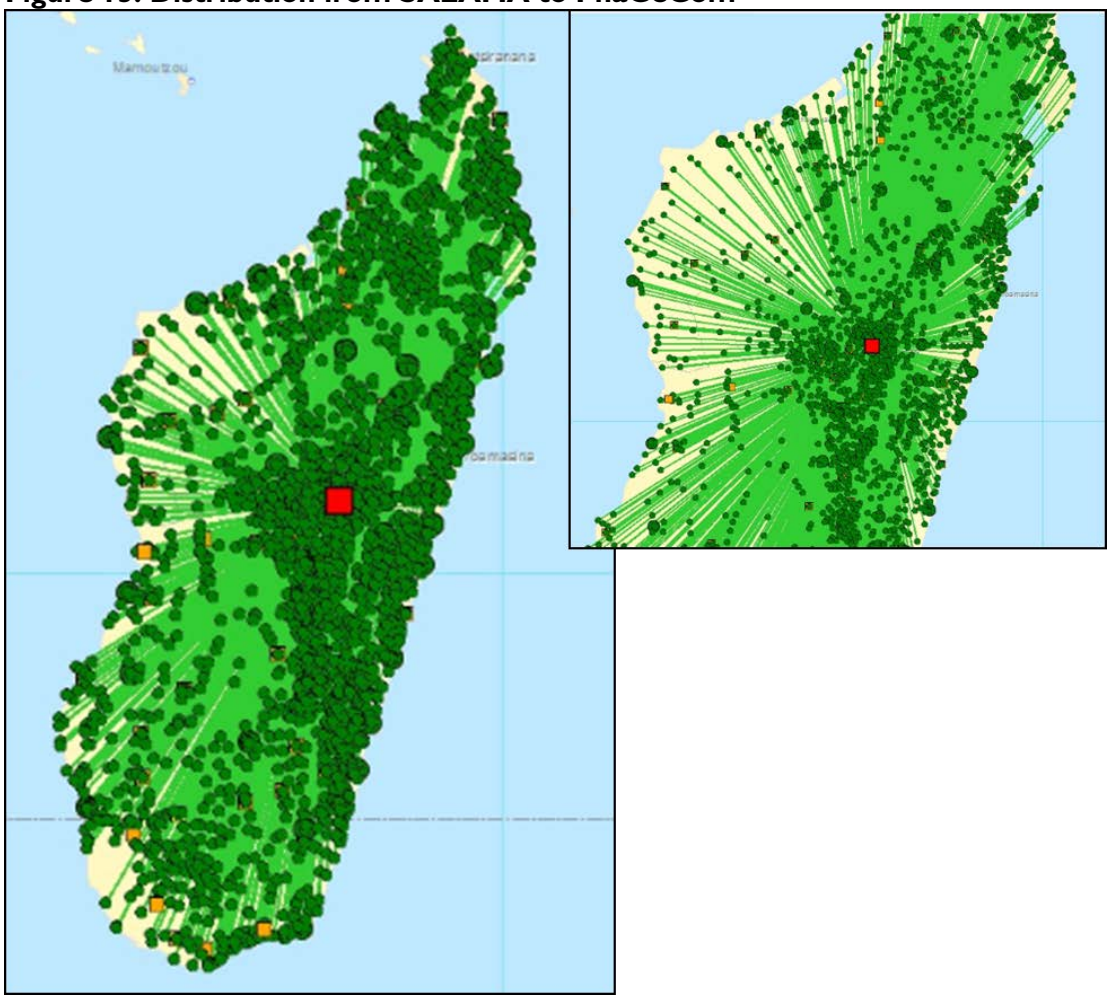
* *Add

* Additional trucks needed by SALAMA

For option 4, the total cost is calculated as—

Total Cost: Ar 14,976,641,228

Figure 15. Distribution from SALAMA to PhaGeCom



Recommendations

Considering the costs for the four options, option 2, and then option 1, are the least costly (see table 3).

Table 3. Comparison of Options

Option	Additional Trucks (40m3)	Total Km	Total Costs
1	5	577,532	AR 2,399,264,203
2	5	490,349	AR 2,282,145,036
3	9	2,276,990	AR 8,225,295,805
4	16	14,497,774,889	AR 14,976,641,228

Option 2 is a viable medium- and long-term possibility (operational costs are the lowest). It does not, however, include the cost to build the two additional warehouses, which will also take some time to complete.

Option 1 is immediately viable and applicable in the short term and the overall implementation is not as costly. To implement this option effectively, the following elements/tasks are necessary:

- Use a computerized inventory management tool
  - essential for efficient management (warehouse and distribution)
- Optimize transportation and route
- Buy/rent additional trucks
- Review and restructure the service fee
  - Cost driver analysis (volume/costs)
- Develop a performance management plan
  - indicators, such as stock turnover, order fill rate, etc.

Pilot Regions

Region Characteristics

To determine the best regions to conduct a pilot, the team analyzed the following characteristics:

- accessibility
- product volume
- number of PhaGeCom.

Region Accessibility

The team analyzed road accessibility in each region; vehicle accessibility is a challenge in certain areas during certain times of the year, which is a major concern for the supply chain in Madagascar. As seen in figure 16, with the exception of four completely accessible regions, most regions have a mix of accessible and inaccessible areas. For the pilot, selecting a region with a mix of both would be ideal, because it would offer a more realistic and comparable transportation experience for the rest of the country.

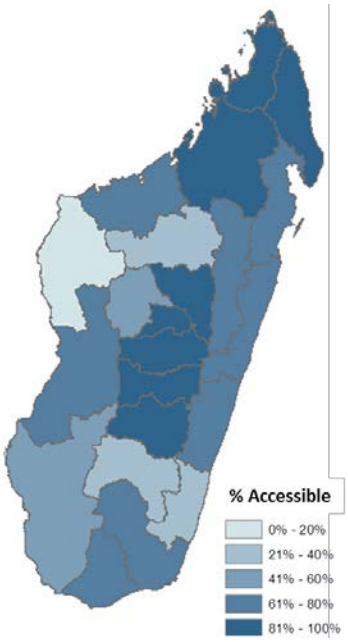
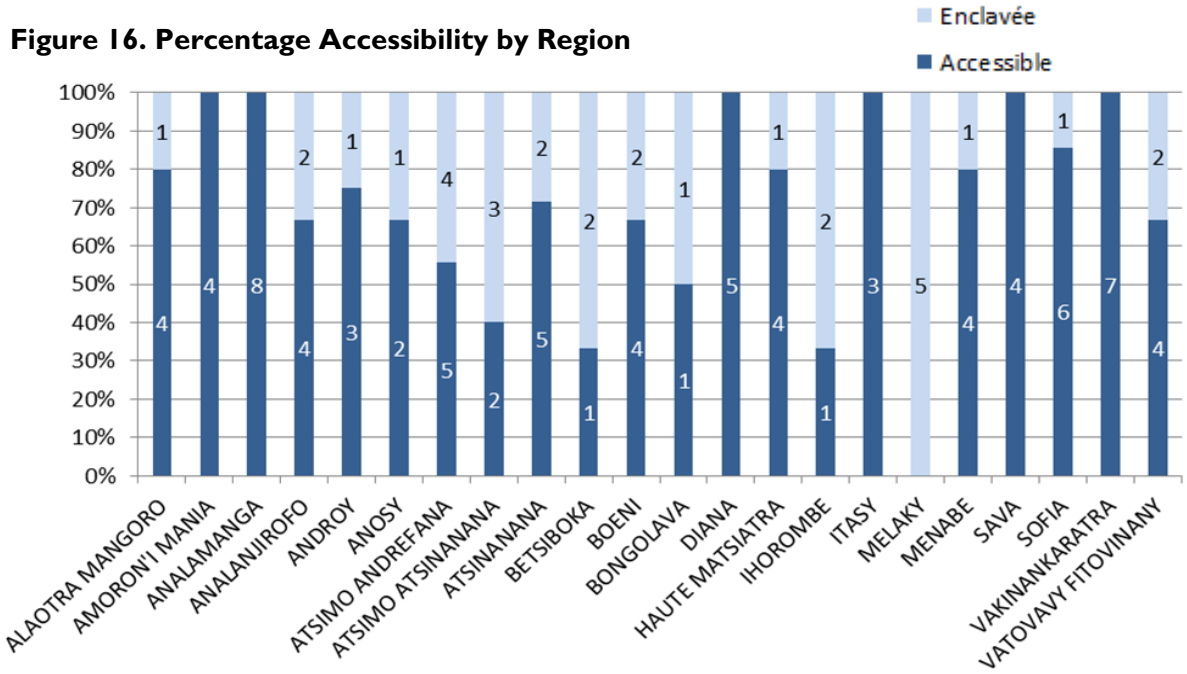


