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2015 OUTCOME MONITORING SURVEY (OMS) IN THE USAID INTERVENTION ZONES IN THE SOUTH AND SOUTH EAST REGIONS OF MADAGASCAR

FINAL REPORT

April 2016

This publication was produced at the request of the United States Agency for International Development. It was prepared independently by BROOKESIA Madagascar and Consultant Associates Cabinets.

PERFORMANCE EVALUATION:

2015 OUTCOME MONITORING SURVEY IN THE USAID INTERVENTION ZONES IN THE SOUTH AND SOUTH EAST OF MADAGASCAR

Acronym list

ACT	Artemisinin-Combination Therapy
ANC	AnteNatal Care
ARI	Acute Respiratory Infection
BCC	Behavior Change Communication
BHC	Basic Health Center
CCDS	Comité Communal pour le Développement de la Santé (Communal Committee for Health Development
CHV	Community Health Volunteer
COF	Completion of Field Work
COR	Contracting Officer's Representative
CSB	Centre de Santé de Base
CU5	Children under 5 years-old
DMISC	Data Management Information System Cards
DPT	Diphtheria, Pertussis and Tetanus
FP/RH	Family Planning/Reproductive Health
HPN	Health, Population and Nutrition
HSS	Health System Strengthening
IEC	Information Education and Communication
INSTAT	National Institute for Statistics
IPC	Inter-Personal Communication
IPTp	Intermittent Preventive Therapy for pregnant
IRS	Indoor Residual Spraying
ISM	Integrated Social Marketing project
ITN	Insecticide-Treated Nets
LAM	Lactational Amenorrhea Method
LAMP	Long Acting Permanent Method
MCPR	Modern Contraceptives Prevalence Rate
MCH	Maternal and Child Health
MID	Moustiquaire Impreignée Durable (Long Lasting Insecticide-Treated Nets)
MNCH	Maternal, Newborn and Child Health
MOH	Ministry of Health
MUAC	Middle-Upper Arm Circumference
NGOs	Non-Governmental Organizations
ODF	Open Defecation Free
OMS	Outcome Monitoring Survey
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PMI	The President's Malaria Initiative
PMP	Program Management Plan
PPR	Performance Plan and Report
PPS	Probability Proportional to Size
PSU	Population Sampling Unit

RDT	Rapid Diagnostic Test
SI	Sampling Interval
SOW	Scope of Work
SP	Supply Point
STI	Sexual Transmitted Infection
USAID	United States Agency for International Development
USG	United States Government
WASH	Water, Sanitation and Hygiene
WRA	Women in Reproductive Age
WSSH	Water Supply, Sanitation and Hygiene

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1. Background

USAID/Madagascar investment on health activities aims to improve the health of the Malagasy people, especially women of reproductive age, and children under-five years of age, through implementing sustainable programs that deliver essential health services and products with a focus on rural and underserved areas.

The USAID health population and nutrition (HPN) programs are focusing on four main sectors: Malaria, Maternal, Newborn and Child health (MNCH), water supply, hygiene and sanitation (WASH), and Family Planning and Reproductive Health (FP/RH). This assignment is to collect the status of selected key outcome indicators related to these sectors.

With its implementing partners, USAID has identified specific technical interventions in the health system. For Malaria, the President's Malaria Initiative (PMI) provides efforts to scale-up proven prevention and treatment interventions including long lasting, insecticide-treated nets, intermittent preventative therapy for pregnant women, indoor-residual spraying of insecticides, malaria testing using Rapid Diagnostic Tests (RDTs), artemisinin-combination therapies (ACTs) for malaria treatment. The USG assistance aims to reach 85 percent coverage among vulnerable groups to support the PMI goal of reducing malaria-related morbidity by 50 percent.

For MCH, the USAID health programs support an integrated package of low-cost, high-impact child, newborn and maternal health interventions, including Integrated Community Case Management for the early recognition, prompt diagnosis, and appropriate treatment of simple pneumonia and diarrhea among children under-five years of age, as well as referral for severe cases and preventative health facility services including vaccinations. The HPN programs also support preventative child health practices including the improved hygiene and sanitation, home point-of-use water treatment, Growth Monitoring Promotion, exclusive breastfeeding, appropriate complementary feeding, and dietary quality and diversity. The overall goal is to accelerate reductions in child, newborn, and maternal death.

For FP/RH, the USAID health programs sustainably expand access to high-quality, voluntary family planning services throughout the health system. Over the next four years, the program aims to steadily meet unmet need for family planning by increasing the use of modern contraceptive methods by approximately 1.5 percent a year. The activities include education, counseling and commodities provision through public and private health centers, mobile outreach sites, as well as pharmacies and other retail venues. The programs also serve the hardest-to-reach populations through a network of 17,000 trained community health volunteers (CHVs). Adolescents and youth, a primary target group, are being reached with youth-friendly services and improved access to a broad range of contraceptive choices. These interventions allow individuals and couples to decide the number and spacing of births, as well as, the timing of first birth, which will contribute to decreasing maternal and infant mortality. Expanding individuals' access to family planning services will also mitigate population effects on natural resources, as well as, increase economic growth and stability.

WASH activities aim to increase access to sustainable water supply, sanitation, and hygiene services in targeted rural areas of Madagascar. USAID supports expanding access to sustainable WASH services; facilitate improved behaviors and use of WASH services; develop and support public-private partnerships for improved supply of WASH products and services; and strengthen WASH governance at the community, commune, region, and national levels.

To reach these goals, the USAID health programs implement several projects comprising two community-based healthcare projects (USAID MIKOLO and MAHEFA projects), one Integrated Social Marketing project (ISM), nationwide actions on Malaria through mass-distribution of bed nets and indoor residual spraying, and other activities involving different international and national partners.

2. Methodology and Limitations

2.1. Sampling and Data Collection

a. Sampling

The Outcome Monitoring Survey (OMS) is a nationwide representative survey that USAID/Madagascar uses to collect the status of key health outcome indicators in its regions of intervention. The survey relies on the Demographic and Health Survey (DHS) methodology with the exception of the population sampling unit (PSU). While the DHS uses geographical unit as PSU, the OMS instead is using the Malagasy smallest administrative boundary (Fokontany) as PSU. The fokontany comprises several hamlets and has different numbers of households and thus different numbers of population. However, the fokontany has the advantage of being used as the basis for the community-health intervention by the Ministry of Health (MOH). Each fokontany is supposed to have two community health volunteers (CHVs) identified and nominated by the villagers themselves; and each CHV is professionally related to the basic health center (CSB) located at the commune level. The Government employee chief of the CSB (often medical doctor, nurse, or midwife) is the main contact and mentor of the CHVs at the commune level. The USAID Supply Points (SP), which has the mandate of selling social marketed health products to the CHVs are also located at the commune level.

The OMS uses two stage clustering approaches to ensure representative sampling. This is a proven methodology commonly used for nationwide surveys. The first cluster is the fokontany. The scope of work required the Contractor to use a method mimicking Probability proportional to Size (PPS) to randomly select the fokontany. For that purpose, in each district all the fokontany where USAID implementing partners intervene are ranked by the size of the population; and then divided in five groups of similar total population size. In each group, one fokontany is randomly sampled, which results in larger fokontany (fewer number of fokontany in the group) having higher probability of selection and smaller fokontany (larger number of fokontany in the group) having lower probability of selection.

The second stage is a random selection of 25 households within each fokontany. As much as possible, the Contractor used maps from "Google earth" to locate all the hamlets constituting the sampled fokontany. These maps are used to discuss with the local authority at the fokontany level to estimate the total number of households within the fokontany.

In total, 250 fokontany will be selected from 50 districts of the USAID MIKOLO and PSI zones, resulting in a sample size of 6,250 overall.

Using the map from Google, the supervisor works with the local authority to get the list of all the villages within the fokontany and the approximate number of households (n_i) per village, i is the number of hamlets. Thus, the total number N of households in the fokontany is $N=\Sigma n_i$. With 25 households per fokontany, the sampling interval (SI) is then equal to $\Sigma n_i/25$.

The supervisor ranks all the hamlets from 1 to i, starting from the most northern hamlet (H1). In each hamlet, the team proceeds with the calculation of the SI_i that is the integer of n_i/S ($SI_i = n_i/25$) where n_i is the population number in each hamlet. So, in each hamlet, the team randomly chooses a number p_i between 1 and SI_i, which should be the rank of the first household to interview; thus the sample of households is p_i, p_i+SI_i, p_i+2SI_i, and so on. In total, the total sample in all the hamlets gives 25. It follows that no hamlet is left over, even if it is constituted by only one household. However, the number of sample in each hamlet depends on its size, ranging from 0 to 25 (fokontany constituted by only one hamlet).

Then in the field for the first hamlet, the team identifies the first household p1 based again on the most northern house within the hamlet H1. The supervisor put one enumerator at p1; then with the other members of the team, the supervisor uses the random walk to choose the next household ($p1+SI_i$) and so on until having the entire sample SI. When the team reaches the last household in H1, it moves to the next hamlet H2.

Based on the SI_i and number of population in each village, all the villages or hamlets are represented. When the last enumerator has been placed with his household (to be interviewed), the supervisor continues the identification of the remaining households. The Google Map of the fokontany helps for this step.

For the CU5 and WRA surveys, all the available individuals at the sampled household are subject to the interview. The Contractor has also the mandate to interview the two CHVs within each fokontany, as well as the one SP working with PSI/ISM at the commune level.

The following table summarizes the sample obtained for each type of survey.

Table 1: Number of interviews by type of structured survey

Survey Type	Sample		
	Zone 1	Zone 2	Total
Household	5,125	1,125	6,250
WRA	5,386	1,254	6,640
WRA in union	4,184	851	5,035
Pregnant women	480	110	590
Caretaker of CU5	4,389	994	5,383
CU-5	5,734	1,386	7,120
CU-28	115	30	145
CU-6	754	201	955
CU-1	1,476	370	1,846
CU-2	2,576	625	3,201
CU-1/2	1,100	255	1,355
CU-6/24	1,822	424	2,246
CHV	301	65	366
SP	156	25	181

b. *Data collection*

For the data collection for each type of survey, USAID provided the draft questionnaires which are subset of the DHS questionnaires. Only the questionnaires related to the OMS indicators were retained. The data collection for this 2015 OMS was held between October 6 and November 20, 2015. Nine teams of six to seven persons comprising of one supervisor, one controller, and four to five enumerators, have conducted the data collection. Five types of structured surveys were conducted during the data collection phase: the household survey; the WRA survey, which include WRA in union and pregnant women; the caretakers of CU5 broken down by different children age-category (children under 28 days "CU28", children under six months"CU6", children under 12 months "CU1", children between 12 and 24 months "CU1-2", children under 24 months "CU2", children between six and 24 months "CU6-24" and children under five years old "CU5"); the survey of CHVs; and the surveys of SPs at the commune level. The Contractor also collected socio-economic information at the fokontany and commune levels.

To improve the quality of the data collection, the OMS team used the service of "Google Earth" to map the sampled fokontany. The approach is to have previews of the distribution of households within the fokontany; and print out all of the viewable mapped fokontany to serve as the main discussing tool with the local authority to count and identify the fokontany, thus the villages, and later on the houses and households within each village. It is a very useful tool for sampling mainly in case of lack of list of households which is often the case in rural areas.

In order to have good quality of data, tablets are also used to collect the data. USAID team attended the entire training session, and participated in the pre-testing of the survey tools in two locations. The advantages of this approach are the reduction of errors during data collection. It gives opportunities to real time availability of data from the field and thus reduces the time between data collection and data verification. In general, it facilitates data control and processing and provides real time feedback to the field staff while still in the field. As stated in the contract, the data collection cannot start without the approval of USAID of the survey tools, including the data entry mask.

c. *Field staff training and testing*

Training and testing of the enumerators and questionnaires were planned before field implementation in order to have good quality of data. For this purpose, one week for training and four (4) days of testing were organized with the data collection staff (enumerators and supervisors).

The field staff were selected based on the result of the post-test assessment, their experience in collecting health data, their computer skills (use of tablet for data collection), and their

knowledge of local context and dialect. Note that the team composition took gender aspect into consideration.

A live testing including test of tablet data collection and final selection of field staff was also organized in the five (5) nearest districts[1] during the first ten (10) days of field work.

2.2. Data Quality Control

Two types of supervisions by the Contractor central staff were carried out during the data collection in the field to insure good quality of the data: Supervision by the Central Office staff. The first type was carried by the Team Leader and the data analyst at the beginning of the survey during three weeks. The second type was carried by the database manager during the data collection period.

In addition, during the field implementation, the field teams received two supervisions of one week each from USAID Monitoring and Evaluation team.

Two types of systematic control were also carried out during the field implementation. At the end of each day, the field supervisors and controllers checked the completeness and consistency of the collected data. Moreover, along with the enumerators, they also verify the validity of the data by checking any outliers or missing information; and then, according to the availability of internet connection, upload the cleaned data to the cloud server. Comments and remarks found, if any, during this verification process were communicated directly to the field supervisors.

2.3. Data Analysis

The results are presented by sector, comprising Malaria, Maternal and Child Health (MCH), Family Planning and Reproductive health (FP/RH), Water Hygiene and Sanitation (WASH), and Health System Strengthening (HSS). The main results, which might be illustrated with Tables and Figures, are presented for each sector. The detailed results, including breakdown by project, region and district levels are presented in the Annexes. Confidence interval of 95% is used to assess the statistical significance for the comparison across categories; the p-values are specified in case of significant differences. These statistical tests are calculated using the test of chi2 probability.

[1] The five first districts are Ambohidratrimo, Manjakandriana, Arivonimamo, Miarinarivo and Soavinandriana

Table 2: List of Districts by Project Intervention Zone

REGION	DISTRICTS FOR ZONE 1 (both Mikolo PSI projects)		DISTRICTS FOR ZONE 2 (only PSI project)
VATOVAVY FITOVINANY	Ifanadiana	Mananjary	Nosy varika
	Manakara	Vohipeno	
ANALAMANGA	Ambohidratrimo	Ankazobe	
	Anjozorobe	Manjakandriana	
VAKINANKARATRA	Ambatolampy	Faratsiho	
	Antanifotsy	Mandoto	
	Antsirabe II	Betafo	
HAUTE MATSIATRA	Ambalavao	Lalangina	
	Ambohimahasoa	Isandra	
	Ikalamavony	Vohibato	
AMORON'I MANIA	Ambatofinandrahana	Fandriana	
	Ambositra	Manandriana	
ATSINANANA	Brickaville	Toamasina II	
	Mahanoro	Vatomandry	
	Marolambo	Antanambao M.	
ALAOTRA MANGORO	Ambatondrazaka	Moramanga	Anosibe anala
	Amparafaravola	Betioky	
ATSIMO ANDREFANA	Ampanihy	Morombe	
	Ankazoabo	Sakaraha	
	Benenitra	Toliara ii	
	Beroroha		
ITASY			Arivonimamo
			Miarinarivo
			Soavinandriana
ATSIMO ATSINANANA			Farafangana
			Midongy atsimo
			Vangaindrano
			Vondrozo

In addition, the results were weighed with regards to the number of the population in each area, when needed. For instance, the results by zone of intervention are weighed by both, the population at the region and district; and the results by region are only weighted by the number of population by district. Indeed, the results at the district level do not need weighting since we used PPS for the sampling of the fokontany.

The comparison of results across two USAID intervention zones is done if the situation required such breakdown. Zone 1 designs the areas where PSI and the MIKOLO projects are present at the same time; and Zone 2 designs the zones where only the PSI project is present. For Malaria, the Contractor uses different zoning by taking into account the level of endemicity of the disease. Table 2 shows the list of districts in Zone 1 and Zone 2.

