UNEP

Integrated Baseline Study

Port-à-Piment Watershed
Sud Department, Haiti

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

CÔTE SUD INITIATIVE

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- Center for Tropical Agriculture and the Environment (TropAg)
- Lamont-Doherty Earth Observatory (LDEO)
- The Modi Research Lab
- The Urban Design Lab (UDL)

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2. ACRONYMS:

AIDS	Acquired Immunodeficiency Syndrome
ASEC	Assemblée de Section Communale
CAEPA	Comité d'Approvisionnement en Eau Potable et Assainissement
CASEC	Conseil d'Administration de la Section Communale
CEmOC	Comprehensive Emergency Obstetric Care
CDCSH	Centre de Développement Sur la Côte Sud d'Haïti
CFC	Common Fund for Commodities
CIESIN	Center for International Earth Sciences Information Network
CHW	Community Health Workers
Col-Vols	Community health volunteers
CNIGS	Centre National d'Information Géo-Spatiale
CNSA	Coordination Nationale de la Sécurité Alimentaire
CSI	Cote Sud Initiative
CRS	The Catholic Relief Services
CQ	Cloroquine
CU	Columbia University
DEM	Digital Elevation Model
DGI	Direction Generale des Imports (Director General of Taxes)
DHS	Demographic and Health Survey
DINEPA	Direction Nationale de l'Eau Potable et de l'Assainissement
ECVH	Enquête sur les conditions de vie en Haiti
EDH	Electricite d'Haiti

EI	The Earth Institute at Columbia University
FAES	Fonds d'Assistance Economique et Sociale
FAO	United Nations Food and Agriculture Organization
GAR	Gross Attendance Rates
GDP	Gross Domestic Product
GIPPN	Group Initiative Pour Port-à-Piment Nouveau
GoH	Government of Haiti
Ha	Hectares
HIV	Human Immunodeficiency Virus
ICT	Information, Communication and Technology
IHSI	Institut Haïtian des Statistique et d'Informatique
KPP	Konbit Pou Pôtapiman
LDSF	Land Degradation Surveillance Framework
LULC	Land use and land cover
MARNDR	Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural
MDE	Le Ministère de l'Environnement
MENFP	Ministre de l'Éducation Nationale et de la Formation Professionnelle
MDG	Millennium Development Goals
MOD-T	Development Organization Movement of Tiburon
MPCE	Ministère de la planification et de la cooperation externe
MSPP	Ministère de la Santé Publique et de la Population
MUAC	Mid Upper Arm Circumference
NAR	Net Attendance Rates
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration

ODP	Ozone Depleting Substance
OFDAN	Women Development Organization of Les Anglais
ORE	Organization for the Rehabilitation for the Environment
OREPA	Offices Régionaux de l'Eau Potable et de l'Assainissement
ORS	Oral Rehydration Solution
TBAs	Traditional Birth Attendants
TFR	Total Fertility Rate
UNEP	United Nations Environment Programme
UNOPS	United Nations Operations
USDA	United States Department of Agriculture
WASH	Water Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization

3. EXECUTIVE SUMMARY

This report provides a platform to measure indicators of development and poverty reduction over a multi-year timeframe. It puts forth data-driven tools for communities and government decision-makers to create and implement objective and target-based development investment plans. This report is also part of ongoing scientific research to understand the elements of fragility and vulnerability that are linked in a perverse web of interactions. Natural disasters for example prevent sustained economic growth, limit execution of strategic planning, and undermine poverty reduction programs. As such, the report summarizes the socio-economic, demographic, biophysical, social services, environmental, and community organizational structures. The findings are intended to guide and reinforce the implementation strategy of an integrated development model grounded in the targets and objectives of the Millennium Development Goals (MDGs). The results of this baseline study are designed as part of a multi-component monitoring and evaluation platform for ongoing data collection, costing of programs for the total investment in the area and for overall regional monitoring. This report is the only comprehensive integrated impact assessment that is MDG-based and representative of a geographically-defined area in Haiti.

The study area focuses on the watershed of Port-à-Piment located in the South Department of Haiti and is comprised of the administrative communes of Chardonnieres, Port-à-Piment and Coteaux. This watershed is located at the base of the Pic Macaya National Park -- one of Haiti's last remaining original forests as the source of water for the entire southern peninsula. The Port-à-Piment watershed has the most direct route to the peak of Pic Macaya and was historically a major production area for coffee, timber, and spices. With significant potential for high value crops and value-added production, the area demonstrates growing vulnerability to environmental risks and poverty-driven fragilities. The residents report an increased frequency of large flooding events and Earth Institute studies have shown the increasing rates of erosion in the small, yet highly productive, areas of fertile agricultural land in the river valley.

Facing economic insecurity, households employ multiple strategies to address their needs. Over one-third of households reported discontinuing their child's school to save money or reported having sold or pledged their land or house to buy food. Nearly two-thirds of households reported having consumed seeds meant for planting next season or having sold their livestock as a strategy to buy food. These strategies meant to address immediate needs increase both the individual and the collective vulnerability of the population as households resort to unsafe agricultural techniques or unsustainable deforestation to survive.

The collective body of research, as understood within the goal-driven MDG framework, paints a clear picture of the state of extreme fragility in Port-à-Piment and the interrelated nature of

vulnerabilities that reinforce and exacerbate one another. Results, detailed below, show the overwhelming majority of households experience food insecurity most of the year. Large portions of children are inflicted with preventable diseases such as diarrhea, yet few report subsequently receiving adequate health care. The majority of land is under some form of cultivation and production, with the majority of households reporting intercropping and mixed use of their parcels. This is occurring in a watershed where steep slopes of over 30% comprise over 64% of the total area of the watershed. There is a high risk of flooding due to frequent high rainfall events, exacerbated by extreme spatial variation in the rainfall patterns and consequent high river levels and water flows. These are only a few of the results presented in this report that demonstrate sector priorities, regional priorities, and key needs.

The analysis in this report is largely based on data collected in 2011 across 10 communes in the Department Sud of Haiti. The report draws from previous desk research and other 2011-2012 studies that are targeted to describing bio-physical, market, and community planning and governance assessments. A full methodology section is found in the annex of this report. The survey data collection upon which this report is founded was designed to serve as a baseline with clear focus areas that, when repeated at a later date can measure progress towards clear national and international development goals, under a globally agreed framework for MDG attainment.

4. TABLE OF MAIN MDG INDICATORS

Millenium Development Goals and MVP Indicators											
Goal 1: Eradicate extreme poverty and hunger											
Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from hunger											
MDG Indicator	**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
Proxy 2 for MDG Indicator 1.9: Months of adequate food provision	3.5		3.2							
1.8. Prevalence of underweight [weight-for-age] in children under 5 years of age (0-59 months) Moderately or Severely (-2SD):	10%		13.8%							
Dietary diversity score for children under 24 months	2.68		2.65							
Dietary diversity score for adult women 15-49 years of age	2.79		2.85							
Goal 2: Achieve universal primary education											
Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling											
MDG Indicator	**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
MDG 2.1. Net attendance ratio in primary education	74%		60%		49.6%	B				
Proxy for MDG 2.1 Gross attendance ratio in primary education	135%		131%		123.5%	B				
Net Secondary School Attendance	22%		15%		16.4%	B				
Gross Secondary School Attendance	36%		23%		47.6%	B				
MDG 2.3 Literacy rate of 15-24 year olds, women	60%		47%		70.5%	D				
Proxy to MDG 2.3 Literacy rate of 15-49 year olds, women	51%		48%		81.1% 15+ years	B				
MDG 2.2 Proportion of pupils starting grade 1 who reach last grade(grade 6) of primary education	17%		11%		38.4%	B				
Goal 3: Promote gender equality and empower women											
Target 3.A: Eliminate gender disparity in primary and secondary education and preferably by 2005, and in all levels of education no later than 2015											
MDG Indicator	**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
MDG 3.1 Ratio of girls to boys in primary and secondary education (by NAR) Primary	0.79		0.83		1.02	B				
Secondary	0.74		0.9		0.94	B				
MDG 3.1 Ratio of girls to boys in primary and secondary education (by GAR) Primary	0.94		0.8							
Secondary	0.91		0.8							
Goal 4: Reduce child mortality											
Target 4.A: Reduce the under five child mortality by 2/3 between 1990 and by 2015											
MDG Indicator	**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
MDG 4.1. Under-5 mortality rate (U5MR) 2007-2011	**65**		**77**		**165** 2010	**D**				
2002-2007	**87**		**107**		**92** 2005	**D**				
1997-2002	**90**		**133**		**109** 2000	**D**				
MDG 4.3. Proportion of 1 year old children immunized against measles	56%		60%		45.3%	B	55.5%	F	60.2%	F
Proportion of children under 5 with diarrhea in last 2 weeks	27%		33%		23.7%	F	24.6%	F	13%	F
Proportion of children under 5 who received Vitamin A supplementation (injection or capsule) in the last 6 months	68%		65%		28.7%	F	28.2%	F	19.5%	F

Goal 5: Improve maternal health												
Target 5.A: Reduce by 3/4 the maternal mortality ratio between 1990 and 2015												
MDG Indicator		**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
MDG 5.2 Proportion of births attended by skilled health personnel		15%		8%		26%	B	30%	E	23.7%	F
Target 5.B: Achieve, by 2015, universal access to reproductive health												
MDG 5.3 Contraceptive prevalence rate (among married / union women aged 15-49 years)	All methods	31%		24%		21.4%	B	29.2%	F	34.9%	F
	Modern methods	29%		22%		23.6%	D	22.3%	F	26.7%	F
MDG 5.5 Antenatal care coverage (at least one visit by a skilled health worker		83%		87%		84.5%	B	81.6% 2005-2006	F	83.8% 2005-2006	F
MDG 5.5 Antenatal care coverage (at least 4 visits by any health provider)		63%		71%		53.8%	B	46.1% 2005-2006	F		
Postnatal care within the first seven days with a doctor or nurse		16%		17%				15.6%	F	16.9%	F
MDG 5.6 Unmet need for family planning		40%		43%		38%	B				
Goal 6: Combat HIV/AIDS, malaria, and other diseases												
Target 6.A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS												
MDG Indicator		**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
Proxy for MDG 6.3 Proportion of women with comprehensive correct knowledge of HIV/AIDS	15-24 years	8%		8%		31.9%	B				
	15-49 years	24%		31%		31.9%	B				
Proportion of women who tested for HIV/AIDS	Ever tested	54%		48%		16.6%	B				
	Ever received test results	47%		39%				11.4%	F	13.2%	F
	Tested within the last 12 months	16%		14%				5.1%	F	7.1%	F
	All the above	13%		11%							
MDG 6.7 Proportion of children under 5 sleeping under insectide-treated bednets		1%		1%							
MDG 6.8 Proportion of children under 5 with fever who are treated with appropriate anti-malarial drugs		6%		4%		5.1%	B	4.3%	F	1.3%	F
Goal 7: Ensure environmental sustainability												
MDG Indicator		**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5
Average number of parcels of land per household		1.77		1.40							
Proportion of parcels located at...	Flat land on top of a hill	32%		31%							
	Side of a hill	44%		50%							
	Flat land on the bottom of a hill	24%		19%							
Proportion of parcels where the following soil conservation methods have been employed in the past 12 months	No method	88%		82%							
	Vegetative	8%		12%							
	Structural	5%		7%							
Proportion of parcels where any type of irrigation system has been used in the past 12 months		3%		3%							
Proportion of households who planted trees in the past 12 months		39%		40%							

Target 7.C: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation												
Proportion of households that treat their drinking water	Total	93%		94%		32.6%	B					
	Boil	3%		5%								
	Add bleach/chlorine	30%		30%								
	Use a water filter	1%		1%								
	Aquatab	95%		94%								
	Other	2%		4%								
MDG 7.8: Proportion of population using an improved drinking water source (year-round: during both wet and dry seasons)		45%		46%		55.2%	B	50%	B			
MDG 7.9 Proportion of population using an improved sanitation facility		22%		13%		16.5%	B					
Primary sanitation facility	Flushed to Piped sewer system	0%		0%			B					
	Ventilated Improved pit latrine	11%		11%								
	Pit latrine with slab	17%		10%								
	Pit latrine without slab/open pit	13%		10%		20.7%						
	Composting toilet	0%		1%								
	No facilities	56%		65%		34.7%						
	Other	1%		3%								
MDG Indicator		**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5	
Proportion of households using firewood as cooking fuel	Primary	88%		85%		51.8%	B	91%	E			
	Secondary	10%		13%								
Proportion of households using charcoal a cooking fuel	Primary	11%		14%		41.6%	B					
	Secondary	88%		85%								
Average length of time it takes to go there and get fuel and come back	Minutes	43		45								
Most important environmental problems faced by households	Contaminated drinking water	3%		4%								
	Deforestation	0%		1%								
	Earthquakes	11%		8%								
	Flooding	20%		28%								
	Hurricanes/ Cyclones	56%		55%								
	Inadequate rainfall/drought	3%		1%								
	Inadequate sewage and sanitation	1%		1%								
	Land slides	1%		1%								
	Soil erosion	0%		1%								
	Wind	4%		3%								
Goal 8: Develop a global partnership for development												
Target 8.F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications												
MDG Indicator		**10-commune average**	1	**Port-à-Piment Watershed**	2	**National**	3	**Rural**	4	**South Department**	5	
Proxy for MDG 8.15 Proportion of adult females (15-49 years old) who own a cellular phone		57%		43%								
Proportion of households who received credit		36%		36%		1.10%	C					
Proportion of households that have a bank account		15%		18%								

N/A = not available/measured

** = data quality issues

__* = sample size less than 10

Data Sources

B: ENQUÊTE MORTALITÉ, MORBIDITÉ ET UTILISATION DES SERVICES EMMUS-IV, 2005-2006

C: World Bank, 2009

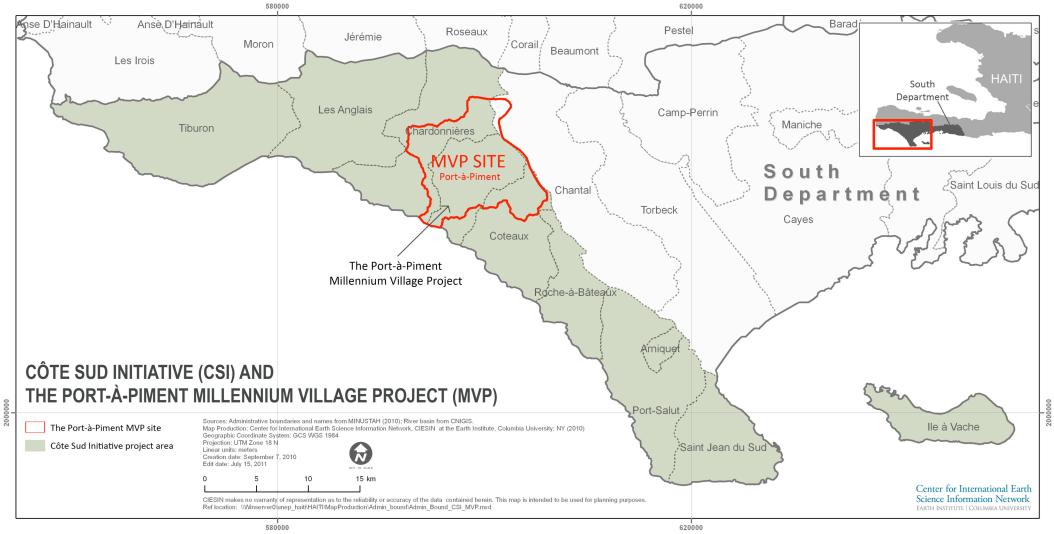
D: UN Millennium Development Goals Indicators, updated September 2011

E: OMD, 2010

5. GENERAL BACKGROUND

Haiti is located at the western part of the island of Hispaniola between the Caribbean Sea and the North Atlantic Ocean. The country's surface area covers 27,750 km^2. The climate is mainly tropical, with semi-arid climate variations in the eastern regions. Morphologically, Haiti has a mountainous and rough terrain. The highest peak of the country is the Chaines de la Selle (2,680m), located in the southeastern portion of the island followed by the Pic Macaya in the South Western peninsula.

The Port-à-Piment watershed is an area of 102km^2 situated in Haiti's southwestern peninsula, located in the South Department. This area is defined by the topographic features of the flow of water from ridge to reef, not by administrative boundaries set by the government. The Port-à-Piment watershed is comprised of seven communal sections—4ème Condé, 6ème Quentin, 2ème Déjoie, 1ère Randel, 2ème Balais, 1ère Paricot and 3ème Carrefour Canon—within the limits of the communes of Port-à-Piment, Chardonnieres, and Coteaux. A small portion of the watershed also falls within the boundaries of the commune of Chantal. The upper watershed area is embedded within the Pic Macaya National Park. The delineation of the watershed is determined by the physical morphology of a hydrological system, which drains downwards to the ocean. The Port-à-Piment watershed, formed by the drainage basin of the Port-à-Piment river, is one of several sub-watersheds in the major Tiburon river and watershed system of the southwestern peninsula. The project area of the Port-à-Piment watershed also includes a smaller sub-watershed system that contains the entirety of the coastal town of Port-à-Piment.



