MADAGASCAR DIAGONAL FUNDING STUDY

November 2008

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MEASURE Evaluation

MADAGASCAR DIAGONAL FUNDING STUDY

November 25, 2008

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Contents

Abbreviations and Acronyms

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ARI	Acute respiratory infection
BCC	Behavior Change Communication
CHD	Centre hospitalier de district (district hospital)
CSB	Centre de santé de base (basic health center)
EPI	Expanded Program on Immunization
HBMF	Home-based management of fever
HMIS	Health Management Information Systems
IEC	Information, education, and communication
IPTp	Intermittent preventive treatment of pregnant women
ITN	Insecticide-treated net
LLIN	Long-lasting insecticide treated net
MOH	Ministry of Health
NMCP	National Malaria Control Program
PMI	(U.S.) President's Malaria Initiative
RDT	Rapid diagnostic test

Executive Summary

The Global Fund to Fight AIDS, Tuberculosis and Malaria and the U.S. President's Malaria Initiative (PMI) commissioned the Madagascar Diagonal Funding Study with two objectives: (1) to assess whether malaria control activities reduced demand for therapeutic malaria services, and (2) to determine whether this reduction allowed a refocusing of clinical efforts, as has been anecdotally reported. This was accomplished by gathering key information from patient registers on malaria, pneumonia/acute respiratory infection (ARI), and diarrhea in children less than 5 years of age (children < 5) from 2003 to 2007. This report presents an analysis of register data from three districts in Madagascar to determine whether malaria activity scale-up reduced malaria burden, and whether this reduction corresponded with a change in the relative demand for services at facilities due to other common childhood illnesses such as pneumonia/ARI and diarrhea.

Malaria control and treatment activities were implemented in all three districts between 2003 and 2007. The district with the most intense scale-up of malaria activities was Soanierana Ivongo (high intensity), especially during 2006 when bed net distribution was at a peak and artemisinin-based combination therapy (ACT) and rapid diagnostic tests (RDTs) were introduced. Maintirano (medium intensity) experienced a similar scale-up, although at a later date (2007). In Morafenobe (low intensity), bed net distribution was low and only a few interventions had been implemented by 2007.[1]

The malaria control and treatment activities implemented in both Soanierana Ivongo (high intensity) and Maintirano (medium intensity) are associated with reduced demand for therapeutic services. In these two districts, both the number of malaria diagnoses in children < 5, and the overall number of diagnoses given at the health facility was reduced between 2003 and 2007. In Soanierana Ivongo (high intensity), the reduction in malaria diagnoses was most apparent between 2006 and 2007, which coincides with the increase in bed net distribution and the introduction of RDTs and ACTs. Significant reductions in malaria may not have occurred in Maintirano because scale-up of bed nets did not occur until 2007, the last study year, and RDTs and ACTs were not introduced until November of that year. By contrast, in Morafenobe (low intensity), the number of malaria diagnoses in children < 5 did not decrease and the number of overall diagnoses actually increased slightly.

This study sought to understand whether reduced demand for therapeutic services for malaria allowed for a refocusing of clinical efforts. One way this was achieved was by collecting information on non-malarial diseases to understand the "diagonal" or "spillover" effect of malaria control and treatment activities on other diseases that do not receive significant vertical funding. A change in proportional distribution of diseases that could represent a diagonal effect was evident in Soanierana Ivongo (high intensity) only. In that district, the total number of malaria diagnoses and the proportion of all diagnoses that they represent trended downward, while the percentage of diagnoses attributed to pneumonia/ARI increased. By contrast, in Maintirano (medium intensity) there was no shift in the proportional distribution of diseases, even though the number of malaria diagnoses decreased.

[1] Intensity of malaria control activity gathered from central authorities indicated three levels of intervention intensity and duration. See Section 40 for details.

Key informant interviews also provided perspective on how malaria program scale-up may have produced a diagonal effect on providers' time and the resources available to them. Many of the providers interviewed stated that malaria burden had decreased, but no consensus regarding changes in malaria burden was apparent in Maintirano (medium intensity), while in Soanierana Ivongo (high intensity) a majority of providers clearly indicated a perceived decline in malaria burden. Many providers also stated that the decrease in malaria caseload allowed them to refocus some of their time and effort on activities such as caring for other diseases, improving the organization of the health center, and increasing patient outreach. In Soanierana Ivongo (high intensity), however, many providers also stated that the amount of time spent on individual malaria patients increased because of the use of RDTs.

There is no established definition or framework for describing diagonal funding effects. To clarify the concept, this study proposes that vertical funding can affect health systems by changing six fundamental components: quality of care, the allocation of provider time on different diseases, the availability of resources, the management of the health system, access to care, and changes in the proportional distribution of disease—as in the number and type of cases visiting facilities.

It is not clear whether a diagonal effect exists because of the study's conflicting results. The system shift from malaria diagnoses to pneumonia/ARI diagnoses that corresponds with malaria intervention scale-up in Soanierana Ivongo, the high intensity district, suggests a potential diagonal effect; however, because providers also conveyed an increase in the time allotted to individual malaria patients as a result of using RDTs, it is not clear if the decrease in caseload resulting from malaria is significant enough to offset the increase in provider time. If it is, then a diagonal effect is more probable. Further studies are needed to answer this question.

The reasons for a shift in caseload from malaria to pneumonia/ARI in Soanierana Ivongo are unknown. This shift coincides with the scale-up of RDTs, ACTs, and bed net distribution. The use of RDTs, however, offers the simplest explanation for the diagonal effect by reclassifying clinical malaria cases as pneumonia/ARI through a confirmatory laboratory test that can rule out malaria. If the introduction of RDTs is permitting providers to diagnose and treat both malaria and pneumonia/ARI more effectively, then malaria scale-up is improving the quality of care for both diseases, thus constituting a diagonal effect. More data on the treatment of pneumonia/ARI are necessary to determine if this is the case.

The qualitative and quantitative data suggest a potential diagonal effect in the high-intensity district only. This result suggests that the effect of malaria activity scale-up on the proportion of services demanded for pneumonia/ARI may be graded, with a potential diagonal effect evident only after significant scale-up.

If a diagonal effect is evident, it is a boon to proponents of vertical programming efforts and can further justify this expedient approach. It is not clear, however, if this approach is more efficacious than horizontal approaches; head-to-head comparisons, or trials, are therefore necessary. At the very least, this study suggests that the scale-up of malaria control activities coincides with a decrease in malaria and that further scale-up is probably justified.

1 Study Question

Malaria control activities have recently received an influx of attention and funding from The Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), the World Bank Booster Program, and the U.S. President's Malaria Initiative (PMI). As a result, malaria control activities such as bed net and artemisinin-based combination therapy (ACT) distribution expanded rapidly in target countries. This resulted in anecdotal reports of a reduced demand for therapeutic malaria services as well as an overall decrease in caseload at health facilities.

"Diagonal funding effect" is a term used to describe beneficial "spillover" effects to the health system from disease-specific vertical funding mechanisms. There is no established definition or framework for describing diagonal funding effects; but in order to clarify the concept, this study proposes that vertical funding can affect health systems by changing six fundamental components: quality of care, the allocation of provider time on different diseases, the availability of resources, the management of the health system, access to care, and changes in the proportional distribution of diseases—as in the number and type of cases visiting facilities. In fact, there is overlap between these various effects; for example, provider time and availability of resources are reflected in both the proportional distribution of diseases and quality of care.

Since malaria causes a significant portion of mortality and morbidity within some countries, it is reasonable to expect that as malaria mortality and morbidity declines, the health system could benefit by allowing it to refocus on other health conditions. This refocusing would involve the release or provision of resources, such as staff time and commodities, for non-focally funded diseases and would constitute a diagonal effect.

The Global Fund and PMI commissioned the Madagascar Diagonal Funding Study with the following two objectives: (1) to assess whether malaria control activities reduced demand for therapeutic malaria services and (2) to determine whether this reduction allowed for a diagonal effect on the health system. This study assessed the diagonal effect in Madagascar by visiting health care facilities and gathering data from existing sources.

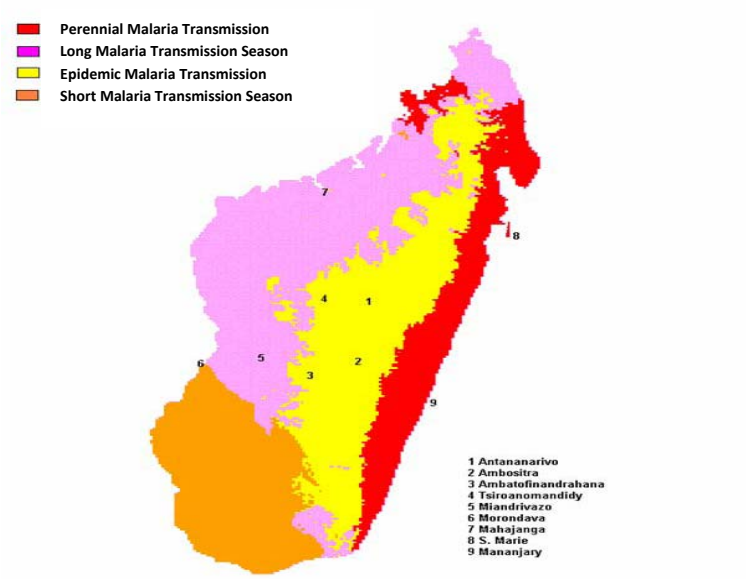
2 Study Setting

2.1 Burden and Transmission of Malaria in Madagascar

Malaria is a major health problem in Madagascar. It accounts for an estimated 16 percent of all outpatient visits, and 20 percent of all children < 5 admitted to a hospital are diagnosed with severe malaria. It is ranked as a leading cause of children < 5 mortality, and according to UNICEF, kills approximately 20,000 Malagasy children every year.[2]

The epidemiology of malaria varies considerably in different regions of the country, from stable transmission in the coastal areas to epidemic malaria in the Central Highlands (Figure 2.1.1).

Figure 2.1.1: Malaria Transmission Patterns in Madagascar[3]



2.2 Malaria Control and Treatment Interventions

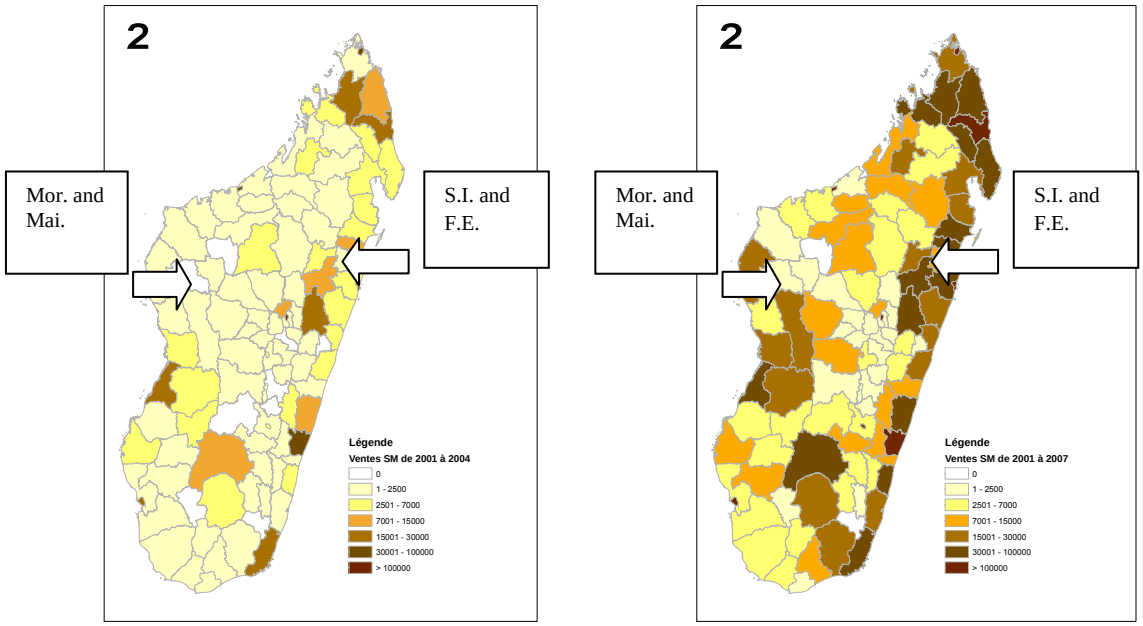
The current national malaria control strategy divides the country into four separate intervention zones, each with a different set of priorities. The interventions in the eastern and western part of the country (stable malaria transmission) focus primarily on insecticide-treated nets (ITNs) distribution, case management, intermittent preventive treatment during pregnancy (IPTp), home-based management of fever (HBMF), and community education. The interventions in the Central Highlands focus on indoor residual spraying, case management, HBMF, epidemic surveillance, and community education. In the south, the main activities are epidemiological surveillance, case management, HBMF, IPTp, ITNs, and community education. Currently, no up-to-date information is available on nationwide coverage of key malaria prevention and control measures in Madagascar. The last survey of the Demographic Health Surveys program was conducted in 2003–2004, well before the recent rapid scale-up of ITN distribution and the

[2] President's Malaria Initiative. Malaria Operational Plan—FY 08, Madagascar. Available at http://www.fightingmalaria.gov/countries/mops.html.
[3] Ibid.

introduction of ACTs as a first-line treatment for severe malaria.[4] Information from the National Malaria Control Program (NMCP) and the Country Coordinating Mechanism, however, is available (Figure 2.2.1) and demonstrates regional differences in long-lasting insecticide treated net (LLIN) distribution between 2004 and 2007. These maps illustrate that in recent years, the east coast of Madagascar has distributed more bed nets than both the west coast and Central Highlands. The arrows indicate the regions visited by the study team: Morafenobe (Mor.) and Maintirano (Mai.) in the west, and Soanierana Ivongo (S.I.) and Fenerive Est (F.E.) in the east.