2.4. Limitations

Following are some identified limitations which may impact the quality of the data and the results:

- Refusal bias: Bias may occur when some respondents refuse to answer some questions or absent during the survey period (case of CHVs and SPs) or if the interview is assisted by a third person (for example, in giving opinion about family planning). This later may occur even if the enumerator insists on excluding other family members rather than the main respondent to assist the interview.
- Recall bias: There are some questions of which the respondent has difficulties to remember mainly the questions about dates, quantification of past event e.g. number of immunization for CU1-2, number of ante-natal care, iron folate shots, antimalarial shots. In case where the woman/child doesn't have health record; the accuracy of the response could be affected.
- Some factors did not allow to correctly applying the methodology, such as (i) the absence of local authorities at the time of the survey in the Fokontany which may lead to a wrong estimation of the number of households, (ii) the difficulty of using systematic random sampling method when many households are absent, (iii) the replacement of some hamlets because of high insecurity; (iv) even with the help of the "Google Map", there are in few cases wrong estimation of the number of households provided by the chief of Fokontany which led to change in the interval sampling during the survey.
- The strict comparison between OMS 2014 and OMS 2015 is not possible because of the difference of the population sampling units. The numbers of districts are not the same (46 vs 50) as well as the numbers of regions (9 and 10). There was also significant change in the survey tools. OMS 2014 data are only provided for the reference purpose.

3. Malaria Results

3.1. Malaria Indicators

Table 3: Malaria indicators

Indicator	Result
Percentage of caretakers who cite that sleeping under an ITN every night prevents from getting malaria (4,977 out of 5,383)	92.1%
Percentage of Children under 5 years of age who slept under an ITN the night before survey or lived in a house sprayed with IRS within 12 last months (4,400 out of 7,120)	61.8%
Percentage of pregnant women slept under an ITN the previous night or lived in a house sprayed with IRS (328 out of 590)	54.1%
Percentage of Households with at least one ITN (3,970 out of 6,244)	63.2%
Percentage of houses sprayed with IRS - over 16 districts where campaign of IRS was held (745 out of 1,994)	31.0%
Percentage of children under 5 years old with fever in the last 2 weeks (753 out of 7,120)	10.0%
Percentage of children under 5 years old with fever seeking treatment from CHVs (275 out of 753)	37.5%
Percentage of children under 5 years old with fever who received ACT treatment within 24h from onset of fever (264 out of 753)	34.4%
Percentage of children under 5 years old tested RDT positive and treated with ACT (234 out of 753)	29.9%
Percentage of WRA who received 2 doses of SP for IPTp during last pregnancy (981 out of 3,350)	29.5%
Percentage of caretakers satisfied of the quality care of the CHV (270 out of 463)	57.6%
Percentage of CHVs that have stock-out of ACT or ASAQ (248 out of 303)	81.8%
Duration of last stock-out of ASAQ for CHV (N=248) More than 3 months From 1 to 3 months	 62.7% (51.3%)* 15.5% (12.7%)*
Percentage of CHVs that have stock-out of RDT (123 out of 303)	40.6%
Average duration of last stock-out of RDT for CHV (N=123) More than 3 months From 1 to 3 months	 32% (13.0%)* 6.6% (2.7%)*
Percentage of ISM supply points that have stock-out of ASAQ (165 out of 181)	91.2%
Average duration of last stock-out of ASAQ for ISM supply points (165 obs.) More than 3 months From 1 to 3 months	 74.8% 13.7%
Percentage ISM supply points that have stock-out of RDT (27 out of 181)	14.9%
Duration of last stock-out of RDT for ISM supply points (27 observations) More than 3 months From 1 to 3 months	 8.8% 3.3%

* In parenthesis are the percentages related to all CHVs certified to sell the products (with or without stock-out)

3.2. Malaria Prevention

According to the Demographic and Health Survey (2008-2009); there are two main categories of Malaria endemicity related to geographical location: endemic and stable in coastal areas at low altitude; and unstable in Central Highlands and in the semi-desert of the south. Thus, the distribution of malaria in Madagascar is characterized by its heterogeneity, consequences of regional variations in terms of rainfall, temperatures and altitudes.

USAID main interventions to prevent Malaria through the President Malaria Initiative (PMI) include purchasing and distributing of Insecticide Treated Nets (ITN); and indoor residual spraying (IRS). For these two main activities, USAID is partnering with other stakeholders in the National Malaria Program Coordination entity[2].

Malaria prevention is tracked by three indicators: the proportion of households having at least one ITN; the percentage of pregnant women sleeping under ITN or protected by IRS; and the percentage of CU5 sleeping under ITN or protected by IRS. For the last two indicators, the question asks whether these target populations had slept under an ITN the night before the survey and/or stayed in a house sprayed with IRS within the 12 months preceding the survey.

To get meaningful information, the analysis was broken down by zones related to Malaria endemicity. For instance, possession and use of ITN were computed separately across regions with ITN mass campaign distribution and regions without. The process was similar for regions with and without IRS activities.

Overall there is no significant changes between the OMS 2015 and the OMS 2014 results on the proportions of households having at least one ITN. The 2015 OMS shows possession rate of 62.2% vs. 61.5% in 2014[3]. **However, the percentages go up to 87.2% in the regions with 2015 ITN mass distribution campaign.** The highest percentages are observed in Vatovavy (97.4%), close to 94.5% in Atsinanana, and 92.6% in Alaotra Mangoro. The lowest proportions are in the regions of Atsimo Andrefana (73.1%) and Amoron'i Mania (78.4%), which are categorized by moderate Malaria endemicity. On the contrary, in the regions where Malaria does not pose high threat to health, the percentage of possession of ITN drops to 14.8% on average. **Some households decided to acquire ITN even in the regions with low malaria endemicity.** In the district of Ambatolampy, there were few interviewees who claimed that they children have been sick of Malaria and they would like to get ITN.

For the campaign of ITN mass distribution, 66.5% of the 250 visited fokontany have had at least one distribution within the three years preceding the survey. This

[2] PNLP: Programme National de Lutte contre le Paludisme (roll back malaria)

[3] The 2008 DHS result found 62% of households with at least one ITN at national level. Note that for FY 2015 OMS, there were two additional regions (Itasy and Atsimo Atsinanana) in a moderate Malaria endemicity level compared to FY 2014. Also, one region (Ihorombe) was dropped from the 2014 sampling.

result aligns with the data collected from households where 63.2% has at least one ITN. Vatovavy Fitovinany region shows the highest number of households with ITN (97.4%), followed by Atsinanana (94.5%) and Alaotra Mangoro (92.6%). The lowest regions in terms of possession of ITNs are Itasy (14.9%) and Amoron'i Mania (27.9%). Districts in these two regions were not targeted by the bed nets mass distribution in the last three years.

Among the 50 visited districts, 16 had communes targeted by IRS spraying campaign within the year preceding the survey. **As results, 31% of houses (households) within the 16[4] districts were sprayed with IRS**. This proportion goes up to 96.8% in the district of Farafangana which shows the higher rate (region of Atsimo atsinanana) while the districts of Isandra, Mandoto, and Vatomandryregister the lowest cases (respectively 19%, 22% and 22%).

In the moderate to high Malaria endemicity, 83.3% of CU5 are protected against Malaria; either they use ITN or slept in a house receiving IRS in the past 12 months. Note that in 2015, there was mass campaign ITN distribution during the survey period in the Malaria endemic regions. Again, the regions of Vatovavy Fitovinany and Atsinanana have the highest rates with respectively 96.2% and 94.0% of protected CU5. Indeed, in low Malaria prevalence regions, the results are much lower with one out of 10 children protected against Malaria in the sampled households.

For pregnant woman in the regions with moderate to high Malaria endemicity, 73.9%[5] slept under ITN the night before the survey or stayed in a room sprayed with insecticide by the MID. The regions of Atsinanana, Atsimo Atsinanana and Vatovavy Fitovinany have the highest proportions respectively at 91.7%, 90.9% and 90.6%. Several districts in these regions caped 100% for this indicator (Vangaindrano, Manakara, Mananjary, Vohipeno, Brickaville, Mahanoro, Toamasina II, and Vatomandry). In moderate endemicity regions, the ratios are lower, ranging between 40 to 60% in Analamanga, Atsimo Andrefana, and Amoron'i Mania. As expected, the results drop to an average 11.7% in low Malaria prevalance regions as illustrated by the rates ranging from 0% in the districts of Antsirabe II, Antanifotsy, Ambatolampy, and Ambositra to 20%-30% in Ambohidratrimo, Miarinarivo, Isandra and Manandriana.

In case of lack of ITN, households give priority to CU5 rather than pregnant women on the use of ITNs. Figure 1 shows that the blue line (WRA protected against Malaria) always lies below the green line (CU5 protected by Malaria) for the case there are no overlapping across these two curves.

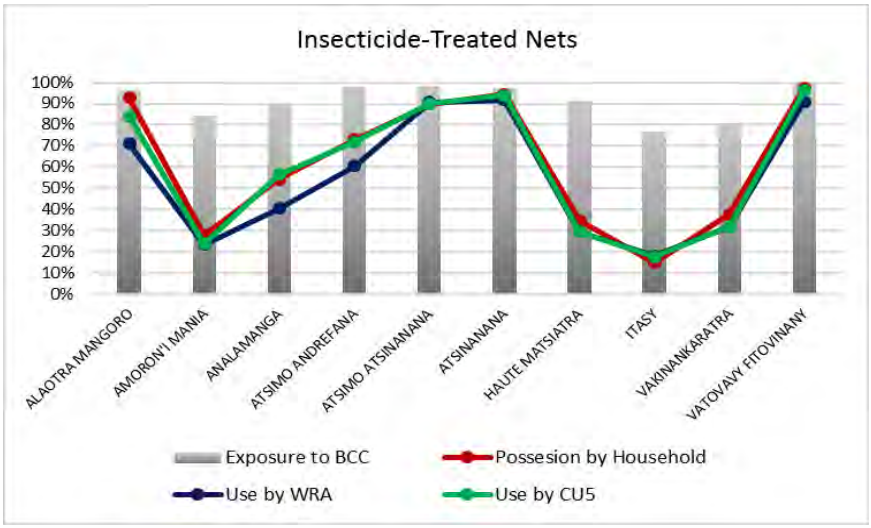
USAID projects are doing well on disseminating BCC messages on Malaria prevention, which is measured by the percentage of households reporting having heard at least one Malaria prevention BCC messages in 2015. Overall, 92.1% of caretakers could cite

[4] IRS campaign was held in 16 districts: Anjozorobe, Manjakandriana, Faratsiho, Ambositra, Ambohimahasoa, Manandriana, Fandriana, Farafangana, Brickaville, Toamasina II, Vatomandry, Sakaraha, Mandoto, Lalangina, Isandra and Vohibato

[5] Out of 590 individuals

that sleeping under an ITN prevents from getting malaria (89.9% in the OMS 2014); 93.6% of them in Zone 2 and 91.9% in the Zone 1, with significant difference of 1.5 percentage point. However, independently on the knowledge on Malaria prevention, the use seems to be directly linked to the possession of ITN as shown in Figure 1 and not on the knowledge of the Malaria prevention. With the exception of Analamanga, Atsimo Andrefana, and Alaotra Mangoro where a gap of more than 10% is visible between possession and use of ITNs, the other regions present good overlap across the three variables measuring the possession and use of ITN to prevent from Malaria.

Figure 1 : Possession and Use of Insecticide-Treated Nets



3.3. Malaria prevalence and treatment

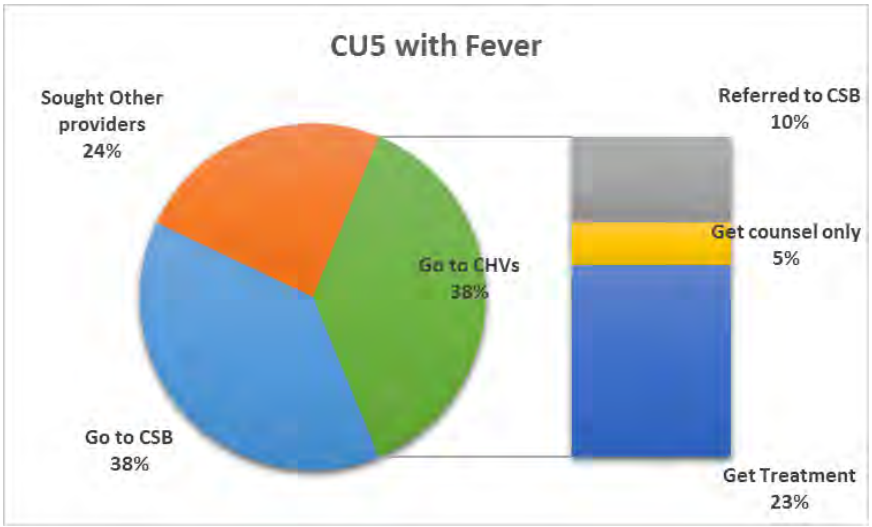
In the past two weeks preceding the interview, about 10.0% of CU5 were sick with fever. Huge difference can be found between Zone 1 (8.4%) and Zone 2 (20.3%). The ratio is most important in Atsimo Atsinanana region (21.4%) with peak in the districts of Vondrozo (31.9%) and Midongy Atsimo (31.2%), followed by Vatovavy Fitovinany region (18.9%) which includes the district of Nosy Varika (35.7%). The least affected regions are Vakinankaratra (2.1%) and Amoron'i Mania (2.5%). The percentages in these low Malaria endemicity are very low, close to zero in some districts such as Antanifotsy (0%), Manandriana (0.7%), Mandoto (0.7%) and Antsirabe II (1.6%).

Out of all the children with fever (753 observations), 37.5% had sought treatment from CHVs, 38.3% from CSBs and other health facilities; and 24.2% did self-medication or sought treatment from traditional healers, or not seeking any treatment at all. For this indicator, the ratio of caretakers seeking treatment from CHVs in Mikolo zones (41%) is higher compared to PSI alone zones (28%); there is a difference of 13 percentage points[6]. By region, Haute Matsiatra shows the lowest rate with 17% of CU5 (9 out of 53) with fever seeking treatment from CHVs. Analysis within districts are not interesting because of the low number of samples. On the other hands, Atsimo Andrefana records the

[6] P-value=0.0002

highest rate on seeking treatment from CHVs (47.6%); in this region, only 11.1% of sick CU5 are not seeking treatment from qualified providers. For instance, in the district of Benenitra, Beroroha and Toliary II, more than 60% of CU5 are seeking treatment from CHVs. Note that in some regions (Itasy, Vakinankaratra, Amoron'I Mania), there was not enough number of sick children to infer the percentages of caretakers seeking treatment from CHVS.

Figure 2 : Seeking treatment for CU5 with fever



Among the 753 CU5 with fever, about 41.7% were tested with RDT and 29.9% were tested positively, thus confirmed of having malaria. A non-significant difference is noted between the Zone 1 (29.1%) and Zone 2 (32.1%). No CU5 with fever were positively tested with RDT in Amoron'i Mania (15 observations); six out of 53 were positive in Haute Matsiatra; and three out of 16 were positive in Vakinankaratra. The region which record the highest rate of children with fever is Atsimo Andrefana (225 cases); of which 60.4% were tested with RDT and 46.2% were positive.

Among the 10% of children with fever in the past two weeks, about 51.1% were treated with ACT and 48.9% were not. Note that ACT use is higher than RDT tested because there are cases of self-medication where caretakers use ACT as treatment without RDT testing; others are seeking treatment from CSB which might not have RDTs but the Chief CSB (professional medical service providers) treated with ACT. Treatment with ACT is much higher in Zone 2 (64.4%) compared to Zone 1 (46.2%).