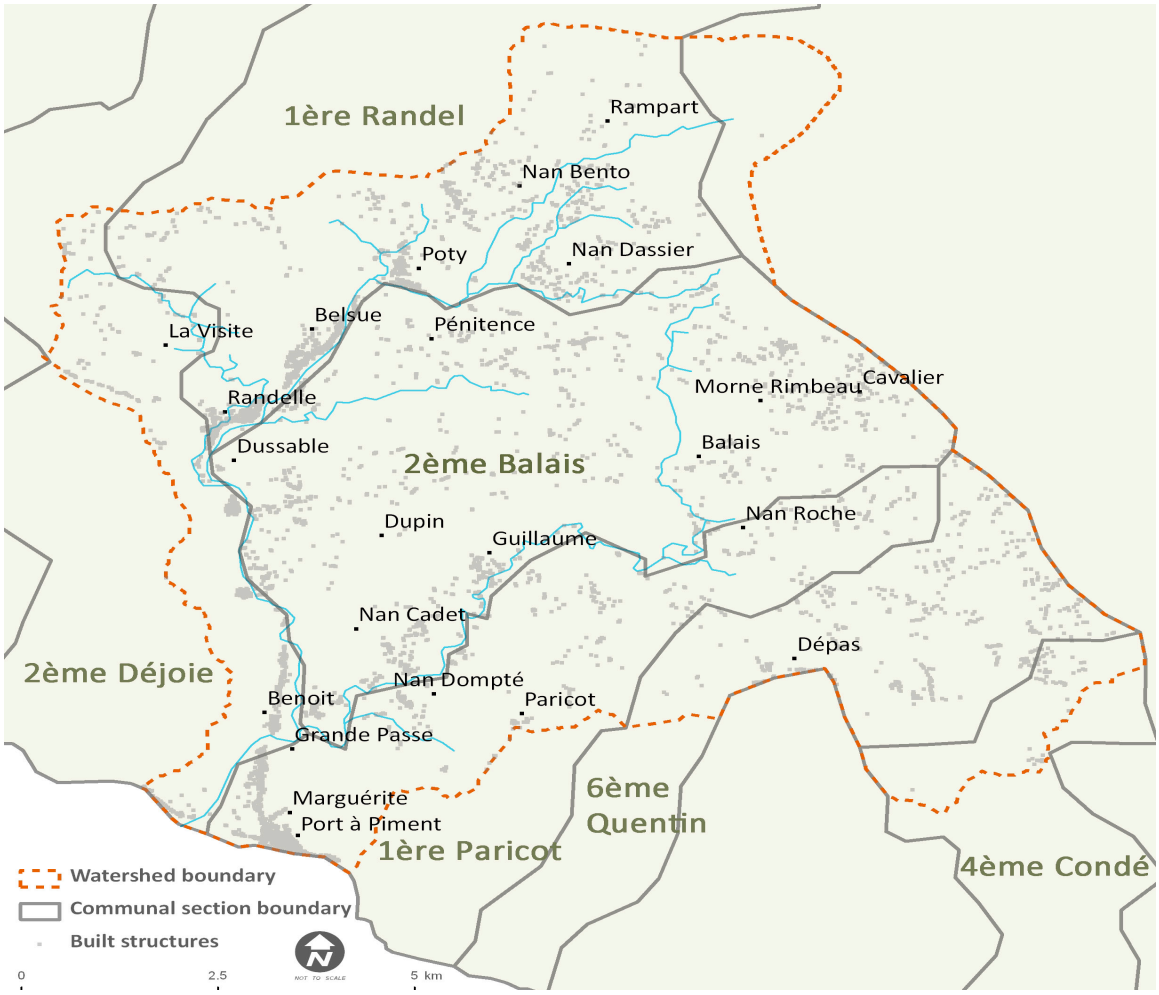
Map 1 Localization of the Port-à-Piment Watershed.

The Port-à-Piment watershed was selected as the research and intervention site as a result of its geophysical placement, proximity to the Pic Macaya, development potential, lack of

comprehensive integrated development programs, and characteristics as a multi-hazard zone, with high environmental, social, and disaster risk vulnerabilities.

5.1. Natural boundary of the Port-à-Piment Watershed

The physical delineation of Port-à-Piment watershed does not correspond to the borders of administrative units. There are three communes (partially and/or entirely) included in the watershed: Coteaux, Chardonnières and Port-à-Piment along with six communal sections: 4ème Condé, 6ème Quentin, 2ème Déjoie, 1ère Randel, 2ème Balais, and 1ère Paricot. Rather than roughly estimate the population living in the watershed from figures by communal sections, a smaller administrative units, enumeration areas, were taken from the census data of 2003; the research team selected only those which fell inside the borders of the watershed. Total figures were considered even though some enumeration areas did not fit entirely inside the watershed's boundary.



Map 2 Distribution of built structure in the Port-à-Piment Watershed circa 2004. Source: IHSI, 2003; CNIGS 2004. Map produced by CIESIN 2010.

The research teams excluded the small portion of the commune of Chantal in the upper watershed during the household survey. During the calculation on the spatial population distribution, observations using satellite imagery from 2007 and 2009 and spatial data from 2004 showed no built structures in this area. To avoid bias in the spatial representation, these enumeration areas were omitted from the total count for the survey teams[1].

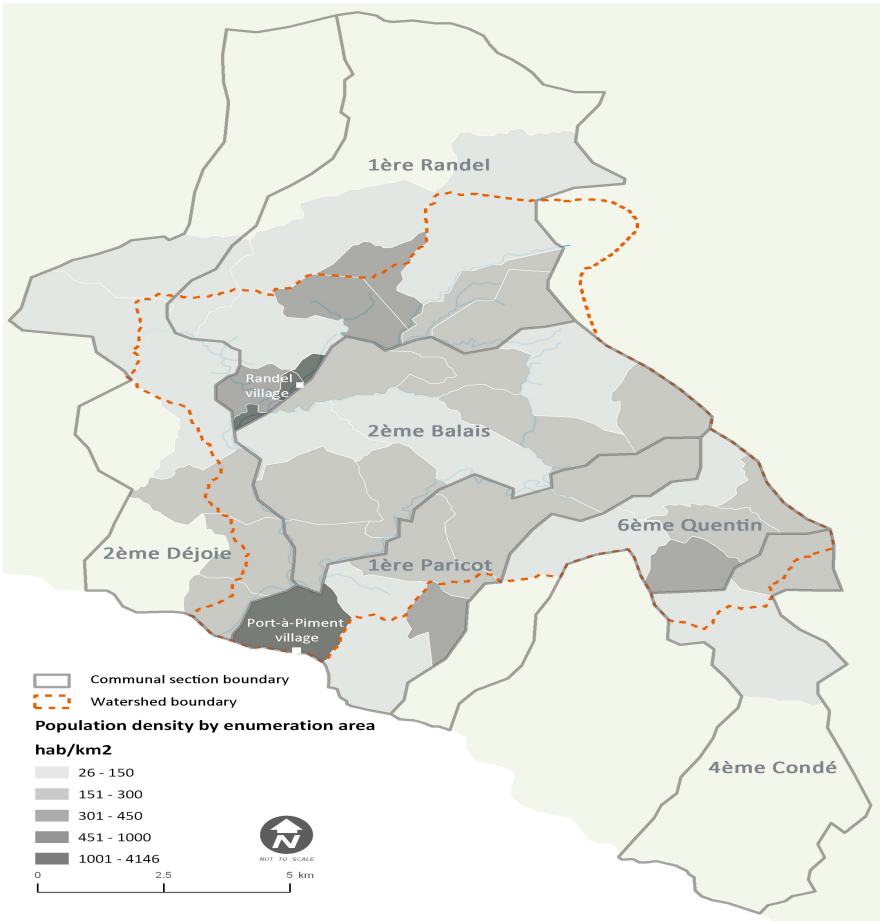
The figure above shows the distribution of built structures across the watershed in 2004. A built structure refers to any constructed unit visually identified from a satellite image. Thus built structures do not only refer to houses but also to commercial, health, education, religious and other uses. The total count of built structures within the watershed summed close to 5000 units. [Built structures dataset from CNIGS, 2004]. More than half of the population is settled along Port-à-Piment's main river streams and coastline; the rest of the population is scattered around approximately 100 km^2 of steep slopes and uneven microclimates. As elevation increases, the terrain becomes more mountainous. As depicted in the figure above, the densest settlements follow a linear configuration that corresponds to the flat land alongside the riverbed. The highest risk from floods and land loss during each year's hurricane season (August through November) is present in those highly dense settlements. During extreme weather events, rivers can widen more than twice its regular size[2]. Without adequate infrastructure, soil conservation and preventive stabilization measures, housing and other structures could be temporarily damaged or permanently lost. Built structures located close to riverbeds and coastlines are vulnerable to severe structural damage, providing limited means for shelter or protection to the hundreds of families living within this area.

[1] This portion refers to Chantal commune, 3ème Carrefour Canon communal section.
[2] Based on field observations in various periods throughout a given year (April 2010 to June 2012)
[3] Based on field observations from various periods throughout a given year (April 2010 to June 2012)

6. DEMOGRAPHIC PROFILE

TOTAL POPULATION

The Port-à-Piment watershed has an estimated total population of 28,863 people. This is derived from the Direction des Statistiques Démographiques et Sociales (IHSI, 2009) for the areas within the watershed boundaries. The population in the Port-à-Piment watershed represents almost 4% of the total population in the South department. More than half of the total population lives within the premises of the Port-à-Piment commune.



Map 3: Population density by enumeration area in the Port-à-Piment watershed. Data sources used: IHSI 2003, CNIGS 2004.

The majority of dwellers in the Port-à-Piment watershed are concentrated in two main settlement clusters of Port-à-Piment and Randel. Based on density of structures and population, these areas are classified as urban areas and surrounding areas as peri-urban. The smallest settlement clusters are present in the upper watershed areas close to Pic Macaya.

CHARACTERISTICS OF HOUSEHOLDS IN THE PORT-À-PIMENT WATERSHED

The household survey obtained information from 300 households and 1603 individuals distributed across the 3 communes of the Port-à-Piment watershed[3]. The survey identified 6% of those individuals as migrants. Among the main reasons to migrate are: family commitments, seek professional health assistance, and work related.

Males head the majority of the households (64%) whereas women head the remaining 36%. Of those women, widows head one of three households and single or divorced women head 13% of households. Almost half of female-headed households are led by married women, or living as married.

The average household size in the Port-à-Piment watershed is 5.3 individuals per household, which is relatively higher compared to the 4.7 average size within rural areas (Cayemittes et. al., 2007).

The total fertility rate (TFR) in the watershed-- also known as the average number of children that would be born to women[4] --has decreased from 5.4 between 2007-2009 to 4.8 between 2009- 2011. Compared to the latest Demographic and Health survey for the same period (2005-2007) the watershed reported a lower TFR (3.8) than rural averages (5.0), but then increased for the following period (2007-2009). High TFR ranges in Haiti are representative of low- income countries in general.

In the Port-à-Piment watershed there are more men than women. There is an estimated average of 112 men per 100 women in the region. Individuals of working age[5] (15-64 years-old) represent more than half of the population (53%). Children between 0 and 14 years old (39%) and aged people of 65 years or older (8%) constitute the remaining 47 percent. In terms of total dependency, the overall ratio for the watershed is 89 per 100 individuals at working age[6]. The total population under the age of 35 is estimated to be 68.3% of the total population. The total dependency ratio is a measure of the overall pressure that dependents (children and elder people) place on the population of productive ages. As depicted in the figure below, all who are of working population are heavily burdened in terms of their dependents.

[3] Only the enumeration areas from Coteaux and Chardonnières that fall within the watershed's premises were included in the sample for the Port-à-Piment Watershed. During the household survey, all enumeration areas from the Port-à-Piment commune were considered as part of the watershed.

[4] Total Fertility Rates (TFR) are based on age-specific fertility rates (ASFR), thus TFR refers to the average number of children born to a woman within her lifetime assuming that she experiences the same ASFR throughout her life and that she will survive the average reproductive age (15-49 years).

[5] 15-64 years old.

[6] The total dependency ratio is the sum of child dependency ratio and aged dependency ratio. Based on estimations from respondents, the calculated child dependency ratio in the Côte Sud is 75, and the aged dependency ratio is 14.

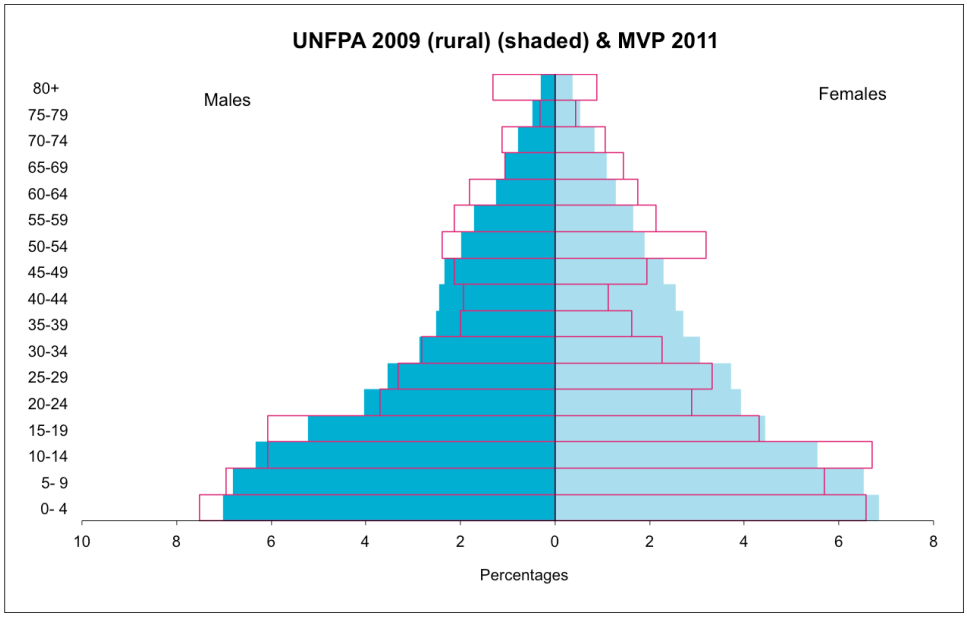


Figure 1 Population pyramid in the Port-à-Piment watershed. The shaded area represents the total rural population estimated by UNFPA, Haiti in 2010. The red outline refers to the data obtained from households in the Port-à-Piment Watershed in 2011.

As discussed before and also evident from figure 6, the population in rural Haiti predominantly youth. The triangular profile depicts very high proportions of children and young adults, and is often associated with large families and a decline in mortality. The shaded area represents the population projections for rural Haiti in 2009 (IHSI, 2010) and the red outline depicts the age and gender structure in the Port-à-Piment watershed in 2011. In addition, the age group between 35 and 49 years of age is lower in the watershed than national averages. The age groups 10-14 and 15-19 show larger percentage in the watershed than national averages. This represents growing pressures for the education system and job creation.

Main occupation

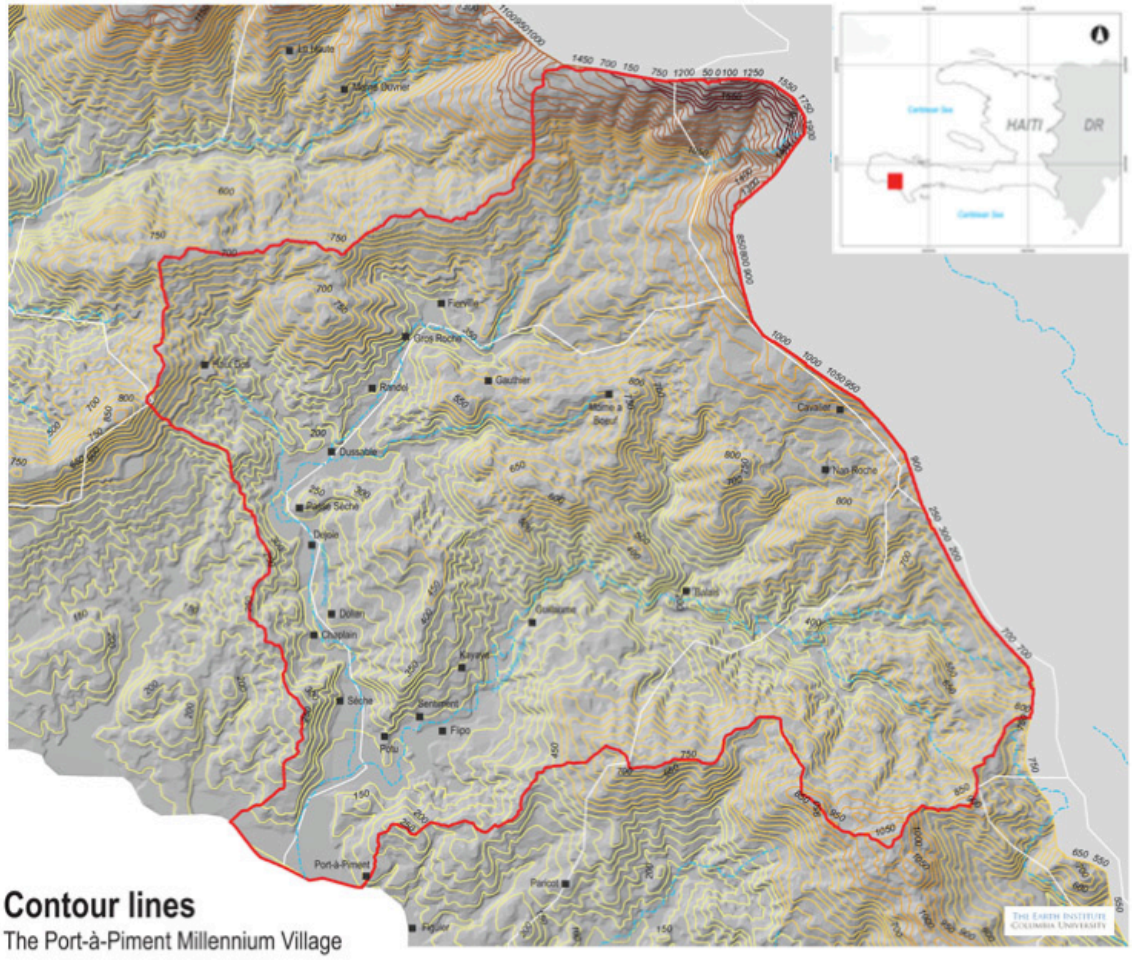
The main occupations of working age individuals (15-64 years) in the Port-à-Piment watershed are farming, animal husbandry and fishing (36%), while self-employment or small business development at the household level represents 13%. There is an opposite gender breakdown in these two occupation categories. There are almost two male farmers for every female farmer, whereas two thirds of self-employed individuals in the watershed are women. Only 6% reported a salaried job as their main occupation.