Figure 16. Percentage Accessibility by Region



Commodity Volume

Commodity volume was analyzed to ensure that the region chosen for a pilot would have a good mix of RC, program, and malaria, as well as a volume comparable to the rest of the country. As seen in figure 17, Vatovavy Fitovinany has the largest volume.

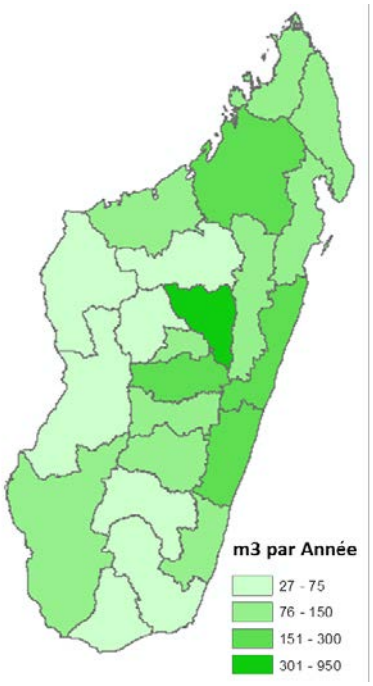
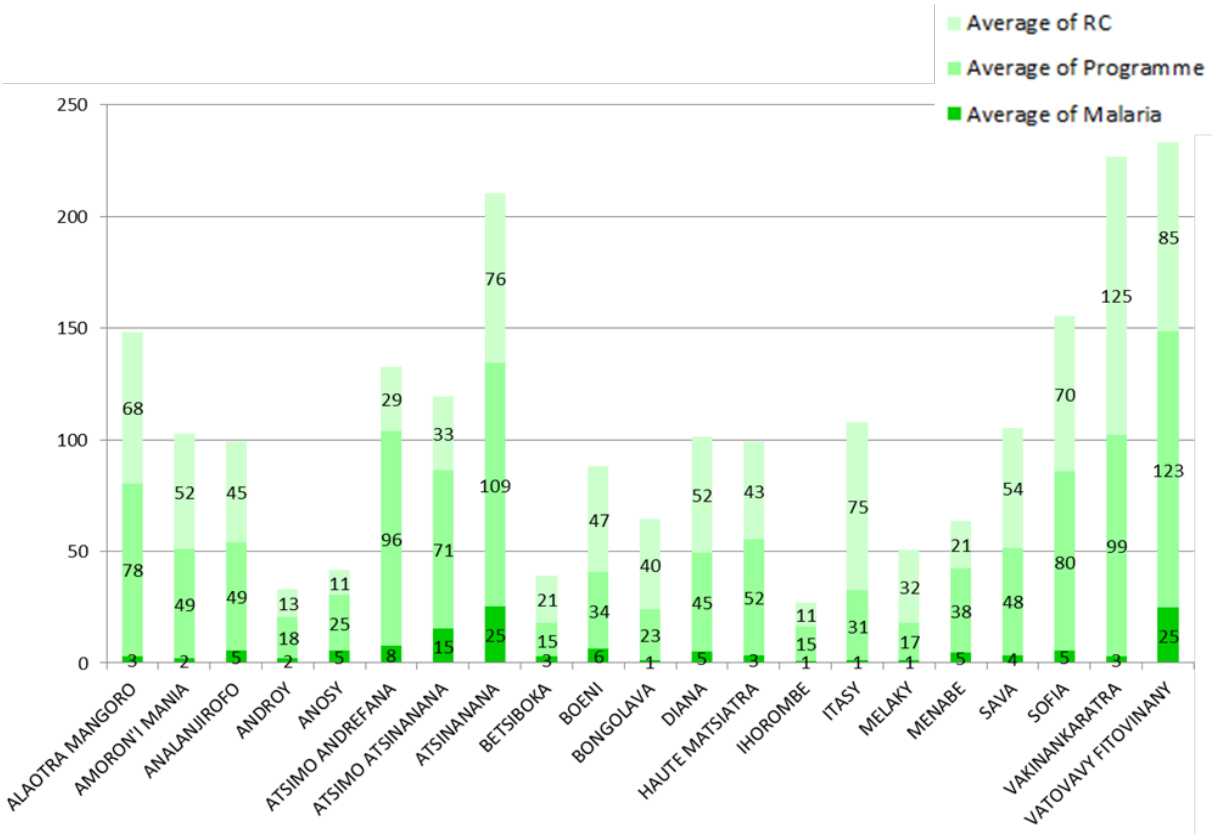


Figure 17. Volume (m3) of RC, Program, and Malaria, by Region



Number of PhaGeCom

To ensure the selected region has a representative number of PhaGeComs, the number of PhaGeComs was looked at by region. As seen in figure 18, regions have number of PhaGeComs ranging from 40–289.