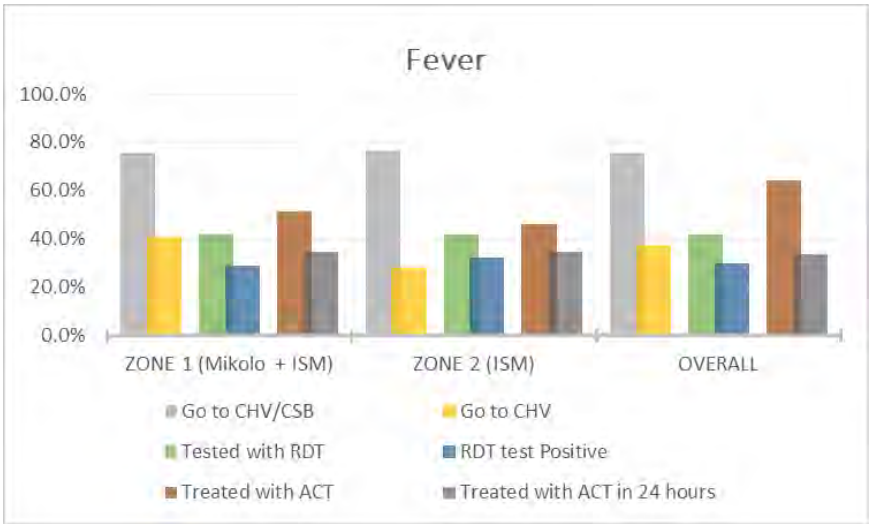
However, only 34.4% of sick children are treated with ACT within 24 hours from the onset of fever. Compared to the above results about sick children treated with ACT, we found that in PSI+MIKOLO zones, two out of three children were treated within 24 hours from onset fever while the proportion is about one child of two in the ISM zone[7].

More than half of the caretakers of CU5 who sought treatment from CHVs are satisfied with the quality of care. It means that in the future they will still seek

[7] P-value=0.0000

counsel, products or treatment from CHVs[8]. From the survey, 57.6% of the caretakers reported that they are willing to seek counsel, product, and treatment from the CHVs in the future. The level of satisfaction is highest in the region of Atsimo Atsinanana (54 cases out of 62 or 82.5% of caretakers) and Haute Matsiatra (32 cases out of 39 or 84.3%). Caretakers are more reluctant to go to CHVs in Atsinanana (19 cases out of 49 or 38.3%). Analysis at district level is not interesting because of low number of cases. The analysis is based on caretakers who sought treatment from CHV in the past two weeks, when their child had fever.

Figure 3 : Treatment of CU5 with fever



3.4. Availability of Malaria treatment products

Two types of Malaria products were considered for the assessment on the availability of Malaria health products at the CHV and SP levels: the Rapid Diagnosis Test (RDT) which is used to confirm or reject malaria case; and the Artemisinin-based products (ACT, ASAQ) used to treat Malaria. Similar questions were asked to CHVs and SPs. The goal is to assess whether the products are available at the time of passage of the survey team, the duration of and reasons for stock-out.

There is a problem on the supply of Malaria treatment products such as ASAQ and ACT at both levels: SP and CHV. The percentage of CHVs with stock-out at the day of the interview reaches 81.8%. Only 55 CHVs have ACT products and the average quantity of stock is 15 packs of three (3) tablets per CHV. CHVs in Zone 2 (only PSI) have higher average stock (19 packs) compared to those in Zone 1 (both MIKOLO and PSI) with 14 packs. In Haute Matsiatra for example, no CHV have available stock of Malaria treatment i.e. 100% of the surveyed CHVs has stock-out. The regions of Atsinanana and Atsimo Andrefana (both with average stock of 27 packs) and Atsimo Atsinanana (20 packs) have the highest available stock of Malaria treatment. The regions with low Malaria endemicity have also low average stock e.g. only three (3) packs per CHV in Itasy and Amoron'i Mania. Note that stock-out is

[8] To check the reliability of satisfaction, the questionnaire included additional questions on whether caretaker is willing to return to CHVs for future use

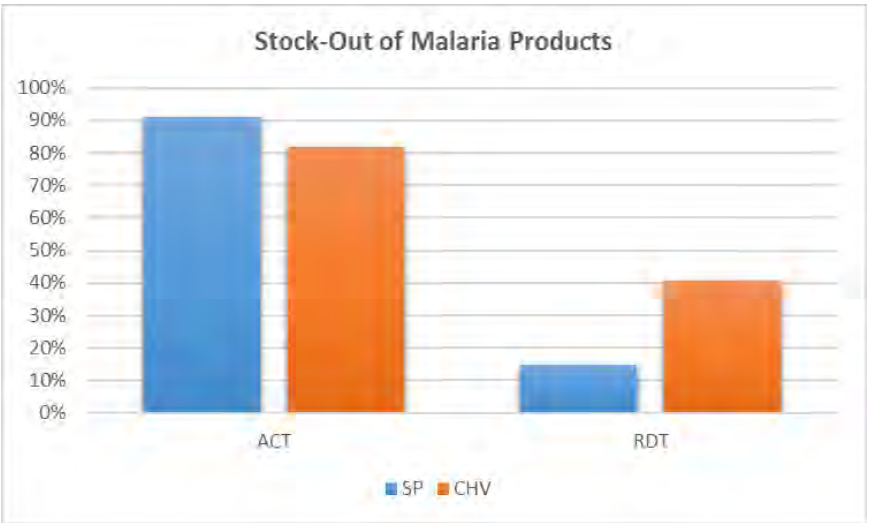
computed using the total number of CHVs that are certified to sell the products i.e. those CHVs who are certified for PCIMEC. It means that there are CHVs (only mother CHVs) who should not sell ACT.

Artemisinin-based product stock-out has been a problem for several months. About half of "children and polyvalent" CHVs noted that the stock-out of Malaria treatment pills lasted for more than three months. **They reported that the main reason of stock-out is the non-availability of the products at the PSI suppliers. Indeed, only 9% of the SPs (16 observations) have available stock of ACT pills at the period of the survey.** It seems that the issues of stock-out is almost everywhere except in the Analamanga region where 31% of SP still have stock of Malaria treatment pills. On average, each SP has 18 packs of 3 tablets, with stock ranging from 14 packs in Zone 1 to 48 packs in Zone 2. Stocks of ACT are only found in six regions at the SP level (Itasy: average of 40 packs, Vatovavy Fitovinany: 31 packs, Alaotra Mangoro: 22 packs, Atsimo Andrefana, Vakinankaratra, and Analamanga).

The availability of RDT seems to be less problematic than the treatment products. About two out of three CHV (180 observations) still have available stocks at the time of the survey. This corresponds to 40.6% of stock-out in all the sampled regions. There are significantly more CHVs[9] who have RDT stocks in Zone 1 (71.9%) compared to PSI zones (54.7%). However, for 13% of all the CHVs (32% of CHVs with stock-out), the duration of product non-availability is more than three months. On average, each CHV has 22 RDTs in stock and there is no significant difference on the average level of RDT stock between Zone 1 and Zone 2. The main reason for stock out is the non-availability of the RDTs at the SP level though it is at lower magnitude compared to ACT since stock-out is only observed in about 14.9% of the sampled SPs. Some CHVs are also talking about temporary stock-out i.e. they are planning to re-supply in near future. Only 12.2% of the SPs have stock-out for more than three months and 2.1% for less than three months.

[9] P-value=0.016

Figure 4 : Comparison between Malaria Stock-Out (date of interview) Levels at SP and CHV



4. Mother and Child Health (MCH)

4.1. MCH Indicators and results

Table 4: MCH indicators

Indicator	Result
Percentage of communities certified as "ODF" as a result of USG assistance (50 communities, 6 fokontany out of 250 fokontany)	6.1%
Percentage of households using open defecation (2,714 out of 6,244)	39.0%
Percentage of children fully immunized (944 out of 1,355)	71.4%
Percentage of children between 12-23 months of age who received their third dose of DPT (1,090 out of 1,355)	81.5%
Percentage of children 6-59 months receiving vitamin A supplement during the six last months (5,378 out of 6,162)	87.0%
CU5 diarrhea prevalence in the last two weeks (359 out of 7,120)	4.8%
Percentage of caretakers of CU5 who know two ways to prevent diarrhea (3,146 out of 5,383)	58.9%
CU5 cough/pneumonia prevalence in the last two weeks (665 Out of 7,120)	8.9%
Percentage of caretakers of CU5 who cite that cough and rapid breathing are main symptoms for ARI/pneumonia (1,623 out of 5,383)	30.7%
Percentage of caretakers of CU5 exposed to Health messages about Mother and Child Food and Nutrition (2,803 out of 5,383)	51.2%
Percentage of caretakers of CU5 exposed to Health messages about Prevention and Treatment of child diseases (3,884 out of 5,383)	71.3%
Percentage of caretakers of CU5 exposed to Health messages about Immunization and Deworming (4,857 out of 5,383)	90.9%
Percentage of caretakers of CU5 satisfied with the quality of care of CHV (2,591 out of 5,383)	49.1%
Percentage of CU5 with chest-related cough and fast and difficult breathing receiving appropriate care (170 out of 287)	59.6%
Percentage of CU5 with cough/pneumonia seeking treatment from CHV (162 out of 655)	26.3%
Percentage of CU5 with cough/pneumonia treated with antibiotic in USG-supported program (101 out of 665)	16.0%
Percentage of CU5 with diarrhea seeking treatment from CHV (112 out of 359)	33.3%
Percentage of CU5 with diarrhea treated with Oral Rehydration Therapy (ORT) in USG-supported program (58 out of 359)	17.1%
Percentage of newborns receiving essential newborn care through USG-supported programs (24 out of 145)	11.0%
Percentage of children 0-6 months exclusively breastfed in the past 24 hours (674 out of 955)	70.9%
Percentage of newborns attended during the post-natal period by a healthcare provider (55 out of 145)	37.4%

Percentage of WRA seen at ANC at least 4 times during their pregnancy with a live birth (1,282 out of 2,807)	46.1%
Percentage of WRA who receive two tetanus toxoid shots (or equivalent) during their last pregnancy (1,556 out of 3,384)	47.6%
Percentage of WRA who received iron folate supplement during their last pregnancy (2,509 out of 3,384)	74.4%
Percentage of birth attended by a doctor, nurse and trained midwife (2,873 out of 4,165)	49.7%
Percentage of CHV that have stock-out of pneumostop tablets (230 out of 303)	75.9%
Duration of last stock-out of pneumostop tablets for CHV (N=230)	
More than 3 months	51.2%
1 to 3 months	20.1%
Percentage of CHV that have stock-out of pneumostop sirup (220 out of 303)	72.6%
Duration of last stock-out of pneumostop sirop for CHV (N=220)	
More than 3 months	51.5%
1 to 3 months	13.5%
Percentage of CHV that have stock-out of Viasur (175 out of 303)	57.8%
Duration of last stock-out of Viasur at CHV level (N=175)	
More than 3 months	43.6%
1 to 3 months	8.6%
Percentage of CHV that have stock-out of Sur'Eau 40ml (258 out of 366)	70.5%
Duration of last stock-out of Sur'Eau 40ml at CHV level (N=258)	
More than 3 months	66.3%
1 to 3 months	6.9%
Percentage ISM SP that have stock-out of pneumostop tablets (114 out of 181)	63.0%
Duration of last stock-out of pneumostop tablets for ISM SP (N=114)	
More than 3 months	54.0%
1 to 3 months	32.0%
Percentage ISM SP that have stock-out of pneumostop sirop (86 out of 181)	47.5%
Duration of last stock-out of pneumostop sirop for ISM SP (N=86)	
More than 3 months	33.7%
1 to 3 months	25.6%
Percentage of ISM SP that have stock-out of Viasur (16 out of 181)	8.8%
Duration of last stock-out of Viasur at SP level (N=16)	
More than 3 months	56.3%
1 to 3 months	18.8%
Percentage of ISM SP that have stock-out of Sur'Eau 40ml (35 out of 181)	19.3%
Duration of last stock-out of Sur'Eau 40ml at SP level (N=35)	
More than 3 months	22.9%
1 to 3 months	74.3%

4.2. Use of Latrines and Status of Open Defecation Free

Open defecation is the practice of people defecating outside and not into a designated toilet. Open defecation causes public health problems such as high child mortality and undernutrition. High poverty rate and lack of sanitation are also statistically linked, thus the role of improved sanitation to poverty reduction.

Open Defecation Free (ODF) is a termination of fecal-oral transmission defined by no visible feces found in the village i.e. every household as well as community institutions are using latrines for disposal of feces. A community is officially certified as ODF after complying to several steps[10] starting with awareness raising and ends with the quality control. In general, the process of certification is held at community level by the WASH coalition. During the survey, the chief of fokontany was asked if the village is certified as "ODF". **In total, 6.1% of the visited fokontany has at least one community certified as "ODF"** (15 fokontany representing 50 communities out of 247 fokontany). Indeed, the interview was held at Fokontany level and not at community level and the total number of hamlets is not exactly known. It follows that the correct rate of certified communities could not be calculated as the total number of communities for the 247 interviewed fokontany is not known.

From a second source of data, the household survey shows that about 39% of the interviewed households are still practicing open defecation, with huge regional discrepancies. The percentage of households without access to latrine is higher in Zone 2 (PSI) at 49.2% vs. 38.0% in Zone 1. By region, Atsimo Andrefana and Vatovavy Fitovinany record the most important proportions respectively at 93.4% and 71.2%. For instance, in the region of Atsimo Andrefana, more than 95% of the population in five districts among eight practice open defecation while in the Vatovavy Fitovinany region, almost all of the districts (except Ifanadiana) record between 70% and 85% of the population still practice open defecation. On the opposite side, the regions of Vakinankaratra, Analamanga and Itasy are showing the lowest rates (respectively 5.5%, 6.2% and 6.7% of the sampled fokontany). The proportion is below five percent in the districts of Betafo, Arivonimamo, Ambohidratrimo, Faratsiho, and Manjakandriana.

4.3. Child Health

4.3.1. Immunization

About nine out of ten caretakers of CU5 have already heard messages or seen sensitization session on immunization. The proportions do not significantly differ across Zone 1 and Zone 2, both culminating around 91%. By region, the lowest percentages are observed in Alaotra Mangoro (75%) and Itasy (77.7%) while the highest are for the sampled households in the regions of Atsimo Atsinanana (97.5%); followed by Haute Matsiatra (95.5%)

[10] By UNICEF definition, the ODF certification process involves the steps including the community self-assessment, the District level verification and the regional level declaration

and Vatovavy Fitovinany (95.3%). Some districts even have perfect score such as Isandra and surprisingly in some very remote districts of Nosy Varika, Vondrozo and Midongy Atsimo.

The roles of CHVs are critical in disseminating disease prevention messages. **Overall, about 89.6% of caretakers reported getting information on immunization from CHVs.** Public health agents such as CSB staff are at second place with 59%; and media campaign plays slightly reduced roles at 23.2%. Interpersonal communication (IPC) is important as 62.5% of the caretakers declared having received the visit of CHVs and talked about child disease prevention. However, about half have had IPC within the last 12 months.

Effective BCC on child disease prevention could contribute to higher immunization rates. Different methods were used to capture the status of immunization. The ideal situation is that the child received a certificate of vaccination completion before his/her first year of anniversary. In such case; the certificate is checked by the enumerator, which in turn fills all the corresponding questionnaires on immunization in the survey. For the second option, the child does not have vaccination completion certificate. In this situation, the enumerator asks the caretaker whether the child has immunization records and marks all completed vaccination in the questionnaire. In the third scenario, the child doesn't have immunization records. Therefore, the enumerator relies on the mother's statement for the types of vaccines that have already been done.

A complete immunization schedule before two years old comprises of four types of vaccines delivered in eight shots which are:

- One shot against tuberculosis (BCG);
- Three shots against poliomyelitis (Polio1, polio2, Polio3). Not that the Polio0 or Polio at birth is optional;
- Three shots against diphtheria, pertussis and tetanus (DPT1, DPT2 and DPT3);
- One shot against measles.

The questionnaire also asks whether the child received a shot during the 2015 Polio campaign. Among the 1,355 children between 12-23 months identified in the sample, 46.5% have a vaccination diploma, i.e. had completed all required immunization prior to their first birthday; 33.7% have immunization records and 19.8% are without any records.

As results, 71.4% of the sampled children between 12 months and 24 months are fully immunized (all sources of data taken into account). When a physical evidence of the immunization is required, the proportion drops to 67.3%. By implementing areas, the percentage of fully immunized (all sources) children in Zone 1 (72.3%) is higher compared to those in Zone 2 (65.2%); but this difference is not statistically significant. By region, Vakinankaratra has the highest rates with 85.4%; followed by Vatovavy Fitovinany (83.1%). In the district of Betafo, for example, all sampled CU12-23 are fully immunized. On the opposite, Atsimo Andrefana region closes the line with 30.3% of children fully immunized. In fact, none of the eight (8) districts exceeded 50% (Ampanihy at 12.5%, Toliary II at 16.7%, Morombe at

22.7%, Ankazoabo at 25%, Sakaraha at 34.4%, Benenitra at 36.8%, Betioky at 38.7% and Beroroha at 48%).