In the Port-à-Piment watershed 11.1% of the population of working age reported *not* having a main occupation.

7. BIOPHYSICAL PROFILE

The geographical location and topography of the watershed makes it extremely vulnerable to various natural hazards, including hurricanes, earthquakes, severe erosion and droughts. The south coast is exposed to a large number of hurricanes and is subject to large rainfall events, usually inducing severe flooding. In addition, the island of Hispaniola is also located at the verge of the North American and Caribbean plates, which grinds in an east-west direction at a speed of about 2.5cm/year (USGS, 2010).

7.1. TOPOGRAPHY



Map 4 Contour lines in the Port-a-Piment Watershed. Data sources: CNIGS 2004, IHSI 2003. Produced by CIESIN 2010

The Port-à-Piment watershed rises from sea level up to 2,347 meters above sea level. The map above shows the topography of the region.

Morphology

The morphology of the Port-à-Piment watershed ranges from the sea-level town of Port-à-Piment in the lower watershed, to a hilly mid-section, to a steep and mountainous upper watershed that leads to the boundaries of the Pic Macaya National Park, with a maximum elevation of around 2,000 meters above sea level. Approximately 1% of the watershed is in the Pic Macaya National Park Biosphere protected area of high-elevation, fragile original forests in a buffer zone around the park. The park and buffer zone are one of the last vestiges of the less than 3% primary forests left in Haiti. The park also serves as one of the remaining sites of the country's unique biodiversity. The biological, social and institutional dynamic of the watershed are closely tied to this park. The park is included within the Massif de la Hotte mountain range, in which the Pic Macaya National Park (2,347m) is embedded. This mountain chain runs through the central portion of the southern peninsula.

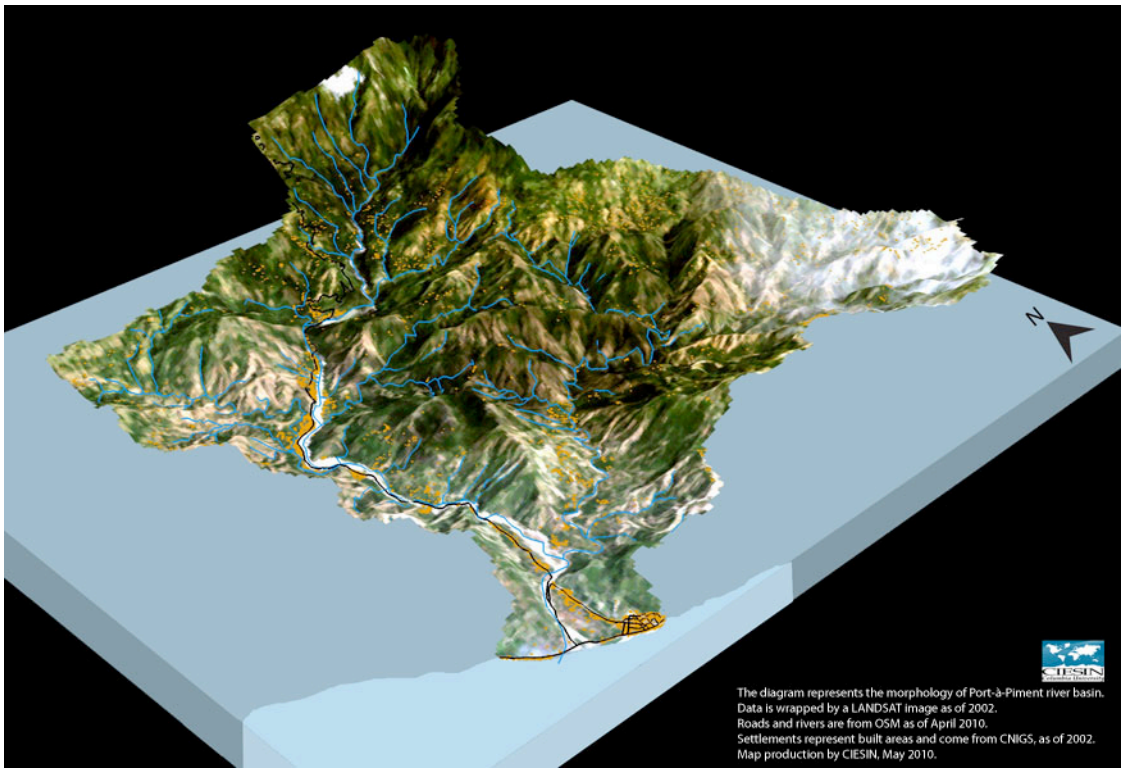
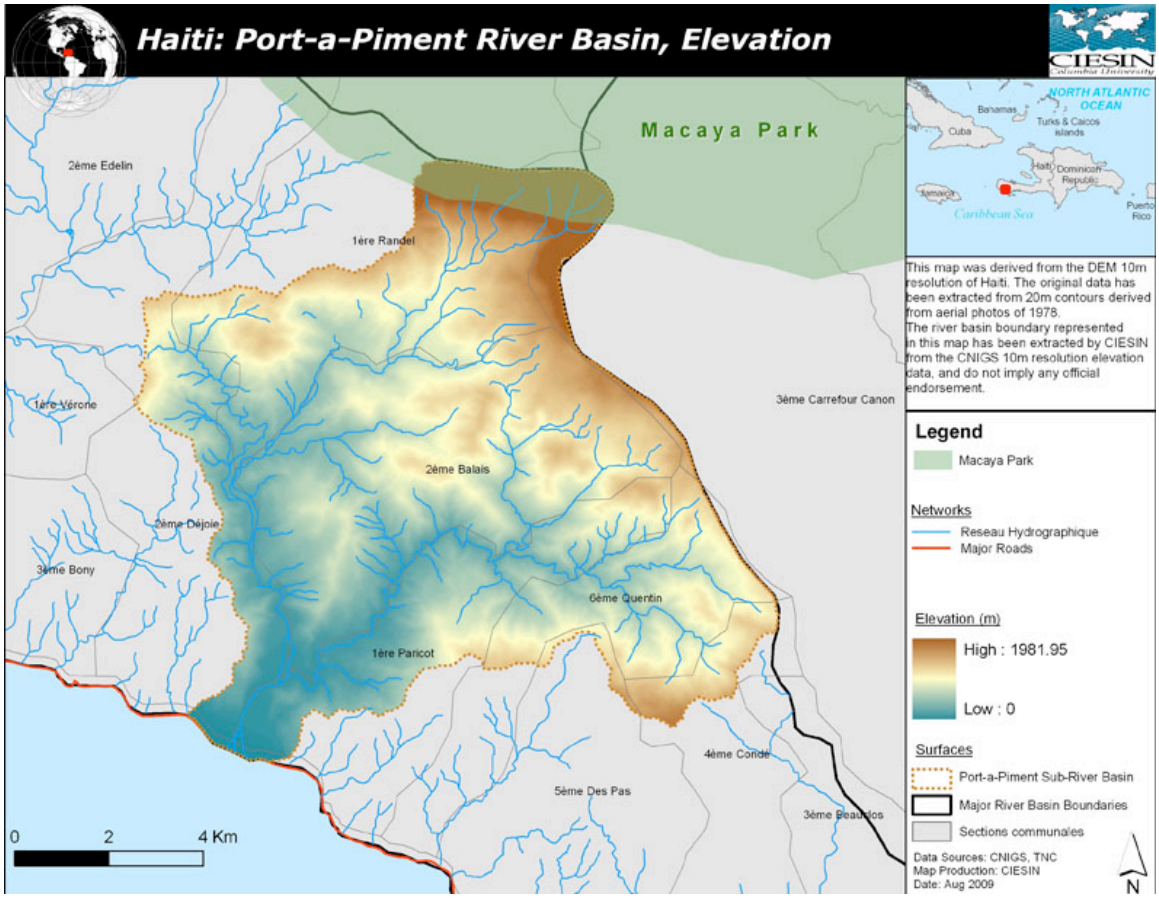


Figure 2 Visualization of the Port-à-Piment watershed topography. Source: CIESIN, 2010.

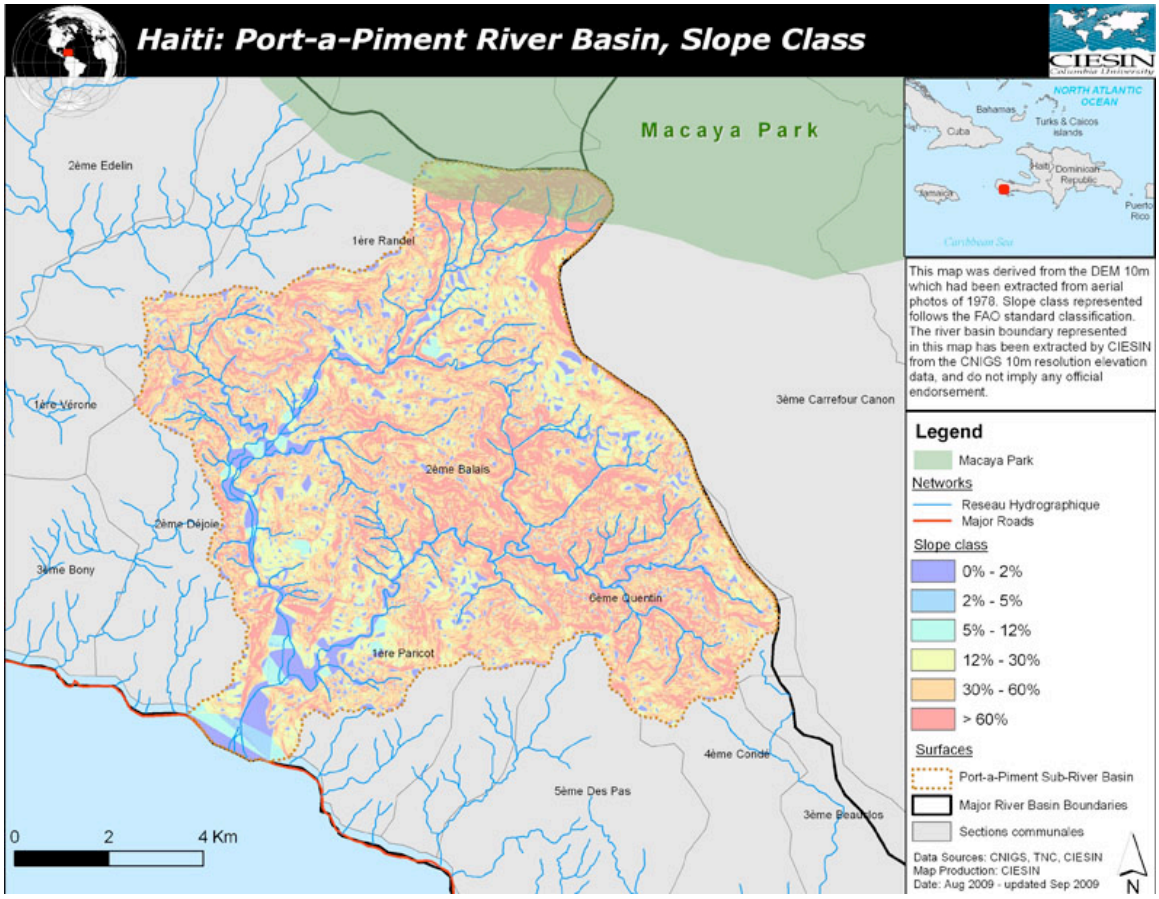
The watershed has extremely steep slopes and deep valleys off the two main branches of the river. The higher elevation areas of the watershed have steep valleys and limited amounts of plateaus. This upper area is the base of the Pic Macaya.



Map 5 Map of Elevation across the watershed. Data from CNIGS and TNC. Map produced by CIESIN 2009.

Slope

In the watershed 66% of the terrain is below 600 meters with the remaining 34% classified as high elevation, which implies different agricultural growing conditions. See the maps below to detail the slope variation across the watershed. The section below on agriculture provides a detailed description of the agro-ecological zones and the impacts on specific crop production and income strategies.



Map 6 Slopes in Port-à-Piment upper watershed. Data source used: CNIGS 2004. Map produced by CIESIN 2009.

However the classification, the slopes in Port-à-Piment are above the national average. In Port-à-Piment, only 2% of land is classified as flat, whereas steep slopes of over 30% grade comprise 64% of the watershed; of those slopes, 26% are categorized as very steep, with a maximum slope of 311%. Moderate slopes, which make up 31% of the watershed, still risk soil and nutrient losses without proper measures to ensure soil conservation. The average slope of the watershed is 42% grade. The topography of the watershed makes it poorly suited for intensive agriculture; only 15% of the area falls within conditions based on slope for sustainable agriculture. A slope of 12% is considered the safest limit for annual plowing (Singh and Dillon 2004); in the Port-à-Piment watershed, this limit is largely exceeded. Cultivation occurs on slopes of up to a 30% grade, which are very steep and generally inaccessible with dry and unstable soils where plants cannot adequately grow. This suggests that alternative crop production strategies are required to target the slopes of greater than 12%. (Smukler et al, 2012)

The combination of steep slopes and a mountainous morphology gives Port-à-Piment a natural predisposition to geological and hydrological hazards, such as erosion and floods. The physical vulnerability to natural hazards has been exacerbated by long-term unsustainable human behavior, such as unrestricted deforestation, intensive agriculture, poor land-use planning, and

the lack of environmental governance. See the energy and agricultural sections below for more in-depth analysis of these sectors and hydro section for the climate to flood risk, amplified by the physical topography.

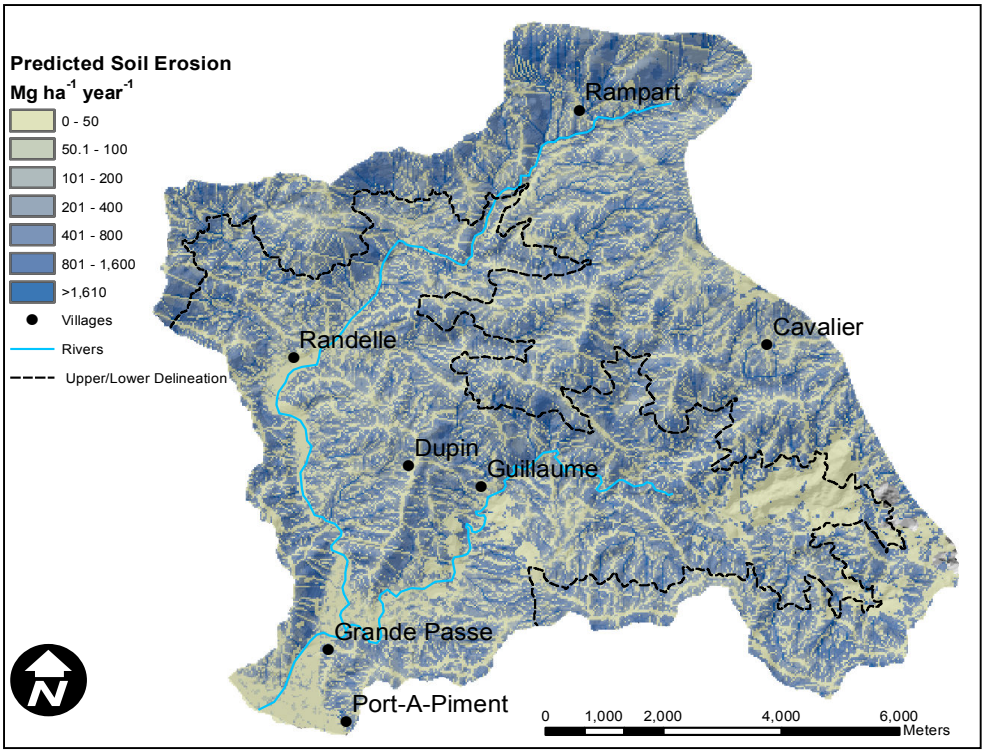
Erosion

The Land Degradation Surveillance Framework (LDSF), collected extensive field observations and soils samples in 2011, to help estimate erosion in the region. The LDSF study estimated soil erosion rates across the watershed in tons per hectare per year (Mg ha-1 year-1). See the map below for estimated erosion rates based on the LDSF.

Only 14% of the watershed is classified as level slopes. These areas are primarily below 500m. These level areas, or lowland flat areas, are where agriculture is likely to be most productive and with the least observed erosion. Estimates of erosion rates in the other areas of the watershed are extremely high as a result of the steepness of the steep topography. Across the watershed the overall estimated rate of soil erosion was on average 504 Mg ha^{-1} yr^{-1}. Average values were 308 Mg ha^{-1} yr^{-1}, 463 Mg ha^{-1} yr^{-1} and 542 Mg ha^{-1} yr^{-1} for level, moderate and steep slopes, respectively. These values are consistent with other estimates of the regions using the RUSLE model that predicted soil losses ranging from 75-500 Mg ha^{-1} yr^{-1}. These average values however do not accurately predict the risk of severe erosion or the quantity of soil losses that end up in waterways or are carried as soil deposits from one part of the watershed to another. It is difficult to set a general or standard sustainable rate of soil erosion as it depends on multiple factors from climate, soil type, topography, vegetative cover and human impacts. In an article in 1990, Young operationally classed erosion rates in tropical forest in tree crop systems as low (< 2 Mg ha^{-1} yr^{-1}), moderate (2-10 Mg ha^{-1} yr^{-1}) and high (> 10 Mg ha^{-1} yr^{-1} (Young 1990).