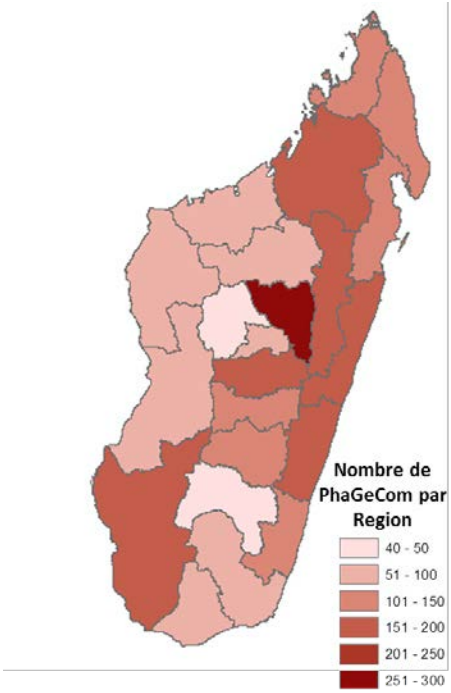
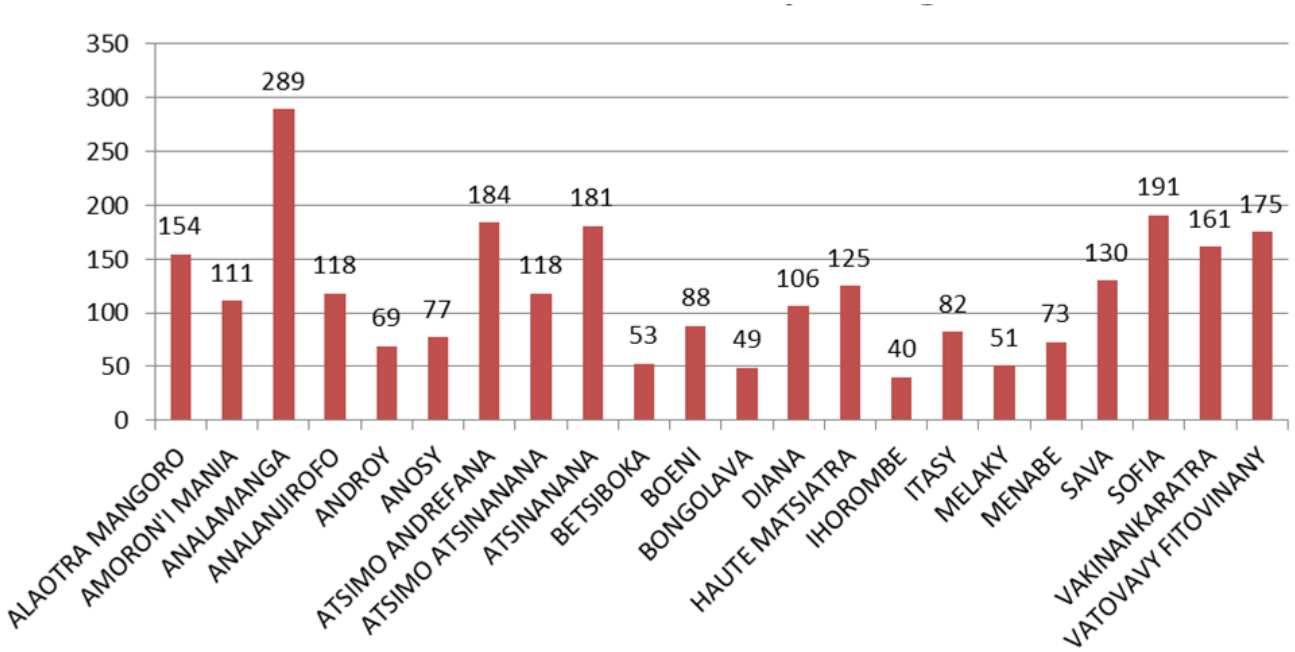


Figure 18. Number of PhaGeComs, by Region



Recommendations for Pilot Regions

Based on the analysis above, Vatovavy Fitovinany was recommended for the pilot. Boeni and Atsimo Andrefana are both good second choices because they also represent the country. Boeni is a smaller region but provides a good volume for the PhaGeCom ratio. Atsimo Andrefana, a much larger area, has many PhaGeCom, but does not have as much volume as Vatovavy Fitovinany.

Region 1) Vatovavy Fitovinany
South-east, 175 PhaGeCom
Large volume
60 percent accessible, 40 percent inaccessible

Region 2a) Boeni
North-west, 88 PhaGeCom
Medium volume
60 percent accessible, 40 percent inaccessible

Region 2b) Atsimo Andrefana
South-west, 184 PhaGeCom
Medium volume
80 percent accessible, 20 percent inaccessible.

Costs by Potential Pilot Region

After determining the regions that are most suitable for the pilot, the team costed out the three possible regions, based on option 1, which can be implemented immediately. To do this, some assumptions had to be made, which are listed below:

Assumptions for Pilot Costs

- Routes are one day, maximum—9 hours.
- Stop times:
  - PhaGDis: 45 minutes
  - PhaGeCom: 30 minutes.
- Working hours at PhaGDis and PhaGeCom:
  - 8–12 hours, 14–17 hours.
- Vehicles:
  - $3.5m^3$
  - Average speed 25 km/hour.
- Cost per km from SALAMA to PhaGDis
  - AR 3,325
- Cost per km from PhaGDis to PhaGeCom
  - AR 3,305
- Costs are calculated based on 100 percent accessibility by a vehicle.

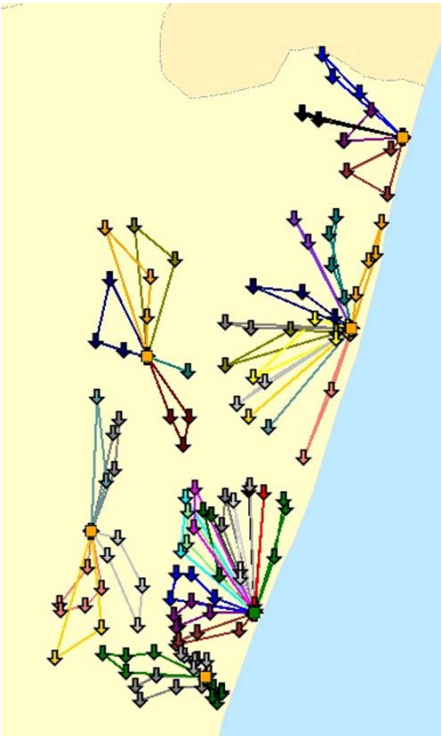
Vatovavy Fitovinany: Estimated Costs for Region

Table 4 shows the costs for Vatovavy Fitovinany, based on the assumptions listed and implementing option 1.

Table 4. Estimated Costs for Vatovavy Fitovinany

	Total Km	Costs
SALAMA → District	3,603	Ar 11,979,859
Districts → PhaGeCom	6,458	Ar 23,087,397

Accessible	Inaccessible
108 sites	67 sites
62%	38%



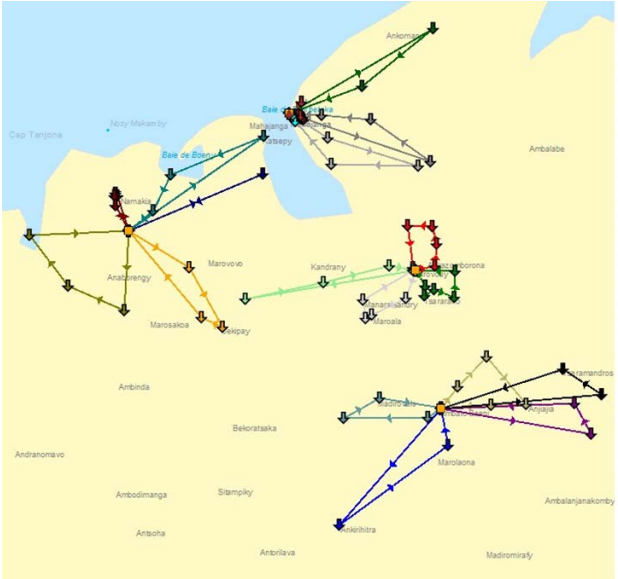
Boeni: Estimated Costs for Region

Table 5 shows the costs for Boeni, based on the assumptions listed and implementing option 1.