For children who don't have diploma (with or without records), 35% have completed the third dose of DPT. In total, 81.5% of CU12-23 have received their third dose of DPT. CU12-23 receiving the third DPT are higher in PSI with Mikolo zones (82.1%) compared to PSI alone zones (76.9%) but the difference is not significant. The highest rates are found in the districts of Betafo, Toamasina II, Mahanoro, Antanambao Manampotsy, Manakara, Faratsiho and Soavinandriana where all of the CU12-23 have completed the third dose of DPT (all at 100%); the lowest are found in the region of Atsimo Andrefana (40.5%), in the district of Ampanihy (12.5%) and Morombe (22.7%) and Sakaraha (37.5%).

Madagascar has integrated the distribution of vitamin A supplements in its national health policy strategies, with support from stakeholders. In fact, Vitamin A supplementation is recommended for children 6 to 59 months to reduce child morbidity and mortality. **Out of the 6,165 identified CU6-59, 95.3% have received vitamin A supplementation from birth, and 87% have got it within the six months preceding the survey.** Atsimo Atsinanana records the highest rate among the regions (94.7% of CU6-59 have received Vitamin A supplementation within the six months preceding the survey). Alaotra Mangoro shows the lowest proportion with only 72.9% of children. The lowest rate is observed in the sampled children in the district of Amparafaravola with 51.7% followed by Ambatondrazaka at 62.7%. Note that during the interview period, there was a national event on maternal and child health week, which provided Vitamin A to children.

4.3.2. BCC on Children disease prevention

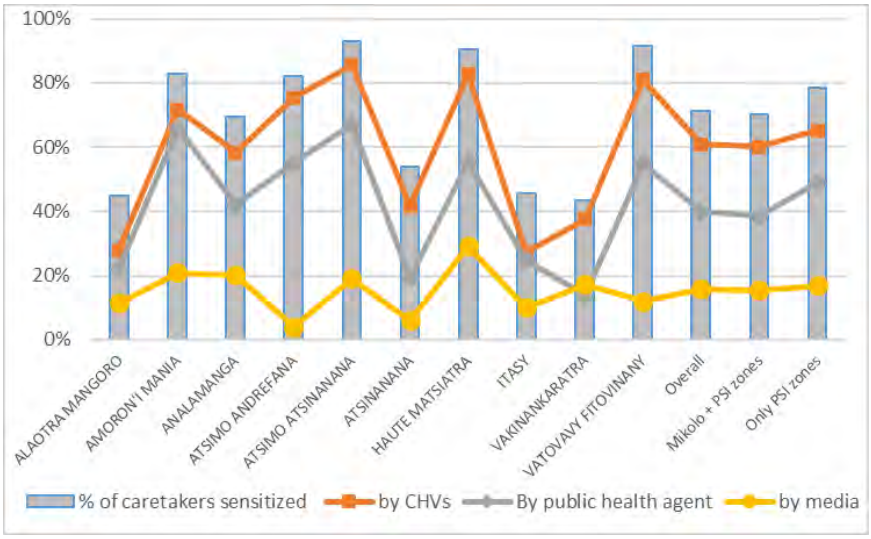
This section describes the steps from sensitization, prevention, and treatment of childhood illnesses. USAID implementing partners are implementing several BCC activities through CHV interpersonal communication; mass communication during village's gathering, communication relying on media campaign etc.

Overall, 71.4% of the caretakers have already been informed about prevention and treatment of critical childhood illnesses: malaria, diarrhea, and pneumonia. Caretakers in Atsimo Atsinanana (93.0%) and Vatovavy Fitovinany (91.5%) have the highest percentages. In the districts of Farafangana and Midongy Atsimo, for instance, it goes up to respectively 98.4% and 98.2%. The region of Vakinankaratra has the lowest proportion (43.2%), mainly in the districts of Ambatolampy (33.0%) and Antsirabe II (40.7%). These districts are the ones where the MIKOLO project only recently begun to implement its activities.

Caretakers identified CHVs as the main vehicle in increasing awareness on the prevention of child health. About 85.1% of caretakers declared that they have been sensitized mostly by CHVs. The public health agent held the second position with 55.7% of caretakers; and the last through the media (by 22.0% of caretakers). This ranking remains

constant over the region, with the exception of Vakinankaratra where the percentage of media surpasses public agents. **In General, however, the exposure of caretakers to media disseminated messages is very limited, likely due to the low availability of radio, TV, and newspapers in rural areas of Madagascar.** By region, more than nine (9) caretakers out of ten (10) have been sensitized through CHVs in Atsimo Atsinanana (92.1%), Atsimo Andrefana (91.8%) and Haute Matsiatra (91.7%). The districts which present the highest rates are Midongy Atsimo (98.2%), Vondrozo (97.5%), Benenitra (97.7%), Beroroha (97.6%), Isandra (98.3%) and Vohibato (97.4%). In these zones where CHVs play an important role in disseminating health messages, the role of the other means are low, for example, in Atsimo Andrefana, only 5% of the caretakers have been sensitized by media. The role of the CHVs are the least important in Itasy and Alaotra Mangoro (only 59.5% and 62.1% of caretakers reported that they have heard the messages through them). The graph below gives a summary of the situation.

Figure 5 : Source of BCC over region



4.3.3. Diarrhea

On average, only 44.6% of caretakers of CU5 could correctly cite at least two ways to prevent diarrhea. The most cited prevention (59% of caretakers) is the use of drinkable water or the effective way to make water drinkable. The second diarrhea prevention to give healthy and clean food to children was cited by 50.6% of caretakers. On the other hand, about 4.8% of caretakers was not able to cite at least one way to prevent children from diarrhea. By implementation areas, there are more knowledgeable caretakers in the Zone I (45.1%) compared to the Zone 2[11]. The highest rate is in Amoron'i Mania region where 53.7% of mothers know at least two ways of preventing diarrhea while this percentage is only 36.6% in Atsimo Andrefana. By district, Ambalavao records the highest proportion of knowledgeable caretakers with 74.8%; followed by the district of Vatomandry (59.7%), Fandriana (59.4%) and Toamasina II (56.1%).

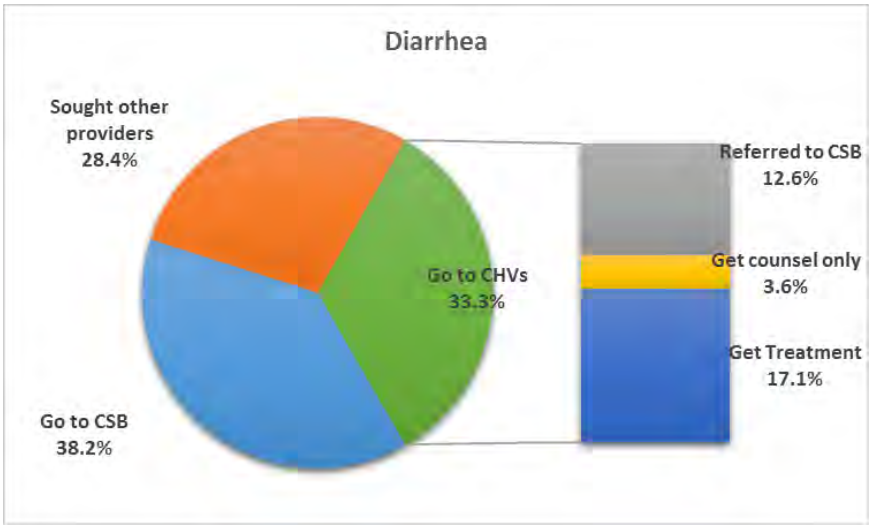
[11] P-value=0.0017

Among the 7,120 CU5, 1,974 were sick (all diseases) two weeks before the survey. This represents about 26.7% of all CU5 within the sampled households. **Among these total children, 4.8% are affected by diarrhea.** By region, Atsimo Andrefana and Atsimo Atsinanana are the most touched with respectively 7.3% and 6.8% of affected children. These sick children mostly live in the districts of Toliary II (13.1%), Ankazoabo (10.6%), Beroroha (9.9%) and Vondrozo (9.2%). The least affected region is Analamanga (3.0%). For instance, the sampled households in the districts of Mandoto and Lalangina did not show any CU5 diarrhea case; in Antsirabe II there was only one case of diarrhea.

In total, 33.3% of the caretakers of CU5 with diarrhea were seeking treatment from CHVs, 38.2% went to CSBs and other health centers, and 20.5% did self-medication; 0.8% went to traditional healers; and 7.2% did nothing to treat the disease. Behavior of caretakers in Zones 1 and Zone 2 are quite similar with the exception that percentage of CU5 brought to private health providers are much higher in Zone 2 compared to Zone 1 which present more CU5 treated by self-medication (32% in Zone 1 vs. 23% in Zone 2) [12]. The graph below shows this trend.

For those who have been reached by CHVs, 12.6% was assessed as presenting danger signs thus have been referred to public health centers; 3.6% have had received only counseling but without any product; and 17.1% was counseled and treated by the CHVs.

Figure 6 : Behavior of Caretakers of CU5 with Diarrhea



The proportion of caretakers of CU5 with diarrhea seeking treatment from CHVs is higher in Zone 1 (34.6%) compared to Zone 2 (25.6%) but this difference is not significant[13]. The difference across the two zones is about nine percentage points, which would correspond to the value added of the MIKOLO project on the use of CHVs services by caretakers with children with diarrhea. By region, Amoron'i Mania showed the lowest rate

[12] P-value=0.067
[13] P-value=0.218

of CHV use for diarrhea with only one case out of 21 CU5 with diarrhea; the highest rate of CHV use was observed in Analamanga (7 cases out of 15).

4.3.4. Pneumonia

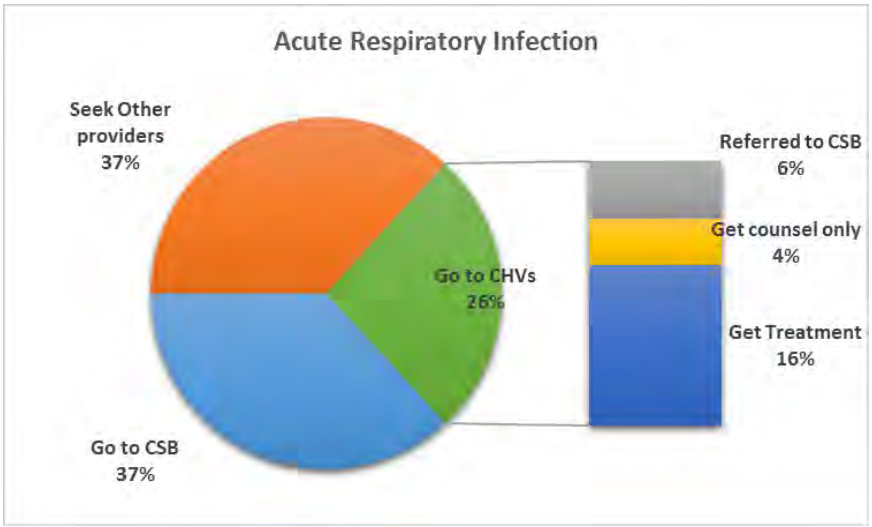
For pneumonia, less than half (48.3%) of caretakers of CU5 responded that the main symptom of pneumonia case is "recurring cough" and about one third (30.9%) cited "rapid breathing". In total, 23.3% of mothers have cited both at the same time. However, there are 19.9% of caretakers who do not know anything about pneumonia symptoms.

The overall results show strikingly low percentages of caretakers who have correct knowledge of all the signs for acute respiratory infections. In most cases, only one out of three caretakers has good knowledge of the symptoms; this is the case for the region Atsinanana (35.2%), Atsimo Atsinanana (31.6%), Atsimo Andrefana (30.8%) and Analamanga (30.2%). A couple of districts pull the percentage up, for example in the districts of Antanambao Manampotsy (50.0%), Mahanoro (46.6%) and Ankazobe (44.4%). In some regions, the rates even drop below 15%, which are the cases of Vakinankaratra (10.3%), Amoron'i Mania (13.8%) and Haute Matsiatra (14.4%); and the district with lowest records are Mandoto (6.5%), Lalangina (6.7%), Ikalamavony (7.5%), Antsirabe II (7.9%) and Antanifotsy (8.5%).

Within the sampled households, 8.9% (665 CU5) have been affected by cough/pneumonia (5.8% by cough with difficult breathing and 3.1% by simple cough) during the past two weeks before the interview. CU5 in Zone 2 are slightly affected (11.1%) compared to those in Zone 1 (8.6%). The most affected children are observed in the regions of Vatovavy Fitovinany (13.8%) and Atsimo Atsinanana (12.1%); and the fewest number of cases are observed in Vakinankaratra (6.3%) and Analamanga (6.7%). By districts, the extreme cases are observed in Mandoto with only one case and in Manakara with 19.8%.

About one out of four caretakers are willing to seek counsel and treatment from CHVs if their child has respiratory infections (often for acute respiratory infections). Out of the 665 CU5 with cough/pneumonia, 26.3% were seeking treatment from CHVs, of which 5.8% were referred to public health center; 16.0% were treated by CHVs themselves (counsels and antibiotics), 4.6% have been advised and counseled without medicine. Seeking treatment from CHV means that the first behavior in case of child's sickness is to go to CHV. However, the CHVs may treat the case; refer to another center in the presence of danger signs; or provide only counsel if they do not have the adequate products (e.g. stock-out of pneumostop).

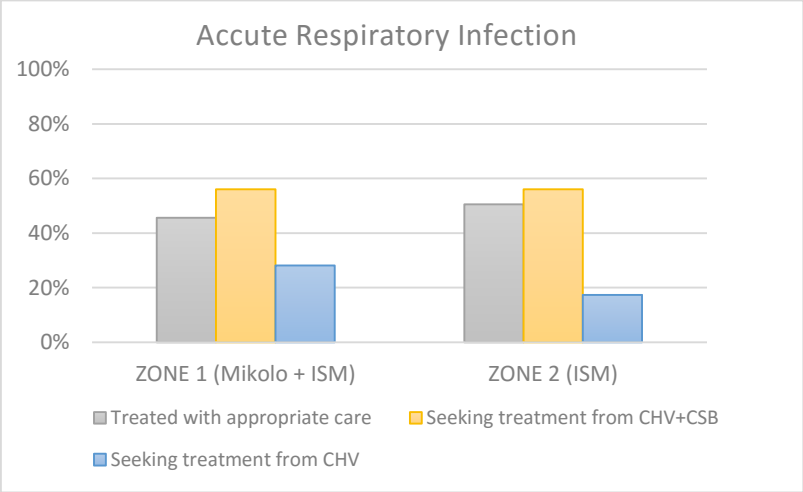
Figure 7: Behavior of Caretakers for CU5 with ARI



By USAID implementing partners, Zone 1 (MIKOLO+PSI) shows higher proportion of CHV use compared to Zone 2, with respectively 28.1% and 17.3% of children with respiratory infection problems. Again, the difference between the two zones is about 10.8%[14], which would correspond to the value added by the MIKOLO project on promoting the use of CHVs two years after the onset of the MIKOLO activity. The regions of Analamanga and Atsinanana peak at more than 38%; the opposite is observed in the regions of Itasy and Atsimo Atsinanana with rates below 14%.

Independently of the healthcare providers, about 59.6% of CU5 with ARI did get appropriate care for the pneumonia treatment from any type of providers. The highest rates are found in Atsimo Atsinanana (77.8%) and Atsimo Andrefana (75%) while Amoron'i Mania (29.2%) and Vakinankaratra (33.3) record the lowest rates.