Figure 2.2.1: Evolution of *Super Moustiquaire* Distribution Between 2004 and 2007[5]

Cumulative LLIN Distributed in 2004 **Cumulative LLIN Distributed in 2007**



2.3 Health Delivery System

The health delivery system in Madagascar consists of a four-step pyramidal system. The basic health centers—Centre de Santé de Base I (CSB I) and Centre de Santé de Base II (CSB II)—represent the first level of the health system. The distinction between CSB I and II is that the former is staffed by a nurse provider or other health care worker and the latter with a physician. This distinction reflects the availability of staff and does not indicate a referral hierarchy. There are also district hospitals such as Centre Hospitalier de District (CHD I) offering similar services to those offered in a CSB II, plus inpatient facilities. The next level in the pyramid is CHD II or district hospitals, which offer emergency surgery and comprehensive obstetrical care. The public sector, especially CSB I and II, is a major source of health care in the Madagascar, particularly in

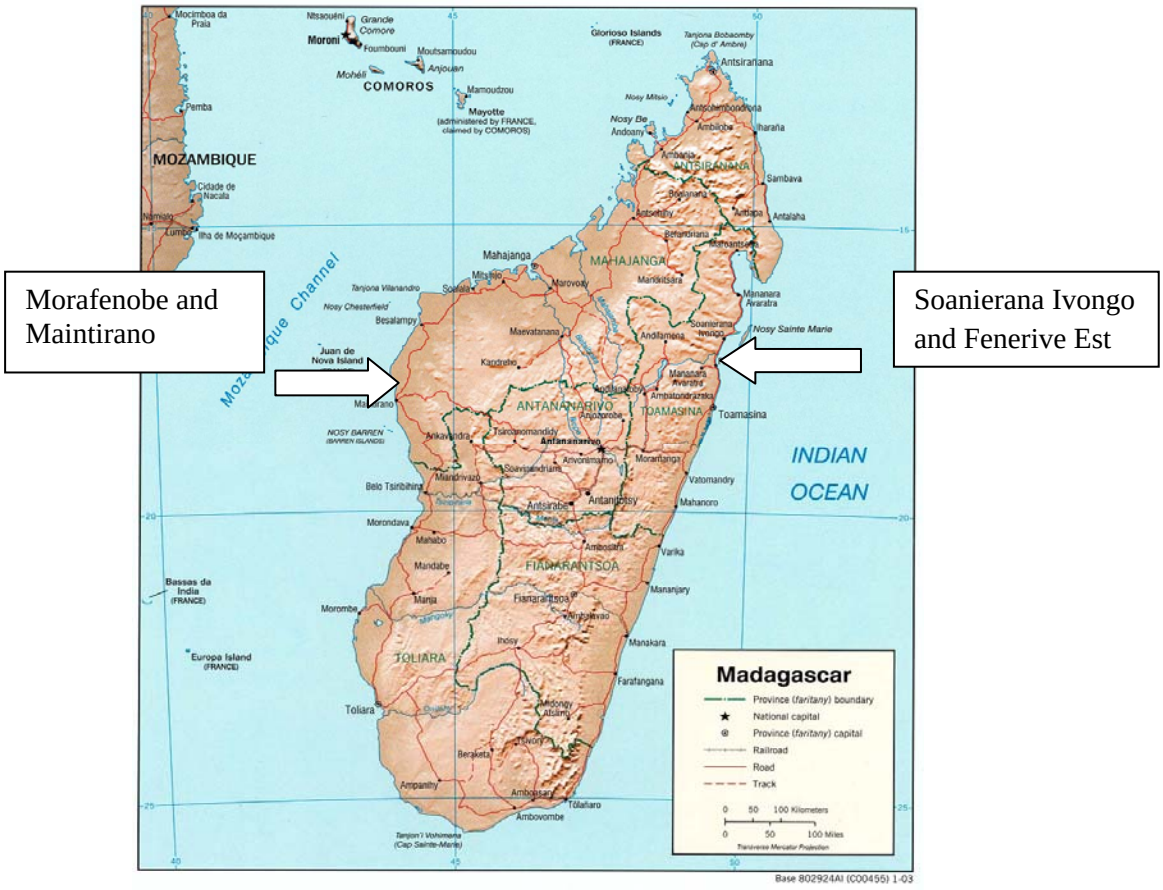
[4] President's Malaria Initiative. Malaria Operational Plan—FY 08, Madagascar. Available at http://www.fightingmalaria.gov/countries/mops.html.
[5] The Global Fund to Fight AIDS, Tuberculosis and Malaria. CCM+PR information for qualification Annex A RCC document.

rural areas, where it accounts for more than 70 percent of first contacts. In urban areas, fewer than 40 percent of first contacts occur in public sector health facilities.[6]

2.4 Site Selection

Teams visited four districts on the east and west coasts of Madagascar. Districts were chosen in coordination with the in-country PMI team, representatives from SanteNet, and the NMCP to capture the wide range of malaria activity intensity and duration in districts with similar rates of malaria transmission. The districts visited fell into three distinct categories: low intensity (Morafenobe), medium intensity (Maintirano), and high intensity (Soanierana Ivongo). The level of intensity was defined according to the duration and number of implemented malaria control and treatment activities over the last 5 years, including the total number of bed nets distributed annually (see Section 4 for specific information regarding these districts). Figure 2.4.1 illustrates the exact location of the districts visited for this study.

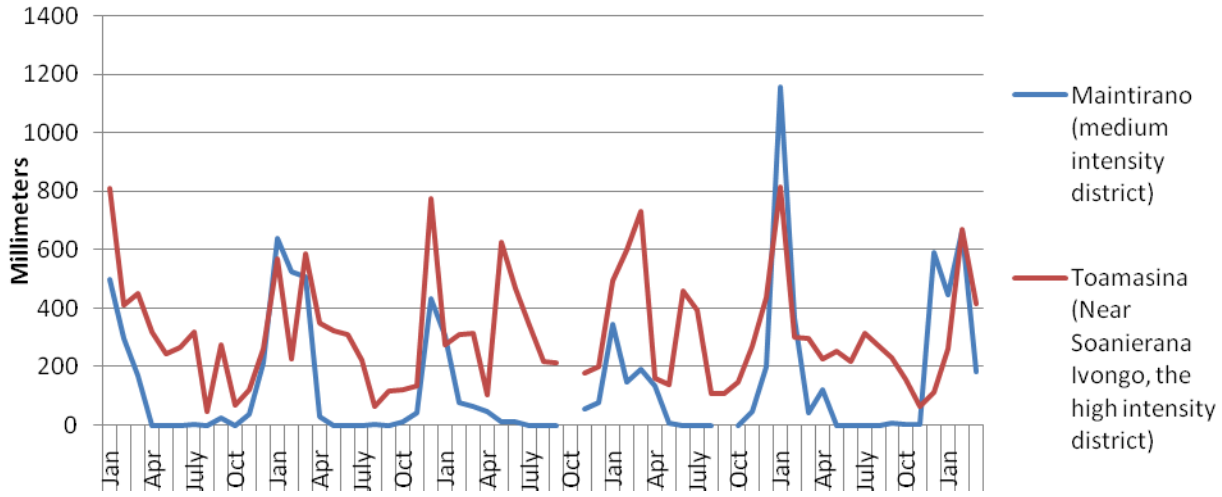
Figure 2.4.1: Location of Districts Visited



[6] President's Malaria Initiative. Malaria Operational Plan—FY08, Madagascar. Available at http://www.fightingmalaria.gov/countries/mops.html.

The districts are not identical, and from Figure 2.1.1, it is apparent that the east and west coasts have slightly different malaria transmission patterns. It was not possible to choose districts that had the exact same transmission patterns and represented the large difference in activity scale-up, and the decision was made to favor the latter. Data gathered from the Ministry of Public Works and Meterology (Figure 2.4.2), however, demonstrate that the two regions have approximately similar rainy seasons.[7] Data on monthly rainfall were collected from Maintirano (the medium intensity district and the closest available rainfall data to Morafenobe, the low intensity district) and Toamasina (a district on the east coast and the closest available rainfall data to Soanierana Ivongo, the high intensity district). Figure 2.4.2 confirms that Maintirano has less rainfall than Toamasina, but seasonal variations are similar.

Figure 2.4.2: Total Rainfall per Month in Maintirano and Toamasina Districts



[7] Rainfall data were not available from Soanierana Ivongo and Morafenobe. Rainfall data from Toamasina were used to approximate rainfall patterns for Soanierana Ivongo, and rainfall data from Maintirano were used for Morafenobe.

3 Study Methods

3.1 Study Approach

This study attempted to answer the question of whether scale-up of malaria prevention and control resulted in a diagonal effect in three ways:

- Assessing whether overall malaria burden decreased at facilities. This was done by collecting data from health facility records on the number of children < 5 visiting clinics because of malaria from 2003 to 2007.

- Assessing whether malaria represented a smaller proportion of the case burden, relative to other common childhood illnesses such as ARI and diarrhea—this was accomplished by collecting data from health facility records on the number of children < 5 visiting clinics because of malaria, diarrhea, and pneumonia/ARI and by analyzing changes in the proportional distribution of diseases from 2003 to 2007. These three diseases account for almost 60 percent of < 5 deaths in Madagascar; changes in the proportional distribution of disease could capture a system shift toward diseases that do not receive significant vertical funding.[8]

- Assessing whether malaria scale-up resulted in other diagonal effects, such as the amount of provider time or resources available for treating other diseases—this information was gathered through key informant interviews assessing provider perceptions of the changing malaria burden, the time spent on malaria patients, and the resources available to treat malaria.

The quantitative component of the study was designed to detect changes in the proportional distribution of diseases. Thus, for the purposes of this analysis, a diagonal effect in the proportional distribution was defined by the following two criteria: (1) malaria burden must decrease, and (2) the proportional distribution of common childhood illnesses must change so that the proportion of malaria diagnoses decreases and the percentage of diagnoses caused by diarrhea or pneumonia/ARI increases. This only addresses one way in which vertical funding could exert a diagonal effect.

Key informant interviews were conducted to assess two other components of a diagonal effect—the allocation of provider time on different diseases and the availability of resources. This analysis recognized a diagonal effect in the key informant interviews by identifying consensus remarks conveying system shift and by comparing the differences in these statements across the districts.

The study was not designed to gauge changes in access to care, quality of care, or management of the health system. Additionally, because this analysis was limited to collecting data from health facilities and staff, this study could not directly observe or evaluate diagonal effects resulting from changes in provider time.

[8] World Health Organization. 2006. Mortality Country Fact Sheet 2006: Madagascar. Available at http://www.who.int/whosis/mort/profiles/mort_afro_mdg_madagascar.pdf.

Lastly, experience from the diagonal study was intended to serve as a pilot to inform further analysis of diagonal funding effects from vertical disease programs.

3.2 Study Indicators

For the quantitative component, specific indicators targeted for this study were as follows:

- Number of outpatient visits for all ages
- Number of diagnoses of *clinical* malaria/fever, diarrhea/dysentery, pneumonia/acute respiratory infections, other causes in children < 5
- Length of inpatient stay for patients < 5 with malaria
- Number of inpatient admissions for all ages.

The study utilizes data on the clinical diagnosis of malaria because data on confirmed malaria were not available for most of the study period.

3.3 Data Sources

The team gathered information from the following sources:

Quantitative Information

- Inpatient and outpatient registers located at facilities: Clinical encounter information was gathered from inpatient and outpatient registers, as these data sources were assumed to be the most complete and accurate logs of facility activities.

- Health Management Information System (HMIS) forms: HMIS information was collected from monthly HMIS forms to complement the information from the patient registers and to serve as a comparison when applicable.

Qualitative and Contextual Information

- Qualitative interviews with health care providers: Limited qualitative data were collected in order to understand provider perspectives of malaria treatment and control, and to examine a potential "diagonal effect" on time spent with non-malaria patients.

- "Other" sources such as program records, partner reports, discussions with Ministry of Health (MOH) staff, weather reports: The team collected district-level rainfall and malaria control activity data to provide context for information gathered from health facilities.

3.4 Data Collection Methods for Patient Registers

To account for the wide variety of diagnoses and any local shorthand/diagnostic coding for malaria, diarrhea, or pneumonia/ARI in the patient registers, the team consulted with local clinicians to develop a list of qualifying diagnoses for each of the diseases (Table 3.4.1).

Table 3.4.1: Diagnoses Included in Malaria, Diarrhea, and Pneumonia/ARI Definitions for Outpatient and Inpatient Registers

Malaria **Patient Registers**	**Diarrhea** **Patient Registers**	**Pneumonia/ARI** **Patient Registers**
- Malaria - Uncomplicated malaria - Complicated malaria - Malaria-like illness - Fever - High fever - Hyperthermia - High temperature	- Diarrhea - Diarrhea with dehydration and without dehydration - Acute diarrhea - Dysentery - Typhoid fever - Salmonellosis - Bloody stool - Stool with mucus - Waterborne infection causing diarrhea - Cholera - Diarrhea caused by parasites (excluding helminthic infections) - Gastroenteritis - Food poisoning	- Pneumonia - Uncomplicated pneumonia - Complicated pneumonia - Acute respiratory infection - Cough (excluding chronic cough) - Cold - Flu

3.5 Data Collection Instrument

This study adapted data abstraction tools and analysis templates used for PMI assessments conducted in four other countries from September to October 2007. The tools consisted of a series of Excel spreadsheets matched to both the type of facility and the available data sources. For this study, the team met with central HMIS MOH officials and local clinicians to review the methodology and to adapt the data abstraction tool. The tool was subsequently tested and refined during a 2-day pilot in a nearby district.