Table 5. Estimated Costs for Boeni

	Total Km	Costs
SALAMA → District	1,259	Ar 4,187,599
Districts → PhaGeCom	2,239	Ar 9,081,819

Accessible	Inaccessible
65 sites	23 sites
74%	26%



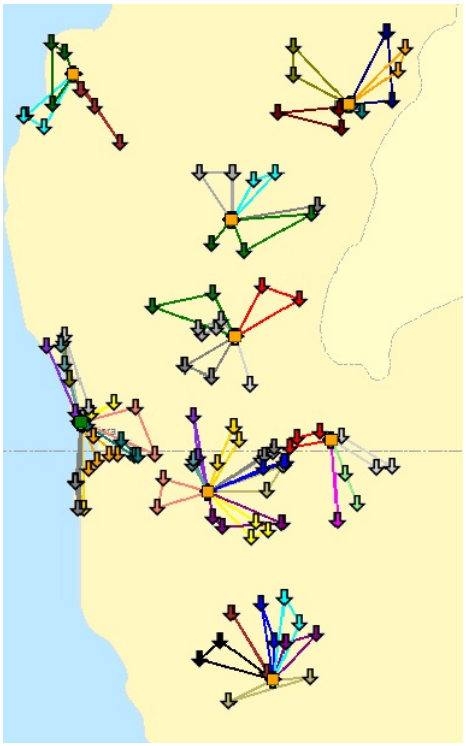
Atsimo Andrefana: Estimated Costs for Region

Table 6 shows the costs for Atsimo Andrefana, based on the assumptions listed and implementing option 1.

Table 6. Estimated Costs for Atsimo Andrefana

	Total Km	Costs
SALAMA → District	4,490	Ar 19,908,385
Districts → PhaGeCom	6,724	Ar 25,214,114

Accessible	Inaccessible
148 sites	36 sites
80%	20%



Costs Comparison of the Three Potential Pilot Regions

Table 7 compared the costs for a pilot in the three regions. Because Boeni is the smallest region with the fewest facilities, it is the least costly. Atsimo Andrefama, with the most facilities and the farthest distance to travel, is the most expensive.

Table 7. Costs of Three Potential Pilot Regions

Region	Total Km	Cost
Vatovavy Fitovinany	10,061	Ar 35,067,256
Boeni	3,498	Ar 13,269,418
Atsimo Andrefana	11,214	Ar 45,122,499

Logistics System Design Workshop

What does designing a supply chain mean?

That question was very important for the workshop participants. It is also important for anyone interested in managing the health products presented in the current report. It is helpful to understand the approach and the logistics components considered throughout the design process.

Designing a supply chain means defining the functioning parameters of a supply chain; i.e., defining how a supply chain should function to ensure the constant availability of commodities at each institutional level of the supply chain. It is, therefore, important to answer the following questions:

- Which categories of commodities is the supply chain designed for?
- Which inventory control system is appropriate for distributing these commodities?
- Which data collection tools needs to be in place to improve the decisionmaking process?
- What are the warehousing, storage, and transportation requirements to maintain the integrity of the commodities?
- What organizational support (personnel, monitoring supervision, etc.) needs to be put in place?

Throughout the following sections, in addition to the warehousing, storage conditions, and transportation already addressed in previous sections, the team tried to answer each of the questions above. The potential approaches agreed upon, even though they are critical for the functioning of the supply, must be reassessed and adjusted in the medium term.

Category of Commodities

Overall, the commodities used for health care include—

- drugs
- laboratory products
- vaccines
- consumables.

Vaccines, laboratory products, and medicines for tuberculosis and leprosy were not included in the current system design. Because of their respective particularities, additional supply chain analysis is needed. Management of consumables can benefit from similar practices used for essential medicines management. Because the essential medicines list and consumables have many products and, at a certain level, their management is manual, it is necessary to regularly track and monitor fewer

commodities and consumables. This assumes that good management practices for the reduced list of commodities will benefit other commodities. Of course, with automated commodity management, and if the human and financial resources allow, the stock managers can consider tracking and monitoring all the commodities. Therefore, participants in the workshop recommended the following group of commodities for the current system design:

- generic essential medicines
- malaria commodities, including rapid diagnostic tests (RDTs)
- family planning commodities
- plague commodities
- STI and HIV and AIDS commodities, including RDTs
- volume expander fluid.

The selection criteria are as follow:

- tracer commodities
- minimum package of goods to be available at each institutional level
- program commodities.

Resupply Process and Distribution of Commodities

Figure 19 describes the current distribution channel of generic essential medicines, contraceptives, malaria commodities, and social marketing products. Although the social marketing program receives and distributes contraceptives and malaria commodities, the focus will essentially be on the public sector supply chain. The social marketing and public sector supply chains are functioning independently and in parallel. Also, from the discussions with the nongovernmental organization (NGO) partners—Malagasy Lutheran Church Health Department (SALFA), CES, Development Bureau–Catholic Diocese (ECAR), Malagasy Protestant Church Health Department (SAF/FJKM) and International Planned Parenthood Federation Madagascar branch (FISA)—except for FISA, which manages its distribution channel, they are all supplied either through the central medical stores or through districts pharmacies. The direct supply of the NGO by the USAID|DELIVER PROJECT in malaria commodities is temporary and a response to 2009–2014 political crisis.

The Madagascar public sector supply chain has four levels:

1. central (SALAMA)
2. district pharmacies: PhaGDis (112)
3. health facilities: approximately 2,967, including 138 hospitals; 879 CSB1; 1,600 CSB2; and 350 private/faith-based health facilities
4. community level: more than 17,210 community health workers (CHWs): Mikolo: 5,113; MAHEFA: 6,550; and ex-SanteNet2: 5,847.

The CHWs are supervised either by the health centers or the local and international NGOs.

Generic essential medicines

SALAMA procures the generic essential medicines and makes them available to public referral and specialized hospitals, district pharmacies (PhaGDis), and nonprofit NGOs. District pharmacies supply district hospitals (CHRD1), health centers' pharmacies (CSB1 and CSB2 PhaGeCom), and the local NGO nonprofits. Generic essential medicines are sold to clients under the cost recovery mechanism called FANOME. Health facilities use the money generated from the sale of generic essential medicines to resupply their products. However, over the past five years, a number of health facilities were decapitalized and it was difficult for them to resupply. According to the coordinator of UNICEF's PASSOBA project, nearly 800 health centers were decapitalized and were unable to pay their debts to the PhaGDis, which was also having trouble reimbursing/paying SALAMA. Each month, in addition to financial reports, health facilities also prepare and submit stock movement reports, which are submitted to the person in charge of FANOME at the district; that person submits them to the regional health direction, which, in return, submits them to DPLMT. Reports are not submitted to SALAMA.

MCH/family planning commodities

The distribution of MCH/family planning commodities is based on a pull system between districts and the central level (i.e., each district estimates its needs and places orders with the central level), and a push system between districts and health facilities (i.e., program managers at the districts calculate quantities and allocate products to each health facility, based on the facility report).

SALAMA delivers MCH/family planning commodities to districts and health facilities collect their commodities from the districts using an ad hoc transportation system. To store, manage, and distribute MCH/family planning commodities to the districts, UNFPA pays five percent of the value of the commodities to SALAMA as management fees. Health facilities then collect their commodities from the districts using an ad hoc transportation system. The lack of deliveries from districts to health facilities, and the withdrawal of the users' fee policy, are impacting the availability of donated commodities—particularly the MCH/family planning commodities at health centers. Facilities that do not receive regular deliveries take advantage of meetings, visits to the district, or supervisory visits to collect supplies.