Figure 8 : Prevalence and Treatment of CU5 with ARI



[14] P-value=0.0200

At the community healthcare system level, about 16% of CU5 with ARI had received appropriate care from CHVs; the ratio is higher in Zone 1 (16.8%) compared to Zone 2 (12.3%). The difference across zone is non-significant (p-value=0.196). In general, the proportions vary between seven percent (7%) and 23% for each region; for instance, in Atsimo Atsinanana and Amoron'i Mania, only seven percent (7%) and 7.1% had benefited health products from USG-supported program; the ratios are over 20% in Atsinanana and Atsimo Andrefana (respectively 22.9% and 21.1%).

The consolidation of the caretakers' behavior when having sick CU5 (all three childhood illnesses combined) shows that out of the 1,974 sick children in the past two weeks, about 28.9% are seeking treatment and counsel from CHVs. About 34% were referred by the CHVs to CSB because of danger signs, and based on the declaration of caretakers; 31.6% made it through the basic health centers.

4.4. Newborn care

Overall, the 2015 OMS survey includes 145 newborns, which represent 2.1% of the total CU5. The questionnaire includes one indicator related to the dotation of newborn kits during child delivery. **Only 11% of newborns have benefited the kits, however with huge regional variability.** For instance, no newborn in Analamanga, Atsimo Andrefana, Atsinanana and Vakinankaratra received the kits even though newborns in these four regions represent more than 45% of all identified newborns. The highest percentages of kit dotation were observed in the regions of Itasy and Amoron'i Mania, respectively with 53.9% and 50.0%.

For the post-natal period, 37.4% have received care and counsel from professional healthcare provider (33.8% by public and 3.6% by private health agent). Across USAID implementing areas, follow-up of newborns by professional healthcare in zone 1operates is more important (34.8%) compared to those in Zone 2 (27.4%) but this difference between zones is a not significant (p-value=0.69). In these PSI zones, traditional practitioners or unformed midwife are the most important (for respectively 60.9% and 8.5% of newborn cases). Across regions, Atsimo Andrefana shows the lowest situation where only 17% of newborn have been attended by a public or private healthcare provider and over 78% by traditional practitioners. In Itasy, Amoron'i Mania and Alaotra, the reversed situations are found where more than the half (respectively 61.5%, 58.3% and 56.3%) are attended by public or private healthcare provider.

The survey has identified 955 CU6 within the sampled households. From the WHO definition, exclusive breastfeeding means that "the infant receives only breast milk. No other liquid or solids are given – not even water – with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines." Studies have shown that babies who were exclusively breastfed got sick less often than babies who were not. The protection against illness continues even after breastfeeding ends. Breast milk is also the least expensive way to feed an infant. However, the mother must maintain good nutrition.

About 1.6% of caretakers does not give breastmilk at all to their child; and 71% are exclusively breastfed. In some regions, exclusive breastfeeding peaks above 80%. These are the cases of Vatovavy Fitovinany (89.5%), Vakinankaratra (84.5%), and Atsinanana (82.1%). The lowest percentages are found in the regions of Atsimo Andrefana, Alaotra Mangoro and Atsimo Atsinanana; respectively with 55.4%, 55.8% and 62.0%.

4.5. Mother Health

4.5.1. Ante-natal care

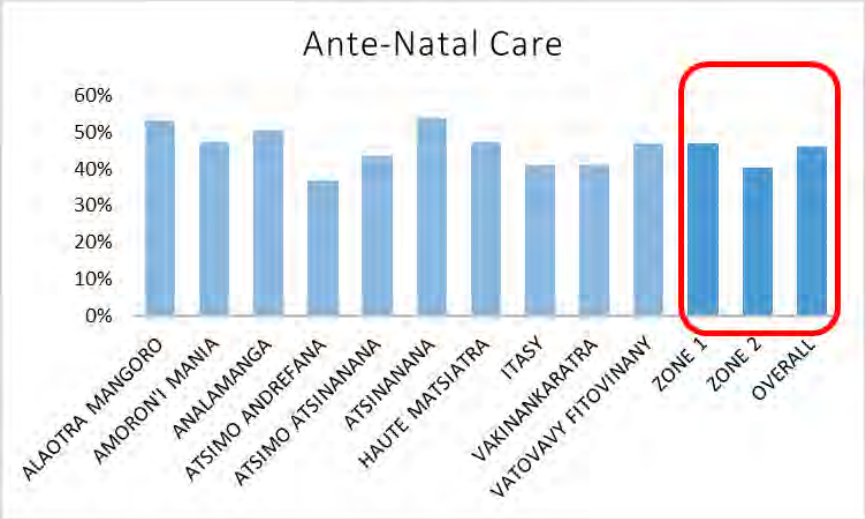
Inadequate prenatal care is one of the reasons for high perinatal mortality in developing countries. During pregnancy, WHO recommends a minimum number of four prenatal visits. If this minimum number is not respected, then the pregnant woman is at high risk of morbidity and maternal mortality.

Among the 2,807 women pregnant in the two last years and had given a live birth, 46.1% have been seen at Antenatal Care at least four times during their last pregnancy. It means that more than the half of the women still don't seek for prenatal care or did not complete the necessary steps for the preparation of birth delivery. This result is based on respondent's declaration for 52.5% of the women and based on health records for 47.5%. Indeed, this later provides much reliable estimates of ANC since the respondent may have recall issues especially for the case of not recent delivery. Sometimes, the respondents have a doubt (or don't remember at all) how many times they have gone to ANC.

The proportion of women seen at ANC at least four times during the last pregnancy is significantly higher in Zone 1 (46.8%) compared to Zone 2 (40.2%)[15]. There is also variability across regions; from the low percentages in Atsimo Andrefana (36.8%) mostly in the districts of Sakaraha (19.6%), Ankazoabo (23.3%) to the highest rates in the region of Atsinanana (53.7%) and Alaotra Mangoro (53.1%) mainly in the districts of Moramanga (75.0%), Toamasina (74.5%), and Brickaville (67.2%).

[15] P-value=0.005

Figure 9 : Percentage of women pregnant in the past two years completing at least 4 ANC



4.5.2. Tetanus toxoid shots

Tetanus vaccination during the antenatal care plays an important role in preventing tetanus, which may lead to the death of the newborn and the mother. According to the UNICEF immunization guide, the administration of five shots confers lasting immunity to the women, enabling the elimination of neonatal tetanus.

Of all the pregnant women in the last two years, 47.6% received at least two toxoid shots during the last pregnancy. However, the last birth was protected against neonatal tetanus in 65.1% of cases because either the mothers received tetanus shots during this pregnancy (47.6% at least two shots), either they have already completed five shots during previous pregnancy (17.5% of the cases).

The proportion of pregnant women in the last two years who receive at least two tetanus toxoid shots are significantly higher in the Zone 1 (49.1%) compared to those in the Zone 2 (36.4%). The same trend is recorded for those who have already completed shots during previous pregnancy (18.7% for Zone 1 vs. 9.0% for Zone 2)[16]. The lowest protection rates are observed in Atsimo Atsinanana and Itasy respectively with 42.7% and 44.2%); and the highest protection rates are in Atsinanana and Haute Matsiatra (75.3% and 71.5%). By district, Arivonimamo is at 27%; Miarinarivo at 27.5%; Vangaindrano at 35.1%; and Soavinandriana at 40%. On the opposite, the district of Mahanoro is at 87.2%; Antsirabe II at 85.1%; and Ambatolampy at 81.1%.

4.5.3. Iron folate

The short to medium term iron folate supplementation for pregnant women is recommended by the WHO to reduce the prevalence of anemia, particularly before and during the first trimester of pregnancy. Question about how often supplementation of iron folate was taken

[16] P-value=0.000

was asked to WRA during the survey implementation for those who were pregnant during the last two years. **At least 74.4% of women received supplementation of iron folate during their pregnancy: 7.8% reporting having received it once or twice and 66.6% said more than three times.** There is no large difference across zones (74.2% for Zone 1 and 76.3% for Zone 2)[17]. In Zone 1 for instance, 8.1% of women have received iron folate once or twice during pregnancy and 66.1% received it more than three times, while in Zone 2, 5.5% received the supplementation once or twice and more than 70% received more than three times. Note that the percentages are higher than complete ANC because WRA reported taking of supplementation of iron folate during each visit.

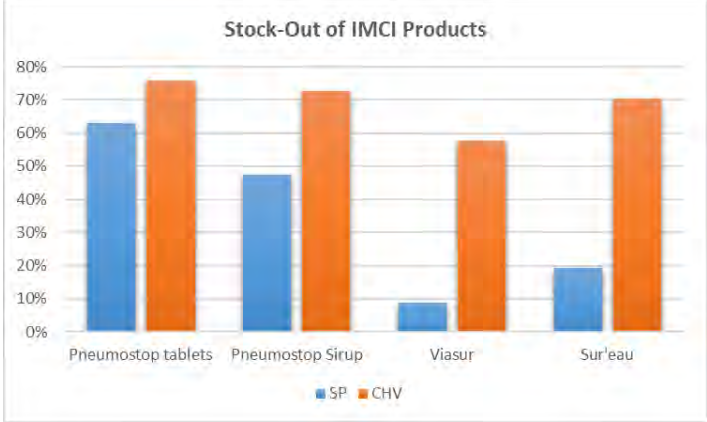
4.5.4. Birth Assisted by Trained Personnel

About 4,165 women have been asked about the post-natal healthcare provider during their last childbirth. **The result indicates that 71.6% of the last births have been attended by a doctor, by nurse or by trained midwife.** The most used healthcare is trained matrons or midwives (28.2% and 24.4%) followed by doctor (17.3%).

4.6. Availability of MCH products

Three types of MCH products were considered for the assessment of availability of IMCI products at the CHV and SP levels: Pneumostop (sirup and pill) to treat Acute Respiratory Infections; Viasur to treat child Diarrhea; and Sur'eau to make drinking water. Again, the goal is to assess whether the products are available at the time of passage of the survey team, the duration of and reasons for stock-out.

Figure 10 : Comparison between MCH Products Stock-Out Levels at SP and CHV



There are no big issues on the supply of Diarrhea treatment such as Sur'eau and Viasur at the SPs with stock-outs below 20% for both products. However, the stock-out at the CHVs reaches 57% for Viasur and close to 70% for Sur'eau. The level of stock-out is still high even the threshold is set at three-months i.e. CHVs do not have the product for less than three months from the time of the interview: 43.6% for Viasur and 51.7% for Sur'eau.

[17] P-value=0.000

These numbers denote some issues linked to the supply of diarrhea products by CHVs. Several reasons were provided by CHVs to explain the stock out; among them the lack of demand from the beneficiaries (32% of CHV for Sur'eau and 18% for Viasur); the difficulty to manage the stock (15% for Sur'eau and 12% for Viasur); the financial burden (8% for Sur'eau and 13% for Viasur); and the non-availability of the products at the SPs (27% for Sur'eau and 26% for Viasur).

Zone 1 is most affected by stock-out of Sur'Eau where only 34% of CHVs did not experience it at the time of the survey with average stock of 6 flacons of 40ml per CHV. For example, in Atsinanana region, only 14% of CHVs have stock of Sur'Eau at the survey passage, 23% in Analamanga and 25% in Alaotra Mangoro. Zone 2 is less affected compared to Zone 1 where 44% of CHVs still have stock of Sur'Eau with an average stock of 13 flacons of 40ml. The Atsimo Atsinanana region stands out where more than 65% of CHVS did not have stock-out.

For Viasur, the less affected regions by the stock-out of VIASUR are Vakinankaratra, Alaotra Mangoro and Atsimo Andrefana where 71%, 67% and 63% of CHVs have not experienced stock-out at the survey passage, while CHVs in Vatovavy Fitovinany suffer most with more than 70% stock-out of Viasur at the moment of visit, followed by Itasy region with 55% of CHVs with stock-out.

There are supply issues for the treatment against ARI: the stock-out levels are high, all above 50% at the SPs and CHVs. Only 20% to 30% of the sampled CHVs have available Pneumostop (both syrup and pill) at the time of the survey. Indeed, some reported not selling at all for lack of financing but more stock-outs are linked to the non-availability of the products at the SP level. It seems that the MOH is planning to use a different product to treat ARI i.e. moving from the cotrimoxazole to amoxicylin; so this change results in gap on the supply of ARI treatment for children[18]. The average duration of the stock-out for Pneumostop is more than three months for more than half of the sampled CHVs. Again, stock-out is computed using the total number of CHVs that are authorized to sell the products (Child and polyvalent CHVs). Note that for the distribution of socially-marketed health products; PSI project approach to provide health products to the "Community wholesalers" and SPs relies on the "pull" system; as well the approach used by USAID community-based health projects for the supply of products to CHVs, which mean that the financial risks are entirely bear by these intermediate actors (with the exception of the start-up package for CHVs).

The stock-out of ARI treatment products is stronger in regions of Itasy, Analamanga and Vakinankaratra where the percentage of CHVs who held it at the time of the survey did not exceed 20% (for both syrup and pill), while the regions of Haute Matsiatra and Amoron'i Mania are less marked by the rupture where more than half of CHVs still had it at the survey passage (50% Amoron'i Mania and more than 60% for Haute Matsiatra).

[18] This should not be the case in the presence of good coordination between the MOH and implementing partners.

5. Family Planning (FP)

5.1. FP Indicators and results

Table 5: FP indicators

Indicator	Result
Percentage of WRA in union satisfied with the quality of CHV care (2,156 out of 2,398)	90.6%
Percentage of mothers of CU1 expressing a desire to wait at least 24 months before being pregnant again (645 out of 1,438)	43.3%
Percentage of WRA in union using modern contraceptive methods (2,122 out of 5,035)	42.8%
Percentage of WRA in union with unmet FP need (1,098 out of 5,035)	21.1%
Percentage of WRA in union exposed to IE/BCC FP messages (4,797 out f 5,035)	95.7%
Percentage of WRA seeking counseling or treatment from CHV for FP/RH (1,057 out of 5,035)	21.7%
Percentage of WRA in union reporting no myths or misconceptions regarding modern FP methods (2,260 out of 5,035)	45.9%
Percentage of WRA in union who perceive that their partners support them to use modern contraceptives (2,784 out of 5,035)	56.6%
Percentage of WRA in union seeking counsel or products for FP from CHV two weeks before the survey (332 out of 2,568)	14.4%
Percentage of CHV aware of Long Acting Permanent Method (LAPM) service availability: IUD (200 out of 366)	54.6%
Percentage of CHV aware of LAPM service availability: IMPLANT (208 out of 366)	56.8%
Percentage of CHV certified by type of certification PF4 (174 out of 366)	47.5%
Percentage of CHV certified by type of certification DEPO (111 out of 366)	30.3%
Percentage of CHV providing FP/RH counseling or services including STI prevention and referral (232 out of 366)	63.4%
Percentage of CHV that have stock-out of Pilplan (36 out of 179)	20.1%
Duration of last stock-out of Pilplan at CHV level (N=36) More than 3 months Between 1 to 3 months	 9.5% 3.9%
Percentage of CHV that have stock-out of Confiance/Depo (19 out of 155)	12.3%
Duration of last stock-out of Confiance/Depo at CHV level (19 out of 155) More than 3 months Between 1 to 3 months	 5.8% 1.3%
Percentage of CHV that have stock-out of Protector Plus (92 out of 181)	51.4%
Duration of last stock-out of Protector Plus at CHV level (94 out of 181) More than 3 months Between 1 to 3 months	 32.4% 5.0%
Percentage of ISM SP that have stock-out of Pilplan (6 out of 181)	3.3%
Percentage of ISM SP that have stock-out of Confiance/Depo (25 out of 181)	13.8%
Percentage of ISM SP that have stock-out of Protector Plus (25 out of 181)	13.8%

5.2. Education and counseling

5.2.1. IEC/BCC FP messages

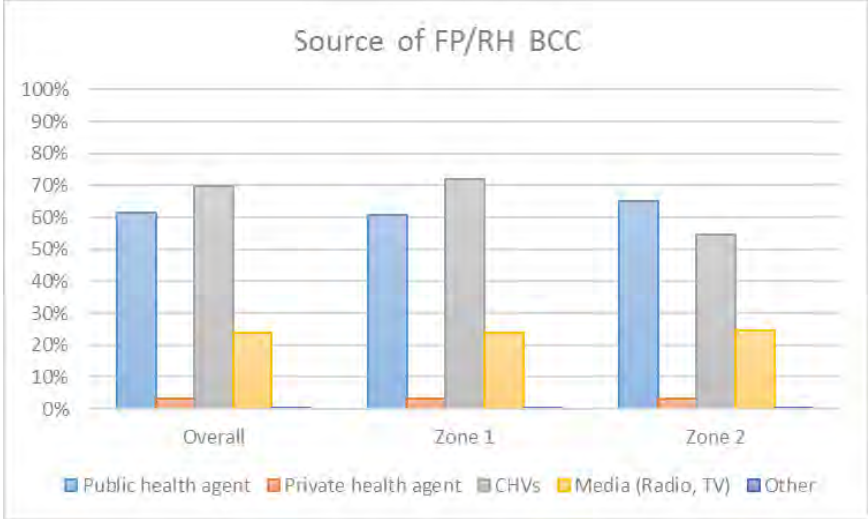
The main objective of USAID is to meet the need of WRA for FP through different activities such as the increase use of modern contraceptive methods, education and counseling, insurance of commodities provision through public and private health centers and mobile outreach sites.