A short key informant interview tool was developed, adapted, and translated in-country before fieldwork began. The tool asked open-ended questions about perceptions of malaria control and the resources available to combat the disease. Close-ended questions were also asked to determine the start dates of certain interventions, and whether user fees were implemented or changed over the study period. The tool can be found in Appendix D.

3.6 Sample of Facilities

As previously mentioned in Section 2.4, the team visited two districts on the east coast and two on the west coast of Madagascar that were purposefully chosen to represent the extremes of malaria scale-up activities. Within these districts, the teams visited a convenience sample of facilities based on geographic accessibility. The teams visited both inpatient and outpatient facilities—including CSB I, CSB II, CHD I, and CHD II. In total the teams visited 15 facilities, 12 of which were CSBs.

Because of transportation and accessibility difficulties, the team expanded the facility sample beyond the original two districts (Morafenobe and Soanierana Ivongo) chosen by PMI. On the west coast, the team was required to expand data collection to nearby Maintirano; while on the

east coast, the team visited Fenerive Est. Data from the facility visited in Fenerive Est were excluded from this analysis because, as the lone facility from this district, it would not be representative.

The districts visited fell into three categories of malaria activity scale-up based on intensity and duration: high, medium, and low. For convenience, the districts are referred to only in terms of their intensity throughout the study; but the terms high, medium, and low intensity refer to districts with high, medium, and low durations of scale-up as well.

Table 3.6.1 presents the breakdown of facilities by district and for the CSBs visited, the average number of visits per month, as well as the average number of diagnoses per month assigned to children < 5. It is clear from these numbers that usership in Morafenobe is much less than it is in the other two districts.

Table 3.6.1: Facility Sample for Madagascar Diagonal Funding Study

Region	Intensity of Malaria Interventions	District	Facility	Average Visits per Month, All Ages	Average Number of Diagnoses per Month < 5
East Coast	High Intensity	Soanierana Ivongo	Manakatafana CSB I	134	39
			Ambodiampana CSB II	93	18
			Antanifotsy CSB II	111	28
			Fotsialanana CSB II	151	44
			Soanierana Ivongo CSB II	586	116
			Soanierana Ivongo District Hospital		
West Coast	Medium Intensity	Maintirano	Ankisatra CSB II	100	41
			Betanatanana CSB II	176	64
			Mafajijo CSB II	91	32
			Maintirano CSB II	402	97
			Maintirano Regional Reference Hospital		
	Low Intensity	Morafenobe	Atsingilotoka CSB I	135	56
			Andramy CSB II	46	9
			Morafenobe CSB II	136	26
			Morafenobe District Hospital		

3.7 Analysis and Report Writing

The data were analyzed by facility and aggregated by district. Many facilities lacked data as a result of missing registers or HMIS forms. To account for missing data and to make comparisons across years more robust, averages were calculated per month in each calendar year during the study period. This permitted using only those months with complete data, as they determined the numerator and denominator for the monthly average per year. For example, if a facility lacked the entire month's register data for April and was missing data for August 13 to 30, the number of "usable months" was 10, and data from these months were used to calculate the average

number of malaria diagnoses per month in that facility over that particular calendar year. These monthly averages were then used to aggregate data at the district level as well. Aggregation across a district and over a year can help adjust for variations in seasonality, but the methods utilized cannot adjust for any effects because of the season in which data may be missing.

The number of malaria, diarrhea, and pneumonia/ARI cases in the HMIS records was compared with the number of diagnoses of the three diseases in the patient registers in each facility. This report focuses on the results from the patient registers, as these data are from original source documents and allowed the data collection teams to monitor any potential data quality errors; this would not have been possible with retrospective HMIS data. This report also focuses on outpatient facilities (CSBs), as few patients were referred to higher levels of care; this resulted in insufficient data at the hospital level for meaningful analysis (see Appendix A for details).

3.8 Limitations

This study faces many limitations, the main one being the inability to establish clear causality. As the study lacked randomly chosen controls, it is difficult to determine whether observed differences resulted from any particular intervention or from uncontrolled factors such as changing population size, natural variations in disease incidence, changing service uptake at health facilities, or varying health personnel and recordkeeping practices. Therefore, this study cannot attribute disease trends to any particular intervention.

The study does not represent trends across Madagascar or districts, as the facilities visited were not chosen at random. PMI, the Global Fund, and national authorities chose the regions purposefully to capture a wide range of malaria scale-up activity. The facilities themselves represent a convenience sample within the regions and were chosen on the basis of accessibility.

The selection of regions was based on capturing areas with high and low malaria activity, and limited the comparability of the two regions, as they do not have the exact same level of malaria transmission. The length of the malaria transmission season on the west coast is less than the east coast. To make these comparisons more valid, the trends and changes within a district are compared, not raw numbers. Also, the evaluation of whole years of data limits the effects from slightly different seasonality or malaria transmission.

Lack of available data also limited the study. HMIS forms and registers were missing in several of the facilities visited. This limitation resulted in gaps in the data set. Specific dates of missing data are summarized in Appendix C.

A notable limitation is the lack of data on “laboratory-confirmed” malaria cases. As monitoring and evaluation efforts continue, and recordkeeping sheets evolve, information on the use of diagnostic methodology would be useful to determine actual malaria burden. This would help determine whether the recorded malaria burden changed over the study period as a result of increased use of rapid diagnostic tests (RDTs).

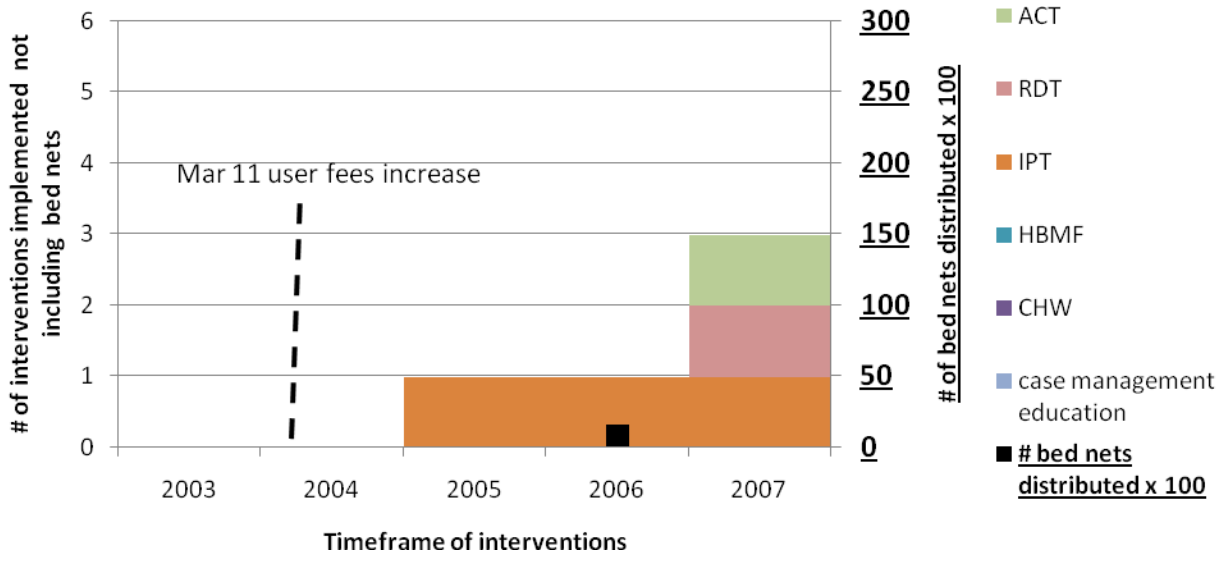
Inpatient facility data were collected for this study; however, the study team quickly realized that most care for children < 5 is delivered at the CSB level, and very few patients < 5 present themselves and/or are referred to inpatient facilities. Consequently, the study could not identify clear trends or changes at inpatient facilities.

4 Study Results

4.1 Findings from Morafenobe (low intensity) District

In Morafenobe, malaria control activities underwent low levels of scale-up from 2003 to 2007; distribution of bed nets was low and without scale-up over the last 5 years. Both ACT distribution and RDT usage began in November 2007, and by the end of 2007, authorities had implemented only four interventions including bed nets (Figure 4.1.1).

Figure 4.1.1: Scale-up of Malaria Interventions in Morafenobe (Low Intensity District) and Number of Bed Nets Distributed



The data from registers in Morafenobe (low intensity) illustrate that the number of diagnoses for children < 5 for all diseases has stayed relatively stable since 2003 (Figure 4.1.2).

Figure 4.1.2: Average Number of Diagnoses per month for Children < 5 for All Diseases in Primary Health Clinics Visited in Morafenobe (Low Intensity)

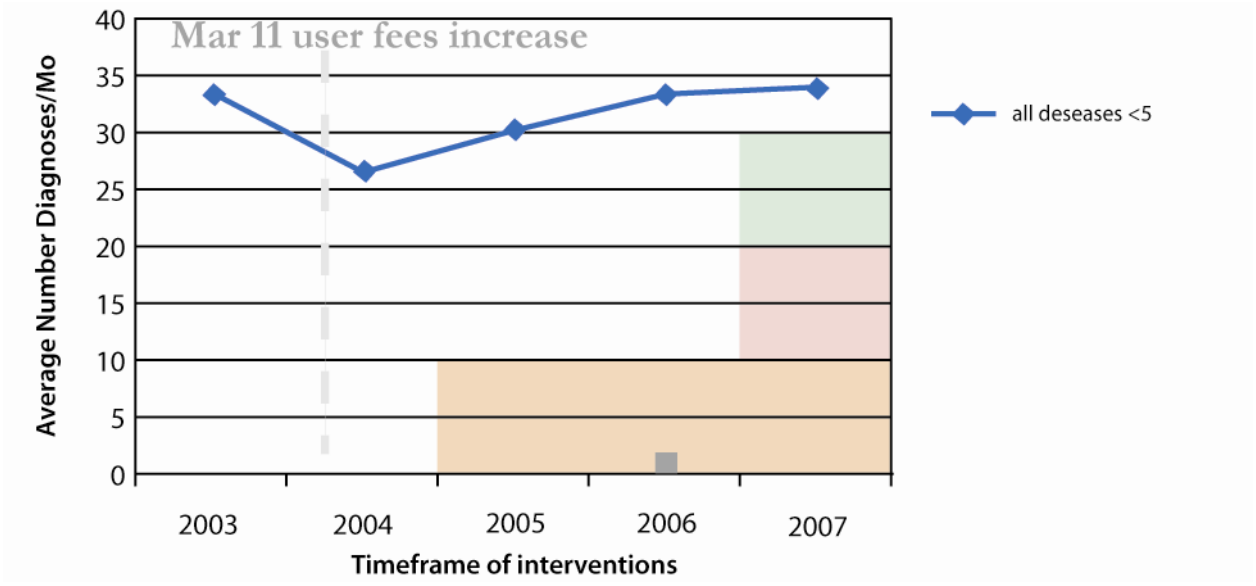
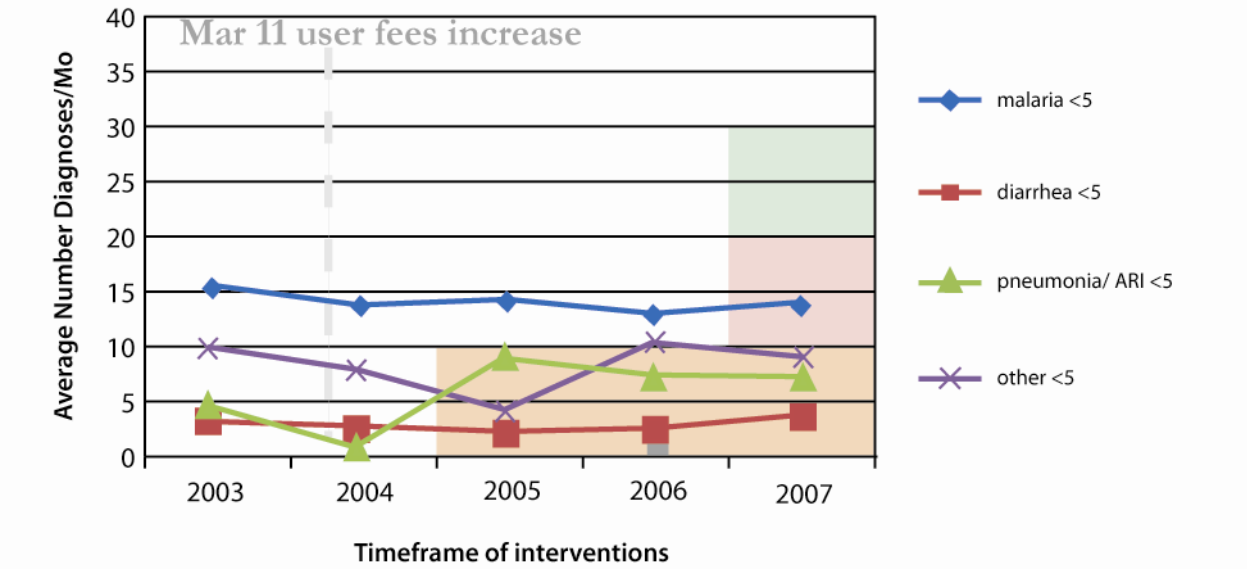


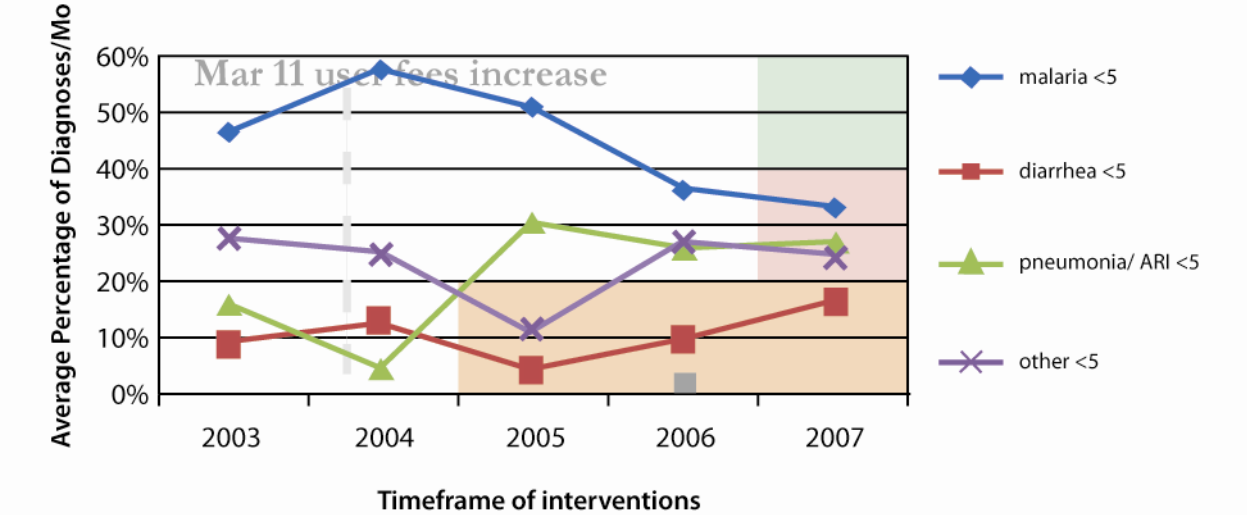
Figure 4.1.3 demonstrates that the number of malaria and diarrhea diagnoses in children < 5 stayed relatively constant within the facilities visited. Pneumonia diagnoses increased in 2005, but have stayed at the same level since that time.