These types of soil losses in the watershed are significantly greater than estimated acceptable levels. The maps below identify estimated soil erosion rates and are compared to the data from CNIGS for soil risk potential. This shows a difference in high erosion areas and requires a greater analysis of the CNIGS calculation methodology.

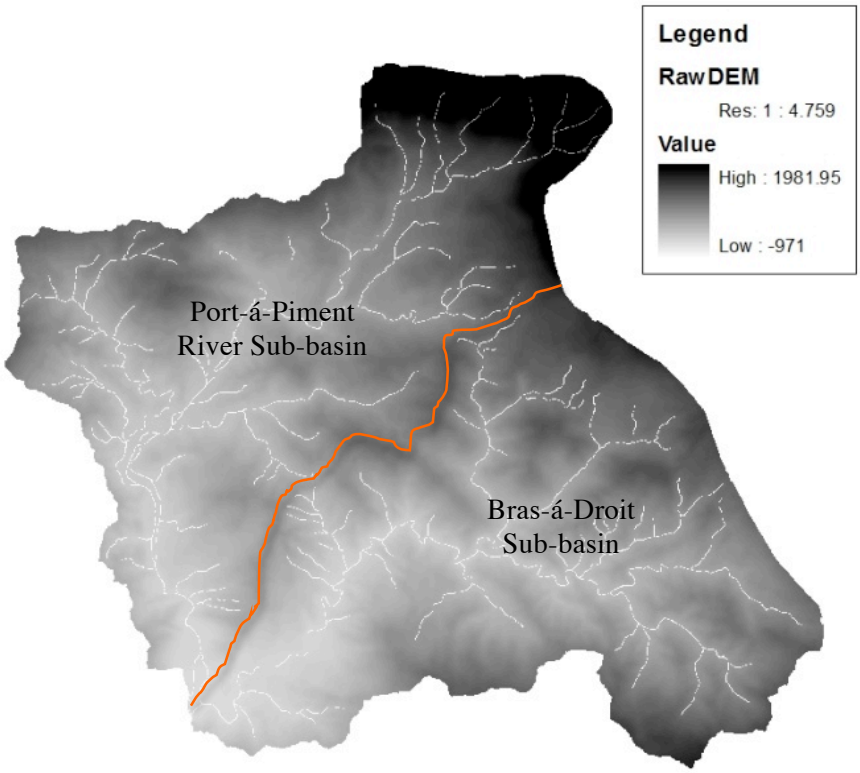
Adequate planning and working with farmers and cooperatives to address these realities is paramount to ensuring the preservation of the remaining soil fertility so as to protect the productivity and economic viability of the marginal agriculture in the watershed.



Map 7 Estimated soil erosion. Data from The Earth Institute 2010 LDSF Study

7.2. HYDROLOGY

The Port-à-Piment watershed can be divided into two main sub-river basins: the Port-à-Piment river, and the Bras- à -Droit, a tributary of the Port-à-Piment river. Details on those two distinct sub-basins help the decision-maker to better understand how the whole basin is functioning, and how they respond to hydrological risks in the basin. The map below details the hydrological subdivision of the Port-à-Piment watershed. This subdivision has hydrological relevance because the watershed will respond differently according to the particularities of each sub-basin.



Map 8 Main hydrological sub-division in the Port-a-Piment watershed.

The two sub-river basins are almost the same size, although they are different in form and in elevation: the Port-à-Piment sub-basin is located in higher elevation than the Bras-à-Droit sub-basin. The Port-à-Piment sub-basin has a much more elongated morphology, while the Bras-à-Droit has a larger upper-based morphology. While the Port-à-Piment sub-basin has the maximum value of slope over 300%, the average slope in Bras-à-Droit sub-basin is higher with a value of 44%. This information gives indication on the fact that the Bras-à-Droit River might have a higher potential to flooding at the confluence area than the left stream of the Port-à-Piment River. It is also important to notice the area where the two sub-basins converge is densely populated.

The geometrical morphology of a river basin influence the way it responds to diverse factors, specifically to flooding. An elongated-type watershed tends to have a high run off time concentration and a low peak discharge. An expanded-type watershed tends to have a low run off concentration and a high peak discharge. When it rains, it takes more time for the elongated-type watershed to drain off the first drop of rainfall than for the expanded-type one. In the presence of heavy rains, high peak discharges from expanded-type watersheds can lead to flood events. The Port-à-Piment watershed has expanded-type morphology, and presents short times of runoff concentration and high peak discharges.

7.3. CLIMATE

TEMPERATURE

The figure below shows a clear and recognizable seasonal pattern associated with air temperature in the Port-à-Piment watershed based on constant readings from the climate monitoring station that started in February 2010. The minimum temperatures are similar for both locations than either the maximum or average temperature. The lower temperature in Randel is most likely due to the difference in elevation.

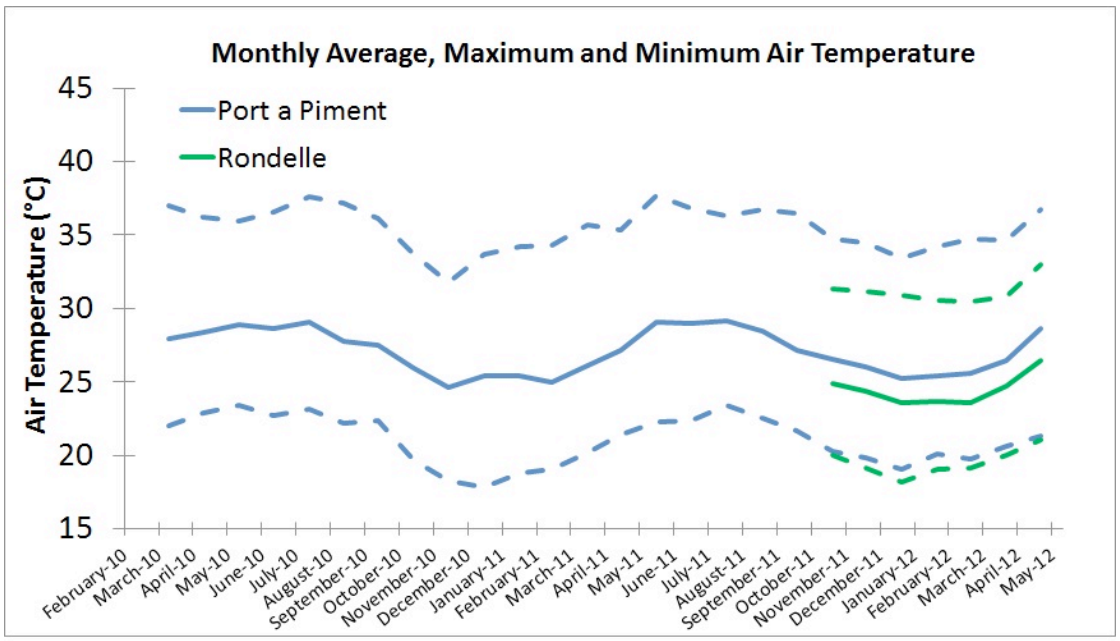


Figure 3. Monthly average, the maximum and minimum air temperature at Port-à-Piment and Randel.

Two relevant variables can be considered for the temperature variability: length of growing season and accumulated temperature above the minimum for the plant to grow. In Haiti, where 80% of the active population relies upon agriculture for their livelihood, the length of growing season is an important factor.

Ideal temperature conditions for plant growing are between 18.3°C and 23.9°C, though the optimum temperature varies by specific crop. Certain crops in the watershed, such as the widely-grown pigeon peas, are able to withstand large and high variations in temperature, up to 40°C. (Singh and Dillon) (Phatak et all, 1993)

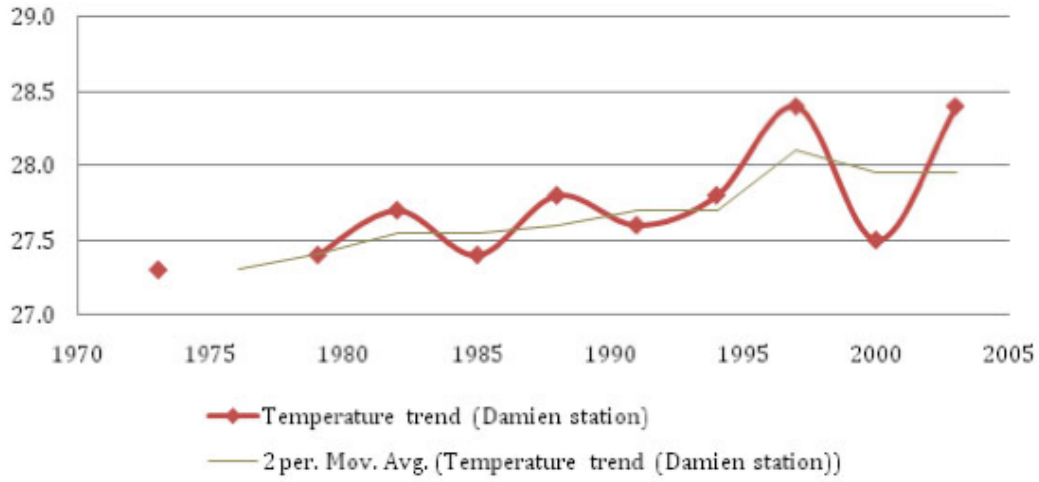


Figure 4. Average annual temperature trend from the Damien station, Port au Prince. Data source: National Meteorological Service, Ministry of the Environment and National Adaptation Programmes of Action (NAPA).

The previous graphic shows the annual average temperature in Damien station, Port-au-Prince, depicting temperatures at three-year intervals from 1973 to 2003. Data clearly demonstrate an increase of almost 1°C on average. Moreover, some predictions estimate an increase of 0.8°C by 2030 –respect to 2003 levels— reaching a total increase of 1°C by 2060 (NOAA) (AR4, IPCC 2007) (Sobel). This rise in temperature is problematic and might be a source for more frequent drought and an increase of the sea-surface temperatures that will create more frequent strong hurricanes and precipitation events in the Caribbean region. For more information on climate change in the Caribbean please refer to the IPCC Fourth Assessment Report and to the Sobel paper in the bibliography.

7.4. RAINFALL

The Port-à-Piment watershed experiences extensive spatial and temporal variation in rainfall patterns, creating patterns for planting and concerns about flooding and droughts. Historic rainfall data from ORE and national records shows alternating rainy and dry seasons of the southern region. Results show that the average precipitation is highly variable across seasons in Port-à-Piment, with very wet rainy seasons and very arid dry seasons. Over time, the average precipitation of these two regions is characteristic of a tropical monsoon climate; but in regards to the overall climate distribution, the variability and unpredictability of precipitation holds characteristic of a semi-arid climate. The large variation between years indicates a highly unpredictable climate with severe weather events causing an overall increase in average precipitation that is not indicative of the overall climatic pattern experienced by those in the

watershed.

The peak of the spring rainy season (April-June) occurs in May, while the peak of the fall rainy season (September-November) occurs in October. The dry seasons preceding the rainy seasons bottom in February and July, respectively. The following figures demonstrate the monthly precipitation of Port-à-Piment from 1925 to 1961. Missing data were estimated based on statistical linear correlation between existing complete data in Camp-Perrin and data in Port-à-Piment rain stations.

To develop a better understanding of the current hydrological conditions in the watershed, from the morphology to the climatic conditions, a pilot program has been developed, deployed and maintained hydrological and climate stations in the southwest region of Haiti. The lack of real-time, continuous hydro-meteorological observations compromises robust management and planning of flood hazards and risks, agriculture, health, and energy. There is significant heterogeneity in rainfall levels both regionally and locally. High precipitation trends at elevated locations, such as the upper regions of the Port-à-Piment watershed, can result in significant river discharge and flooding in the coastal regions.

Historical records of precipitation across the watershed - where rainfall tends to vary drastically based on topographic location – are necessary to quantify and predict the hydrologic behavior in the region. Recorded historical rainfall for southwestern Haiti is very limited. There are only a few partial data sets of monthly and annual precipitation available in the region. The data sets and the location map of the rain stations are presented in Figure 1 and Table 1, respectively. Regionally, there is long-term recorded data available for only two stations: Camp Perrin and Les Cayes. Precipitation data for the Port-à-Piment watershed is available only at one location, from the years of 1924-1961. In order to overcome this lack of historical record, the historical Port-à-Piment data was correlated to nearby stations with longer and more complete records and the correlated values were used to predict the missing data.

Currently there are two automated climate stations in the Port-à-Piment watershed: one (as of 2010) in the town of Port-à-Piment and one as of 2011 in Randel in the upper watershed. The instrumentation of the rain gauges includes: a tipping bucket rain gauge, solar radiation, wind speed and direction, relative humidity and air temperature, soil moisture and temperature, water depth sensor device and electronics. The unit acquires data at 30-minute intervals and broadcasts by satellite telemetry every 120 minutes. Figure 3 shows the 2010-2012 two year monthly composite rainfall trends.

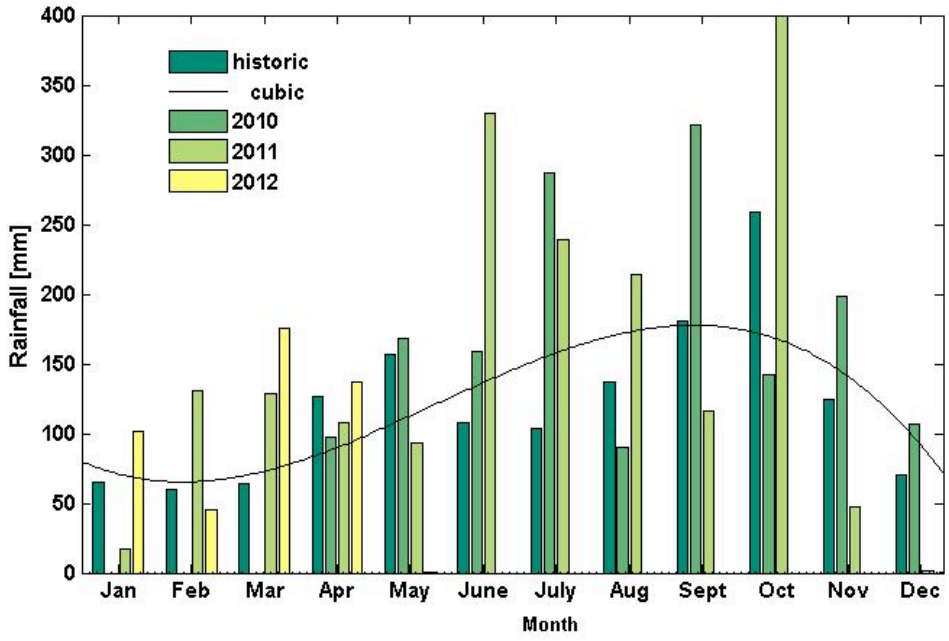


Figure 5. Real-time monthly totals of precipitation in the town of Port-à-Piment.

RAIN AND SOIL MOISTURE DYNAMICS IN PORT-À-PIMENT

In addition to precipitation data, soil moisture is a secondary parameter used in generating predictive flood models. Soil moisture can indicate the existing moisture present in the soil from previous intense rain events. Defining soil's infiltration capacity at saturation may be useful to use to determine the monitored soil moisture profile and rainfall intensity to predict flood risk. Monitoring soil moisture and rainfall intensity combined integrates the likelihood of surface runoff due to soil saturation, adding to flooding. It is frequently observed that the soil often does not dry out completely before the next rain event due to the frequency of the storms that occur at Port-à-Piment as shown in the figure below. This has implications for modeling and flood predictions. The ability or inability for the natural land to absorb the precipitation that falls will partially dictate how sensitive a particular area will be prone to floods. All data is available online through the Haiti Regeneration Initiative's website: www.haitiregeneration.org.

The soil moisture data is also important in regards to agricultural production, as the seasonal variability of peaks and lows can have an effect on what types of crops are able to grow in certain zones versus others. The figure below shows that the two main planting seasons in the Port-à-Piment watershed (i.e., March-April; August-September) coincide with relatively high levels of rainfall and soil moisture. However, longer historic datasets are required for detailed analysis to link rainfall patterns and soil moisture to agriculture.

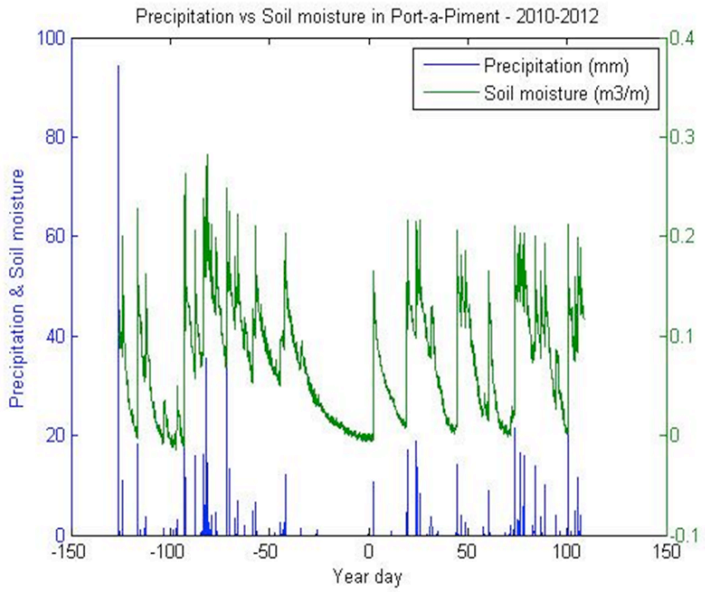


Figure 6. Precipitation and soil moisture profile in Port-à-Piment. Year day "0" represents January 1, 2012

Long-term precipitation data can be used in predictive evapotranspiration models to determine stress periods and estimate crop water requirement. This is essential to avoid excessive application of water, which can cause crop damage, soil erosion, excessive leaching and the wastage of water, labor and energy.