WRA in union exposed to IEC/BCC FP message are those who have already heard about FP or had the opportunity to be sensitized on FP/RH program or methods. There are several venues to do so such as by public or private health agents, by media, by posting, or simply by the interpersonal communication through community health volunteers. **Among the 5,035 WRA in union interviewed, 95.7% had been exposed to FP/RH BCC from at least one of these approaches** (93.7% in 2014). No significant difference can be found between Zone 1 (95.7%) and Zone 2 (95.8%). Sampled WRA in some regions even reach full exposure e.g. Itasy (100%) and Analamanga (99.5%). On the other side, difference can be significant between regions, for example, the least regions on WRA being exposed to IEC/BCC FP messages are Atsinanana (88.1%) and Alaotra Mangoro (88.3%).

In general, CHVs are the most involved in the transmission of the IEC/BCC FP messages, followed by the public health agents. **About 69.7% of WRA declared that they have heard the messages through the CHVs while 61.4% declared through public health agents.** There is, however, very significant difference on the importance of CHVs on increasing FP/RH awareness between Zone 1 and Zone 2 with respectively 71.9% and 54.6%[19]. For example, in the Itasy region, 47.7% of WRA are sensitized through CHVs while it is 84.5% in Atsimo Andrefana. The third approach is the use of mass-media through radio and television spots with 23.8%. The contribution of private health agents is still marginal. The use of mobile technology is also at its burgeoning phase; phone and SMS is only used by less than 0.1% of the sampled WRA to receive FP/RH BCC messages; and very few respondents had reported seeing BCC through village shows.

[19] P-value=0.000

Figure 11 : Source of FP/RH BCC



5.3. Use of modern contraceptive method

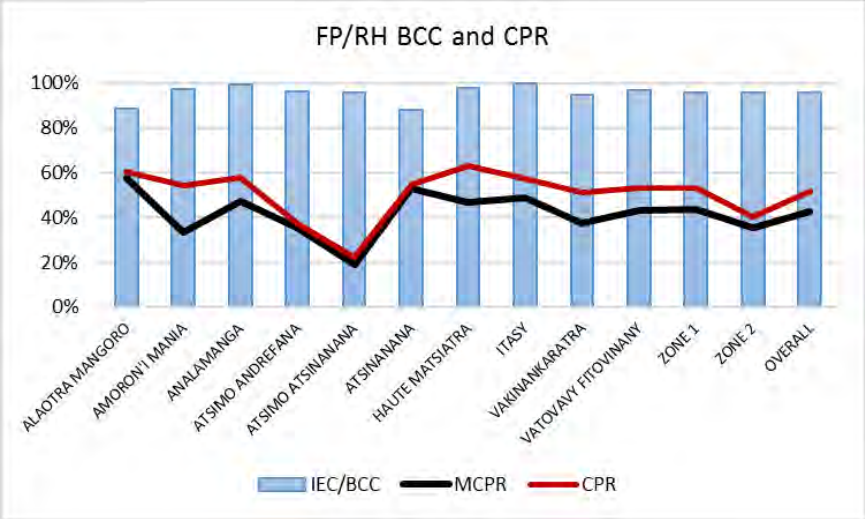
5.3.1. Modern contraceptive Prevalence Rate (MCPR)

"Polyvalent" and "mother" CHVs provide accessible counsels and products on modern contraceptive methods and reproductive health to WRA. Among the modern methods, there are different types of sterilizations (for male and female such as tubal ligation and vasectomy), use of intrauterine devices (IUD), injectable birth control (Depo-Provera or "Confiance"), use of implant rods (Implant), use of combined oral contraceptive, condoms and spermicides. On the other hands, traditional methods include the use of cycle beads, natural methods such as lactational amenorrhea, counting cycle days, abstinence and withdrawal.

For all the sampled women in union in the survey, 51.9% use contraceptive method of all types; and 42.8% use modern contraceptive methods. In both cases, Zone 1 (MIKOLO + PSI) has higher rate of contraceptive users compared to Zone 2. For instance, about 53.3% of WRA in Zone 1 use all type of contraceptives, 13.3 percentage point higher than the 40.3% in Zone 2. Similarly, for modern contraceptive use, Zone 1 is at 43.8% and Zone 2 is at 35.2%[20].

[20] P-value=0.000

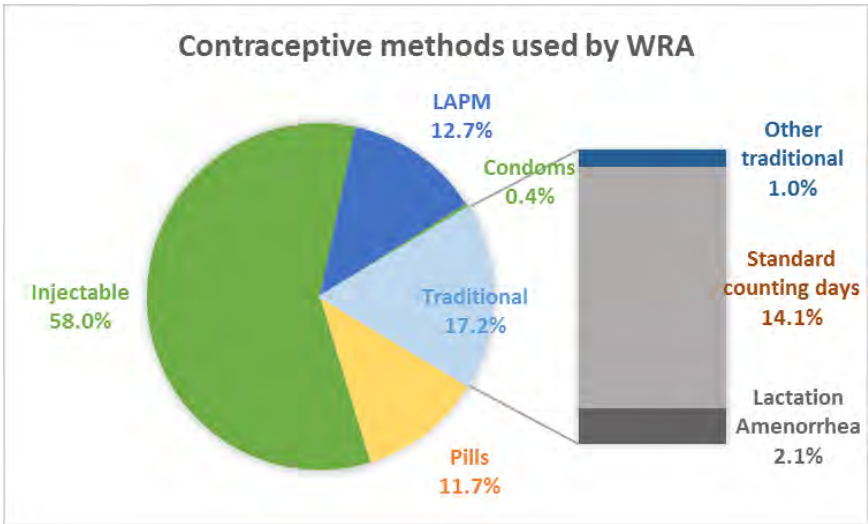
Figure 12 : FP/RH BCC and Uptake of CPR by Region



By region, Alaotra Mangoro and Atsinanana have the highest rate in modern contraceptive methods, respectively at 57.8% and 52.9%; and the lowest is observed in Atsimo Atsinanana, Vakinankaratra and Amoron'i Mania, both below the 40% threshold. There is also huge variability across districts, the highest is Moramanga at 66.7% MCPR, which represents more than 50 percentage points above the rate in Ampanihy (11% MCPR). Note that in some communes (of the district of Ambatondrazaka), a very special dynamism from the CHVs in sensitizing WRA in using MCPR has been noticed during the survey implementation. Also, from the result above, WRA using CPR is quite important (51.9%) even it stays relatively low for MCPR, the question is that how to get these women to use MCPR.

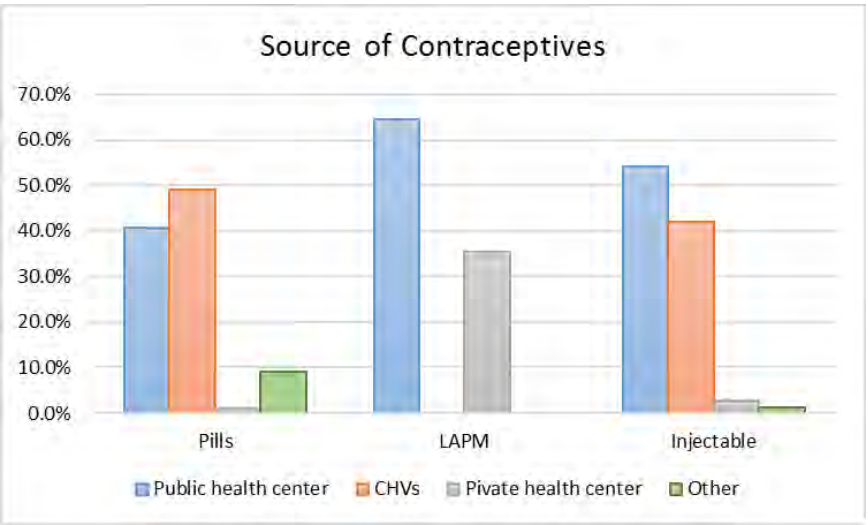
In the zones of intervention of USAID health program, the most used contraceptive method for birth control is the injectable (Depo-Vera or "Confiance") accounting for 58% of the WRA in union using contraceptive methods. This is followed by the group of Long-Acting Permanent Methods (LAPM) at 12.7%, including ligation, intra-uterine device, and mostly implants (10%) and then the pills at 11.7%. Condoms are barely used for FP method with percentage use below one percent (1%). Nonetheless, 17.2% are still using non-modern methods with which the most important is the standard counting days at 14.1% and the lactational amenorrhea at 2.1%.

Figure 13 : Type of Contraceptive Methods used by WRA



The sources of contraceptive methods vary significantly across the type of methods. WRA reach out to public and private health centers for LAPM and complicated methods such as ligation, implant, and intrauterine devices. **However, for pills and injectable, CHVs and public health centers provide most of the services.** CHVs supply 49% of the pills and 41.9% of the injectable for modern contraceptive users in rural areas of Madagascar within the study zones. The public health centers provide 54.1% of injectable; 47% of pills; and also provides LAPM services. The contribution of other source such as market and grocery stores, friends and family, and drugstore and pharmacy is close to zero with the exception of pills (10%) and condoms.

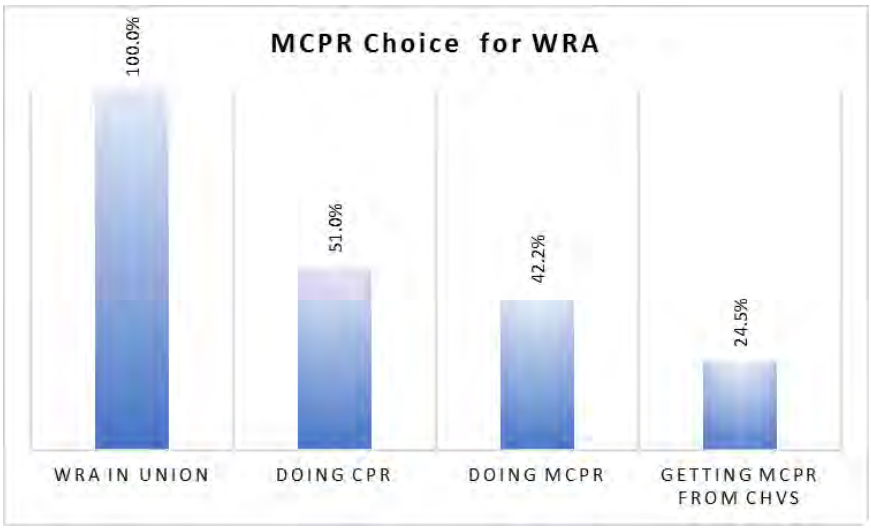
Figure 14 : Source of Contraceptives



To further assess the roles of CHVs on increasing the use of family planning, the survey includes specific questions whether WRA has recently sought counsel and/or product from CHVs. Out of the 2568 WRA using contraceptive methods, 14.4% did reach out to CHVs within the past two weeks preceding the interview. The difference is significant between zone

1 (14.7%) and Zone 2 (9%)[21]. Low rates are observed in Vakinakaratra, Amoron'i Mania and Atsimo Atsinanana regions with respectively at 4.8%, 4.9% and 7.5% but by districts, the lowest percentages of WRA seeking FP services from CHVs in the past two weeks are in the districts of Vondrozo (0%), Manandriana (1.7%), Betafo (1.8%) and Ambositra (2%). On the opposite, the highest rates are found in the regions of Atsimo Andrefana (30%) and Analamanga (23.3%) mainly in the districts of Toliary II (51%), Morombe (46.9%), Beroroha (46.2%) and Ambohidratrimo (36.4%).

Figure 15 : MCPR Choice for WRA – Share of CHVs Services



Overall, out of the 5,035 WRA in union in the sample, 51.0% is doing any type of contraceptives including traditional methods; 42.2% is practicing modern contraceptive methods, of which 24.5% get the service from CHVs. On average, 75.8% of the WRA seeking counsel or treatment from CHVs received adequate care and the remaining are either referred to another competent center or unfit to use contraceptive method at the moment of the visit. Specific services that CHVs will not be able to provide include all LAPM methods; injectable method if the CHV was not yet DEPO certified and in case they do not have stock of the FP products.

5.3.2. Limiting and Spacing birth

About 43.3% of the mothers of CU1 (1,438 observations) want to space birth i.e. wait at least 24 months before the next children. There is no significant difference between Zone 1 at 43.5%) and Zone 2 at 42%. In terms of preference, about 61.3% of the interviewed CU1 mothers want to have children again.

The desire to space birth is higher in Amoron'I Mania (54.4%), Haute Matsiatra (54.2%) and Vakinankaratra (54.1%) and lower in Analamanga (32.7%) and Vatovavy Fitovinany (37.3%). This difference between regions is significant for all mothers wanting to have another children

[21] P-value=0.000

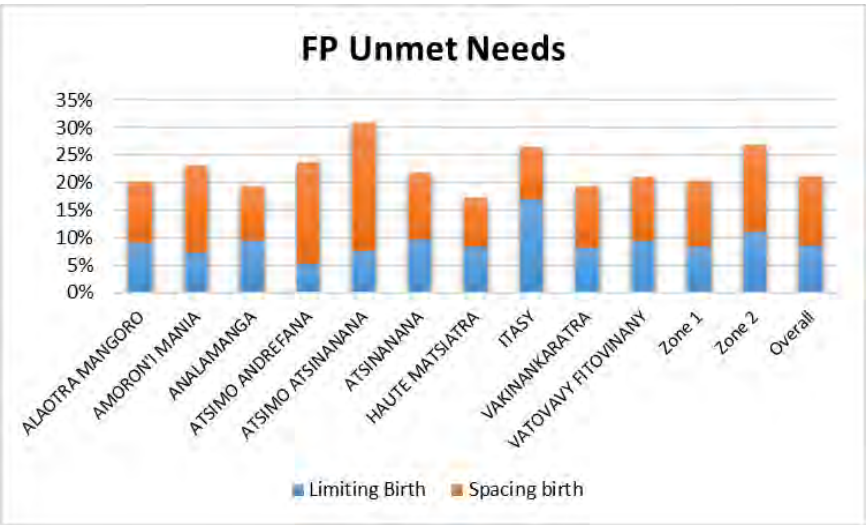
and wait at least 24 months (but not especially for all mothers of CU1). By districts, the proportion is the highest in the districts of Ambalavao (70.4%) and Mandoto (68.8%) and lowest is in the districts of Morombe (4.1%) and Ampanihy (21.9%).