Figure 4.1.3: Average Number of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Morafenobe (Low Intensity)



To illustrate shifts in the proportional distribution of childhood illness; the percentage of diagnoses resulting from the four disease categories are graphed below. Because of a small caseload in Morafenobe, it is difficult to make definitive conclusions regarding the proportional distribution of diagnoses (Figure 4.1.4). From the small sample, however, it is apparent that the proportion of malaria diagnoses increased in 2004, but decreased from 2004 to 2007. Pneumonia/ARI increased in 2005, while diarrhea stayed relatively stable throughout the study period. It is also apparent that by 2007 diagnoses were more evenly distributed among the four disease categories.

Figure 4.1.4: Average Percentage of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Morafenobe (Low Intensity)



Key Informant Interviews

When providers were asked about the main illnesses encountered at the health facility, the top three responses in Morafenobe were malaria, diarrhea, and respiratory illnesses. Regarding whether malaria specifically was seen as a problem, there were mixed responses: Some providers thought that malaria continues to be a problem, albeit less than in the past, while others did not think it was a problem. Despite the relative stability of malaria diagnoses and low level of malaria scale-up in Morafenobe, all providers mentioned that that the number of malaria patients coming to the health clinic had decreased in the past few years because of bed net and IPTp distribution; some of the respondents said that this decrease allowed them to spend more time on non-malaria patients, to conduct outreach to villages, and to focus more on antenatal care (ANC).

In reference to the resources available for treatment of malaria, anti-malarials, IPTp, and LLINs were given as examples. Respondents did not identify any changes in available facilities or equipment.

Finally, when asked what needs to be done to improve the malaria situation in the community, respondents cited community education and behavior change communication (BCC) as main ways to reduce malaria. One respondent mentioned that patients often seek care from traditional healers rather than through a primary health care facility.

It appears as though the facilities visited in Morafenobe have not yet experienced a decrease in malaria burden or a diagonal effect from the limited malaria scale-up. The patient register data confirm that malaria caseload has stayed relatively stable; this is in contrast with some providers' statements that suggest they have more time now because malaria is less of a problem than in the past.

4.2 Findings from Maintirano (medium intensity) District

In Maintirano (medium intensity), malaria control activities, including distribution of bed nets, increased steadily and underwent significant scale-up from 2005 to 2007. Both ACT distribution and RDT usage began in November 2007; by the end of 2007, authorities had implemented seven interventions, including bed nets, in this district (Figure 4.2.1).

Figure 4.2.1: Scale-up of Malaria Interventions in Maintirano (Medium Intensity District) and Number of Bed Nets Distributed

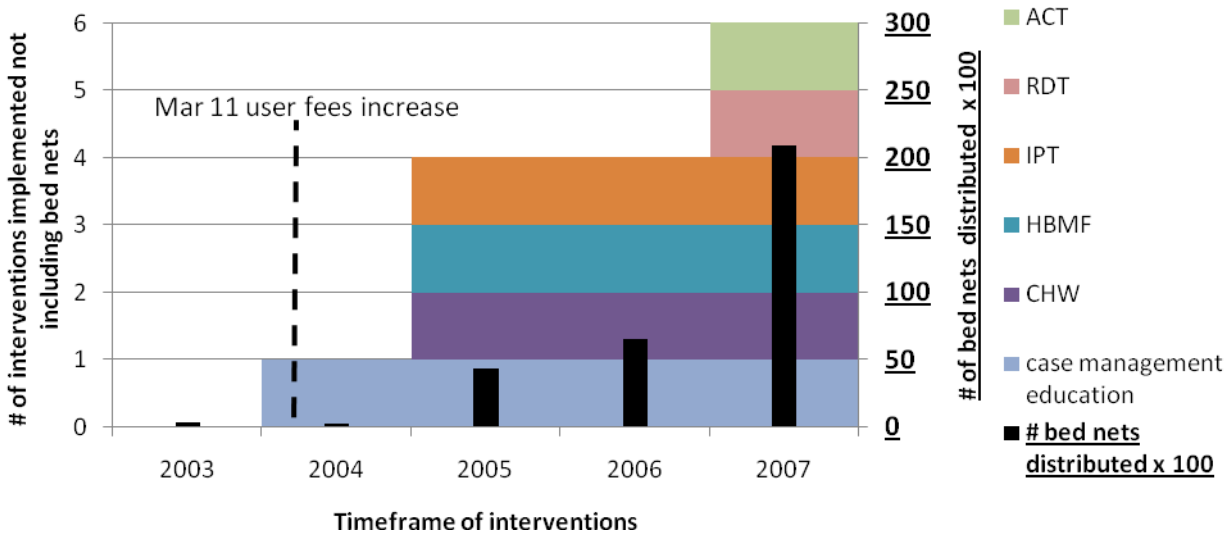
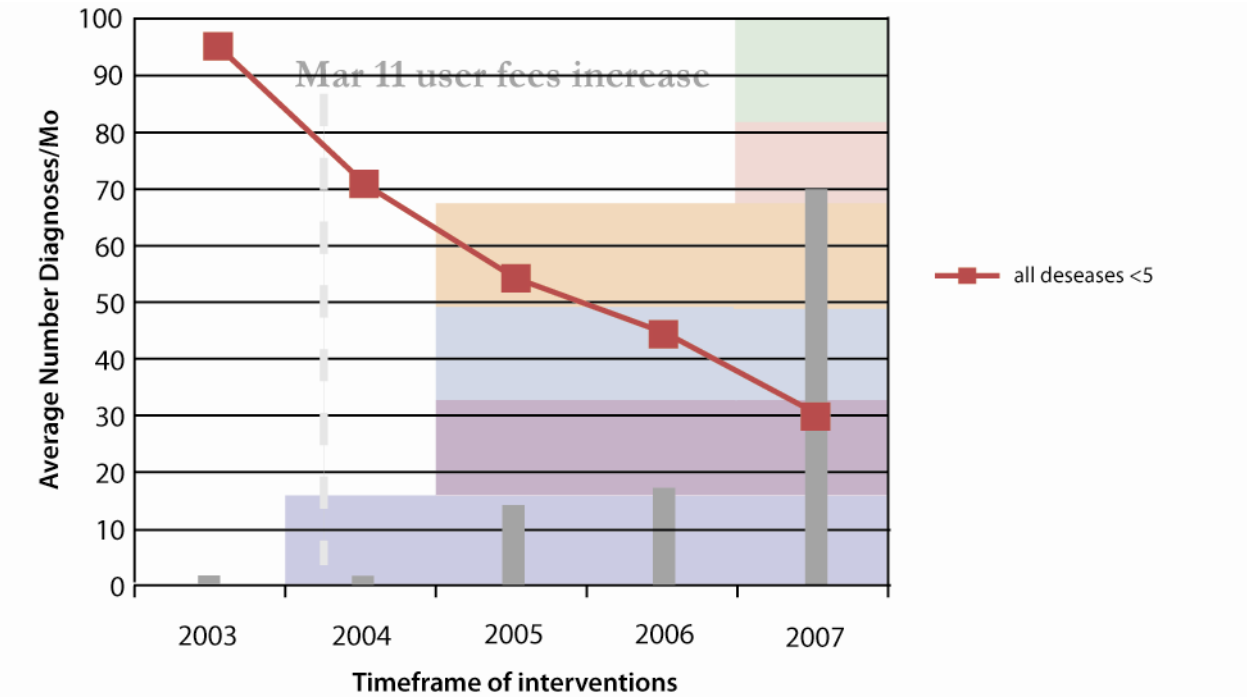


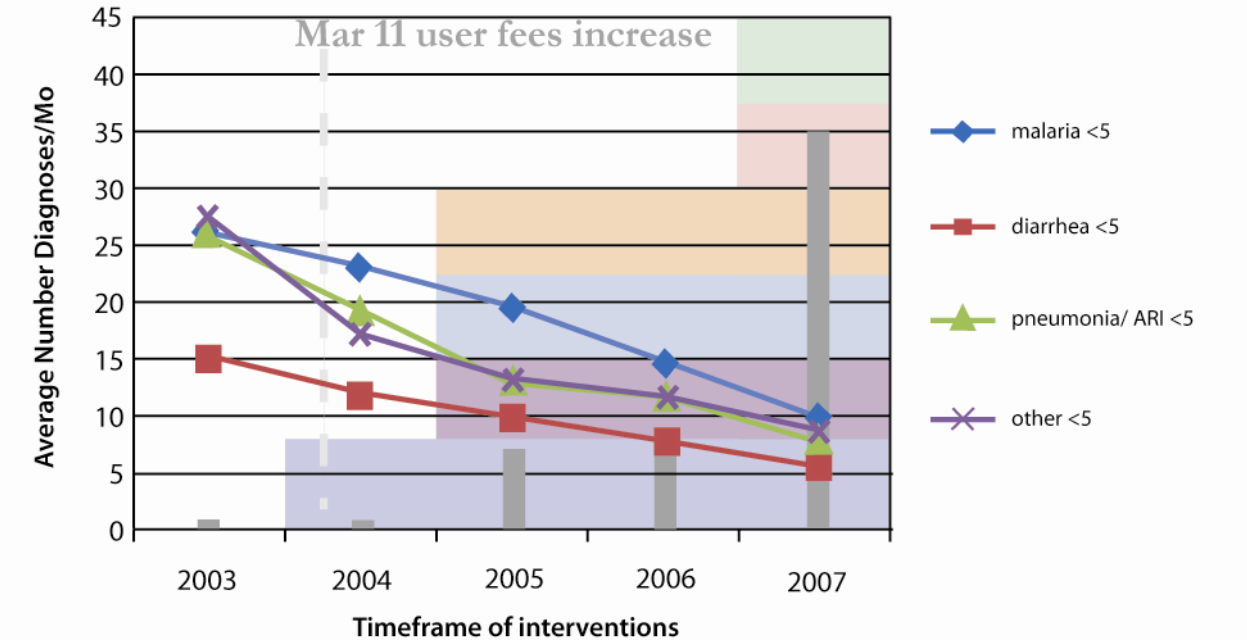
Figure 4.2.2 illustrates that in Maintirano (medium intensity) the number of diagnoses of all diseases for all children < 5 has decreased since 2003.

Figure 4.2.2: Average Number of Diagnoses per month for Children < 5 for All Diseases in Primary Health Clinics Visited in Maintirano (Medium Intensity)



Figures 4.2.3 for Maintirano (medium intensity) demonstrates that the number of diagnoses in children < 5 steadily declined across all diseases over the study period. Because of this general decrease in diagnoses for children < 5 in Maintirano (medium intensity), it is hard to discern relative changes in caseload between malaria, diarrhea, and pneumonia/ARI diagnoses.