COMPARISON OF METEOROLOGICAL PARAMETERS IN THE PORT-À-PIMENT WATERSHED

The direction of winds in the Port-à-Piment watershed, both in Port-à-Piment and Randel, come primarily from the north and northeast direction, in theoretical agreement with the theoretical model of global winds: Port-à-Piment is located at a latitude of about 18° 15' 0.77"N, which is within the bandwidth of latitudes that receives tropical easterlies, or trade winds, that blow from the northeast direction.

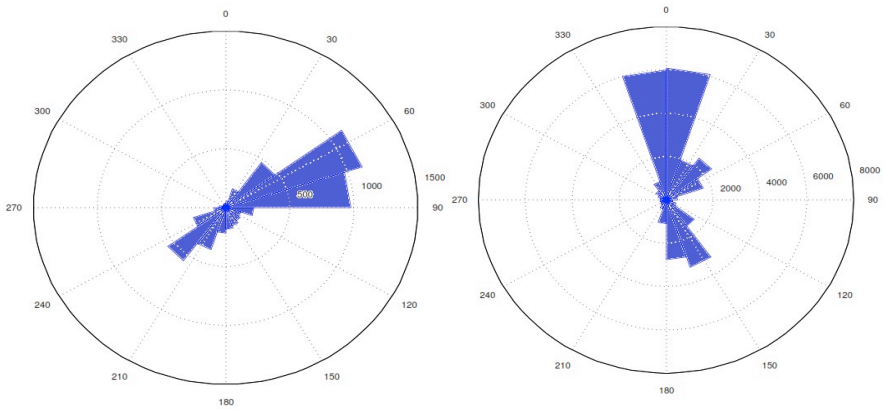


Figure 9. Port-à-Piment and Randel wind direction.

Since winds move moisture around, wind direction may provide some insights into the topological factors that impact weather patterns. Rain data in Port-à-Piment was categorized and aggregated in accordance with the corresponding wind direction. As expected, the highest rainfall volumes corresponded with the northern and northeastern winds, which occurred with the greatest frequency. Topography and geography, including the position of mountains and the sea, also determine the moisture level of winds.

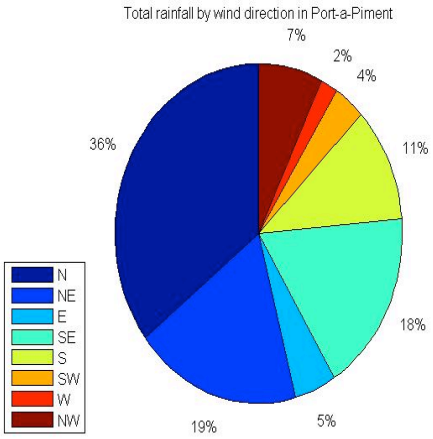


Figure 7. Aggregate rainfall volume by wind direction in Port-à-Piment.

In order to get insight into the relative moisture load of the winds, the effect of wind directional frequency was eliminated and rainfall data was normalized. The figure above shows that more of the "rain-bearing" winds seem to emerge from the East rather than from the West. An explanation based on topology is simply that Port-à-Piment is flanked by the sea on the west and mountainous terrain on the east. The slightly higher average relative humidity associated with western winds (40%) in comparison with eastern winds (36%) as seen above may be attributed to the sea being and abundant source of moisture. On the other hand, the mountains on the East will cause the moisture on the windward side to be condensed by orographic lifting, leaving dry winds to proceed to Port-à-Piment on the leeward side (USGS, 1997). Thus western winds are the more likely harbingers of rain.

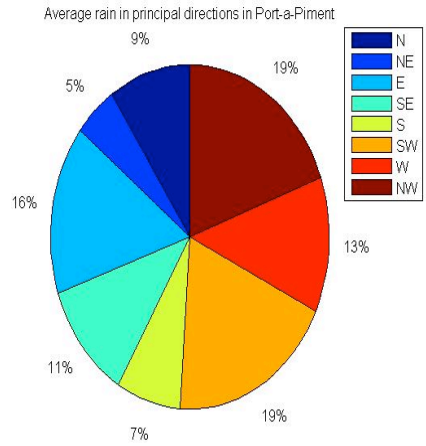


Figure 8. Daily average rainfall volume by wind direction in Port-à-Piment.

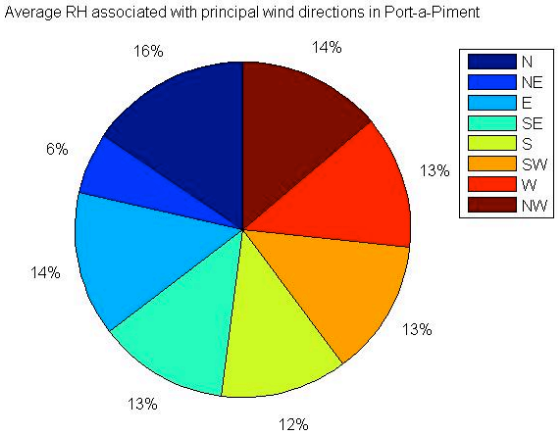


Figure 9. Average Relative Humidity (RH) in Port-à-Piment.

Further monitoring of wind and rain dynamics could potentially aid in the creation of an early warning system.

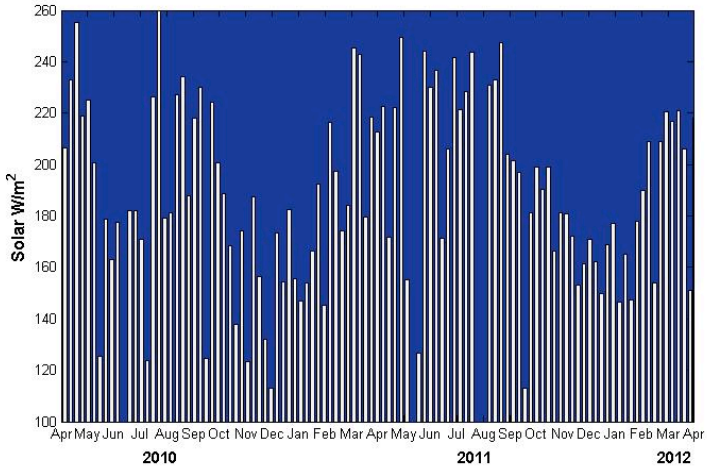


Figure 10. Port-à-Piment weekly average solar radiation.

Winter months receive significantly less weekly solar radiation as do year-round cloud cover and precipitation as seen in the figure above. Solar radiation is also an important component for convection and soil moisture, which all play an important role in the overall hydrological cycle in the watershed.

CLIMATE VARIABILITY

The El-Niño Southern Oscillation (ENSO) is the wavelike pattern of reversing surface air pressure between the eastern and western tropical Pacific. When the surface pressure is high in the eastern tropical Pacific, it is low in the western tropical Pacific, and vice-versa. This regular fluctuation happens within a period of three to seven years. Wind direction reversals, changes in hurricane activity, and abnormal rainfall in arid regions or droughts in typically wet tropical regions follow this pattern.

El Niño and la Niña have two opposite effects. Whereas el Niño refers to the abnormal warming of the surface ocean waters in the eastern Pacific region, la Niña relates to the abnormal cooling effect in the same location. Under normal meteorological conditions, the Indonesia/Australia areas experience heavy rainfall brought by the sea-surface convection, and the Chile/Peru areas experience drought, produced by the Humboldt Current that cools off the sea-surface temperature.

During el Niño years, Haiti experiences lower precipitation (Butterman, 1997). During la Niña years, Haiti experiences wetter than normal condition (Butterman, 1997). The following table shows the variability of rainfall at the Port-à-Piment station during periods of el Niño and la Niña. The data demonstrate that during el Niño years, rainfall average decreases up to 16%, whereas during la Niña years, rainfall average increase up to 6% from the normal average. Given this variation in precipitation, considerations should be made when designing a system for flood

control in the Port-a-Piment watershed. This information can also aid in the management of agriculture as well as disaster preparedness efforts.

Station	Average rain (mm/yr)	Average rain during la Niña (mm/yr)	Difference from average (%)	Average rain during el Niño (mm/yr)	Difference from average (%)
Camp Perrin	2253	2286	+1.5	2145	-4.8
Les Cayes	1922	2040	+6.1	1935	+0.7
Port-à-Piment	1462.5	1550	+6.0	1235	-15.6

Table 1 Average rainfall by pluviometric station.

7.5. CLIMATE DATA FOR FLOOD RISK MODELING

Port-à-Piment's overall environmental and social vulnerability is tightly bound to its geographic location and topographical characteristics. New climate data and understanding of the meteorological behavior of the region, including the volatile aquatic dynamics of the river behavior, as well as the soil and erosion quality and tendencies, allow for accurate flood modeling and help to inform efforts to address the catastrophic flooding and lack of environmental risk management as a population hazard and barrier to sustainable development in the Port-à-Piment watershed. A full understanding of the region's hydrology is crucial for risk management and communication and implementation of possible flood mitigation strategies.

To illustrate this often reoccurring flooding, two major rain events are depicted, one on October 11, 2011 and a half-day event on April 23, 2012. In both of these cases, a substantial amount of precipitation, unconnected from a hurricane or tropical storm system, caused a rapid build up of water in the hydrological system and fast flooding. In the April 2012 rain event, the amount of rain at Randel and in Port-à-Piment is substantial. Randel is located in the upper watershed, thus the significant rainfall in Randel causes a deluge in the town of Port-à-Piment hours later, though often without warning as to the severity of the flooding itself. The flooding at lower elevations resulting in heavy precipitation in the mountainous zones acutely demonstrates the need for flood protection and early warning systems in this area. Increasing the response time of between rainfall and potentially severe flooding is crucial for ensuring the safety of the residents who live downstream.

Figure 11. River discharge from Port-à-Piment (left). Flooding in the same area, in April 2012 (view from the bridge).Photos from UNEP.

Gathering of hydrologic data across each watershed is a crucial first step in being able to create simulation models to quantify, predict and manage the flooding in the watershed. Real-time precipitation data and statistically obtained historical rainfall information will be two of most important parameters for the models and for future hydrologic analysis and management.

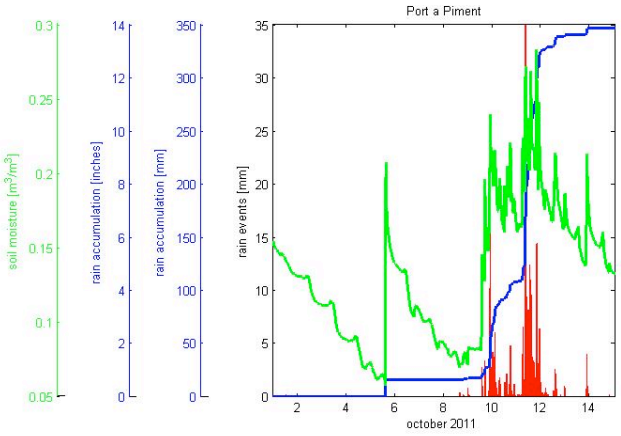


Figure 12. October 11, 2011 flooding in Port-à-Piment

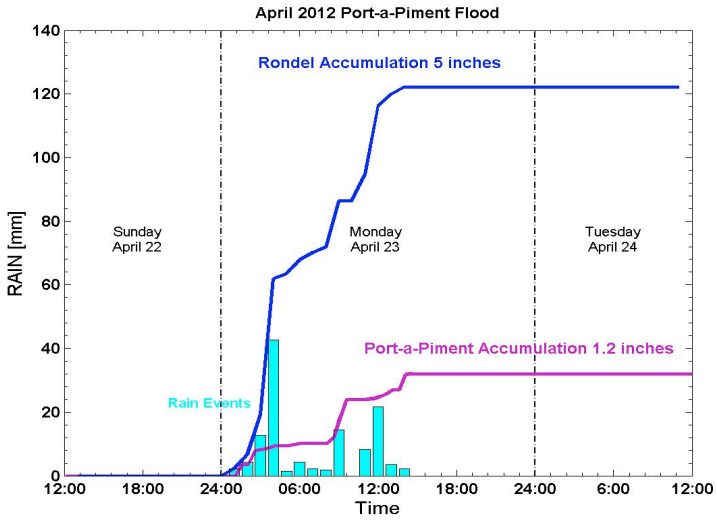


Figure 13. April 23 2012 flooding in Port-à-Piment.

The figure above compares the monitored precipitation from the Port-à-Piment and Randel stations during the rain event on April 23, 2012. As previously indicated, Randel is located at a higher elevation in the watershed. Thus, it can be concluded that the mountainous regions receive significantly more precipitation than the regions closer to sea level, near the shore. Further rainfall monitoring in the watershed, with more spatially varied gauges, would help to better define and quantify these differences in accumulative precipitation. An integrated system of precipitation monitoring across the watershed, coupled with a hydrologic model, could aid in the design of an early warning system for flood management that would be based on historical and real time information.

7.6. Land use and Land Cover

Field observations and remote sensing were used to assess land use land cover. These field observations were categorized in a decision matrix based on the Land Cover Classification System (LCCS) of the Food and Agriculture Organization (FAO) and designed to be compatible with Haitian national mapping projects utilizing the Coordination of Information on the Environment (CORINE) classification system.

The results are in the table show the percentage of each land cover and the map.

Only 14% of the total landscape is covered in woody vegetation, either trees or shrubs, and of this only 5% is closed canopy forest. This lack of forest cover poses a threat to the availability of several ecosystem services. The remaining vegetation on the landscape is not likely to protect the soil and meet the demand in wood for cooking, charcoal production and timber throughout the watershed.

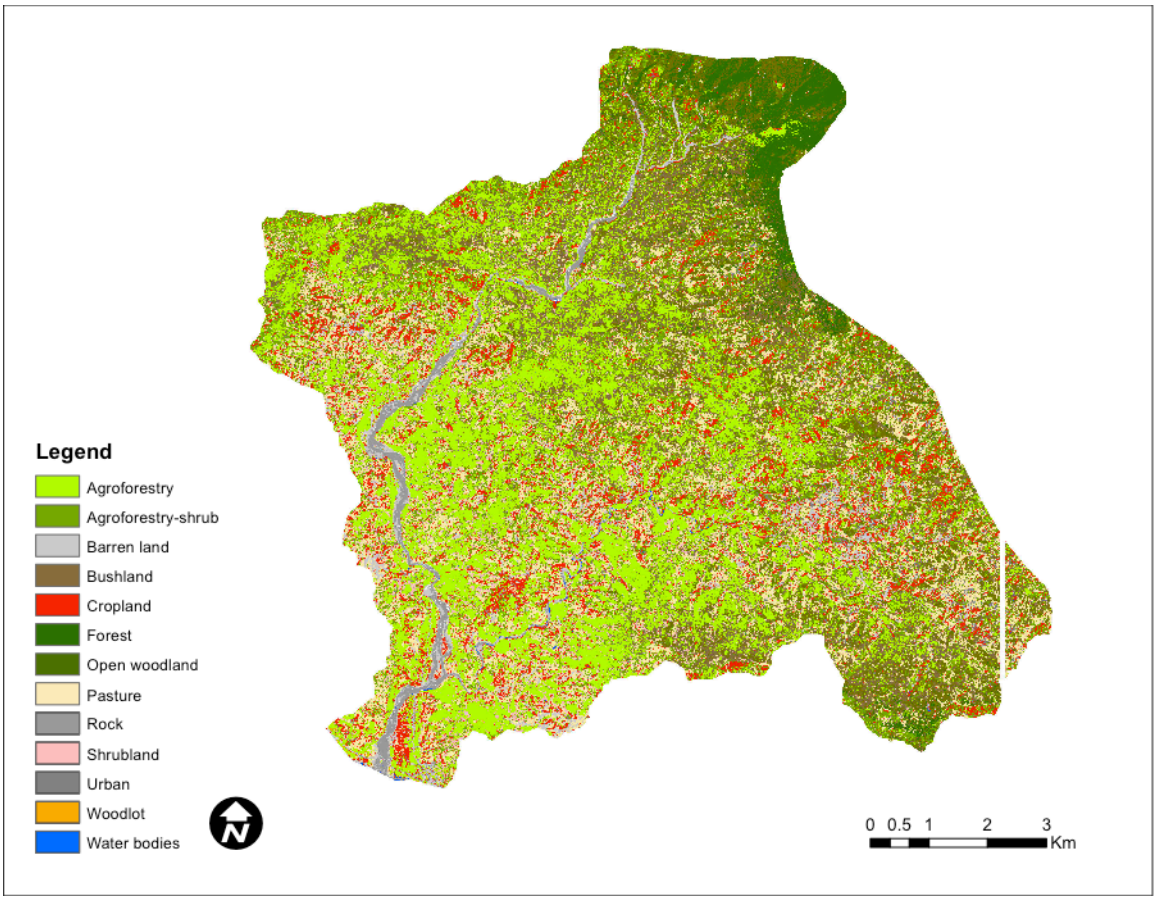
The practice of annual cropping, even on the steepest terrain, will continue to cause severe soil erosion and destructive sedimentation and flooding downstream unless addressed. Unabated soil erosion will eventually limit rooting depth and deplete nutrients required for crop productivity.

