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# Bottlenecks in the Functioning of the Supply Chain of Drugs

Preliminary Results – First Round

March 2007

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## Introduction

In recent years, Madagascar's health sector has gone through some significant policy changes with an overall increase in the health budget in nominal terms (Minten *et al.*, 2005; World Bank, 2006a). Yet, the country continues to face serious health issues and the United Nations ranked Madagascar as 143<sup>th</sup> out of 177 countries i.e. amongst the lowest in the world in the latest Human Development Report (UNDP, 2006).

Despite large efforts by the Government and international donors to reach the frontline service providers, little updated information is available on the effectiveness of spending in the public health sector (World Bank, 2006b). This study tries to contribute to this matter by investigating the different resource flows and in particular, the supply chain of drugs to the basic health centers.

The functioning of the drug supply chain in Madagascar is illustrated in Figure 1 in the Appendix and is described by the World Bank (2006a) as follows: "SALAMA is the semi-autonomous central drug purchasing unit for the Government of Madagascar. It supplies District Pharmacies (PhaGDis<sup>1</sup>), based on their purchase orders, who in turn supply the public basic health centers (CSB<sup>2</sup>) with drugs. The supply of the CSBs is based on purchase orders submitted through the Community Managed Pharmacies (PhaGeCom<sup>3</sup>), which are supervised by the Community Management Committee (CoGe<sup>4</sup>). The CoGe is supposed to be elected by members of various villages (*fokotany*s) that fall within a CSB area through the commune level Community Health Committee (CoSan<sup>5</sup>). Drugs, which have been prescribed by staff at the CSB, are then sold to patients through the retail side of the Commune Pharmacy, which is administered by the Dispenser. The Dispenser of the PhaGeCom and the Guard are paid for by the commune out of a subvention from the Government. Money from the sale of drugs is received by the Dispenser, who transfers it on a regular basis to the CoGe Treasurer. From here, the money should be deposited into an account,

of a bank or a post office, on a regular basis. The account should require the signatures of both the CoGe Treasurer and President for any transactions. In cases where it is difficult to open a bank account, a provision is made for the CSB to use the account of the District Hospital (SSD<sup>6</sup>). The funds from sale of drugs are used by the Management Committee (CoGe) and Commune Pharmacy (PhaGeCom) to purchase drugs, pay for transport, management, banking fees, upkeep of the basic health center infrastructure and stipends for the President and Treasurer of the CoGe."

This brief is made available to let stakeholders know of the findings as they become available. The results are based on primary data collected in the first round of a nation-wide budget tracking survey at the end of 2006.<sup>7</sup> Hence, it is a preliminary analysis of the first round of data collection. More analysis is forthcoming as the second round of data is on the way.

The preliminary findings of the first round of the survey show:

- Extensive lead times from SALAMA to PhaGeCom. Drug delivery from the central purchasing unit to the Commune Pharmacies takes on average one and a half month. In particular the delivery of drugs from SALAMA to the District Pharmacies is slow and takes on average 33 days;
- Inventory shortages at district and at commune level are mainly problematic for some specific drugs;
- Substantial leakages i.e. discrepancies in the amounts or prices of goods reported as sent by the District and as received by the Commune Pharmacies in the drug supply chain with large differences across drug types and across provinces;
- Almost all basic health centers implemented the Fanome policy at the end of 2006;
- Huge delays in payments of the dispensers by the communes. In a high 60% of the health centers there are reports of irregular payments;

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<sup>1</sup> Pharmacie à Gestion District

<sup>2</sup> Centre de Santé de Base

<sup>3</sup> Pharmacie à Gestion Communautaire

<sup>4</sup> Comité de Gestion

<sup>5</sup> Comité de Santé

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<sup>6</sup> Service de Santé de District

<sup>7</sup> The sampling frame of the survey is discussed in the Appendix.

- Average inspection rates. During the last six months, 82% and 60% of the CSB2 and SCB1 were inspected respectively.

## 1. Flow from SALAMA to PhaGeCom

The delivery of drugs from the central purchasing unit to the Commune Pharmacies takes on average approximately one and a half month.

The average total lead time of drugs from SALAMA to PhaGeCom/CSB level is 43 days or approximately one and a half month. In order to investigate this result in greater detail, we will break the supply chain down into discussions of the flows from SALAMA to PhaGDis and from PhaGDis to PhaGeCom level in the following subsections.

### 1.1. Flow from SALAMA to PhaGDis

a. Significant lead times are reported at district level. It takes on average more than one month between the placement of an order and delivery at the District Pharmacies.