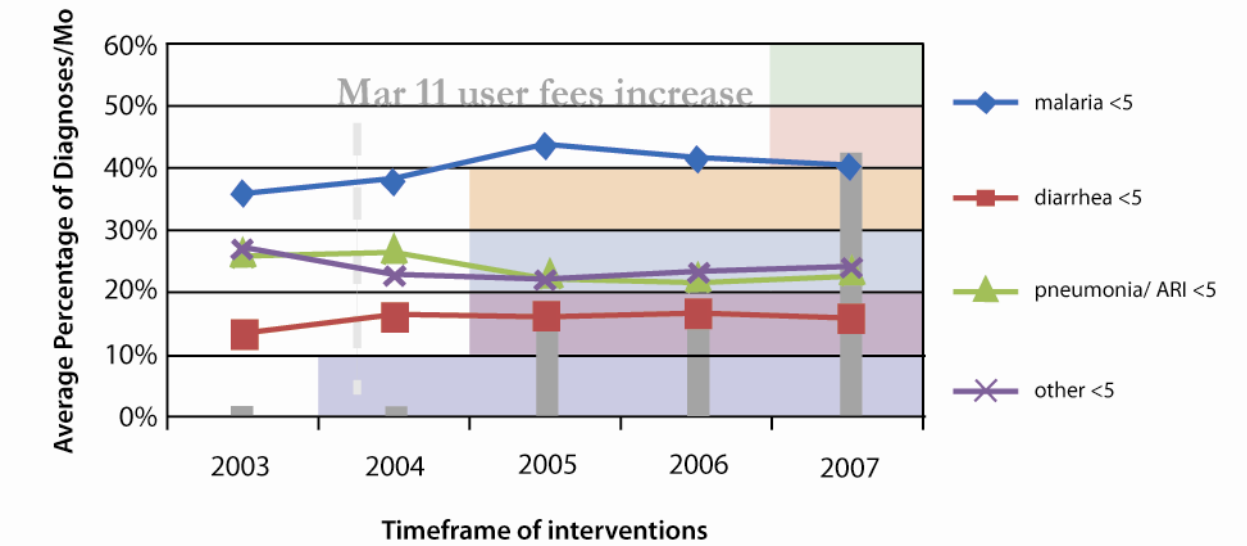
Figure 4.2.3: Average Number of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Maintirano (Medium Intensity)



To better gauge the effect of a decrease in malaria burden on the relative number of diagnoses of other diseases, the average percentage of diagnoses resulting from malaria, diarrhea, and pneumonia/ARI was calculated and graphed in Figure 4.2.4.

This illustrates that in Maintirano (medium intensity) the proportion of diagnoses resulting from malaria trended slightly upwards, while the proportions resulting from diarrhea and pneumonia/ARI stayed relatively stable.

Figure 4.2.4: Average Percentage of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Maintirano (Medium Intensity)



Key Informant Interviews

The qualitative interviews collected perceptions of malaria caseload and control activities from health center staff. These providers identified malaria, diarrhea, and respiratory infections as the most frequent causes of visits to the clinic. They also mentioned the presence of schistosomiasis and sexually transmitted diseases.

Providers identified malaria as a problem, especially during malaria season. Some stated that patients frequently self-medicate and that malaria is a significant cause of absenteeism from both school and from the nutrition clinic, a preventive health service.

Interviewees did not agree when asked about changes in time spent treating malaria; responses varied between a decrease, increase, and no change in time spent. One interviewee stated that time on individual malaria patients increased from 15 to 30 minutes as a result of RDTs and ACTs.

When asked about resources available for treatment of malaria, most interviewees identified only the interventions such as bed nets, RDTs, ACTs, and IPTp. They did not identify any changes in available facilities or equipment.

In interviews, providers identified a need for increased bed net distribution and information, education, and communication (IEC) activities to improve malaria control. One respondent even stated that more resources were needed for other disease programs that are not directly funded.

In Maintirano, the medium intensity district, the caseload steadily declined for children < 5 in general. The breakdown in terms of percentages visiting facilities as a result of malaria, diarrhea, and pneumonia/ARI, however, remained steady. Providers reflected this lack of change in relative caseload as responses did not provide a clear consensus on perceived changes in the time spent on malaria.

4.3 Findings from Soanierana Ivongo (high intensity) District

In Soanierana Ivongo (high intensity) malaria prevention and control scale-up was substantial. Distribution of bed nets increased steadily, with significant scale-up from 2004 to 2006 while both ACT distribution and RDT usage began in June 2006 (Figure 4.3.1),. By the end of 2007, authorities implemented seven interventions including bed nets.

Figure 4.3.1: Scale-up of Malaria Interventions in Soanierana Ivongo (High Intensity District) and Number of Bed Nets Distributed

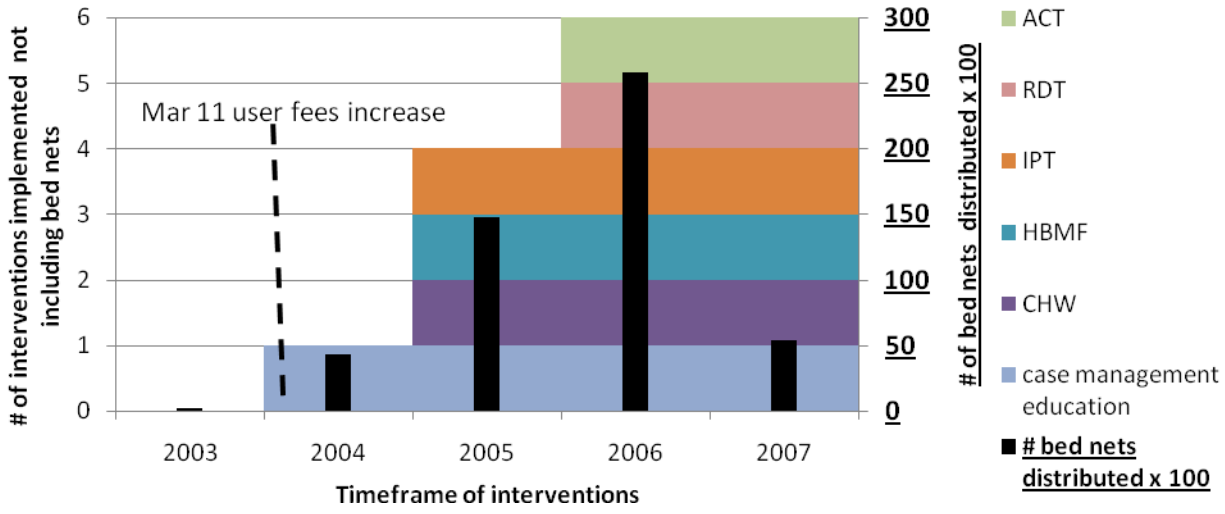


Figure 4.3.2 illustrates that in Soanierana Ivongo (high intensity) the number of diagnoses of all diseases for children < 5 has decreased since 2003.

Figure 4.3.2: Average Number of Diagnoses per month for Children < 5 for All Diseases in Primary Health Clinics Visited in Soanierana Ivongo (High Intensity)

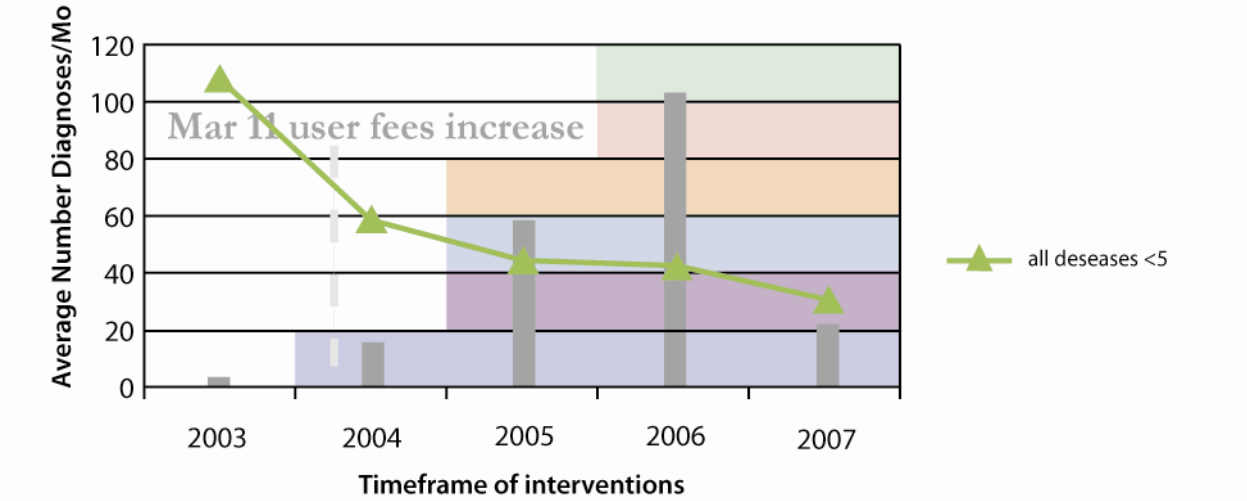
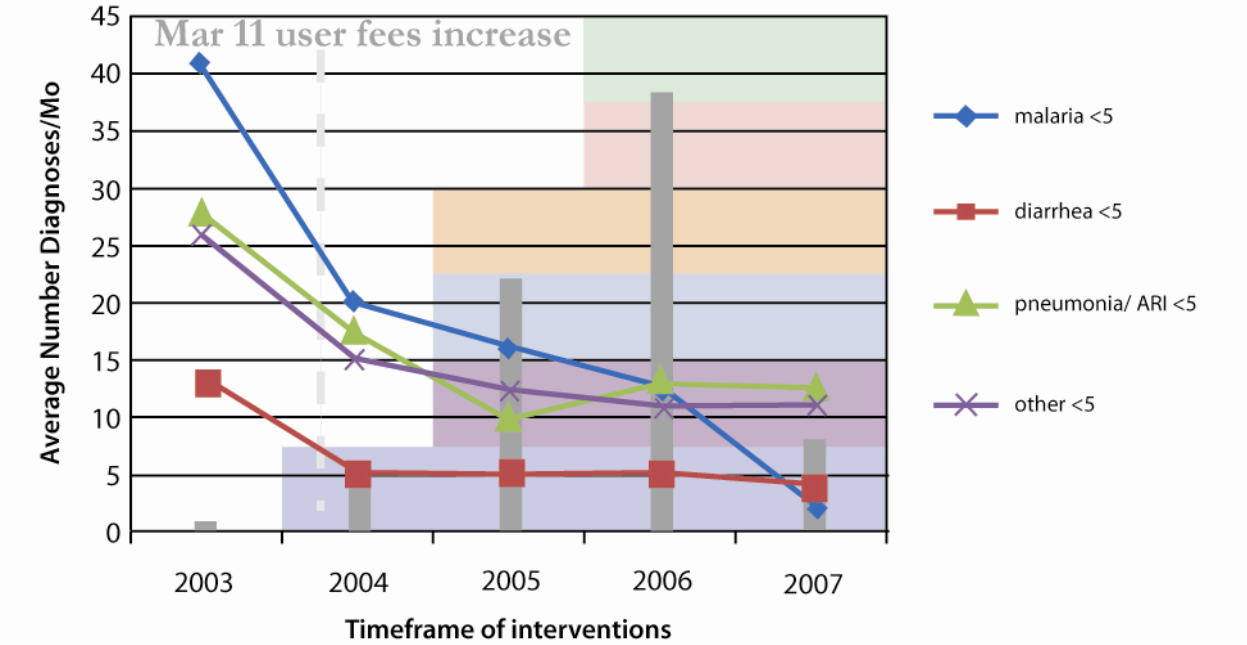


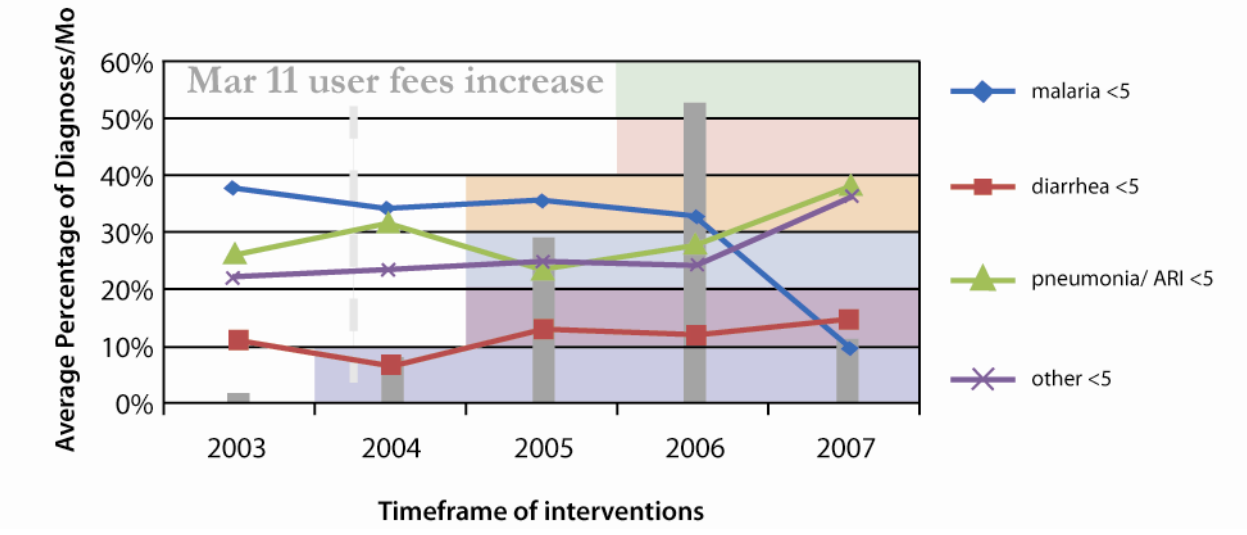
Figure 4.3.3 for Soanierana Ivongo (high intensity) demonstrates that the number of diagnoses in children < 5 steadily declined across all diseases over the study period.

Figure 4.3.3: Average Number of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Soanierana Ivongo (High Intensity)



To better gauge the effect of a decrease in malaria burden on the relative number of diagnoses of other diseases, the average percentage of diagnoses resulting from malaria, diarrhea, and pneumonia/ARI was calculated and graphed in Figure 4.3.4. This figure illustrates that in Soanierana Ivongo (high intensity) the proportion of malaria-related diagnoses decreased over the study period, while the proportion of pneumonia/ARI-related diagnoses increased—most notably from 2006 to 2007.