Land Use Port-à-Piment Watershed		
Class	Area (km2)	Percent of total area(%)
Agroforestry	27	27%
Agroforestry-Shrub	14	14%
Barren Land	4	4%
Bushland	11	11%
Cropland	9	8%
Forest	4	4%
Open Woodland	10	10%
Pasture	16	16%
Rock	1	1%
Shrubland	3	3%
Urban	2	2%
Woodlot	0	0%
Clouds	0	
Water bodies	0	0%

Table 2 Percentage breakdown of land cover and land use for the watershed.

This data layer is critical baseline information to measure change at the watershed scale over the next five years. It is also a base layer for crop modeling to help determine potential production, optimal land use and help with land use management planning. The high-resolution

imagery should be shared with localities and local community groups trying to improve the precision of their land use planning and management.



Map 9 Land use and land cover map for watershed. Produced from imagery taken in November 2011.

8. GOVERNANCE AND PLANNING MECHANISMS

The complex and well-established networks of local associations, trade cooperatives, municipal government and active development-driven organizations are important building blocks for long-term sustainable development. This section provides a preliminary analysis of the various mechanisms for governance and planning, as well as stakeholders with overlapping thematic work or interests. The general purpose of this section is to identify and examine the existing social mechanisms for addressing challenges within the Port-à-Piment watershed and to assess the current and potential institutional capacity to solve problems, make collective decisions, organize group work and respond to the needs of different communities within the watershed.

8.1. PLANNING MECHANISMS

A 2011 analysis of the existing planning and governmental system in Haiti and specifically across the South Department reveals that a substantial gap exists between the planning processes as defined by law and what happens in practice. Many interviewees from within Haiti's planning system noted that according to the law, the Haitian planning process is outlined as a bottom-up approach, beginning with the commune and communal section.

Each of Haiti's ten departments is divided into district units called *arrondissements*. These are subdivided into units called communes, which have management responsibilities over the local development. There are 18 communes in the South department; the Port-à-Piment watershed is comprised of four communes. Each commune is headed by the Administrative Council of the Communal Section (CASEC, or kazèk in Haitian Créole).

Commune level state institutions within the Port-à-Piment watershed refer to the mayor's office and local representatives which include the mayor, the local section communal representative (CASEC), the sub-section communal representative (ASEK), and the civil delegate (delege sivil), appointed by the executive. Each of these positions except for the delegate is an elected position that represents a distinct geographic area. The mayor is linked primarily to towns. In the watershed, this means that there is a mayor's office in Port-à-Piment and in the other communes. Other elected local officials and state institutions often use the mayor's office; it also hosts two deputy-mayors who help with decision-making and municipal project/program implementation.

8.2. NATIONAL PLANNING PRACTICE

In practice, the Haitian planning system is characterized by a top-down approach that is often embedded in a patronage-based system of politics. The President and Prime Minister usually set

the funding priorities along with the Ministry of Planning and Ministry of Finance. Projects, which do not align with national priority areas, are less likely to obtain funding since there is less funding available for non-priority areas. The projects that often get funding are linked to political objectives. In addition, to the presence of many donors working in parallel to each other, incentives exist for regional and local government entities to tailor their proposals to projects that are more likely to obtain funding and this undermines planning and long-term initiatives that represent local self-identified needs and priorities. Accordingly, to push forth planning initiatives at the local level, such as in Port-à-Piment, it is also necessary to secure national support programs through alignment with particular government or ministerial actors, or to align projects specifically with nationally-stated funding priorities.

Six different national-level ministries are involved in planning activities at the regional and local levels. The Ministry of Agriculture maintains an office in the town of Port-à-Piment, running extension programs and supporting one full-time technician for the region. The Ministry hosts occasional training seminars on soil preservation and erosion.

The Ministry of Health is responsible for the health clinics. The schools are also overseen by the regional Ministry of Education, which employees regional inspectors and monitors overall school performance.

Departmental senators and deputies oversee governance in the areas as well. There have been two observable projects carried out by these actors, including entry/exit façades in towns along the coast and solar light posts throughout the area (including Randel and Port-à-Piment).

8.3. REGIONAL AND LOCAL ACTORS IN GOVERNANCE, PLANNING AND PRACTICE

On the local level, the Ministry of the Interior, National Defense and Territorial Collectivities oversees the communes and communal-sections, the smallest, political jurisdictions. The mayoral office comprises three individuals, the mayor and two deputy mayors, and is the elected head of the commune level of local government.

The Conseil des Sections Communales (CASEC) and the Assemblée des Sections Communales (ASEC) are the elected heads of the communal section level of local government. This council is made up of three members, with one being the head and two assistants, and all serve for 4 years. According to the 1987 Constitution, the CASEC “manages communal resources to the exclusive benefit of local citizenry and is accountable to the Administrative Assembly”. Observed projects in the watershed were being overseen by the CASECs, including the rebuilding of water piping for Randel and overseeing the implementation of road and canal infrastructure in the towns of Grande Passe and Port-à-Piment.

The ASEC is part of the elected committee that is responsible for approving budgets and state transactions specifically with decisions concerning state property. It is made up of elected

members, often called majistra, varying from five to nine members depending on the population density of the given section. Beyond governance, the impact of these offices depends more on the character of the civil servant rather than the efficacy of the institution.

CASECs were found to play an informal role in conflict mediation, however, resulting from their respected roles within their communities. An example of the informal mediation role, often played outside of the existing judiciary institutions, is in solving disputes over land holdings and land tenure, often among family members. In qualitative interviews in 2012, members of community associations referred to examples CASECs play as respected members with knowledge of systems and precedent that are a no-cost alternative to the formal justice system within the tribunals, which require lawyers and more economic means. Consultations with CASECs confirmed their role in mediation and as community leaders, a role often unacknowledged by the formalized system. This is partly a legacy of the Duvalier era policy of administrative positions.

Many interviewees described the regional and local government planning bodies as largely information sharing and/or coordination conduits rather than strategic planning entities. Many local organizations, such as KPP, Foundation Macaya and GIPPN, have important roles in supporting local planning efforts, including working with the Mayors or Ministries to maintain registries of local associations and helping advance local planning initiatives. Most local municipal goverments do not have the financial capacity to implement a planning process under the current Haitian government structure. Nevertheless, these existing platforms are important for sharing information and coordination and could support better planning processes. For more information please see the report on local planning mechanisms from the Center for Sustainable Urban Development (CSUD).

8.4. REGIONAL COORDINATION (TABLE SECTORIAL)

The table system includes three types of 'Tables' (consultative meetings) and two different levels of government. The Consultation Table and the Sector Table function at the departmental level while the Commune Table is supposed to function at the commune level, but in practice the Commune Table rarely exists.

The regional bureau of the Ministry of Planning and External Cooperation oversees the Consultation Table. The Consultation Table serves as a communication resource between key stakeholders (governmental units, NGOs and the private sector) to enable coordination of services and avoid duplication. Stakeholders are invited to monthly meetings to learn about what others are doing within the department. However, the Sector Tables do not make joint planning decisions and this works against an integrated development planning approach and serve as an information sharing platform.

Sectoral Tables are administered by Regional Directors of thematic ministries. For example, the Ministry of Agriculture's Sectoral Table meets the last Thursday of every month but the Ministry of Health's Sectoral Table meets the first Tuesday of every month. People and institutions relevant to the ongoing problems of a sector are invited to discuss pertinent issues related to say agriculture, including various regional ministry directors, and NGOs such as Catholic Relief Services. At times, Sectoral Tables serve as an effective platform for priority alignment for immediate response, even if not planning and decision-making. An example of such collaboration on the Sectoral Table level occurred in 2012 with CRS and the South Department's OREPA, or office of the National Directorate for Potable Water and Sanitation (DINEPA) in response to an outbreak of cholera in the South Department. The Sector Table served as a platform for response strategy and delegation of responsibility, in which OREPA and CRS worked together to distribute Aquatabs and conduct mass community education campaigns in the affected regions, according to their existing areas of intervention.

Steering Committees (Komite Pilotaj)

The Komite Pilotaj is a temporary governing body. It is essentially a steering committee, a coordinating body setup to manage a given project. It is temporary by design, thus fluctuated given the project at hand.

Local Development Councils (Conseil Developpement Kominal/Seksyon Kominal)

The local development councils were initiated by FAES (Bureau of the Fund for Social and Economic Assistance) in some of their target communes. A FAES representatives noted that where the two councils -- Communal Development Council and the Communal Section -- are present, they essentially replace the Commune Table. These councils tend to exist based on the willingness of the local mayor especially so as to be transparent.

8.5. Local Organizations in operation in Port-à-Piment

The large number of organizations that were identified and interviewed in Port-a-Piment watershed are locally based and inspired in scope and in membership. These groups are divided by primary purpose into the following categories: local governance, religious institutions, youth groups, commodity storage associations, peasant organizations, women's groups, educational institutions, agricultural development cooperatives, and context-dependent organizations. Though this classification system serves to explain the overall structures, but individual organizations may operate in several capacities.

Catholic Church

The Catholic Church is divided into parishes across the South Department, including Port-à-Piment and Randel. The Catholic Church of Randel covers seven parishes, and, based upon an

interview with the Catholic priest, most devotees forego attending their local church for the regional church for Easter and Christmas celebrations.

Youth Groups

Youth groups in the watershed reflect other organizations in terms of objectives of development activities and purpose for creation. Identified groups' missions include maintaining nurseries, planting, agricultural work, and some construction or ravine repair. They also were found to have educational and training elements. These organizations are on the whole associated with larger adult organizations (e.g., MOPAK, Plante Plus), so coordination can be easily established.

Commodity trade associations

This group of individuals, usually men, who work together as a collective team to harvest and store a particular crop (e.g., black beans, sorghum, etc) from their mutually but privately held land. The collectives, ranging from cooperatives, associations, eskwad, to konbit agree on when to sell the goods on the markets and set a price. They therefore control production, distribution, and cost for certain goods in the local market. These groups have a limited capacity to set selling price points and control supply, when coordinated and in agreement. It remains unclear as to the degree to which they may mobilize for other purposes. The crops harvested, size of groups, and quantity stored depends on the organization. No detailed information was available at the time of research.

Peasant organizations

Local associations and peasant groups exist in every section of the watershed visited by members of the research team. These groups function in multiple capacities. Almost all that were identified were formed to support agricultural labor, either through exchange or for pay. Other activities may include micro-lending, construction of roads or retaining walls, maintaining a nursery and reforestation, animal husbandry, or establishing commodity storage. They tend to be the most active grassroots groups in an area and have the largest membership.

As somewhat of a corollary to peasant organizations, which tend to be mostly men, there are women's groups. These groups focus mainly around microcredit, mainly for the purpose of household expenses or for commerce (when possible). These tend to be smaller in membership than peasant organizations, but the stronger organizations appear to be willing to mobilize efficiently.

Konbit

The final type of institution is a tradition in Haiti. In some areas called a konbit, in others (particularly in the watershed) called an eskwad, this is a collective work unit based traditionally

upon reciprocal labor, with some examples where the labor is repaid monetarily. Usually, a man with a field to clear, seed, or harvest contacts a group of people he trusts to help him with the task. While working, the man's wife usually provides food and drink (including alcohol). In the future, when the workers have to clear, seed, or harvest their own fields, they will call on the person who first hosted the konbit. These organizations, though based deeply on trust, are highly context-dependent, and may not be easily mobilized for tasks outside of the konbit network.

9. MDG ONE: ERADICATE EXTREME POVERTY AND HUNGER

RATIONALE

The first MDG is to reduce levels of extreme poverty and hunger by one half by 2015. Progress on the hunger component of MDG 1 is critical for achieving other targets, as continued hunger is indicative of challenges in other areas, from agriculture to education, vulnerability to infectious disease, and maternal and child health. Food insecurity has also been a driving factor in previous political instability and Haiti maintains a high vulnerability to global market prices. Accordingly, making progress towards eradicating hunger and poverty requires interventions that are integrated across sectors, resulting in not only progress towards MDG 1, but in many MDGs. The fragmented nature of planning and interventions across Haiti - site and sector-specific in nature - have failed to address the multi-faceted elements of progress towards MDG 1, which require progress across multiple systems. Under-nutrition limits economic productivity (World Bank, 2006) (Gross 2008) increases vulnerability to infectious diseases (Black 2008), and contributes to over one-third of child deaths (Black 2008). In 2010, about 115 million children worldwide were underweight (low weight for age), 55 million had low weight for their height (wasting) and 171 million under the age of five years had stunted growth (low height for age) (WHO 2010).

Nationally, Haiti faces a pressing hunger challenges: 30% of children under five years in age are stunted, 19% underweight and 10% wasted (Cayemittes et al 2007). In rural regions that rely on agriculture for subsistence and primary form of household income, both food shortages and natural weather events, such as the hurricanes that devastated southern Haiti in 2008, only add to the food insecurity felt by families.

A significant difference between the upper (elevation >=200m) and lower (elevation <200m) watershed was found for prevalence of stunting or chronic undernutrition among children under 5 years in age, with 38% of children stunting in the upper watershed and 26% children stunted in the lower watershed. No significant differences between the upper and lower watershed were found for other primary nutrition outcomes (proportion of wasting and underweight, weight-for-age z-score and weight-for-height z-score) described in detail below. However, this indicates slightly larger problems of acute malnutrition (wasting, low weight-for-height z-score) in the lower watershed (but thus not significant). Further analysis on dietary consumption is required to explain the geographic variation.

	Indicator	Lower watershed	Upper watershed	p value
Primary nutrition outcomes				
	Height for age z-score	-1.1	-1.5	0.0152*
	Stunting prevalence (height for age z-score<-2)	26%	38%	0.006**
	Weight for age z-score	-0.7	-0.9	0.124
	Underweight prevalence (weight for age z-score<-2)	13%	15%	0.511
	Weight for height z-score	-0.25	-0.11	0.297
	Wasting prevalence (weight for height z-score <-2)	8%	6%	0.544
Household food security	Dietary diversity score for adult women 15-49 years of age (range 1-7)	3.16	2.32	<0.000***
	Minimim dietary diversity: adult women15-49 years of age who received foods from 4 or more food groups during the previous day	41%	17%	0.0001***
Child caring practices	Early Initiation of Breast-feeding: Children born in last 24 months who were put to the breast within 1 hour of birth	38%	20%	0.003**
	Exclusive Breastfeeding under 6 months: Infants 0-5 months of age who received only breast milk during the previous day	2%	0%	0.022*
	Ever breastfed: Infants 0-23 months of age who were ever breastfed	82%	80%	0.600
	Dietary diversity score for children 6-23 months	3.35	2.12	<0.000***
	Minimim dietary diversity: children 6-23 months of age who received foods from 4 or more food groups during the previous day	51%	25%	0.0002***
	Minimim meal frequency: children 6-23 months of age who received foods the minimum number of times or more	26%	17%	0.168
	Minimim acceptable diet: children 6-23 months of age who received minimum dietary diversity and minimum meal frequency	14%	11%	0.659

Figure 14 Nutrition outcomes in upper and lower watershed.

A framework developed by UNICEF recognizes the basic and underlying causes of undernutrition, including the environmental, economic, and sociopolitical contextual factors and the central role poverty plays in undernutrition in a population (FAO-WFP 2009). Because poverty is a complex state stemming from multiple variables, nutrition is a crosscutting theme that is indicative of the progress of many different development goals at once. Accordingly, the optimal strategy to ensure rapid improvement of nutrition, requires the implementation of a set of specific nutrition interventions and the integration of nutrition into health, agriculture, environment, education, employment, social welfare and development programs (UNICEF 1990).

An assessment of the burdens of malnutrition in the Port-à-Piment watershed and its direct and underlying determinants shows that its remediation needs on-the-ground nutrition program planning and targeting. That is, its mediation must incorporate the multi-sectoral nature of the challenges and allow for an equally multi-sectoral approach. Below is a summary of key findings.

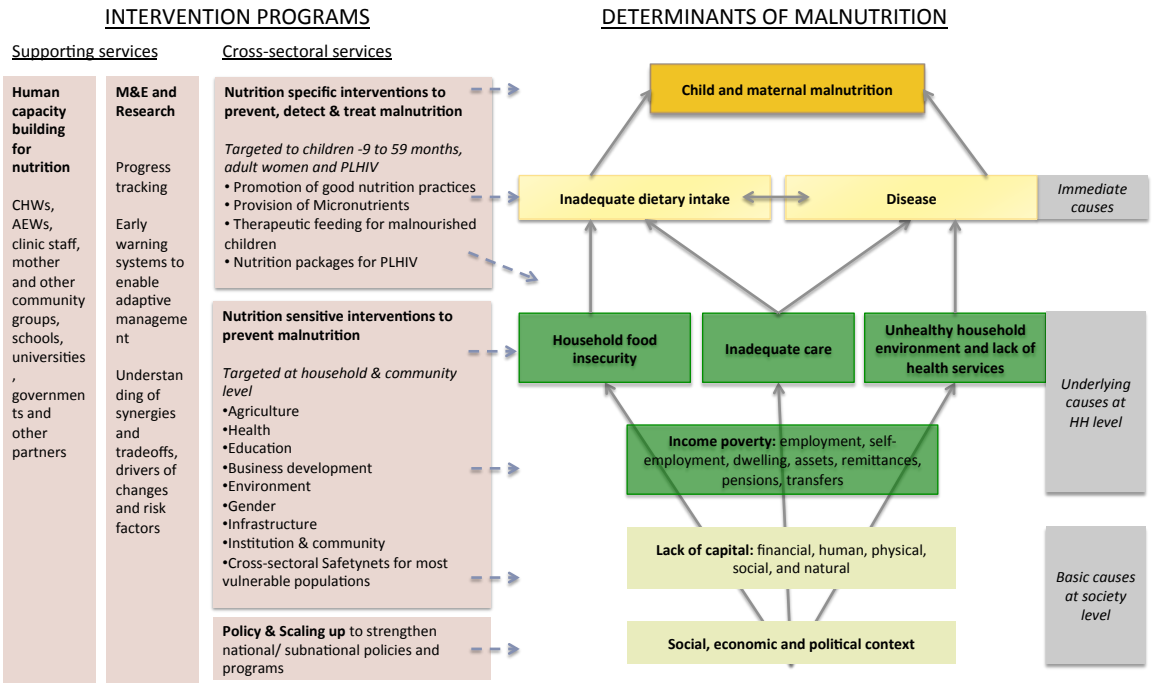


Figure 15 Nutrition intervention framework of relations between poverty, food insecurity and other underlying and immediate causes of child and maternal undernutrition.