Table 1: Time needed for the different steps of the drug supply chain from SALAMA to PhaGDis

	Time from... during last 12 months (in number of days)			
	Common		Maximum	
	Mean	Median	Mean	Median
...mailing of purchase order to chef SSD to obtaining his permission	3.6	1.5	5.2	2.0
...mailing of approved purchase order to Salama to arrival of invoice	12.1	11.5	16.6	15.0
...arrival of invoice from Salama to sending of check to Salama	3.7	2.5	6.6	7.0
...sending of check to Salama to delivery of drugs at PhaGDis	12.7	11.5	18.9	15.0
<b>...mailing of purchase order to chef SSD to delivery of drugs*</b>	<b>32.8</b>	<b>30.0</b>	<b>45.5</b>	<b>45.0</b>

Source: Budget Tracking Survey, 2006; \*entire procedure

The District Pharmacies were asked on the lead times of drugs from SALAMA. The different steps of the delivery process i.e. from the approval of the purchase order by the SSD manager to final drug delivery at district level are shown in Table 1. The entire procedure consists of four steps. In particular, the second and last steps of the process are time-consuming.

Table 2: Lead times from SALAMA to PhaGDis

Province	Time needed from order placement to delivery during last 12 months* (in number of days)			
	Common		Maximum	
	Mean	Median	Mean	Median
Antananarivo	29.2	30.0	47.0	52.5
Fianarantsoa	32.7	32.0	39.0	39.0
Toamasina	48.5	45.0	60.0	60.0
Mahajanga	39.0	39.0	56.4	50.0
Toliara	20.0	19.0	30.3	24.0
Antsiranana	22.5	22.5	37.5	37.5
<b>Madagascar</b>	<b>32.8</b>	<b>30.0</b>	<b>45.5</b>	<b>45.0</b>

Source: Budget Tracking Survey, 2006; \*Time from mailing of purchase order to chef SSD to delivery of drugs at PhaGDis

Overall, there is an average lead time of more than one month from the placement of the order to the delivery of the drugs at district level (Tables 1 and 2). We notice significant differences across provinces. In the province of Toliara the entire process i.e. from order to delivery takes on average 20 days while in the province of Toamasina it takes more than double (49 days).

b. The District Pharmacies also report that SALAMA is often incapable of delivering their orders. However, inventory shortages (or stockouts) at district level are only prevalent for some specific drugs.

Table 3 illustrates that a high 50% and 36% of the PhaGDis reported that SALAMA is often incapable of delivering the drugs that are respectively ordered and paid by the former. Moreover, one-fifth of the District Pharmacies stated that the delivery does often not correspond with the invoice.

Table 3: Drug supply chain from SALAMA to PhaGDis

	Often	Rarely	Never	Total
SALAMA is not capable of delivering the drugs...				
...ordered by PhaGDis	50	36	14	100
...paid by PhaGDis	36	25	39	100
Delivery does not correspond with invoice	21	21	57	100

Source: Budget Tracking Survey, 2006

Looking at the availability of drugs at PhaGDis level in greater detail, we find that there are differences in availability by type of drugs (Table 4). The overall availability of drugs at PhaGDis level is good.<sup>8</sup> Though, there is a low availability of some specific drugs as e.g. Oral Rehydration Solutions (SRO) and the antibiotics Tetracycline. This lack of availability could be due to the fact that the District Pharmacies did not order the drug (as they do not need it or they use another type of drug instead) or due to delivery failures by SALAMA. 32% and 18% of the PhaGDis reported recent delivery failures of SRO and the antibiotics Tetracycline respectively with a median inventory shortage of 3 months.

Table 4: Availability of drugs (in % of PhaGDis)

	Available Oct/Nov 2006	Inventory shortage*	Nr. of days – median
Aspirine (Acetylsalicylique acide)	82	4	49
Paracétamol	100	0	-
Chloroquine	89	7	45
Quinine	96	0	-
Antibiotique cotrimoxazole	100	0	-
Antibiotique amoxiciline	96	0	-
Antibiotique tetracycline	71	18	90
Fer acide folique	89	14	68
Ibuprofene	96	7	45
Mébéndazole	100	0	-
Retinol (Vitamine A)	71	4	90
SRO (Sels de réhydratation orale)	57	32	90

Source: Budget Tracking Survey, 2006; \*rupture de stock

<sup>8</sup> We pooled the results by drug name and considered the drug as available if at least one specification of the drug (e.g. Cotrimoxazole either in tablets or as liquid) was available.