5.3.3. Unmet need for FP

By definition, an unmet need for family planning is defined as the percentage of WRA in union or married, who want to stop or delay childbearing but are not using any method of contraception. Is considered as WRA with unmet need is woman who:

- Is pregnant and her pregnancy was unwanted or mistimed at the time of conception
- Is postpartum amenorrhea and who is not using any family planning
- Is fecund, neither pregnant nor postpartum amenorrhea, and does not want any child more and is not using any family planning method (wants to limit birth)
- Is fecund, neither pregnant nor postpartum amenorrhea, or who want to postpone the next childbearing for at least two years or does not know when or if she wants another child but is not using any contraceptive method (wants to space birth)

Figure 16 : FP Unmet Needs by Region



For all the WRA in union in the sample, 21.1% are with unmet need for family planning. Unmet need for limiting birth is at 8.6% and for spacing birth is at 12.5%. There is a significant difference between PSI with Mikolo zones (20.4% comprising of 8.3% for unmet need for limiting birth and 12.3% for spacing birth) and PSI alone zones (26.8% including 11% and 15.8%)[22]. Across region, Atsimo Atsinanana and Itasy records the higher rates of unmet needs (respectively 30.9% and 26.5%). In the districts of Vangaindrano, for example, the unmet needs are at 41.6%, in Farafangana at 34.7% and in Arivonimamo at 27.2%. The lowest rates are found in the regions of Haute Matsiatra (17.3%) mostly in the district of Ambalavao (5.8%) and Isandra (9.7%) and Analamanga (19.2%) in the district of Ankazobe (10.8%).

[22] P-value=0.000

5.3.4. Perception on FP methods

About 84.8% of WRA in union agree that contraception is also the responsibility of their partners. In addition, more than half (56.6%) perceive that their partners are supportive on using modern contraceptive methods. Support from partners is critical on the willingness of WRA in union to adopt contraceptive methods; in some cases, they are still doing it even with reluctance from their partners but in hiding. WRA in Zone 1 receive more support at 57.8% vs. 46.3% for their peers in the PSI zones[23]. The rate is highest in Alaotra Mangoro region (70%) especially in the districts of Amparafaravola (73.4%), Moramanga (72.1%) and lowest in the region of Atsimo Atsinanana (23.9%) mainly in the districts of Farafangana (14.3%), Vangaindrano (15.7%) and Vondrozo (32%).

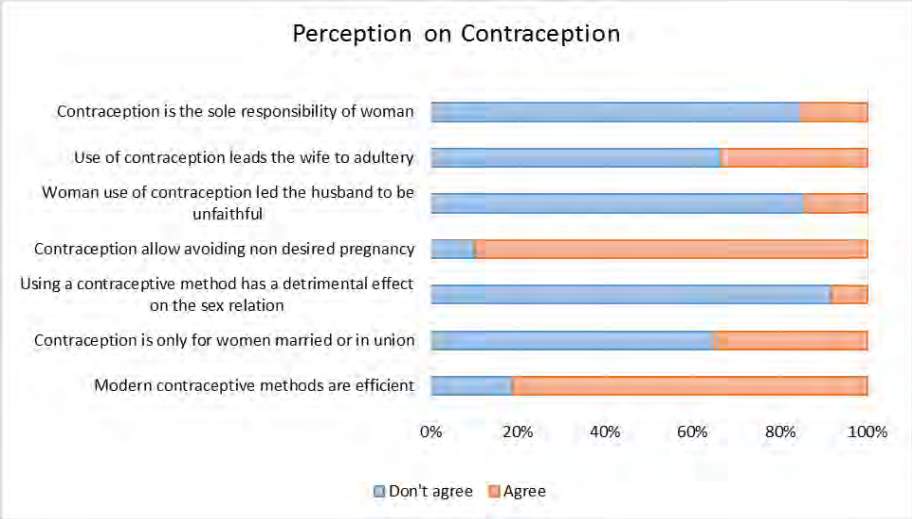
The use of contraceptive, especially the modern methods, has been subject to several myths and interpretations, as well from WRA themselves or from their partners. The survey asked eight series of statements aiming to assess the level of perception of WRA and their partners on the most known myths and misconceptions.

Taking into account the five[24] most important assertions, the result shows that more than half (52%) of WRA in union have no issues or concerns in using modern contraceptives i.e. all their perceptions support the use of contraceptives. For instance, 18.9% of married women disagree that modern contraceptive methods are efficient; 91.8% disagree that using contraceptive methods has detrimental effect on sex relation; about nine out of ten agree that contraceptive allow avoiding non-desired pregnancy; 85.8% disagree that woman use of contraception led the husband to be unfaithful. However, about one third of men still think that the use of contraception led the wife to adultery; and more importantly, about 35% perceives that contraception is for married women only.

[23] P-value=0.000

[24] The 5 more important assertions are: Modern contraceptive methods are efficient; Use of contraceptive methods has a detrimental effect on the sex relation; Contraception allow to avoid non desired pregnancy; Contraception is responsibility of woman; Modern contraception develops cancer and diseases

Figure 17 : Perception of WRA in Union and Partners on Contraception



The region with the highest WRA reporting no myths is Vakinankaratra at 62.7% illustrated by the rates of 73.6% in the districts of Betafo and 67.5% in the district of Ambatolampy. On the opposite, the region with lowest WRA with no myths is Amoron'i Mania at 29.1% with very low rates in the districts of Ambositra (23.2%) and Ambatofinandrahana (29%).

5.3.5. Satisfaction on the FP Quality of Care from CHVs

In general, 90.6% of WRA who received FP care from CHVs are satisfied. However, there is a very significant difference between PSI with Mikolo zones (92.4%) and Zone 2 (77.2%)[25]. This difference could be interpreted as the contribution of the MIKOLO project on the uptake of the use of FP though CHVs. Within the Mikolo zones, many districts such as Ankazobe, Ambositra, Ikalamavony, Toamasina II, Isandra, Vohibato and Betafo caped 100% of WRA reporting entire satisfaction. On the other side, this enthusiasm is dampened in some districts in the non-Mikolo zones; for example, 67.6% of WRA are satisfied in the district of Vondrozo, 68.1% in Midongy Atsimo, and 70.8% in Arivonimamo.

5.4. Availability of FP Products

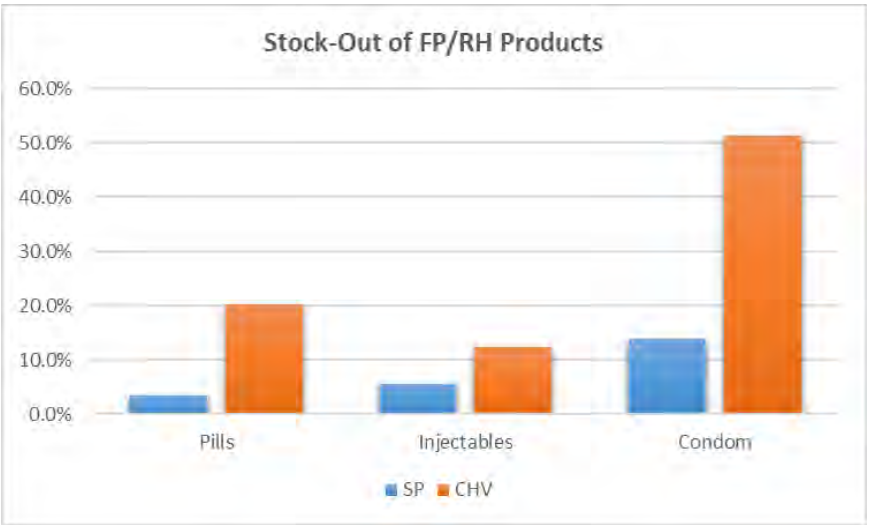
Three key-contraceptives products were considered for the assessment on the availability of FP/RH products at the CHV and SP levels: pills (Pilplan), injectable (Confiance); and male condoms. Very similar questions were asked to CHVs and SPs. The goal is to assess whether the products are available at the time of passage of the survey team, the duration and the reasons for stock-out.

There are no issues on the supply of FP/RH products at the SP level. Out of the 181 points interviewed during the 2015 OMS; only 3.3% and 5.5% of the SPs has stock-out at the time of the interview, respectively for contraceptive pills and injectable. **At the CHVs, the stock-out rates are indeed higher but remain within acceptable range of 20.1% for**

[25] P-value=0.000

pills and 12.3% for injectable. Male condoms show peculiar pattern with low stock-out at SP (12.8%) and relatively high stock-out at CHVs (51.4%).

Figure 18 : Comparison between FP/RH Stock-Out Levels at SP and CHV



Most of the stock-out of female contraceptives products are temporary, which means that CHVs are planning to refill their stock within the next couple of days. For condoms, there is an additional issue related to the lack of buyers, resulting in voluntary decision of no re-supply.

6. Water, Sanitation and Hygiene (WASH)

6.1. WASH Indicators and results

Table 6: WASH indicators

Indicator	Result
Percentage of households using improved sanitation (558 out of 6,244)	10.6%
Percentage of households using improved drinking water source (1,837 out of 6,244)	34.9%
Percentage of households with soap and water at handwashing station commonly used by family members (1,760 out of 6,244)	26.5%
Percentage of households who know the three messages of DIORANO WASH (2,337 out of 6,244)	38.3%
Percentage of CHV houses or huts with soap and water for hand washing (161 out of 366)	44.0%

The overall goal of WASH activities is to increase access and use of drinking water and improved practices on hygiene and sanitation. The promotion of the three key messages of DIORANO WASH has been launched since the beginning of the WASH project. The three messages are:

- Handwashing with soap;
- Use of drinking water;
- Rational use of latrine meeting the standards.

Using drinking water is the most cited response in the regions of Atsimo Atsinanana (96.4%) and Vatovavy (86.6%) with very high percentages in the district of Farafangana (99.2%), in the district of Vondrozo (97.9%) and in both Mananjary and Nosy Varika districts (96%). Washing hands with soap is more cited in the regions of Amoron'i Mania (89.2%) and Vatovavy (84.5%) especially in the district of Fandriana at 96.8%; in the district of Ambositra at 92%; and in the district of Nosy Varika at 89.6%. The least cited is the rationale use of latrines with top percentages of 78.6% in Amoron'i Mania and 69.3% in the region of Vakinankaratra.

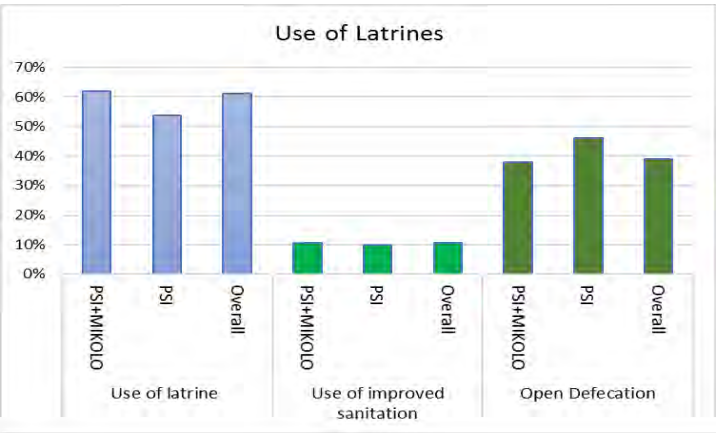
However, only 38.3% of households are capable of citing correctly and completely all three WASH messages. The region of Atsimo Atsinanana records the higher rate at 59% within the district of Farafangana and Vondrozo (both at 66.4%) and Midongy Atsimo (59.2%); followed by Analamanga (47.8%) in the districts of Manjakandriana (56.8%), Anjozorobe (54.4%) and Ankazobe (53.6%). The lowest rates are found in the region of Atsimo Andrefana (19.8%) and Alaotra Mangoro (20%). For example, in the district of Beroroha, it is strikingly low at 1.6%, in Ankazoabo at 2.4%, in Morombe at 4.8%, Toliary II at eight percent (8%) and Ambatondrazaka at 10.4%.

6.1.1. Use of latrine

On average, 61% of the sampled households in the 2015 OMS use some kind of latrines. This percentage is higher for the zones where PSI and MIKOLO projects are implemented together (62.0%), compared to the zones where only PSI is present (53.8%) but the difference is not significant[26]. However, most households are using unimproved sanitation infrastructure with non-washable floor (43.8%). **Only 10.6% are using improved sanitation which defined as latrine with water flush, latrine with washable floor or with airflow.** Slight difference is recorded between Zone 1 (10.7%) and Zone 2 (9.8%)[27].

[26] P-value=0.184
[27] P-value=0.001

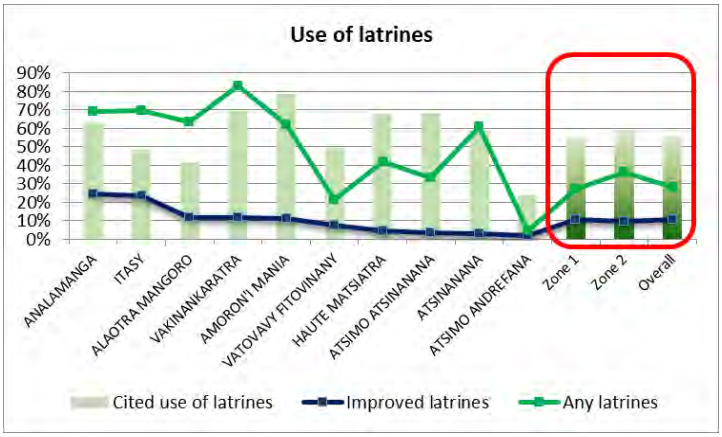
Figure 19 : Use of latrine, Improved Latrines, and Open Defecation



In terms of geographical coverage, Analamanga and Itasy regions record the higher rates of households using improved sanitation (respectively 24.8% and 23.7%) mainly in the districts of Manjakandriana (52%) and Soavinandriana (35.2%). Some districts in the other regions show better rates such as Ifanadiana with 28.8% in Vatovavy, and Antsirabe II with 24% in Vakinankaratra. The lowest rates are found in the Atsinanana and Atsimo Andrefana regions (respectively 2.9% and two percent (2%) mostly in the districts of Vatomandry, Ankazoabo and Benenitra where none of the sampled households are using improved sanitation.

There is also huge gap between knowledge on the "use of latrines" as one of the WASH key messages and the actual use of latrines for some regions such as Vatovavy, Haute Matsiatra, Atsimo Atsinanana, and Atsimo Andrefana. Overall, the gap is about 50% i.e. half of the households who cited latrines as important do not even use latrines. In addition, a second gap is observed between the use of any kind of latrines and the use of improved latrines; and this gap is larger than the first (knowledge vs. adoption) since it reaches above 50% in Vakinankaratra, Amoron'i Mania, and Atsinanana. The peculiar case of Atsimo Andrefana is worth highlighting because of the low awareness (slightly above 20%) as well as low use of latrines (less than 5%).

Figure 20 : Use of latrines by Regions



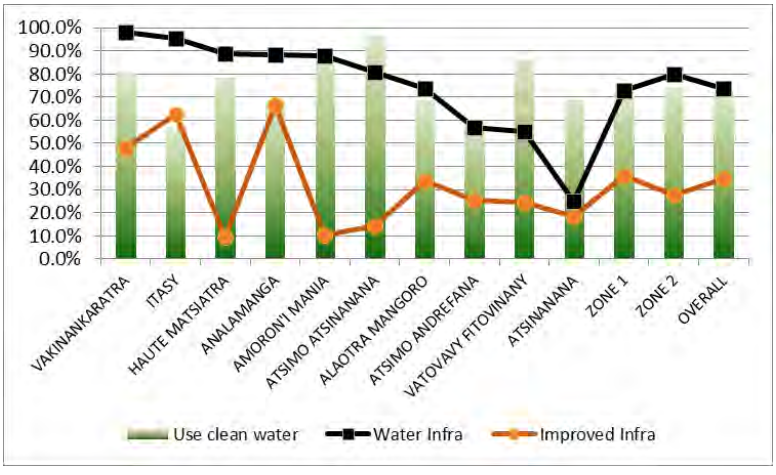
The contribution of USG-supported projects on the use of latrine is quite low i.e. either it is not known by the population that the services are provided by USG-projects, or that the USG-project WASH activities are not significant in the sampled households. Indeed, only 0.6% of the sampled households using improved sanitation (or 0.4% of the total households) recognize that the type of sanitation they use is from an USG assistance program. The only regions with positive responses were in Atsimo Atsinanana, Vatovavy Fitovinany, and in the region of Atsinanana which is probably the results of the RANO HP project implementation.