For the data information flow, facilities use the quarterly report (RTA) report, quarterly, on their use to both the health district office and the MCH/family planning directorate. The health districts then report to the regional health office and to the MCH/family planning directorate; the regional health directorates report to the MCH/family planning directorate. The monthly activity report (RMA) that collects service statistics, quantity distributed, stock on hand, and stockouts data follow the same path, but it ends at the national health information system office. Reports are not submitted to SALAMA.

Malaria commodities

This is organized by funding sources and programs. Essential medicines, such as quinine injectable and malaria laboratory reagents, etc.—subject to cost recovery—are managed and made available to health facilities through the SALAMA. Either the NMCP, or a designated third party, manage donated commodities. For instance, following the political crisis and coup d'état in March 2009, all USG support to the Government of Madagascar, from the central level to the primary healthcare facility level, was suspended. To continue delivering malaria commodities to the population, the USAID Mission in Madagascar mandated the USAID | DELIVER PROJECT to procure, store, manage, and ensure the distribution of USG-funded malaria products directly to the community

through 1,116 distribution points and nearly 11,663 community workers, including the health facilities of four faith-based NGO partners: SALFA, ECAR-Santé/CES, SAF/FJKM, and FISA. With the recent lifting of all restrictions on direct assistance to the Government of Madagascar, the USAID | DELIVER PROJECT will progressively transition the management of these commodities to the public sector supply chain, comprising SALAMA, PhaGDis, and PhaGeCom. After the transition is complete, health facilities will be able to resupply the CHWs, and districts will be able to resupply the faith-based health facilities.

The distribution of all commodities, including malaria commodities, is based on a pull system between districts and the central levels (i.e., each district estimates its needs and places orders with the central level), and a push system between districts and health facilities (i.e., program managers at the districts calculate quantities and allocate products to each health facility based on the facility report). In general, districts and health facilities are using ad hoc transportation system to collect their commodities.

Regarding the data information flow, facilities use the RMA to report on their use to the health district office once a month. The districts then report to the regional health office; which, in turn, reports to the Health Management Information System Unit at the central level. Reports are not submitted to SALAMA.

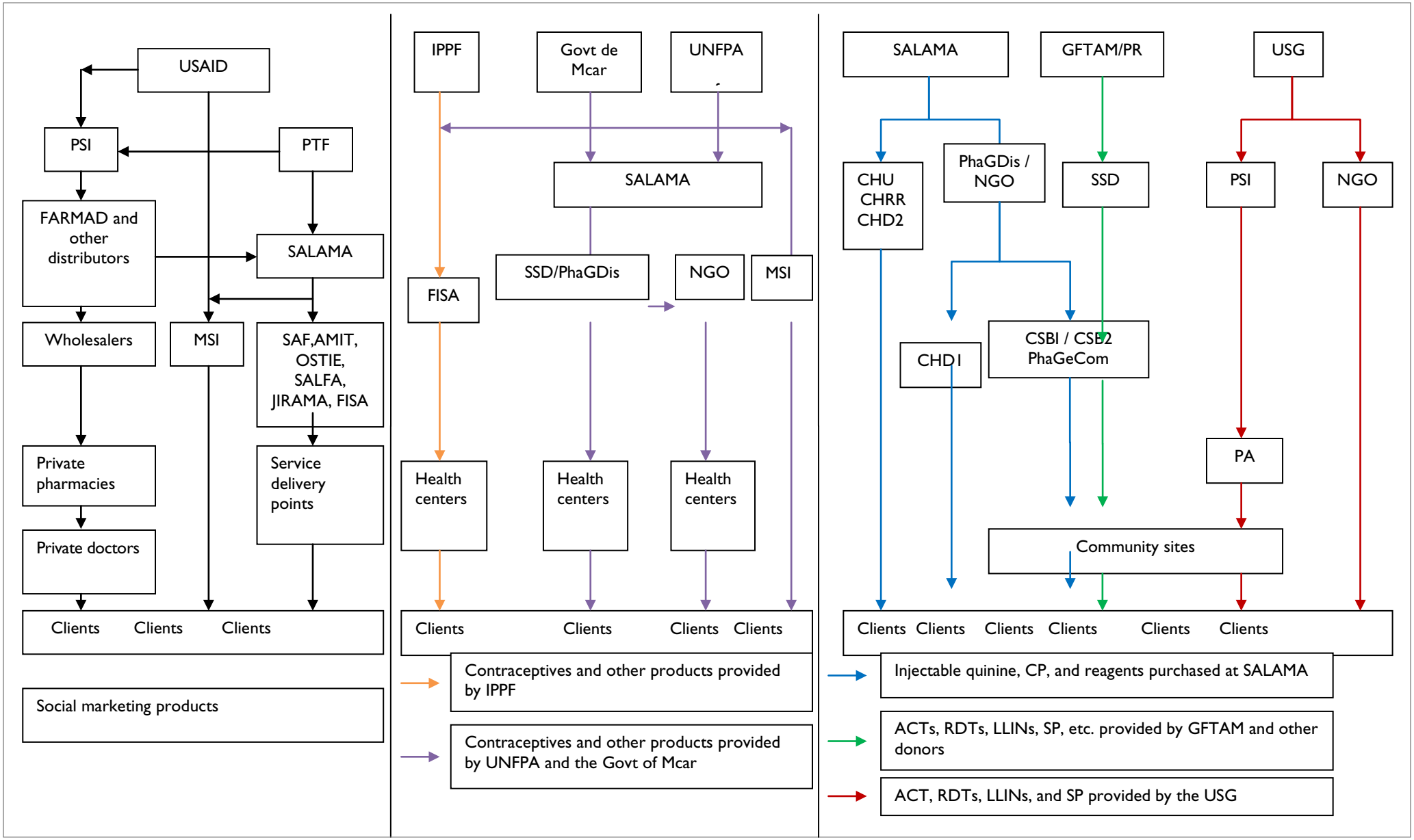
HIV/AIDS commodities

The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), using SALAMA as a procurement agent, buys antiretrovirals (ARVs) and opportunistic infection (OI) drugs. The National AIDS Control Program (NACP), and its representatives at the local level, manage HIV and AIDS commodities. The World Bank, through the project management unit (UGP), pays SALAMA to deliver the commodities to districts. Health facilities then collect their commodities from the districts using ad hoc transportation systems.

Even with donors' support, ARV and OI drugs are regularly stocked out at the peripheral level. According to the NACP director, the stockouts are mainly the result of poor quantifications and distribution challenges.

Reporting on HIV and AIDS commodities is very low and the data quality is poor. Again, no report is submitted to SALAMA.