9.1. UNDERNUTRITION OF CHILDREN UNDER FIVE YEARS OF AGE.

Measuring the nutrition level of children, both as an indicator and a continued driver of poor health and poverty, is done by biophysical measurements of children under five. To detect acute malnutrition, surveyors measured respondents for weight for height (with a weight-for-height *z-score* of less than -2); this acute malnutrition is manifested as thinness, or known as *wasting*. Wasting can be caused by acutely inadequate nutrition that results in rapid weight loss or the inability to gain weight at a normal rate; it is therefore an indicator of immediate lack of adequate food or nutrition.

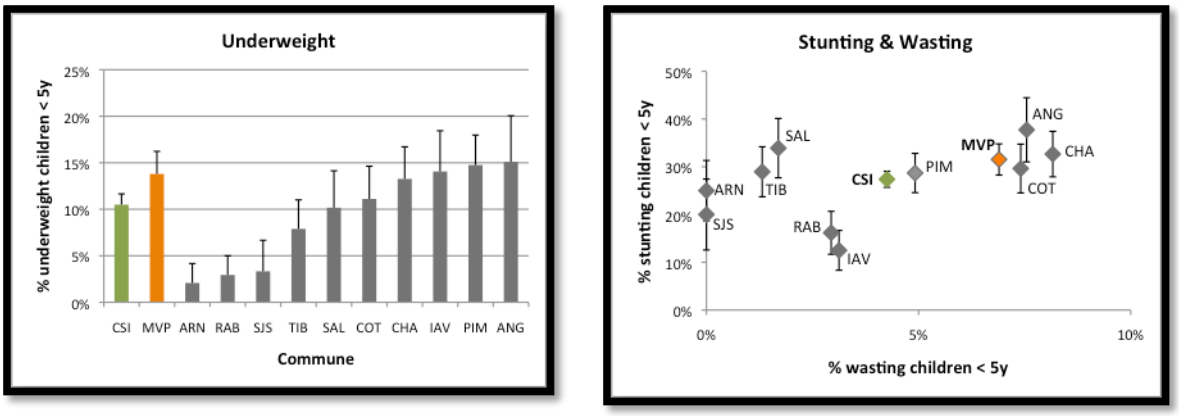


Figure 16 Prevalence of underweight, stunting and wasting among children under 5 years in age.

Based on the 2011 household survey data, in the Port-à-Piment watershed the rate of children who are categorized as wasting is 7%.[7] Malnutrition is defined by low height by age (with a height-for-age *z-score* of less than -2); chronic wasting and low height appears as shortness, or *stunting*. Stunting occurs as children are unable to receive adequate nutrition over a long period of time, causing a failure in linear growth during the crucial times in childhood; in the watershed, 32% of children were classified as stunted[8]. Children are classified as underweight if they have a low weight for their age (a weight-for-age *z-score* or less than -2); this classification, accordingly, can be given as a result of wasting, stunting, or both.

There is large variation in prevalence of underweight children, stunting and wasting in the South Department, in which the Port-à-Piment watershed is located. The commune of Port-à-Piment has the highest level of underweight children at 15%. The high levels of household food insecurity and the low scores in dietary diversity, or the nutritive strength of meals explains this high level of underweight children. The inadequacy of household food supply is widely experienced and prolonged; in the watershed, 94% of respondents reported not having enough food in at least one of the twelve past months, and the average number of months that households reported having an inadequate supply of food for their households was 8.8 out of the past 12 months.

Several infant and young child-feeding indicators show higher scores in the lower watershed than in the higher watershed, e.g. exclusive breastfeeding, early initiation of breastfeeding. This potentially indicates better access to knowledge on infant and young child feeding practices in the lower compared to the upper watershed

9.2. DIETARY DIVERSITY AND RETENTION OF NUTRITION

While access to food is only one of multiple indicators that link to adequate nutrition, the patterns of access to food at the household level follow the pattern of prevalent wasting and stunting in the Port-à-Piment watershed. The difficulty of being properly nourished at a given time (appropriate weight for age, or wasting) is present, as is the prolonged nature of the insecurity (appropriate height for age, or stunting). Other compounding factors in wasting and stunting, including access to adequate health care, are access to clean water to avoid contraction of diarrhea, and a nutrient-rich diet. Based on the UNICEF framework above, the proximate determinants of child undernutrition include household food insecurity, child caring practices (including infant and young child feeding practices (IYCF), and infectious disease control. The analysis emphasizes that an interaction of multiple factors is affecting child and maternal nutrition. A combination of high levels of food insecurity, low dietary diversity and poor infant and young child feeding practices contribute to inadequate dietary intake.

Only 15% of children under two years, the critical window of opportunity to prevent stunting, receive a minimum acceptable diet (i.e. minimum diversity and meal frequency). In the Port-à-

[7] Statistical error of 2%
[8] Statistical error of 3%

Piment watershed, early initiation of breastfeeding, or babies put to breast within an hour of birth, is low at 23%. The high prevalence of home deliveries are more commonly associated with complications for the mother or the child in childbirth. Exclusive breastfeeding for infants under six months is low, at 11% of women interviewed, though the rate of children 0-23 months who were ever breastfed is high, at 97%.

Dietary diversity is an important indicator that correlates to hidden hunger —micronutrient deficiencies are often linked to chronic malnutrition. The average dietary diversity score of children between 6-23 months is 2.68 on a scale of 0-7, with only 15% of children attaining the minimum acceptable diet, meaning both the minimum dietary diversity and the minimum meal frequency (39% of children received foods from four or more groups during the previous day, and just 28% children who received food the minimum number of times or more each day). This trend continues for women aged 15-49 who receive an average score of 2.85 out of 7 for dietary diversity; only 31% of women in the Port-à-Piment watershed consumed the minimum dietary diversity the day before they responded to the survey. Beyond the levels of poverty in the watershed that make access to the adequate number of food groups (of which many are available but outside of the daily expenditure range of many residents), qualitative studies in the watershed indicate that cultural perceptions limit the potential of utilizing local biodiversity for improving nutrition.

Significant differences between the upper and lower watershed are found for proportion of children and adult women, who consumed a certain food group during the day prior to the interview, with consistent higher levels of consumption in the lower watershed. This is particularly pronounced for vitamin A rich fruits and vegetables (e.g. mango, papaya, pumpkin), flesh foods (meat, fish), and legumes and nuts, and results in a significant higher dietary diversity score in the lower watershed (3.4± 0.2) compared to the upper watershed (2.1 ± 0.2). This difference in dietary diversity score is also reflected in the mother's diet.

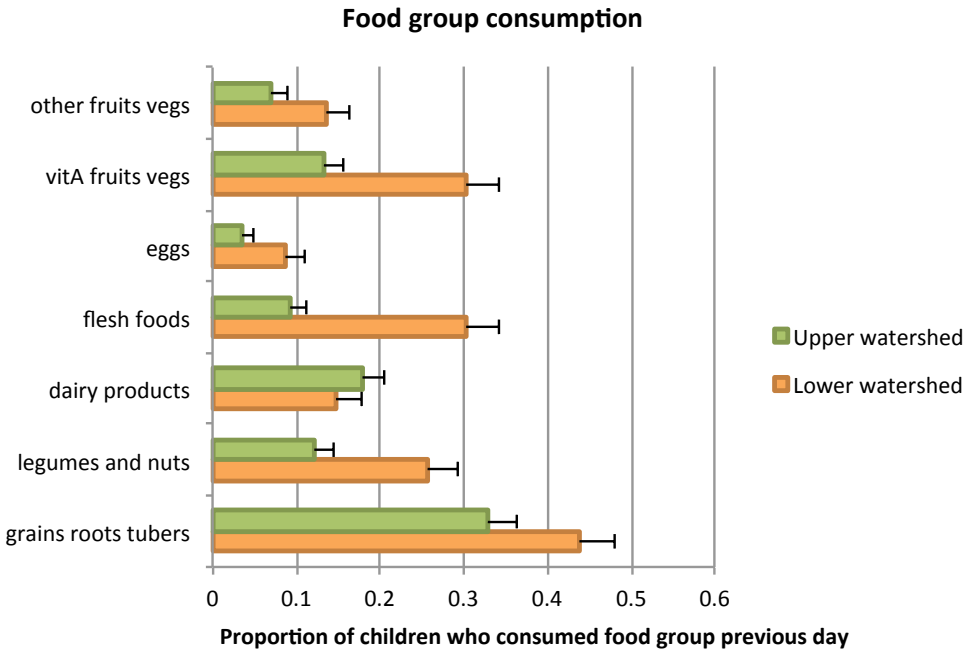


Figure 17 Food group consumption for elevations above 200m (upper watershed) and lower than 200m (lower watershed).

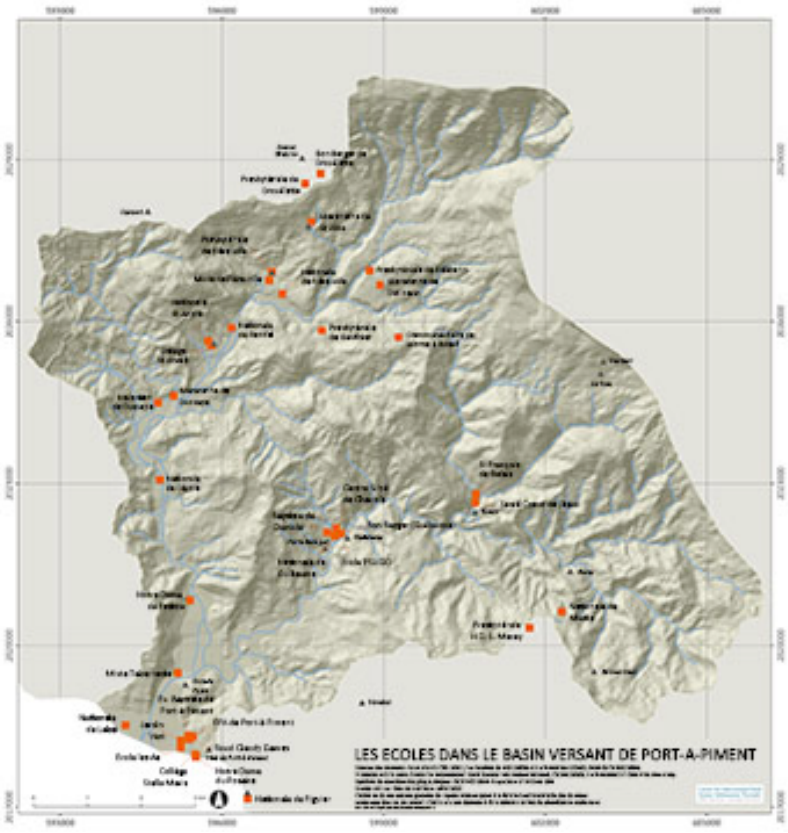
In addition to any food consumed, the state of water quality and sanitation facilities in the Port-à-Piment watershed has an impact on the nutritive health of the population, particularly that of children. High levels of diarrhea related to limited access to safe water and improved sanitation facilities likely contribute to the observed levels of chronic and acute malnutrition, as incidence of diarrhea coincides with nutrient and fluid loss. The proportion of children under 5 years of age that had diarrhea in the two weeks prior to the survey is high in Port-à-Piment, at 33%, however 85% of children with diarrhea received a remedy for diarrhea, either oral rehydration salts (ORS) or another home remedy. In Port-à-Piment, only 13% of households use improved sanitation facilities, furthering the risk of diarrhea. Incidence of malaria and measles also exacerbates the effects of poor nutrition; in Port-à-Piment, only 60% of children have been immunized against measles. Limited access to health services can further aggravate these effects by not adding to preventative or prescriptive solutions. Vitamin A supplements, which are important for growing children, were only received by 65% of children under five in the six months prior to the survey.

10. MDG TWO: ACHIEVE UNIVERSAL PRIMARY EDUCATION

RATIONALE

MDG 2 calls for all children to complete a full course of primary schooling. Indicators of this include net enrollment for boys and girls, primary school completion rates and literacy rates.

Haiti faces significant challenges in meeting these goals. Although free and compulsory universal primary education was mandated in the 1807 Haitian constitution, and has been regularly re-affirmed in parliamentary legislation and Presidential policies, in fact the national educational system is in a shambles. Private education is provided to fill the gaps left by state-supported public education, covering an estimated 70-90% of students. Private schools are not well regulated. The resources and materials at private schools vary immensely, creating an unequal playing field for the children who attend them. Further engendering inequality is the cost of private schools, as their fees tend to be higher than those for public schools; these fees are often paid monthly, and if a student cannot pay for a particular month, he or she must forgo school for that month.



Map 10 Schools in the Port-à-Piment Watershed. Produced by CIESIN 2012.

The coverage of schools not the main constraint in this watershed. There are schools located throughout the small settlements and along the main areas. There are 52 identified schools in

the watershed, serving an estimated 5700 school-aged children[9]. The average ratio of student to teacher in the Caribbean is one teacher to every 22 students (UNESCO 2010). The national average in Haiti is one teacher to every 46 students (Preal 2008). This suggests that for Port-à-Piment, they would require roughly 276 teachers to provide the teacher to student ratio if they were to match the average for the Caribbean. There are no clear national targets for this ratio but further research can compare coverage rates based on population estimates, based on number of students per school and number of teachers per school to help improve the investment in achieving target ratios for student coverage and quality education. UNESCO and global education scholars have derived models to estimate educational system needs. This could be run for future analysis as part of an integrated watershed planning. See the 2006 UNESCO report and Colclough and Lewin (1993), Mehrotra and Buckland (1998), Bruns, Mingat and Rakotomalala (2003) for more information.

The Ministry of National Education and Professional Training (MENFP) endorses a curricular structure which is followed by public schools and some private schools. Fundamental level education covers a span of nine years, and includes children from age six to age fifteen. The nine years of fundamental education span three cycles: 1st cycle (grades 1-4), 2nd cycle (grades 5-6), and 3rd cycle (grades 7-9). In this report, compulsory primary education refers to elementary education for children between six and twelve and is considered equivalent to the 1st and 2nd cycle of fundamental level education. Likewise, secondary education for children between 12 and 19 is considered equivalent to 3rd cycle of fundamental level in addition to the subsequent four years of secondary schooling (grades 10 to 13).

[9] Population estimates based on IHSI, 2009. The calculation only includes children under primary school age.

Comparison with U.S. system

Haiti		U.S.A
Education Prescolaire		**Pre-K and K**
3-4 ans Petite Section		3-4 yrs old Preschool
4-5 ans Moyenne Section		4-5 yrs old Preschool
5-6 ans Grande Section		5-6 yrs old Kindergarten
Enseignement Fondamental		**Elementary School**
Premier (1er) Cycle		
6-7 ans Première Année Fondamentale (AF)		6-7 yrs old 1st grade
7-8 ans Deuxième AF		7-8 yrs old 2nd grade
8-9 ans Troisième AF		8-9 yrs old 3rd grade
9-10 ans Quatrième AF		9-10 yrs old 4th grade
Deuxième Cycle		10-11 yrs old 5th grade
10-11 ans Cinquième AF		**Junior High School**
11-12 ans Sizième AF		11-12 yrs old 6th grade
Troisième Cycle		
12-13 ans Septième AF		12-13 yrs old 7th grade
13-14 ans Huitième AF		13-14 yrs old 8th grade
14–15 ans Neuvième AF		**High School**
Enseignement Secondaire		14-15 yrs old 9th grade
15–16 ans Classe de Troisième		15-16 yrs old 10th grade
16–17 ans Classe de Seconde		16-17 yrs old 11th grade
17–18 ans Classe de Première (Bac 1ère partie - Réto)		17-18 yrs old 12th grade
18–19 Classe de Terminale (Bac 2ème partie - Philo)		

Figure 18 Comparison of Haitian and United States school system. Source: Embassy of Haiti in the US, 2012.