## 1.2. Flow from PhaGDis to PhaGeCom/CSB

*a. It takes on average two weeks from the placement of an order to delivery of the drugs at a remote Commune Pharmacy.*

There are differences in lead times according to the remoteness of the basic health centers (Table 5). On average, it takes 8 to 14 days between the placement of an order and delivery of the drugs at commune level. The maximum average lead time for last year amounted to 19 days for delivery to a remote health center. The Commune Pharmacies mainly pay either in cash (46%) or by check (36%). Some of them (18%) combine both methods of payment.

Table 5: Lead times from PhaGDis to PhaGeCom/CSB

	Lead time during last 12 months* (in number of days)			
	Common		Maximum	
	Mean	Median	Mean	Median
CSB at close distance	8.2	2.0	10.6	3.0
CSB at normal distance	10.3	3.5	14.6	6.0
CSB at remote distance	13.6	6.5	18.6	12.0

Source: Budget Tracking Survey, 2006; \*Time from mailing of purchase order to delivery of drugs at CSB

*b. Only 11% of the PhaGeCom reported perfect flows in the drug supply chain.*

Table 6 illustrates that only 11% of the Commune Pharmacies reported not to suffer from bottlenecks in the drug supply chain. More than one-third of the PhaGeCom claimed that the District Pharmacy is often not able to deliver their orders.

Table 6: Drug supply chain from PhaGDis to PhaGeCom

	Often	Rarely	Never	Total
PhaGDis is not capable of delivering the drugs...				
... ordered by PhaGeCom	36	53	11	100

Source: Budget Tracking Survey, 2006

*b. Inventory shortages at commune level are mainly problematic for some specific drugs. The results are partly consistent with the findings at district level.*

Table 7 shows the availability of drugs at the commune level. Similar to Table 4, we pooled the results by drug name and considered the drug as available if at least one version of the drug (e.g. Cotrimoxazole either in tablets or as liquid) was available. Table 2 in the Appendix illustrates the results in greater detail and shows the availability per drug specification.

Consistent with the findings at district level, the Commune Pharmacies mainly reported delivery failures for Oral Rehydration Solutions (SRO) and the antibiotics Tetracycline. Furthermore, stockouts were reported for the anti-inflammatory drug Ibuprofen and for the vitamin, Folic Acid.

Table 7: Availability of drugs (in % of PhaGeCom/CSB)

	Available Oct/Nov 2006	Inventory shortage*
Aspirine (Acetylsalicylique acide)	66	4
Paracétamol	93	1
Chloroquine	89	6
Quinine	68	7
Antibiotique cotrimoxazole	95	3
Antibiotique amoxiciline	88	4
Antibiotique tetracycline	62	13
Fer acide folique	83	13
Ibuprofene	72	18
Mébendazole	79	8
Retinol (Vitamine A)	69	3
SRO (Sels de rehydratation orale)	68	20

Source: Budget Tracking Survey, 2006; \*rupture de stock

## 2. Leakages in the drug supply chain

In this section, discrepancies in the amounts or prices of goods reported as sent by the District Pharmacies and as received by the Commune Pharmacies are referred to as leakages. However, leakages could occur due to very different factors as e.g. on the one hand a lack of proper accounting procedures or on the other hand false incentives at the local (district or commune) level.<sup>9</sup> Further data analysis – with data from the second round of the survey – is expected to shed more light on this matter.

*a. There are substantial leakages in the drug supply chain from district to commune level with large differences across types of drugs.*

Table 8 illustrates leakages in the drug supply chain aggregated across types of drugs.<sup>10</sup> In particular, leakage occurs when the PhaGDis reported to have sent more supplies or supplies at a lower price than stated as received or paid at PhaGeCom level. Leakage defined as a higher amount of goods reported as sent at district than received at commune level was more prevalent compared to differences in prices or values reported at both levels.

Table 8: Leakages in the drug supply chain (by drug type)

	Leakage (Sum of last two deliveries; in % of CSB who ordered product)
Pain killers	19
Malaria medication	23
Antibiotics	48
Anti-inflammatory drugs	26
Retinol (Vitamin A)	31
SRO/ORS	12
Fer acide folique/Folic Acid	14
Anti-parasitic medication	10

Source: Budget Tracking Survey, 2006

Overall, there are large differences in leakages across types of drugs. Table 8 shows substantial leakages of antibiotics as 48% of the basic health centers who ordered it reported discrepancies. Leakages are also prevalent for Retinol (Vitamin

<sup>9</sup> Examples of the latter case are that the diverted goods or funds could be used for purposes unrelated to health or for private gain of local health staff.

<sup>10</sup> We aggregated the results across types of drugs and considered discrepancies in the amounts reported as sent and received in at least one specification of one sub-type of the drug or more as leakages.