Figure 19. Essential Medicines, Contraceptives, Malaria Commodities, and Social Marketing Products Supply Chain



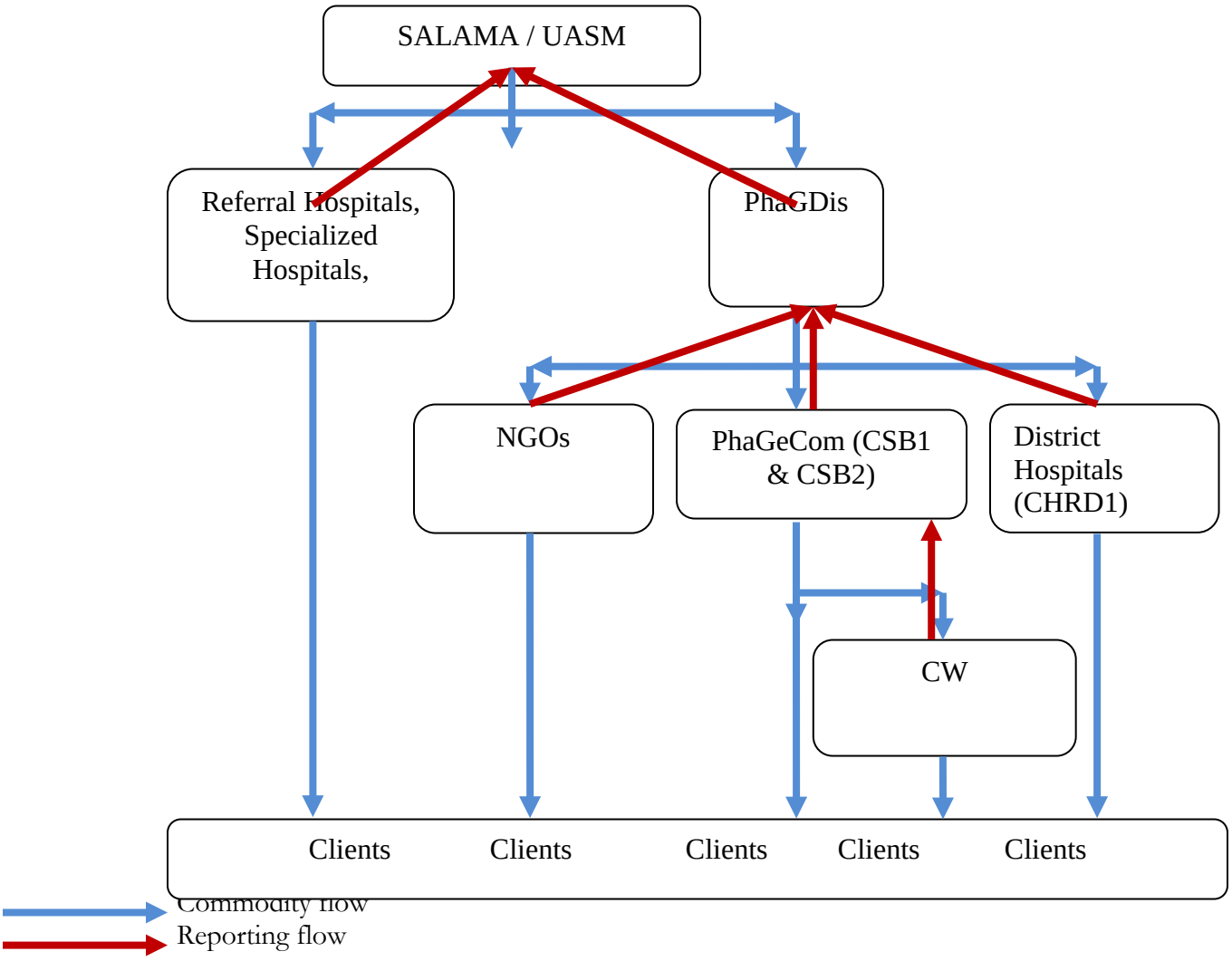
For the distribution channels presented above, and to harmonize the overall management for the health commodities, the workshop participants recommended that all commodities be stored and managed from the MOH designated pharmacies and facility stores. Therefore, SALAMA will store and supply all the revolving and donated commodities to district pharmacies, referral and specialized hospital pharmacies, and CHRD2; district pharmacies, in turn, will store and supply district hospitals pharmacies (CHRD1), health centers, and NGO facility stores. Health centers (PhaGeCom) will resupply the community health workers.

The information flow will go from district hospital pharmacies, health centers (PhaGeCom), and NGO stores to the district pharmacies (PhaGDis); and from the PhaGDis, referral, and specialized hospital pharmacies and CHRD2 to SALAMA. Of course, the health district management offices and the regional health management directions will still receive copies of the respective reports.

The adoption of the proposed distribution channel implies the following:

- The requisition system is maintained.
- All program commodities transferred and managed from SALAMA's warehouses: PhaGDis and PhaGeCom:
  - Program representatives (EMAD—district management team) will not continue to manage the commodities.
  - Programs will still validate all requisitions prior to supplying the commodities.
  - District program staff will continue their supervisory activity, including stock management.
  - Need to revise the policies and regulations governing the functioning of the PhaGDis, PhaGeCom, and hospital pharmacies:
- This will include program commodities.
- Determine the management structure that will run the distribution channel. Three possible options are—
  - MOH personnel manages the PhaGDis, hospital pharmacies, and the PhaGeCom
  - SALAMA manages the PhaGDis, hospital pharmacies, and the PhaGeCom
  - Maintain the status quo; i.e., SALAMA is responsible for the central medical stores, NGOs will manage the district pharmacies and the community manages the PhaGeCom.
- Address the salary issues at PhaGDis and PhaGeCom.
  - The *forced ordering* mechanism is in place and must be enforced; i.e., at each review period, bring all commodities to the maximum level.

Figure 20. Flow of information and commodities



Maximum/minimum Inventory Control System

An inventory control system is used to—

- determine when stock should be ordered/issued
- determine how much stock should be ordered/issued
- maintain an appropriate stock level for all products, avoiding shortages and oversupply.

A functioning inventory control system helps prevent stockouts and expiries of commodities. To establish a minimum/maximum inventory control system, the minimum and maximum stock levels are defined for each institutional level of the supply chain. The calculation of the stock levels considers the longest lead time, safety stock, and review period. It, also, takes into account the shelf

life of the commodities under consideration. Tables 8–11 present the stock levels established for each commodity type.

Table 8. Generic Essential Medicines

Institutional Levels	Safety Stock (month)	Longest Lead Time (month)	Review Period (month)	Emergency Order Point (month)	Minimum (month)	Maximum (month)
PhaGeCom	1	1	2	-	2	4
Accessible PhaGeCom	-	-	-	-	-	-
Accessible PhaGDis	1	1	3		2	5
Difficult to access PhaGDis	-	-	-	-	-	-

Table 9. Family Planning Commodities

Institutional Levels	Safety Stock (month)	Longest Lead Time (month)	Review Period (month)	Emergency Order Point (month)	Minimum (month)	Maximum (month)
Health centers	-	-	-	-	3	6
Accessible PhaGDis	-	-	-	-	6	9
Difficult to access PhaGDis	-	-	-	-	6	12
Central	-	-	-	-	9	15

Table 10. Malaria Commodities

Institutional Levels	Safety Stock (month)	Longest Lead Time (month)	Review Period (month)	Emergency Order Point (month)	Minimum (month)	Maximum (month)
Accessible health centers and community sites	-	-	-	-	2	3
Difficult to access health centers and community sites	-	-	-	-	3	4
Accessible health districts	-	-	-	-	4	6
Difficult to access health districts	-	-	-	-	6	8

Table 11. HIV and AIDS Commodities

Institutional Levels	Safety Stock (month)	Longest Lead Time (month)	Review Period (month)	Emergency Order Point (month)	Minimum (month)	Maximum (month)
Health facilities	1	1	2	1	2	4
Health districts	1	1	3	1	2	5
Support centers	2	1	3	2	3	6

Despite the established levels of stock, facilities were not adequately supplied. Stockouts were common across commodities. The qualitative and quantitative assessments conducted in July and November 2014, respectively, revealed high stockout levels for all commodity types.