Figure 4.3.4: Average Percentage of Children < 5 Diagnoses per Month that were Malaria, Diarrhea, or Pneumonia in Primary Health Clinics Visited in Soanierana Ivongo District (High Intensity)



It is possible that the decrease in the proportion of malaria diagnoses in 2007 could be a result of missing data. In 2007 there were five missing months, while in 2006 there was one. In addition, four of the five missing months in 2007 occurred during the high rainfall months of January, February, and March. It is possible that the average number of malaria diagnoses per month should be higher in 2007, but since data are still available from most of the high transmission period for four out of the five CSBs visited, it seems unlikely that the decrease in malaria diagnoses could be wholly attributed to the missing data alone (for 2007, 21 out of 25 months of data from the five CSBs are available from January to March and November to December).

When comparing the scale-up of malaria activities as described by central authorities with the changes in percentage of diagnoses resulting from the four disease categories, it is interesting to note that the marked decrease in percentage of malaria diagnoses and the increase in proportion of pneumonia/ARI occurred in 2007, after significant scale-up of distribution of bed nets and introduction of ACTs and RDTs. The simplest explanation for this decrease is the reclassification of malaria as pneumonia/ARI because of ruling out malaria with RDTs. Unfortunately, data on routine use of RDTs at CSBs were not available, and their use could not be linked to changes in the proportional distribution of diseases.

Key Informant Interviews

The qualitative interviews in Soanierana Ivongo (high intensity) captured perceptions of malaria activity scale-up and disease burden from health center staff. Most of these providers identified malaria and diarrhea as frequent causes of visits to the clinic. Even though malaria is perceived as a problem, interviewees noted that it is less of a problem than in the past and only during certain portions of the year such as cyclone season. Reasons cited for a decline in malaria included mass distribution of bed nets and more precise diagnosis with RDTs.

Interestingly, even though individuals perceived malaria cases to be on the decline, most individuals interviewed mentioned that the overall time spent on malaria patients has not decreased. This results from the scale-up of RDT use, which according to one interviewee requires 20 minutes per patient.

When asked about resources available for treatment of malaria, most interviewees identified only the interventions such as bed nets, RDTs, ACTs, and IPTp. They did not identify any changes in available facilities or equipment.

When queried about ways in which to improve malaria control, providers cited the need for increased IEC and community health worker activities. They also identified the need for more environmental control of mosquito populations through the removal or trimming of shrubs and brush.

Overall, the data from patient registers and the qualitative interviews convey that an increased access to malaria control interventions coincides with a decrease in malaria caseload. The data suggest the presence of a diagonal effect in terms of the change in proportional distribution of diseases; for instance, less malaria and greater pneumonia/ARI diagnoses, but it is not clear if this represents a significant shift in provider time, as they are spending more time with individual malaria patients because of RDTs.

4.4 Results across Districts

Data can be compared across the three districts: Morafenobe (low intensity), Maintirano (medium intensity), and Soanierana Ivongo (high intensity). By comparing results across districts, the study can evaluate whether increased scale-up of malaria activities potentially impacted malaria caseload, or resulted in a diagonal effect.

Figure 4.4.1 illustrates the change in the average number of children < 5 malaria diagnoses per month in the CSB visited within the three districts. In both Maintirano (medium intensity) and Soanierana Ivongo (high intensity), there was a decline in the average number of children < 5 malaria diagnoses per month. In Morafenobe (low intensity), malaria diagnoses have stayed at the same level.

Figure 4.4.1: Average Number of Children < 5 Malaria Diagnoses per Month in CSB Visited

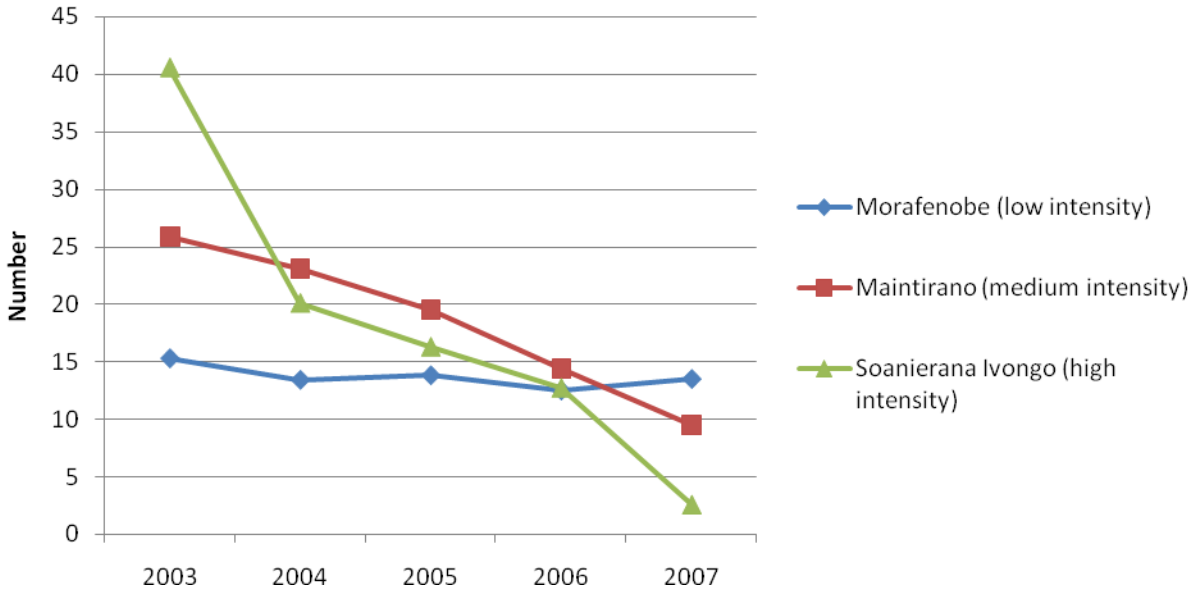
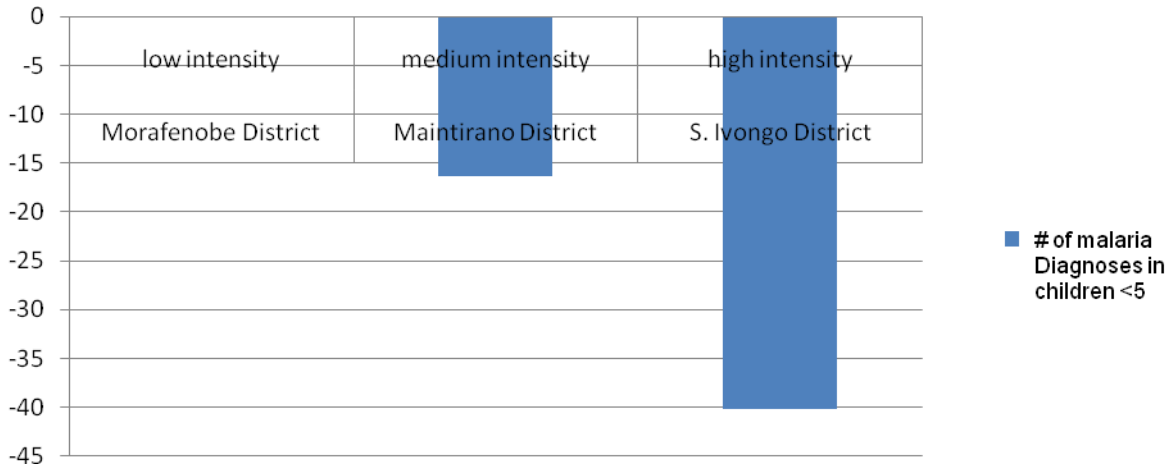


Figure 4.4.2 confirms that the reduction in the average number of malaria diagnoses from 2003/2004 to 2007 in children < 5 is greatest in Soanierana Ivongo (high intensity). This is followed by a sizable change in Maintirano (medium intensity), while Morafenobe (low intensity), experienced minimal change.

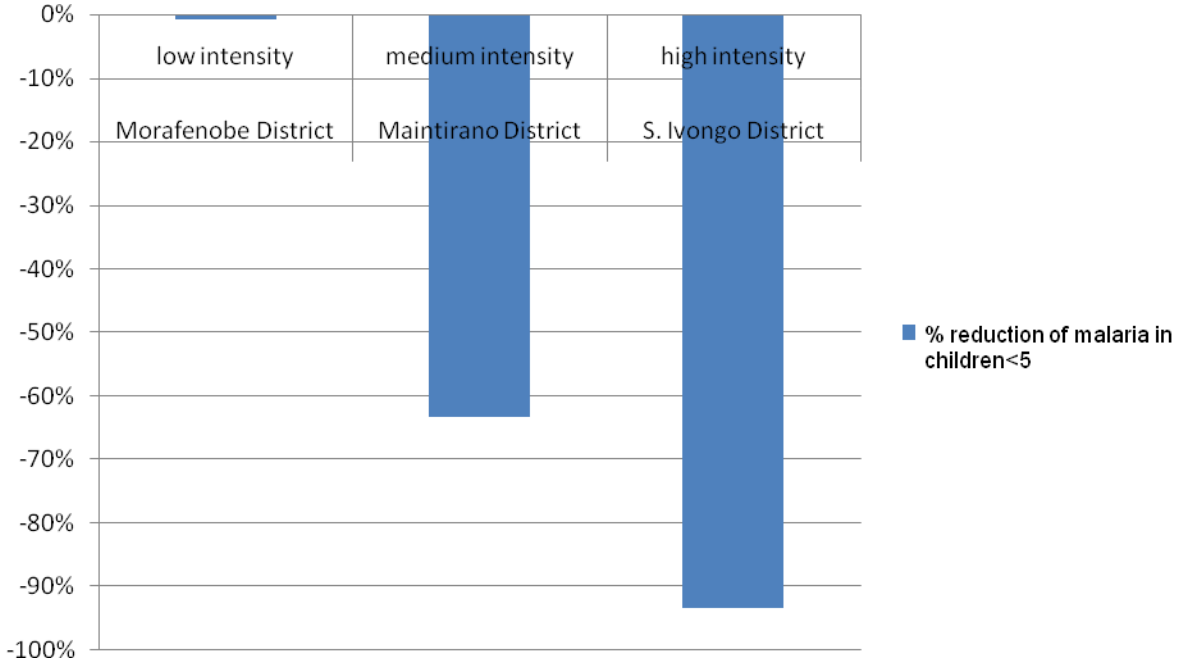
Figure 4.4.2: Difference in the Average Number of Diagnoses per Month of Malaria in Children < 5 from 2003/2004 to 2007



The changes in the number of diagnoses of malaria in Figure 4.4.2 were calculated by aggregating facility data from 2003/2004 to 2007 using the earliest year in which at least 7 of 12 months of data were available. One facility in the high intensity district of Soanierana Ivongo was excluded from the analysis because sufficient data were not available in 2003/2004. Sufficient data in 2003 were available for all other facilities, except for Andramy and Atsingilotoka in Morafenobe, the low intensity district. For these two facilities, the change in malaria diagnoses for children < 5 was calculated from 2004 to 2007.

To further illustrate the relative reduction in malaria burden at health facilities visited within the three districts, Figure 4.4.3 shows the reduction in malaria diagnoses in children < 5 as a percentage, using values in 2003/2004 as baselines. Malaria diagnoses decreased by more than 90 percent in the high intensity district, by approximately 60 percent in the medium intensity district, and minimally in the low intensity district.

Figure 4.4.3 Percent Reduction in Average Number of Malaria Diagnoses in Children < 5 from Baselines in 2003/2004 to 2007



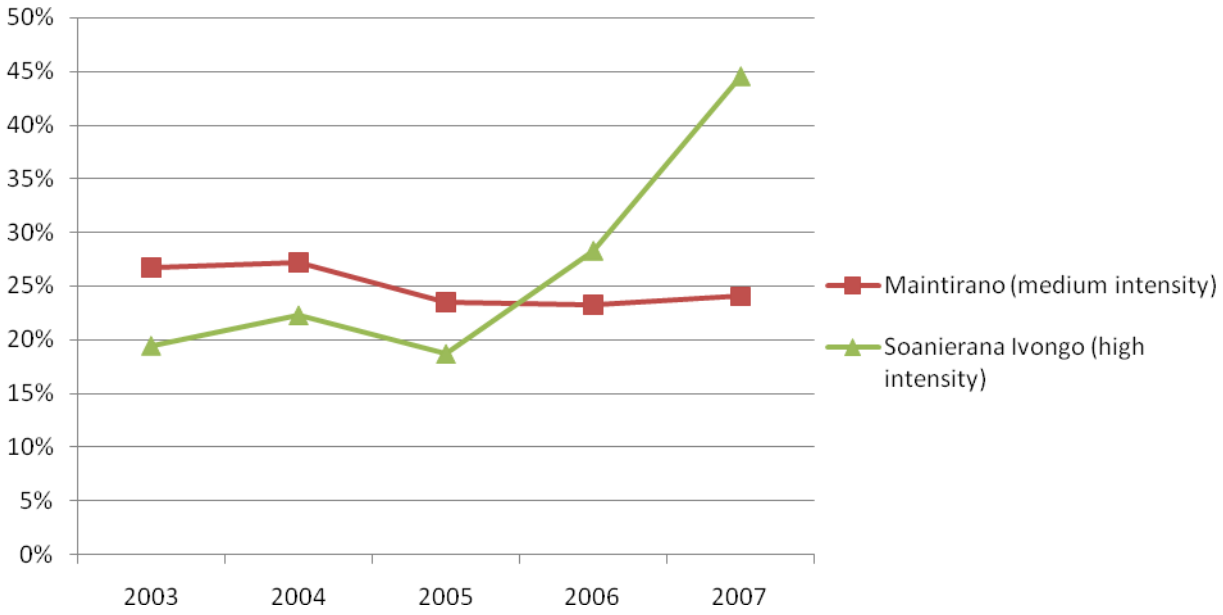
To assess the diagonal effect on proportional distribution of disease, the percentage of malaria diagnoses in the two districts where malaria caseload declined are examined. The low intensity district is excluded because it did not satisfy the first criteria for evidence of a potential diagonal effect in proportional distribution of disease (i.e., a decrease in malaria burden).