A), anti-inflammatory drugs, and malaria medication. The problem appears to be the least occurring for anti-parasitic medication, but still 10% of the basic health centers report leakages of this product.

Table 2 in the Appendix illustrates the results in greater detail and shows leakages and prices per drug specification. The findings seem to suggest a positive correlation between drug price and the likelihood of leakage. However, a more detailed econometric analysis of the determinants of leakage seems to be called for to confirm this.

*b. Leakages in the drug supply chain from district to commune level are reported in 60% of the Commune Pharmacies.*

For the country as a whole, leakages of at least one drug specification are reported in a high 60% of the Commune Pharmacies (Table 9). There are significant provincial differences. The province of Fianarantsoa is the best performer with only 20% of the PhaGeCom suffering from leakages. On the contrary, in the province of Mahajanga 79% of the PhaGeCom reported discrepancies. It does not appear as remoteness has an impact on the likelihood of leakages in the health sector, but a more profound analysis is desirable.

Table 9: Leakages in the drug supply chain (by PhaGeCom)

Province	% of PhaGeCom with leakage
Antananarivo	74
Fianarantsoa	20
Toamasina	73
Mahajanga	79
Toliara	73
Antsiranana	63
Remoteness*	
Low	65
Medium	62
High	52
<b>Madagascar</b>	<b>60</b>

Source: Budget Tracking Survey, 2006; \*terciles of remoteness based on Stifel and Minten (2004).

### 3. The implementation of Fanome

One of the recent important changes in Madagascar's health sector is the cost recovery policy Fanome.<sup>11</sup> It was implemented by the Government since the beginning of 2004 and creates special provisions for the poor through a health card system.

*a. Almost all basic health centers implemented the Fanome policy at the time of the survey.*

A high 96% of the basic health centers implemented the cost recovery policy Fanome at the time of the survey. Almost all of them (97%) established a Management Committee (CoGe) and a vast majority of the latter (87%) organized a management meeting during the last six months.

On average, there are 32 needy people (i.e. people who are inscribed on the Fanome list for cost recovery) with a health card in the commune. Consistent with population size, there are large regional differences with a median number of 11 needy people with a health card. On average, a quarter of them visit the CSB monthly.

In a little over half of the communes (53%), the Fanome list of the poor and needy is set-up by the mayor together with other people of the commune. However, 22% of the communes reported that the list is set-up in another way which is not specified.

There is a Community Health Committee (CoSan) with a median of 11 members in 91% of the communes. Overall, the data indicate a good representation of all different villages in the commune in this Committee.

*b. The commune does often not manage to pay the dispensers on a regular basis.*

The commune is the most important employer of dispensers. However, there is strong evidence of insufficient funds at the commune level to support them. During the previous year, 44% of the dispensers were on average not paid for 7 months by the commune and in a high 60% of the health centers there were reports of irregular payments. As the dispensers hold the key to successful Fanome operations – because they control drug stocks – the lack of regular payments is a serious disincentive which can have unfortunate consequences (World Bank, 2006a). In particular, major problems with salary payment are prevalent in the provinces of Mahajanga and Toliara.

*c. Only 25% of the CSB posted the use of the Fanome funds.*

The accountancy of Fanome funds is available in 92% of the CSB. Though, only one-quarter of the CSB are posting the use of the Fanome funds and the poster is mainly located inside the basic health center facilities. In order to further stimulate monitoring by the beneficiaries of the services, the Government should promote posting in all public health centers and the posters should be publicly accessible at all times.

### 4. Monitoring and evaluation

Monitoring and evaluation is more common in the health sector compared to the education sector. Though, there is a difference in monitoring according to the health center type and the monitoring frequency could still be improved especially in the CSB1. During the last six months, 82% and 60% of the CSB2 and CSB1 were inspected (by the Doctor-inspector or

<sup>11</sup> Fandraisan' Anjara No Mba Entiko

their supervisor) respectively. The CSB1 received on average two inspections during the last half year compared to four inspections at CSB2 level.

Finally, while this first descriptive analysis allows us to have a quick overview of the functioning of the drug supply chain, more profound research is needed to accurately evaluate bottlenecks. We believe that the second round of the survey will provide us with more valuable information and insights on this matter.

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<sup>i</sup> The author would like to thank Mr. Paternostrò, and Mr. Filmer for valuable comments and feedback and Ms. Bidani, Mr. Randrianiaina, and Mr. Rasolofonirina for their continuous support. She would also like to thank the Government of Japan for financing this work through a PHRD grant. Contact: [Nathalie.Francken@econ.kuleuven.be](mailto:Nathalie.Francken@econ.kuleuven.be)