- Generic essential medicines have stockouts between 25–49 percent at health centers and between 10–29 percent at hospitals.
- Contraceptives have stockouts between 9–22 percent at health centers.
- Malaria commodities' stockouts evolve between 17–54 percent at health centers and 11–22 percent at hospitals.

According to MOH officials, the stockouts are mainly due to poor quantification and ad hoc distribution of commodities nationwide. It is repeatedly recognized that health facilities are not supplied because they do not have adequate transportation. The review of minimum and maximum stock levels also shows that they were not adequately established. Either they do not consider the lead time, the safety stock, or the review period; or they are not established for some of the institutional levels. The case of malaria commodities is revealing. When the commodities arrive in-country, they are pushed to the SDPs; 25 percent of the commodities are kept at the central level for epidemic responses. Despite the minimum and maximum stock levels established for health districts (accessible and difficult to access), they do not keep any stock. Both the central and the districts do not have stocks to respond to stockouts at the facility/SDPs.

To ensure the continuous availability of commodities, the workshop agreed on and recommended the stock levels shown in table 12 for the commodities considered for the current system design.

Table 12. Stock Levels

Institutional levels	Longest Lead Time	Security Stock Levels	Review Period	Minimum Levels	Maximum Levels	Emergency Order Points
SALAMA	6	3	4	9	13	6
PhaGDis/referral hospital/specialized hospitals/CHRD2	1	2	3	3	6	2
NGOs	1	1	2	2	4	1
CHRD1/PhaGeCom (CSB1 & CSB2)	1	1	2	2	4	1

The LMIS

The LMIS is used to collect, organize, analyze, process, and submit the data at all levels of the supply chain for decisionmaking. Only the data that will be used for decisionmaking should be collected. Following are three essential data to collect:

- **Stock on hand**: Quantities of usable stock available at any level, or at all levels of the system, at a point in time.
- **Rate of consumption**: The average quantity of commodities dispensed to users during a particular time period.
- **Losses/adjustments**: Losses are the quantity of health commodities removed from the distribution system for any reason other than consumption by clients (e.g., losses, expiry, damage). Adjustments include receipt or issue of supplies to/from one facility to another, at the same level (e.g., a transfer), or a correction for an error in counting. Losses/adjustments can, therefore, be a negative (-) or a positive (+) number.

A well-structured and functioning LMIS must have data collection forms that report on these three essential data.

The data collection forms currently used for commodity management in the country, although they have the three essential data, they vary from one program to another. Each program has developed its own forms. This has caused not only duplicate forms, but the forms are all different; which increases the work for the stock manager/health personnel. Furthermore, the data collected was not always available to the upper levels for decisionmaking. When the data are available, they are often unreliable.

Following the review of the commodity management forms currently used, the workshop recommended harmonizing them and using the same tools for all commodities. See table 13.

Table 13. Recommended Stock Management Tools

Recommended Stock Management Records		Proposed Model	SALAMA	PhaGDis / Referral and Specialized Hospital, CHRD2	PhaGeCom, NGOs, CHRD1
Stock record	Stock card	Cf. CHANNEL	X	X	X
	Physical inventory report	Cf. CHANNEL	X	X	X
Transaction records	Requisition form (temporary, will be replaced by the one in CHANNEL)	SALAMA		X	
	Receipt voucher (PVRD)	SALAMA	X	X	X
	Invoice	SALAMA	X		
	Issue voucher	SALAMA	X		
	Packing list	SALAMA	X		
	Waste management /destruction report	DAMM	X	X	X
Consumption records	RUMER	DPLMT		X	X
	Daily Activity Register per program	SSS			X
Report	Report, Requisition and Issue Voucher for PhaGeCom, NGOs, and CHRD1	Proposed			X
	Tuberculosis activity reports	To be designed and inserted into CHANNEL		X	X
	Feedback report	To be designed and inserted into CHANNEL	X	X	

The only new report and requisition voucher is at PhaGeCom, NGO's health center, and CHRD1. PhaGDis, referral and specialized hospitals, and CHRD2 will generate their voucher from CHANNEL. If CHANNEL is not functioning, the PhaGDis, referral and specialized hospitals, and CHRD2 will use a report and requisition voucher. Being in the center of the newly designed supply chain system, the MOH and UNFPA must deploy CHANNEL at the central- and district-levels. The workshop also recommended introducing a feedback mechanism and reporting at the central- and district-levels. Finally, PhaGDis will no longer use the entry and delivery registers.

Organizational Support and Training

This section addresses the categories of personnel who manage health products and the type of support needed to perform their daily job.

Table 14 summarizes the type of training needs for each level in order to fully operationalize the national integrated supply chain.

Table 14. Training Needs

Levels	Structures	Personnel	Training
Central	Logistics committee/ logistics management unit	Members	- Supply chain management - Quantification - Monitoring and evaluation - Data analysis - CHANNEL - Visite d'échanges
Regions	Referral, specialized hospitals, and CHRD2	Stock managers	- Supply chain management - Monitoring and evaluation - Data analysis - Channel
Districts	CHRD1/PhaGDis	Stock managers	- Supply chain management - Monitoring and evaluation - Data analysis - Channel
Community	Health Centers	Storekeepers	- Supply chain management
Teaching schools	Paramédical schools, Pharmacy school	Student	- Supply chain management

The trainings for the logistics committee and the logistics management unit staff must take place before, during, and after the pilot phase. All other trainings for the rest of personnel will start with the national rollout.

Appendix 1

Program Commodity List

OMS

- Kit anti malaria basic
- Mebendazole cp 500mg
- Module supplementary PEP
- Moustiquaires

PNLT

- Acide chlorhydrique 35 38%
- aluminium hydroxyde cp 500mg
- auramine poudre
- Bleu de methylene poudre
- boite de securité
- boxes made of kraft paper in the following sires
- compresse hydrophile 10x10
- crachoirs a vis
- Cycloserine 250mg
- eau PPI 5ml inj
- Eau PPI 5ml inj 100%
- eau ppi inj 5ml
- essuyeurs de précision (kimwipes)
- ethambutol cp 400mg
- ethanol 95 96°
- Ethionamide 250mg
- fuchin basic poudre 100g
- huile immersion
- Isoniazid cp 100mg
- Isoniazid cp300mg
- Kanamycine 1g inj
- lame porte objet
- Levofloxacine 250mg
- papier filtre
- permanganate de potassium granulé 100g
- Pyrazinamide cp 400mg
- Pyrezinamide 500mg
- rifampicin isoniazid cp 150mg-75mg
- Rifampicin isoniazid pyrazinamid ethambutol cp