In the high intensity district, the proportion of malaria-related diagnoses declined while in the medium intensity district this remained stable (Figure 4.4.4). The change in proportional distribution of diseases suggests potential evidence of a diagonal effect in the high intensity district only.

Figure 4.4.4: Average Percentage of Diagnoses per Month that were Malaria in Primary Health Clinics Visited

This change in proportional distribution of diseases is confirmed by Figure 4.4.5, which illustrates the change in percentage of diagnoses resulting from pneumonia/ARI. The percentage stays stable for the medium intensity district while increasing in the high intensity district, supporting the possibility of a diagonal effect in the high intensity district.

Figure 4.4.5: Average Percentage of Diagnoses per Month that were Pneumonia/ARI in Primary Health Clinics



When comparing the qualitative data across districts, the most notable difference is the clear assertion by providers in the high intensity district that malaria burden had decreased. Additionally, providers in this district stated more consistently than in the two other districts that time spent on individual malaria patients had increased because of the use of RDTs. Lastly, the key informant interviews were notable for the general consensus amongst providers that increased IEC/BCC activities are necessary.

5 Discussion

Malaria control and treatment activities were implemented in all three districts between 2003 and 2007. The district with the most intense scale-up of malaria activities was Soanierana Ivongo, especially during 2006 when bed net distribution was at a peak and ACT and RDTs were introduced. Maintirano (medium intensity) experienced a similar scale-up, although at a later date (2007). In Morafenobe (low intensity), bed net distribution was low and only a few interventions had been implemented by 2007.

The malaria control and treatment activities implemented in both Soanierana Ivongo (high intensity) and Maintirano (medium intensity) could have reduced demand for therapeutic services. In these two districts, both the number of malaria diagnoses in children < 5 and the overall number of diagnoses given at the health facility reduced between 2003 and 2007. In Soanierana Ivongo (high intensity), the reduction in malaria diagnoses was most apparent between 2006 and 2007, possibly as a result of the increase in bed net distribution and the introduction of RDTs and ACTs. Significant reductions in malaria may not have occurred in Maintirano because scale-up of bed nets did not occur until 2007, the last study year, and ACTs and RDTs were only introduced in November of that year. By contrast, in Morafenobe (low intensity), the number of malaria diagnoses in children < 5 did not decrease and the number of overall diagnoses actually increased slightly.

This study sought to understand whether reductions in therapeutic services for malaria allowed for a refocusing of clinical efforts. This report achieved this by collecting and analyzing information on non-malarial diseases to understand the “diagonal effect” or “spillover” effect of malaria control and treatment activities on other diseases that do not receive significant vertical funding. A diagonal effect on the proportional distribution of diseases is evident when an absolute decrease in the number of malaria diagnoses is combined with an increase in the proportion of diagnoses attributed to a disease not receiving vertical funding, in this case, pneumonia/ARI or diarrhea. In Maintirano (medium intensity), the demand for therapeutic services for malaria did decrease, but this did not translate into a system shift as there was no change in the proportion of diagnoses attributed to either pneumonia/ARI or diarrhea. In Soanierana Ivongo, however, the proportion of diagnoses resulting from malaria decreased while the proportion resulting from pneumonia/ARI increased, especially after 2006, when there was significant scale-up of malaria activities. This result suggests the effect of malaria activity scale-up on utilization of services for pneumonia/ARI may be graded, and a significant effect is apparent only after a considerable increase in malaria control activities.

The key informant interviews provided perspective on how malaria program scale-up may have produced a diagonal effect on providers’ time and the resources available to them. Many of the providers interviewed stated that malaria burden had decreased. This was the case in Morafenobe (low intensity), which contradicted the register data that indicated a slight increase in cases. This may result from the slight decrease in the proportion of diagnoses attributed to malaria in Morafenobe; this may be more salient and noticeable to providers than the total increase in number of malaria diagnoses. No consensus regarding changes in malaria burden in Maintirano (medium intensity) was apparent. In Soanierana Ivongo district (high intensity) on the other hand, a majority of providers clearly indicated a perceived decline in malaria burden. These

results further suggest that malaria scale-up may have a graded effect as consensus around decreased malaria burden was only apparent and valid in the high intensity district.

Many providers also stated that the decrease in malaria caseload allowed them to refocus some of their time and effort on activities such as caring for other diseases, improving organization of the health center, and increasing patient outreach. In Soanierana Ivongo (high intensity), however, many providers stated that the amount of time spent on individual malaria patients increased as a result of the use of RDTs. Previously, diagnosis of malaria was made on clinical grounds; whereas with RDTs, providers must observe a patient clinically, collect blood specimens for analysis, and await test results. This perception of an increased time effect of RDTs was evident in the high intensity district because it was the only district to implement RDT use for more than a few months; as other districts increase use of RDTs, this perception may spread. This response from Soanierana Ivongo suggests that as RDT use is scaled-up, efforts also need to be made to streamline and organize clinical processes.

This study stipulates that vertical funding could cause a diagonal effect within the health system in a variety of ways, many of which could not be directly observed. Because of conflicting results, however, it is not clear whether a diagonal effect exists. The system shift from malaria diagnoses to pneumonia/ARI diagnoses that corresponds with malaria intervention scale-up in Soanierana Ivongo, the high intensity district, suggests a potential diagonal effect, but because providers also conveyed an increase in time allotted to individual malaria patients as a result of using RDTs, it is not clear if the decrease in caseload attributed to malaria is significant enough to offset the increase in provider time. If it is, then a diagonal effect is more probable. Further studies are needed to answer this question.

Unfortunately the key informant interviews did not gauge changes in available resources well, as most interviewees just named implemented malaria activities. Future examinations of diagonal effects on resources available at health facilities will need to be clearer and more focused to assess this type of diagonal effect.

The reasons for a potential diagonal effect of malaria scale-up in Soanierana Ivongo are unknown. Possible explanations include a decrease in malaria burden from increased malaria control activities; changes in malaria case definition resulting from increased use of RDTs; or underlying factors such as population migration and natural variation in disease incidence. The results suggest that further research and analysis pertaining to whether vertical funding of malaria has a diagonal effect on pneumonia/ARI care is necessary. A prospective experimental study could elucidate whether a diagonal effect exists, and if it does, is it because of RDTs and better differentiation between malaria and pneumonia/ARI, or does increase in prevention activities, such as bed net distribution, reduce the incidence of malaria.

Although this study could not gather direct evidence or data on RDT use, as this was not included in HMIS forms for the health clinics, introduction of these tests is the likely explanation for the increase in pneumonia/ARI cases in the high intensity district. Most likely “clinical” malaria is now being confirmed, and this confirmation is responsible for at least some of the decrease in malaria diagnoses. As use of RDTs increase in the other two districts, a similar decline in malaria and reclassification as pneumonia/ARI may become evident. To verify this

finding, and to inform future analyses, HMIS systems in countries will need to be adapted to collect data on RDTs and confirmed malaria.

Interestingly, although this study was not designed to assess changes in quality of care (a potential modality for a diagonal effect), the reclassification of suspected malaria as pneumonia/ARI has clear implications for receiving appropriate treatment. If introduction of RDTs is permitting providers to diagnose and treat both malaria and pneumonia/ARI more effectively, then malaria scale-up is improving quality of care for both diseases. If patients are receiving more appropriate therapeutic care, and health systems are using medications more efficiently, a diagonal effect may exist. More data on the treatment of pneumonia/ARI are necessary to determine if this is in fact the case. In addition, as countries scale up RDT use, they may be able to anticipate and explain any concomitant increase in pneumonia/IRA cases.

The key questions that arise from this study concern the nature and existence of the diagonal effect as it pertains to proportional distribution of disease, provider time, and the quality of health services. If the diagonal effect exists, it is a boon to proponents of vertical programming efforts and can further justify this expedient approach. Questions still remain, however, regarding the relative merits of vertical approaches versus broader health system interventions, and head-to-head comparisons, or trials, are necessary. At the very least, this study suggests that scale-up of malaria control activities coincides with a decrease in malaria, and further scale-up is probably justified.

Appendix A: Suggestions for Future Studies on the Diagonal Effect

The diagonal funding study presents some interesting data, observations, results, and questions regarding malaria programming. Based on this experience, the following approaches may be useful if the study was repeated:

- It would be beneficial to get data on confirmed malaria and rapid diagnostic test (RDT) use. The numbers of RDTs used, the results, if the RDTs are used on all patients or just patients for whom the diagnosis is not clear. In addition, information on stock-outs/availability of RDTs would be useful.

- A more focused data collection process concentrating on just the relevant information from the registers (diagnosis, laboratory test, and treatment per case) may prove more efficient and useful. More data on the treatment of diseases such as diarrhea and pneumonia/acute respiratory infection (ARI) may be useful to gauge any change in quality.

- To look at provider time, it may be better to gather data only from the 2 to 3 months when malaria transmission is at a peak each year; changes evident during these periods may be more reflective of changes in provider time.

- It is difficult to gauge a diagonal effect in health systems that are not saturated, because it is not clear that any shift or freeing of the system is being utilized to address health needs. Studying systems that are saturated or demonstrating the clear existence of unmet health needs would be useful.

- Expand the qualitative component in general, and consider adding a section concentrating on specific equipment provided by malaria programs and then interview individuals about how this equipment may be used when caring for other diseases (e.g., a new microscope).

- Additionally the findings from quantitative assessments could help develop informative qualitative studies—a two-stage study design may be appropriate.

- Perhaps the best way to see how malaria scale-up affects the health system at the clinic level is to adapt a tool (such as the HIV/AIDS Service Provision Assessment), which uses accepted standards to evaluate both clinics and the resources available to them.

- In the future, it would be better to do a census of health facilities or survey a random sample rather than a purposeful sample so that data are more representative. Also, future studies should try to match malaria transmission patterns better in regions being compared.

- The collection of register data on non-therapeutic services may serve as a useful gauge of changing usership at facilities. An appropriate indicator may be the number of infants receiving a specific vaccine.

- Collect data to evaluate the connection between disease programs. Malaria programs are connected to Expanded Program on Immunization (EPI) and the antenatal care (ANC) program through the conditional distribution of bed nets; pregnant women are given a bed net during their first ANC visit, and mothers are given a net upon their child's completion of the

primary immunization series. It would be useful to know if these linkages between programs have a positive effect on service uptake, and if so, how these programs should be organized to improve efficacy and service uptake across all three programs—malaria, EPI, and ANC.

- It may be interesting to look at the impact of RDTs on the care of meningitis vs. malaria, and how health systems are currently addressing these diseases that may present similarly and have equally dire consequences.

General operational suggestions

- It is very helpful to hire in-country consultants to organize logistics before arrival.

- More efficient to hire a 4-to-5 person team of consultants for data collection rather than hire staff within each health center.

- Spending significant time training the data collection team and piloting the data collection tool was key, especially when defining the different diagnoses in terms of local shorthand and jargon.

- A relatively small caseload seeking care in health facilities allows for rapid collection of data from patient registers. This may vary from country to country.

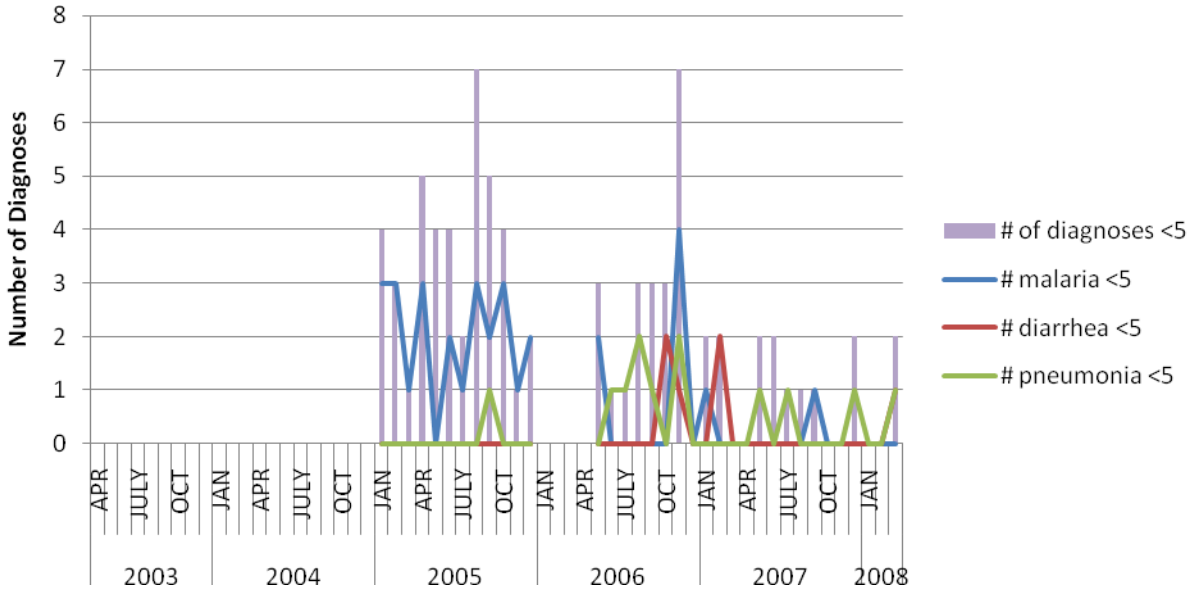
- Collecting contextual information is key; the duration of interventions helps inform results and facilitates meaningful analysis.