6.1.2. Use of improved drinking water source

Overall, 73.7% of 6,244 households have access to any type of water source infrastructure, and 34.9% has access to improved water source in the survey catchment areas. Water source can be unimproved or traditional such as non-protected well, non-protected spring; or improved infrastructures such as private tap, public tap water, protected well (with or without tube). The most used types of unimproved water source are non-protected springs (21.1%) and non-protected well (9.7%); and the most used of improved water sources are public tap water (19.6%) and protected well (11%). The remaining 26.3% of the households do not have use any infrastructure as drinking water source. They usually rely on private system using cart or tanker truck for water distribution; or collecting rain (impluvium), or just use water from rivers and lakes.

In terms of geographically PSI coverage, a significant difference is noted between PSI with Mikolo zones (72.8%) and PSI alone zones (79.8%). But it should be noted that PSI with Mikolo zones use more improved drinking water source (35.8%) than PSI alone zones (27.7%) which use the most non-improved drinking water source (52.1%) compared to PSI with Mikolo zones (37%).

Figure 21 : Awareness and Access to Water by Region



The regions of Atsinanana, Vatovavy Fitovinany and Atsimo Andrefana are the regions where more households do not have access to drinking water infrastructure with respectively 75.2%, 45.1% and 43.0% of the sampled households. The rates are critically high in the districts of Mahanoro (96%), Marolambo (84.8%), Antanambao Manampotsy (84.8%), Beroroha (80%),

Benenitra (76.8%) and Toamasina II (76%). On the opposite, the regions of Vakinankaratra (2.1%) and Itasy (4.8%) record the lowest percentages of households who do not have access to infrastructure for drinking water with percentages close to zero in the districts of Ambatolampy, Faratsiho, and Betafo.

About two third of the households in the regions of Analamanga and Itasy are using improved source of drinking water with respectively 66.4% and 62.7% of households. The rates are quite high in the districts of Manjakandriana (86.4%), Ambohidratrimo (76.8%), Miarinarivo (74.4%) and Arivonimamo (62.4%). In three regions (Haute Matsiatra, Amoron'i Mania, and Atsimo Atsinanana), the proportion of households having access to improved drinking water is below 15%.

Note however that access to water infrastructure has very high intra-correlation across households i.e. if one village has access to water infrastructure; it is likely that almost all households in the sampled village will be at the same status thus, altering the "representativeness" of the results.

For water treatment, about 9.5% of the sampled households practices effective water treatment, including 8.8% using Sur'eau and the remaining using either bleach or javel water or filtering with charcoal and sand. There are significantly more households practicing water treatment in Zone 1 (10.4% of households including use of Sur'eau for 9.5%) compared to those in Zone 2 (6.6% including 5.9% using Sur'eau).[28]

6.1.3. Use of soap and water at handwashing station

Only one quarter of the sampled households (26.7%) has functioning handwashing station and 26.5% is using soaps. The handwashing station may be everywhere and of different kind, inside or outside the house but it should be in a fixed location. The region of Amoron'i Mania (with 50.1%) mostly in the districts of Ambositra (61.6%) and Ambatofinandrahana (51.2%) and the region of Itasy (53.6%) in the districts of Soavinandriana (70.4%) and Arivonimamo (50.4%) lead on this situation.

Households still need more sensitization on having handwashing station in the regions of Atsinanana where only 18.8% has such infrastructure; in Atsimo Atsinanana (20.4%), in Vakinankaratra (20.4%) and in Atsimo Andrefana (21.2%). In some districts, the percentages are even dramatic such as the case of Beroroha with 1.6% of sampled 100 households; 7.2% in Ankazoabo, 9.6% in Mandoto, 10.4% in Antanambao Manampontsy, 12.8% in Toliary II and 13.6% in Vangaindrano.

[28] P-value=0.001

7. Nutrition

7.1. Nutrition Indicators and Results

Table 7: Nutrition indicators

Indicator	Result
Percentage of households with moderate or severe hunger (1,030 out of 6,244)	14.9%
Percentage of CU6-23 months fed according to a minimum standard of infant and young child feeding practice (197 out of 2,246)	10.4%
Percentage of CU2 weighted during Growth Monitoring and Promotion (GMP) in the last two months (1,648 out of 3,201)	52.8%
Percentage of CU2 in the MUAC red zone (84 out of 3,201)	2.4%
Percentage of CU2 in the MUAC yellow zone (350 out of 3,201)	10.9%
Percentage of caretakers of CU5 exposed to Nutrition messages (2,802 out of 5,383)	51.2%
Percentage of CU2 in the weight curve (1,210 out of 3,201) Red Zone Yellow Zone Green Zone	 1.3% 10.6% 88.1%

7.2. Sensitization about nutrition

About half (51.3%) of caretakers declared that they have already heard about some aspects of sensitization and messages on nutrition. The communication may be related to mother and child food and nutrition, the type of food by age, vitamin A supplement intake and growth monitoring. The highest rates are found in the region of Haute Matsiatra (74.7%) within the districts of Vohibato (82.7%) and Ambalavao (80.8%); and in the region of Atsimo Atsinanana (74.6%) in the district of Farafangana (81.3%). The lowest proportions are recorded in the regions of Alaotra Mangoro (25.2%) and Vakinankaratra (34.2%) mostly in the districts of Amparafaravola (17.9%), Ambatondrazaka (21.2%) and Mandoto (17.6%). These last two regions are, however, the agricultural basket of Madagascar.

CHVs are the most important sources of the nutrition health messages to caretakers (90.1%) followed by public health agents (65.9%) and the other sources of information such as media with 26.3%.

7.3. Food Insecurity among households

Three indexes define the Hunger index according to FANTA method:

- No food at home which is determined if one or some members of the family don't have anything to eat at least once during the day. In the survey, the question was about one out of the three (3) usual meals a day (breakfast or lunch or dinner)

- The second index is to sleep hungry that means dinner is not sufficient. In the survey, the question was about one or some members of the family feel hunger when going to sleep.
- The third index is to spend a whole day and a whole night without eating anything.

The Hunger status refers to the situation during a month preceding the interview. The calculation of each index is obtained by grouping the responses into three categories: never, rarely/occasionally and often, in assigning them values of 0, 1 and 2. To obtain the Hunger Index, the sum of the three indexes is calculated. If the sum is between 0 to 1, there is no hunger in the household. If the sum is between 2 to 3, then it is interpreted as moderate hunger, and if the sum is between 4 to 6, there is severe hunger.

As results; there are an overall 14.9% of the households with moderate or severe hunger. However, there is huge variability across regions. Hunger is not frequent in the regions of Analamanga (6.2% of the households are in moderate or severe hunger) and Vakinankaratra (6.7%), both regions illustrated by the low rates in the districts of Manjakandriana (3.2%), Ambatolampy (3.2%), Faratsiho (4%). However, on the opposite, the hunger is quite important in the regions of Vatovavy Fitovinany (27.5%) and Atsimo Atsinanana (23.2%) in the districts of Vohipeno (35.2%), Manakara (29.6%) and Vangaindrano (26.4%).

7.4. Infant and young child feeding practice

According to the Global Strategy, WHO and UNICEF's recommendations for optimal infant feeding practices are exclusive breastfeeding for the six first months and adequate nutrition and safe complementary feeding will start from the age of six months with continued breastfeeding for up to two years of age or beyond.

In addition, from the age of six months, nutritionally adequate and safe complementary feeding is defined by minimum dietary diversity, minimum meal frequency and minimum acceptable diet. The minimum dietary diversity is defined by the proportion of CU6-23 who receive foods from four (4) or more food groups during the previous day. There are seven food group score variables to be created to calculate the minimum dietary diversity indicator: 1) grains, roots and tubers; 2) Legumes and nuts; 3) Dairy products (milk, yogurt, cheese); 4) Flesh foods (meat, fish, poultry and liver/organ meats); 5) Eggs; 6) Vitamin-A rich fruits and vegetable; and 7) Other fruits and vegetable.

The minimum meal frequency is defined by the proportion of children 6 to 23 months of age who receive solid, semi-solid, or soft foods the minimum number of times or more. For the analysis, minimum number of times is three referring to the traditional number of Malagasy meals.

The minimum acceptable diet is defined by the proportion of CU6-23 who had at least the minimum dietary diversity and the minimum meal frequency during the day before the survey.

For the minimum dietary diversity, only 11% of CU6-23 have eaten more than four food groups the day preceding the survey. By region, Analamanga (24.9%) and vatovavy Fitovinany (16.3%) record the higher rates in number of food groups eaten by CU6-23; and Haute Matsiatra (4.4%) and Alaotra Mangoro (5%) show the lowest rates.

Based on the minimum meal frequency, 82.8% of CU6-23 ate at least three times the day preceding the survey.

Taking into account the minimum dietary diversity and the minimum meal frequency, only 10.4% of CU6-23 is fed according to the minimum standard (at least four groups of foods and three meals) of infant and young child feeding practice the day before the survey. No difference is found between Zone 1 (10.6%) and Zone 2 (9.5%). However, by region, the proportions are higher in Analamanga (23.1%) and Vatovavy Fitovinany (16.3%), and lower in Haute Matsiatra (4.4%) and Alaotra Mangoro (5%).

7.5. Children Growth

Growth Monitoring and Promotion (GMP) is a prevention activity aiming to increase awareness about child growth; serves as the core activity in an integrated child health and nutrition program. It is an intervention to detect child growth faltering and to affect family-level decisions and child nutritional outcomes. With the collaboration of other project health workers, it is generally held at the nutrition national office (ONN) site or with active intervention of the CHVs.

Overall, 52.8% of 3,201 CU2 were weighted during the GMP session in the past two months preceding the survey. There is slight difference between Zone 1 (53.4%) and Zone 2 (48.9%)[29]. The lowest rates are found in Atsimo Andrefana region with 14.6% of CU2 weighted and in Alaotra Mangoro with 23%; mostly in the districts of Ankazoabo (3.2%), Benenitra (3.6%), Toliary II (8.9%) and Ambatondrazaka (12.5%). The regions of Vatovavy Fitovinany and Vakinankaratra record the highest proportions with respectively 77% and 74.2% of CU2 weighted. In these two regions, the districts with the highest rates are Ambatolampy (90.5%), Vohipeno (88.9%), Betafo (86.5%) and Mananjary (85.9%).

The Mid-Upper Arm Circumference (MUAC) is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow. In children, MUAC is useful for the assessment of the nutritional status. The MUAC measurement requires little equipment and is easy to perform, its use was taught to enumerators.

Three zones are indicated in the MUAC tape: red, yellow and green which respectively correspond to the cut-off for severe, moderate, and absence of malnutrition. The MUAC

[29] P-value=0.341

measurement is the easiest way to use when screening for children malnutrition status at the community level. In the OMS survey, only children less than two years of age were considered for the MUAC measurement.

Among the 3,201 CU2, 81.7% are measured in the green zone, 10.9% in the yellow, and 2.4% in the red zones. Across regions, Alaotra Mangoro and Atsinanana record the highest rates of CU2 in the red zone (respectively 7.1% and 4.1%) mainly in the districts of Ambatondrazaka (11.1%), Vangaindrano (8.3%), Moramanga (7.6%) and Anosibe Anala (7.1%). More CU2 within the yellow zone are observed in Atsinanana (13.2%), Vakinankaratra (12.8%) and Alaotra Mangoro (12.6%) particularly in the districts of Marolambo (21.2%), Ambatolampy (20.6%), Vangaindrano (17.9%) and Toamasina II (17.7%).

8. Health system strengthening (HSS)

8.1. HSS Indicators and Results

Table 8: HSS indicators

Indicator	Result
Percentage of households covered by USG-supported community health financing arrangement (421 out of 6,244)	5.0%
Percentage of households having access to USG-supported emergency transportation system (198 out of 6,244)	2.9%
Percentage of households having used USG-supported emergency transportation system (89 out of 6,244)	1.3%
Percentage of CHVs receiving supervision from USAID community-healthcare projects in the last 4 months (119 out of 366)	32.5%
Average number of CHVs buying health products at the SP in the past 3 months (145 out of 181)	9.75
Percentage of SP with adequate health product storage equipment (180 out of 181)	99.5%
Percentage of CHV with adequate health product storage equipment (stored in sealed cartons, protected against sunshine, leakage of roofs – (226 out of 366)	61.8%
Percentage of CHV members of microfinance group (72 out of 366)	19.7%
Percentage of CHVs with access to credit provided by COSAN savings and loans (81 out of 366)	22.1%
Percentage of CHVs practicing adequate disposal of hazard materials and equipment - put in a safety box and brought to CSB – (100 out of 366)	27.8%

Accompanying measures have been put in place to improve access to quality health care and strengthen the capacity of CHVs.

8.1.1. Community health financing arrangement

The USG projects contribute to the reduction of the barrier to access quality health through the implementation of the Village Savings and Loan Association (VSLA) and the Health Insurance Mutual approaches. **To date, a very few households (5% of the samples) are covered by these types of health financing arrangement.** Household members of health mutual are concentrated in six districts within two regions: Amoron'i Mania (30.9%) and Atsinanana (7.9%). For instance, in Amoron'i Mania, high rates are observed mainly in the districts of Fandriana (40%), Manandriana (33.1%), Ambositra (30.4%) and Ambatofinandrahana (20%). The region of Atsinanana has significant overall rate but the covered households are concentrated in two dictricts: Vatomandry (34.4%) and Brickaville (12.8%).

For the VSLA approach, five regions are concerned comprising, Atsimo Atsinanana, Amoron'i Mania, Haute Matsiatra, Vatovavy Fitovinany, and Atsinanana. Within these five regions, beneficiaries are members of VSLA in 13 districts.

8.1.2. Supervision of the CHV activities

Supervision of CHV activities from USAID implementing partners is among the specification sheet of the USAID projects. A minimum of quarterly supervision is planned for this purpose. Thus, interviewed CHVs have been asked when they have had the last supervision and who had come.

As result, since the beginning of their role of CHV, 80.6% of them have been subject to supervision. It means that one out of five CHVs never receive this type of support. These could be new CHVs or CHV in the region outside MIKOLO areas of interventions. **Supervision from USAID partners does not always comply with the threshold of at least once visit to CHV every quarter.** About one third (32.5%) of the sampled CHVs had received supervision from the USAID projects within four months preceding the survey. There is a huge difference between Zone 1 (38.5%) and Zone 2 where only 3 CHVs (4.6% of the sample) have been supervised within four months before the survey. Note that apart USAID, there are also other entities conducting supervision such as CSB agents, the inspector from the district health centers, and the national office for nutrition. Note that no supervision from COSAN were identified.

8.1.3. Emergency transportation system

Improvement of the emergency transportation system including motorized cyclo-pousse ambulances (or bicycle ambulances) at the USAID partners' implementation zones is among the measure adopted for increasing the focus on maternal and neonatal health. The goal is that in case of emergency, WRA or CU5 will not have problem to reach the nearest health center. A couple of questions were asked about access of such system to households.

As result, only 2.9% (about 180 out of 6,244) of the sampled households have access to a transportation system in case of emergency. This type of service exists only in five regions: Alaotra Mangoro, Analamanga, Atsinanana, Itasy and Vatovavy Fitovinany. The region of Alaotra Mangoro records the highest rate (16.6%) specifically in the districts of Amparafaravola (32.8%) and Moramanga (27.2%). In the region of Analamanga, only 1.4% of the sampled households have access to emergency transportation system with the district of Manjakandriana peaking at 5.6%.

Among the 2.9% with access to emergency transportation, about half (1.3%) had declared using the system in 2015. Out of this 1.3%: most users (90%) perceive the access to be "easy" (90%) and "not expensive" (86%); with the exception of privately-owned system. In general, the means of transportation belong to private entities (Amparafaravola and Moramanga) and CSB/Non-USAID projects (Ifanadiana and Vatomandry). The USG-supported projects account for only 6.5% of the cases, all located in the district of Vatomandry. Car and

motorcycle are the most used means (46%) followed by other means such as pirogue and boat; rickshaw is also quite important at 18%.

Figure 22 : Type, Access, and Costs of Emergency Transportation System