UNFPA

- aborbable synthetic 1/0 dec 4 75 cm aiguille 1/2 c 38 mm
- Aiguille ponction lombaire 22G
- alese plastique
- alese plastique pour KIA
- Amoxicillin gel 500g
- Ampicillin inj 1g
- Appareil echographique
- Atropine sulfate inj 1mg/ml
- Balance pèse personne
- Brassieres
- Bupivacaine adrenaline 0,5%
- Bupivacaine inj 0,5%
- Canul de Guedel T/2
- Catheter 18G
- catheter court g18
- Ceftriaxone
- Ceftriaxone INJ 250mg
- ciprofloxacine cp 500mg
- Clamp Ombilical
- collier type corling 100*2,5
- Compresse stérile 10x10 12plies
- compresse stérile 10x10 cm
- Coton 500g
- couverture une place en coton
- Dépo provera inj 150mg/ml
- Depo provera inj 150mg/ml amp 1ML
- Diazepam inj 10mg
- Diclofenac sodium 75mg/3ml
- DIU
- drap de dessus
- drap housse
- Enoxaparine inj 2000Ui
- Epherine 30mg/ml

150mg-75mg-400mg-275mg
- rifampicin isoniazid, ethambutol cp 150mg 75 mg 275mg
- rifampicine + isoniazid + ETHAMBUMOL150mg+75mg+400mg
- rifampicine + isoniazid + pyrazinamide 60mg+30mg+150mg
- rifampicine + isoniazid cp 60mg+30mg
- Rifampicine 60+Isoniazide 30
- Rifampicine 60+Isoniazide 30+Pyrazinamide
- Rifampicine+ isoniazide + ethambumol cp 150mg+75mg+275mg
- rifampicine+isoniazid cp 150mg+75mg
- Rifampicine+Isoniazide 150mg+75mg
- seringue 5ml avec aiguille 21g
- seringue hypodermique 5 ml avec aiguille 23 G
- Streptomycine inj 1g

UGP

- aiguille hypodermique 21G
- Albendazole cp 400mg
- alèse plastique
- Amoxicilline 250mg/5ml
- Aspiration manuel intra-utérin (AMIU)
- bac a fiche en plastique avec fermeture a clef
- balance pèse bébé
- Bandelette réactives URS 2T (glucose protein)
- bassin de lit
- boite à instrument avec couvercle 250x100x50
- boite inox avec couvercle 200x90x40
- Brosse à main
- calot
- carnet vouccher 9575351 à1298900
- Carnet voucher
- Carnet voucher N°723451 à 863450 / 864701 à 889700
- Carnet voucher 905950 à 953450
- Cefixine cp 200mg
- ciseaux droits bout mosse 14,5cm
- ciseaux mayo courbé 14cm
- ciseaux pour épisiotomie
- Cotrimoxazole 240mg/5ml
- cupule
- cuvette pour la décontamination
- Epinephrine Adrenaline 1mg/ml
- Ethanol 70%
- Fentanyl inj 0,5mg
- Fil resorbable polyglycolic 1déc4 75cm aig 3/8 cercle 50mm
- Folique acide cp 5mg
- gants chirurgicaux latex poudré paire taille 7 1/2
- gants chirurgicaux latex poudré paire taille7
- Gants chirurgie latex 7,5
- Gants chirurgie latex T7
- Gants chirurgies latex T6,5
- Gants examen latex taille moyenne
- Gants examen moyenne
- GEL lubrifiant 5ml
- Gentamycine pom 3mg
- Glucose inj 10%
- huile vegetale 18kg
- huile vegetale 2kg
- Implanon KIT
- kia
- kit fistule 2
- kit fustila I (surgical instruments)
- kit fustila II suupplementary
- Kit implanon
- Kit individuel d'accouchement
- Kit insertion et retrait DIU
- Kit retrait implanon
- lambahoany 1*1,5m
- Lame bistouri 22
- lame bistouri n°15
- LANGE
- Langes rectangulaire pour kia
- Layette pour nouveau né
- legumes sec
- Lidocaine inj 2%
- lit d'hopital + matelas
- Métronidazole cp 250mg
- Métronidazole inj 5mg/ml
- microgymon cp
- microlut cp
- norethisterone enantala inj 200mg amp 1ml
- PAGNE
- pagne FO
- Perfuseur

- Doxycyline cp 100mg
- eau ppi inj10ml
- Erytrhomycine 125mg/5ml
- Escabeau deux marches
- Fer Acide folique 200-0,4mg
- Fil resorbable 3/0 dec 2 aiguille 1/2 c 26mm 75 cm
- garrot
- Gentamycine collyre 0,3%
- Gentamycine inj 80mg
- glacière
- haricot en inox
- irrigateur
- Journal voucher
- kia
- kit accouchement p
- KIT CSB UGP
- kit de réanimation
- lampe tempête
- Marteau a reflexe
- Masque chirurgical jeton
- matelas coin bébé
- mètre ruban
- Metronidazole inj 0,5%
- minuteur
- Ordonnance Facture
- Oxytocine inj 10UI/ml
- Paracetamol cp 500mg
- pélvimètre
- Perce membrane
- Pince à dissequer sans griffes 14cm
- Pince à dissequer griffes 14cm
- pince hemostatique courbe
- Pince hemostatique droite 12,5
- Pince kocher griffe 18cm
- pince porte aiguille de mayo hegar 14 cm
- pince porte objet
- Plateau à instrument 35x25x5
- porte savon
- potense a perfusion
- poubelle a pedale en inox
- Préservatif Fimailo
- rechaud à petrole un feu 2litre
- perfuseur stérile
- Phytomenadione vit k1 1mg/ml
- Poche collecteur urine
- Polyvidone iodée 10%
- riz blanc
- sac de voyage FO
- SAC KIA
- Sac KIA plastique couleur orange logo et texte
- sac plastique (kia) couleur orange avevc logo et texte
- savon de menage nosy
- savon nosy 120g
- Seringue 10ml aig 21G
- seringue 20ml avec aiguille 21G
- Seringue 2ml aig 21G
- seringue autobloquante 1ml avec aig 22G
- seringue hypodermique 10ml avec aiguille 21g
- seringues auto bloquantes 1ml avec aig 22g
- Serviette de toilette
- Sodium Chlorure inj 0,9%
- Sodium lactate inj
- Sonde aspiration CH14
- Sonde endotrachéal 7,0
- Sonde vesicale foley 2voies CH18
- sparadrap 10cm*5cm
- Sparadrap 10x5m perforé
- Stethoscope
- super cereal
- Tensiométre
- Thiopental inj 1g
- Transfuseur

UNICEF

- Albendazole 400mg

SECNLS

- cartouche CD4 PIMA avec kit de prélevement
- cartouche CD4 PIMA BEAD standard
- condom feminin
- Détermine HIV 1 et 2
- efavirenz cp 200mg
- efavirenz/lamivudine/tenofovire disoproxil fumarate
- Gants examen latex taille moyenne
- lamivudine tenofovir disoproxil fumarate cp 300/300mg

- seau plastique - seringue hypodermique avec aiguille 21G - sonde urinaire metallique pour femme - sonde vesicale nelaton - spéculum vaginal GM - speculum vaginal MM - stérilisateur à vapeur - stethoscope obstétrical pinard - table d'accouchement - table de chevet - tablier tous usage - Test HIV Détermine 1 et 2 - Thermomètre médical - ventouse manuelle (vacuum extractor)	- lubrifiants gel - test de diagnostic rapide de syphilis 3,0 - test proteniure (glucose proteine) - UNIGOLD HIV 1-2 rapide

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