- It is important to know the context of how information is collected within a country before arrival in country. Knowledge of the actual Health Management Information Systems, the patient register forms, and any information on data quality from these two sources will determine what analyses are possible. This will differ greatly from country to country.

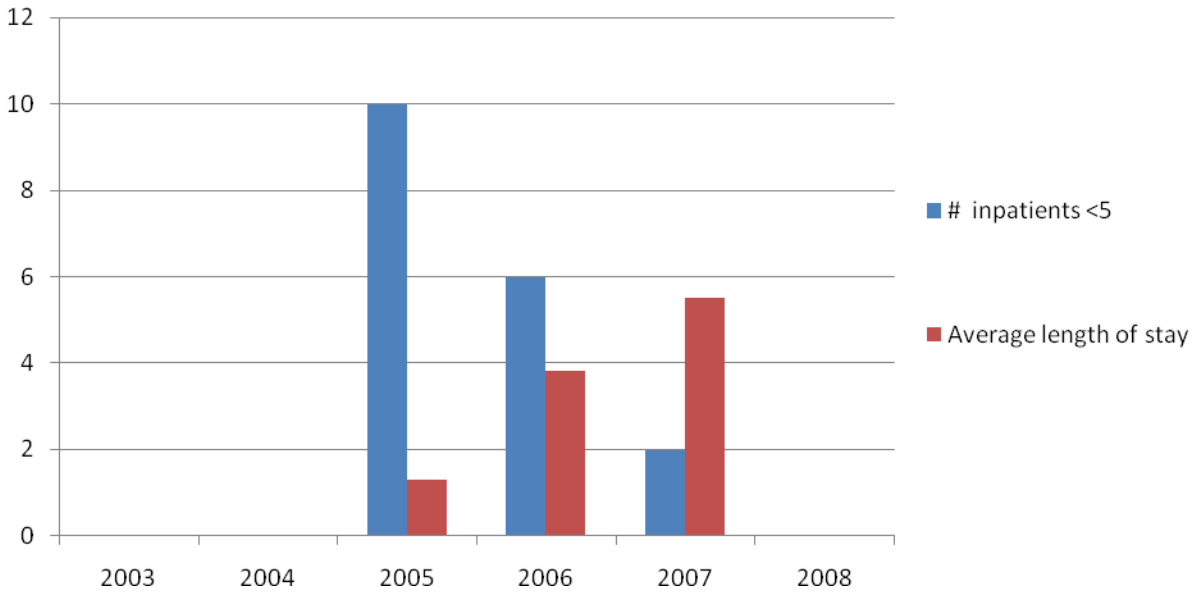
- It is important to know the health system—and where children < 5 are being treated the most frequently (inpatient vs. outpatient) before arriving in the country—as this will determine what type of data is available for analysis.

Appendix B: Hospital Analysis[9]

Number of Diagnoses of Malaria, Diarrhea or Pneumonia in Inpatients < 5 in the Soanierana Ivongo District Hospital



Number and Length of Stay in Days for Inpatients < 5 admitted for Malaria in the Soanierana Ivongo District Hospital

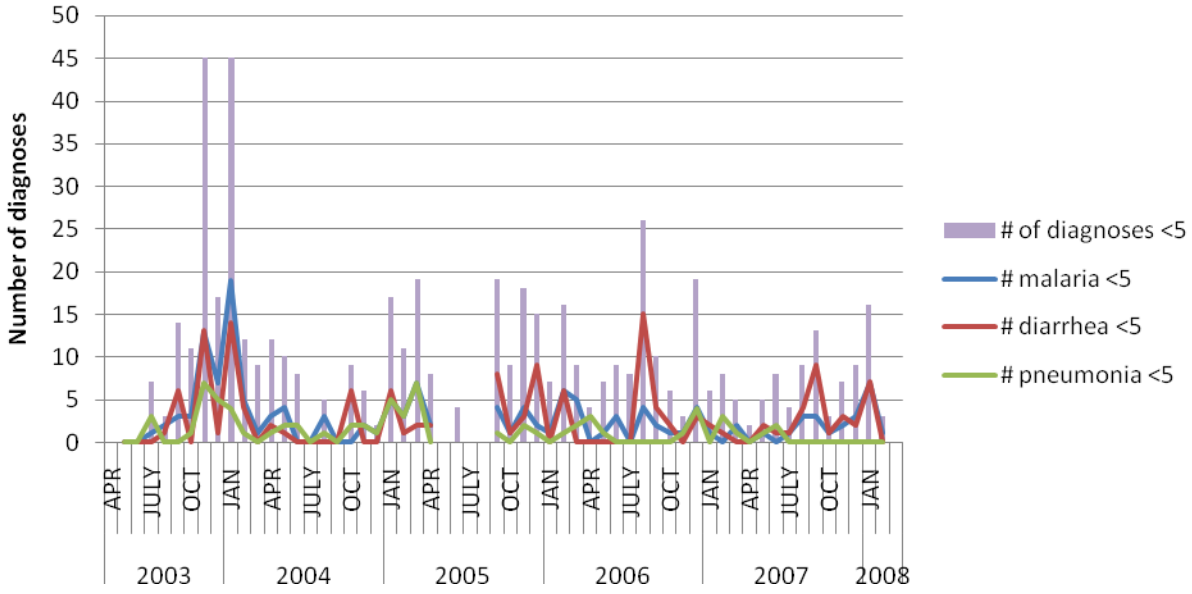


* Missing register at Soanierana Ivongo District Hospital, 2003 and 2004

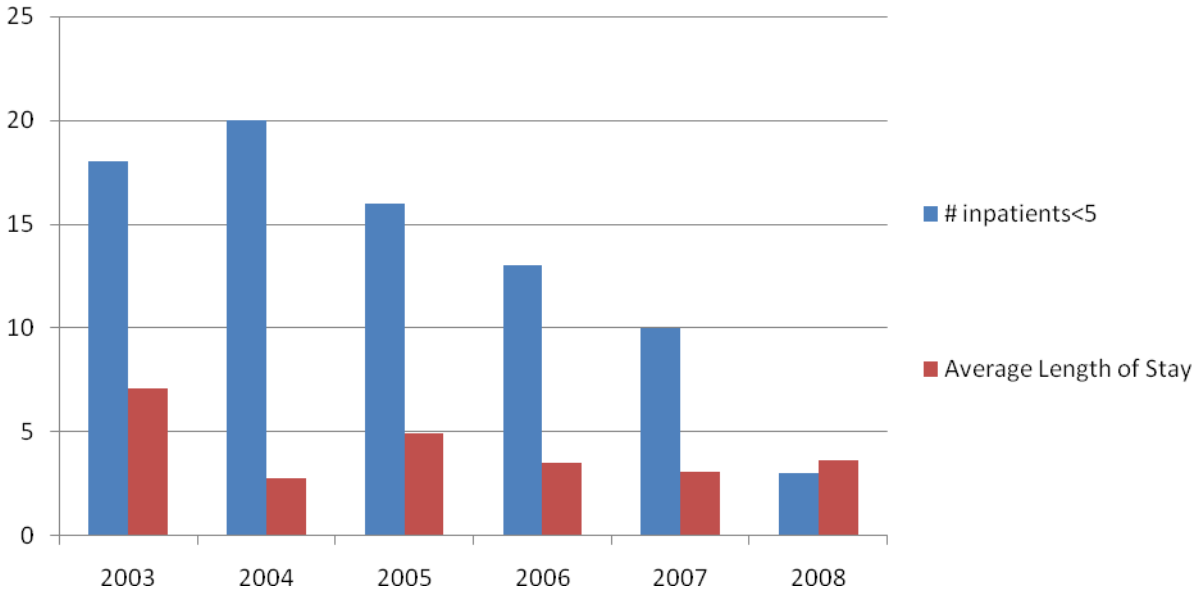
[9] The inpatient register was missing at Morafenobe District Hospital for 2003–2008. A clinician at the hospital informed the data collection team that there have been only 3 to 5 diagnoses of children < 5 hospitalized during the past 3 years. This information is supported by the Health Management Information Systems data collected in this assessment.

Appendix B: Hospital Analysis (continued)

Number of Diagnoses of Malaria, Diarrhea or Pneumonia in Inpatients < 5 in the Maintirano Regional Reference Hospital



Number and Length of Stay in Days for Inpatients < 5 Admitted for Malaria in the Maintirano Regional Reference Hospital



Appendix C: Missing Register Information

The following table demonstrates missing registers (n/a) or the dates within a given month when data were missing.

		Ambodiampana	Antanifotsy	Fotsialanana	Manakatafana	Soanierana Ivongo CSB	Soanierana Ivongo CHD	Ankisatra	Betanatanana	Mafajijo	Maintirano CSB	Maintirano CHRR	Andramy	Atsingilotoka	Morafenobe CSB	Morafenobe CHD
2003	Jan			1-10			n/a				n/a	n/a	n/a	n/a		
	Feb						n/a				n/a	n/a	n/a	n/a		
	Mar						n/a				n/a	n/a	n/a	n/a		
	Apr			n/a			n/a					n/a	n/a	n/a		
	May						n/a						n/a	n/a		
	Jun	n/a				n/a	n/a						n/a	n/a		
	Jul	n/a				n/a	n/a						n/a	n/a		
	Aug	n/a				n/a	n/a					1-25	n/a	n/a		
	Sep	n/a				n/a	n/a						n/a	n/a		
	Oct	n/a					n/a								14-31	
	Nov	n/a		21-30			n/a								n/a	
	Dec	n/a		n/a		22-31	n/a	6-31		n/a					n/a	
2004	Jan	n/a		n/a		n/a	n/a			n/a					n/a	
	Feb	n/a				n/a	n/a				1-22				n/a	
	Mar	n/a				1-14	n/a	20-29,31							n/a	
	Apr	n/a		14-30			n/a								n/a	
	May	n/a		n/a			n/a								n/a	
	Jun	n/a		n/a			n/a								n/a	
	Jul	n/a		n/a			n/a									
	Aug	n/a		n/a			n/a									
	Sep			1-8			n/a									
	Oct			20-31			n/a									
	Nov	n/a		n/a			n/a									
	Dec			n/a			n/a									

		Ambodiampana	Antanifotsy	Fotsialanana	Manakatafana	Soanierana Ivongo CSB	Soanierana Ivongo CHD	Ankisatra	Betanatanana	Mafajijo	Maintirano CSB	Maintirano CHRR	Andramy	Atsingilotoka	Morafenobe CSB	Morafenobe CHD
2005	Jan				n/a											
	Feb				n/a											
	Mar				n/a											
	Apr				n/a											
	May				n/a							n/a				
	Jun				n/a											
	Jul				n/a							n/a				
	Aug				n/a							n/a				
	Sep				n/a											
	Oct				n/a											
	Nov				n/a											
	Dec				1-13											
2006	Jan						n/a									
	Feb						n/a									
	Mar						n/a									
	Apr						n/a									
	May															
	Jun															
	Jul		n/a												16-31	
	Aug														1-14	
	Sep															
	Oct															
	Nov															
	Dec															
2007	Jan	n/a														
	Feb	n/a														
	Mar	1-27		23-31												
	Apr															

		Ambodiampana	Antanifotsy	Fotsialanana	Manakatafana	Soanierana Ivongo CSB	Soanierana Ivongo CHD	Ankisatra	Betanatanana	Mafajijo	Maintirano CSB	Maintirano CHRR	Andramy	Atsingilotoka	Morafenobe CSB	Morafenobe CHD
	May			11-31												
	Jun															
	Jul							n/a								
	Aug							n/a								
	Sept							n/a								
	Oct															
	Nov															
	Dec															
2008	Jan															
	Feb															
	Mar										n/a	n/a	n/a	n/a		

Appendix D: Key Informant Interview Questionnaire

Interview Background Information	
Date	
Region/District	
Name of Facility	
Name of Respondent	
Title of Respondent	
Name of Interviewer	

About This Interview
We are conducting a rapid assessment of malaria control interventions to document malaria's effect on this facility and the community. We will not report your comments directly or attribute your view directly to you. We will be producing a report that is intended to provide policymakers with trends in the programs implementation and progress toward reaching its goals. If you are not comfortable with any questions, you may skip that question or choose to stop the interview. Are you willing to participate? Yes ❒ No ❒ (Stop interview)

1) What is your role at this health facility?

2) Describe the types of illnesses you generally encounter at this health facility.

3) Is malaria a problem in this community?

    a. If so, how does it affect the community? How does it affect your daily work? Why do you think malaria is such a big problem in this community?

4) When was the start date of the following interventions in this facility?
    a. ACTs:
    b. Sulfadoxine-pyrimethamine for pregnant women (IPTp) distribution:

5) Do you have user fees in this facility?

6) Have you seen any changes in the number of malaria patients that come to this health facility in the past year? Two years? In general, do you think the number of malaria patients has increased, decreased, or stayed the same in the past 2 years?

a. Why do you think malaria has increased, decreased, or stayed the same? Has this happened with children < 5? Has this happened with pregnant women? How do you think this is affecting the community? Why do you think this has happened? How does this affect your daily tasks as a health worker?

7) How much of your time do you currently spend in an average day on malaria patients? Has this changed in the past year? Two years?

    a. If so, why has your time with malaria patients changed? How has this affected your day-to-day work? Do you have more time to spend on other patients that do not have malaria? If so, describe the illnesses that you now have time to see?

8) What current resources (funding, infrastructure, equipment) do you have for the care and treatment of malaria in this facility?

    a. Were the current resources you have now here a year ago? Two years ago? If not, how has this changed your ability to care for malaria patients?
    b. Are the current resources used for patients with non-malarial diseases? If so, please describe how these resources are being used for patients with non-malarial diseases.

9) What do you think needs to be done to improve the malaria situation in this community?