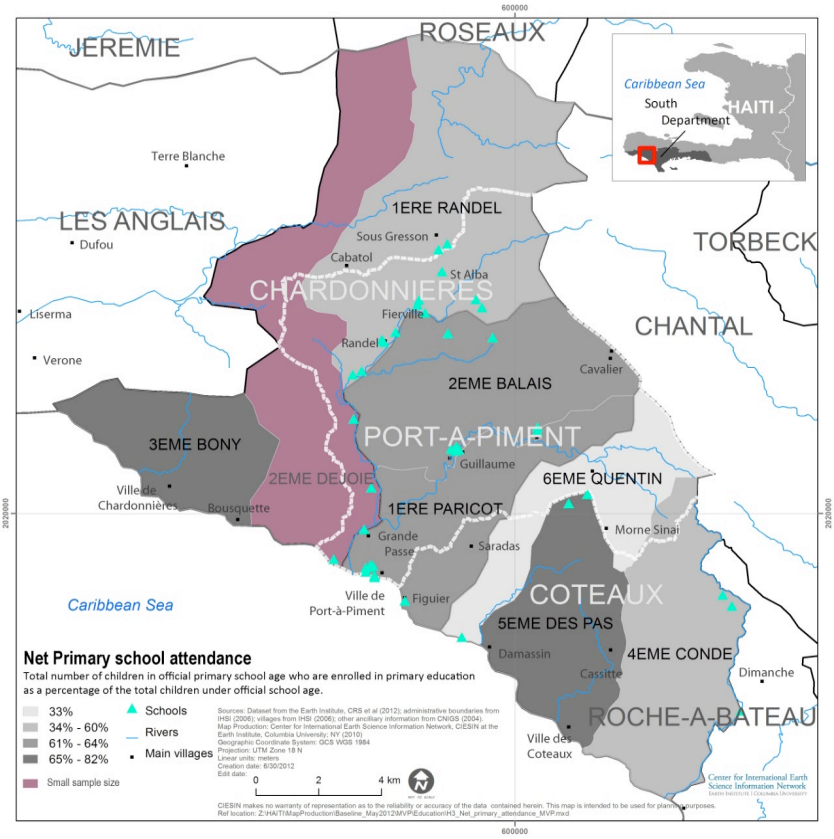
10.1. NET ENROLMENT RATIO IN PRIMARY EDUCATION

The key indicators measuring progress towards achieving MDG 2 include the primary school net attendance rate and gross attendance rate. Net attendance rate (NAR) is defined as the "number of pupils in the official age group for a given level of education who attend school in that level, expressed as a percentage of the population in that age group" (EFA 2005). Thus, net attendance rate measures the attendance of students of the official primary or secondary school-going age. Gross attendance rate (GAR) is the number of pupils regardless of age attending school for a given level of education, expressed as a percentage. Gross attendance rate counts all children attending school, including those who are under or over the official age group for a given level of school. It is possible to see gross attendance rates over 100% if GAR is much higher than NAR, many of the children in school are either above or below the appropriate school going age for that level.

Indicator	Port-à-Piment	National
NAR, primary, %	60	49.6
GAR, primary (proxy), %	131	123.5
NAR, secondary, %	15	16.4
GAR, secondary, %	23	47.6

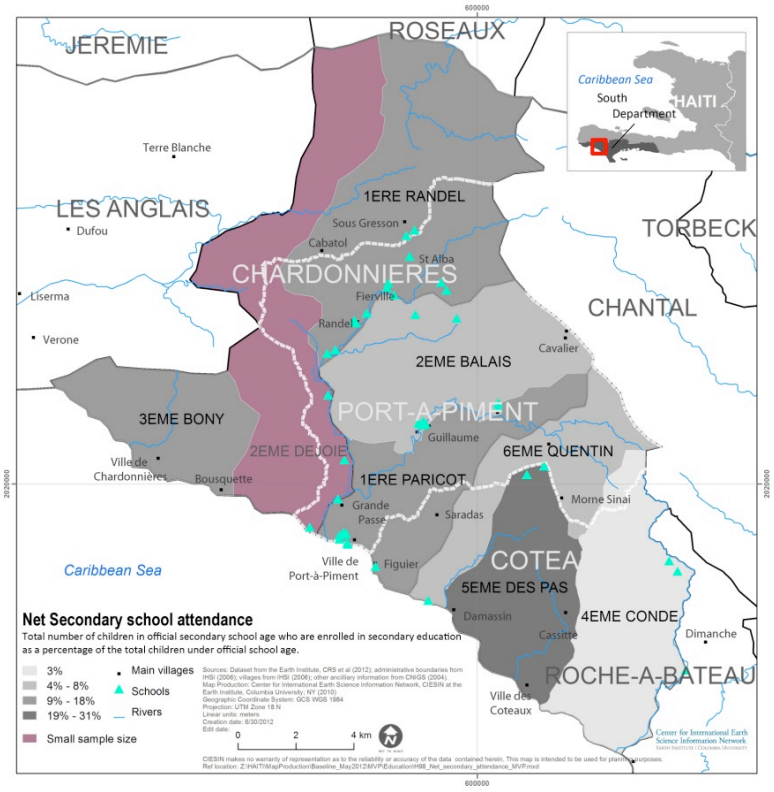
Table 3 Attendance rates, Port-à-Piment Watershed as of 2011 and National figures (Cayemittes et al 2007).

At 60%, the net attendance rate at the primary level in Port-à-Piment is higher than the national average at 49.6%. This indicates that in the watershed, 60% of six to eleven year olds are attending primary (fundamental) school as compared to the national average where only about half of the primary school aged children are attending school. The gross attendance primary rate is less promising, however. At 131%, it is close to the national average, which signals that the watershed has similar problems with over-age students as the nation on the whole does.



Map 11 Net attendance rate for primary level.

The net attendance rate for secondary schools is virtually the same across the board: 15% for the watershed as compared to 16.4% nationally. Children ages 12-18 should be enrolled in fundamental cycle 3 (grades 7-9, ages 12-15) and then secondary school (grades 10-12 ages 15-18). The gross attendance rate in the watershed is well below the national average (47%) at 23%, indicating that regardless of age, less children in the watershed are attending secondary school.



Map 12 Net attendance rate for secondary level

10.2. NET INTAKE RATIO AT FIRST GRADE OF PRIMARY SCHOOL

To achieve MDG 2, students must not only enroll in school and attend school, but also must stay in school and complete a full cycle of primary school. Enrolling children in the first year of primary school at the age of six is one way to ensure that they have a better chance of completing a full cycle of primary school, and that the students in primary school are of the appropriate age. Students who are over or under the appropriate age for their grade are often more likely to fall behind or drop out. Net intake rate and survival rates are two key indicators for measuring progress towards MDG 2.

However, the inconsistency in attendance rates and continuation of students is indicative of the larger struggle with financing education. Inconsistencies in national budgets have placed the burden of educational expense on families. As family expenditures are required on average to cover 85% of schooling costs, education is often prohibitively expensive, particularly in rural areas where children often already perform economically important roles in the daily economic life of the family performing necessary chores, like firewood and water collection (De Sherbinin 1996). According to local experts, it is estimated that families in Port-à-Piment spend $8USD per month per child. The costs are estimated to range from $8USD to $12USD in urban centers.

Given the high level of poverty of most Haitians, the cost of schooling is an issue of great concern. Even public schools are not completely free, as families must pay annual fees, as well

as other costs for schools activities. In contrast with the public school fees, which are state-regulated and paid in the beginning of the year, private school fees can vary considerably in amount and are paid monthly (Lunde 2008). Administrators of private schools in Port-à-Piment watershed are reported to accept what parents can afford but are required to provide full payments by the end of the year. Having to pay so frequently means that there will be some months in which families can afford it and some months where they cannot, especially in rural areas where a family's income depends on the harvest (Lunde 2008). Consequently, if families cannot afford the fee for any given month, students cannot attend school for that month. One of the unfortunate effects of irregular attendance is that students miss crucial instruction time, which sometimes leads students to fail the final exams, forcing them to repeat the school year. What's more, even if students are allowed to attend school when they are not paying school fees, they might not be able to take the periodical or final exam, as exams also carry fees. This pattern of missing instruction time and/or exams contributes to high rates of repetition and overage of students in the school system, especially in rural areas, as shown in the tables below.

Breakdown by sex and geographical situation	Total	Male	Female
Total	3.6	2.9	4.3
Rural	4.5	3.4	5.9
Urban	3.2	2.7	3.7

Table 4 National repetition rates, secondary level. Source: EPDC 2005

The quality of schools is another factor that can greatly impact the likelihood of children to either stay in school or drop out. The lack of state-funded and operated educational facilities has repercussions not only in access to education, but also in ensuring its quality and consistency in structure and instruction. Legally, schools from the preschool to secondary level are under the jurisdiction of MENFP, which is technically responsible for the educational programs of each level. The proctoring of exams, research, and regulation of educational facilities also falls under the jurisdiction of MENFP. However, the actual control and supervision of the national education system is far from actualized on the basest of levels. Schools throughout Haiti receive little in the way of political will, curricular support, and quality control and regulation in the form of oversight (McNulty 2011).

One of the barriers to attracting qualified teachers to private schools is low pay. Public school teachers earn more than private school teachers; a 2004 estimate placed public school teachers' salaries at two times the GDP per capita (US$450 at the time), which was two to three times the amount that private school teachers were paid (Wolff 2008). Private school teachers also do not receive the same social benefits and protections guaranteed to public school teachers, such as insurance and advances on salaries. (MENFP 2007) This is not to say that public school teachers are substantially better off than private school teachers. In both sectors, most teachers receive

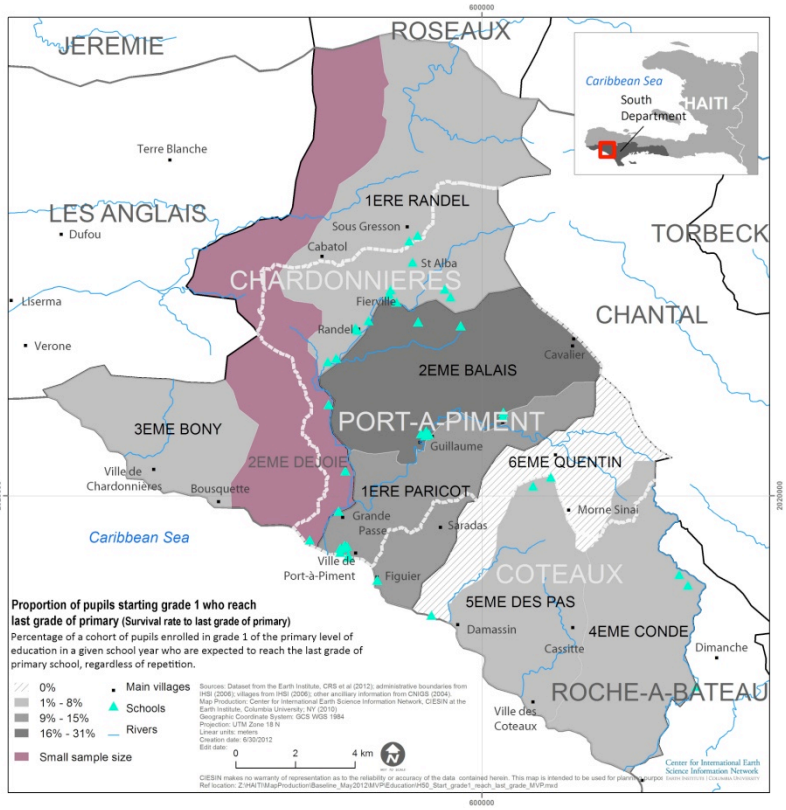
minimal supervision, support, and evaluation, and the five teachers' unions have clashed with the government over missed salary payments and high rates of teacher absenteeism (Wolff 2008). Nonetheless, all things considered, private school teachers are more vulnerable than their counterparts at public schools. Please see the CRS 2012 analysis on teacher quality assessments for more information.

Net intake rate indicates the proportion of children of the official school entrance age who enter the first grade of primary school at the appropriate age. In Haiti, the official entrance age to the first cycle of fundamental education (equivalent of primary school) is 6. The net intake rates in the Port-à-Piment watershed are still far below the target of 100%. In the Port-à-Piment watershed, only 35% of children age 6 are starting fundamental cycle 1, which is the equivalent to the first grade of primary school. The region's higher gross attendance rate indicates that children are starting school later, and are older than they should be for their specific grades.

Net intake rate in the first grade of primary		Watershed	CHA	PIM	COT
	Total	35%	29%	36%	23%
	Females	39%	25%	45%	13%
	Males	28%	33%	18%	40%

Table 5 Net intake rate in the first grade of primary education.

10.3. PROPORTION OF PUPILS STARTING GRADE 1 WHO REACH GRADE 5



Map 13 Proportion of pupils starting grade 1 who reach the last grade of primary (Survival rate to last grade of primary).

The proportion of pupils starting in grade 1 who reach last grade of primary education is known as the Survival Rate to last grade of primary. It is the percentage of a cohort of pupils enrolled in grade 1 of the primary level of education in a given school year who are expected to reach the last grade of primary school, regardless of repetition. As compared to the national average, the Port-à-Piment watershed has a low survival rate. Eleven percent of pupils who start grade 1 are reaching grade 6, as compared to the national average of 38.4%, which is still well below the intended target of 100%. These figures draw attention to the fact that despite having high net enrollment rates, students in the watershed are not staying in school and are highly likely to leave school prior to reaching grade 6.

Geographic Area Average	% of pupils who start in grade 1 and complete grade 6
Port à Piment	11%
10 Communes of the household survey	17%

National Average	38.4%

Table 6 Proportion of pupils who start grade 1 who reach grade 6.

Probability of children succeeding across grade levels, primary level.

	Watershed	CHA	PIM	COT
Grade 1	67	56	70	53
Grade 2	69	57	80	48
Grade 3	62	50	65	58
Grade 4	58	43	67	47
Grade 5	69	61	74	68

Educational attainment rates are very low in the watershed, with an average of 70% of men and women over the age of 25 never having completed primary school. In the three communes that make up the watershed, Port-à-Piment has the lowest education attainment rate, at 67% as compared to 75% and 77% in Chardonnières and Coteaux respectively.

Education Attainment Rates		Watershed	CHA	PIM	COT
Educational attainment rates by level of education men and women 25 and above	None	70%	75%	67%	77%
	Primary	9%	9%	10%	6%
	Secondary or higher	8%	8%	8%	6%

Table 7 Educational attainment rates for Port-à-Piment and communes.

10.4. LITERACY RATE OF WOMEN BETWEEN 15 AND 49 YEARS OLD

The youth literacy rate, defined as the literacy rate of 15–24 year-olds, is the percentage of the population 15–24 years old who can both read and write with understanding of a short simple statement on everyday life. The definition of literacy sometimes extends to basic arithmetic and other life skills. The youth literacy rate is a proxy measure for the effectiveness of the primary education system, and is often indicative of whether or not students are leaving schools having learned basic skills.

Indicator	**Watershed**	**National**
Literacy rate, women age 15-49 (proxy)	48%	N/A
Literacy rate, women 15-24	47%	81%

Table 8 Literacy rate of women between 15 and 49 years old (Cayemittes et al 2007).

Literacy for women between the ages of 15 and 24 in the watershed, at 47%, is significantly lower than the national average, at 81%. One explanation for low youth literacy rates is poor quality schools, in which students are not obtaining basic literacy and numeracy skills. Since enrollment rates in the watershed are higher than the national average, the low literacy rates may be due to poor quality in schools or a recent increase in enrollment, which has not yet affected the youth literacy rate.

11. MDG THREE: PROMOTE GENDER EQUALITY AND EMPOWER WOMEN

RATIONALE

The scale of women's participation in community-based organizations is indicative of the level of social engagement in a particular community and women's participation has a strong impact on the sustainability of development interventions. One of the indicators for target for MDG 3 also includes eliminating the gender disparity in primary, secondary and tertiary education.

In its progress towards achieving the MDGs, Haiti is most on target in its pursuit of Goal 3: gender equality. In Port-à-Piment, the proxy of MDG 2.3 of literacy among women 15-24 is 47%, and 15-49 years of age is 48%. The net intake for primary school in Port-à-Piment is 35% in total, 39% for girls in the watershed and 28% for boys.

11.1. RATIO OF GIRLS TO BOYS

The ratio of girls to boys in primary and secondary education is examined by comparing girls NAR primary/ secondary to boys NAR primary/secondary and comparing girls GAR primary/secondary to boys GAR primary/secondary. A girl to boy ratio of 1 indicates equal participation by both girls and boys in primary or secondary education. Slight variations occur due to the size and gender breakdown of the population.

Ratio of girls to boys in primary and secondary education (by NAR and GAR)	Watershed
NAR, primary	0.83
NAR, secondary	0.9
GAR, primary	0.8
GAR, secondary	0.8

Table 9 Ratio of girls to boys in primary and secondary education (NAR and GAR).

Gender parity appears to be reached or within reach of being achieved. Girls and boys are participating in primary school at almost equal rates, with the national ratio of girls to boys in primary school at 1.02 (Cayemittes et al 2007). This figure drops slightly in secondary school, indicating a disadvantage for girls' participation in secondary school nationally, with a ratio of 0.94 (idem). In the watershed region, the ratio of girls to boys in primary school is 0.83 and in secondary schools is at 0.9. While the ratio of girls to boys in school shows that both girls and boys are participating in school at relatively equal rates, when viewed in the larger context of NAR, significant efforts must still be made to enroll more children in school, ensure they are learning, and participating equally.

11.2. SHARE OF WOMEN WHO PARTICIPATE IN LOCAL ORGANIZATIONS

Gender equality reaches beyond the rate of enrollment in primary and secondary school to equal participation of women in community organizations and post-secondary professional development.

In 2010, MARNDR developed an inventory of community-based organizations working in Port-à-Piment commune. In this database, the Earth Institute found 26 organizations that provided details on the organization's purpose and its membership, specifically on male/ female ratios of registered members. All 26 organizations included female members, and women made up at least 30% of the members for over half of the organizations. Almost 20% of the organizations were run or chaired by women and more than one third included women within their management structure.

Further analysis of the database showed that women play an important role in all types of economic activities, even those sectors traditionally thought of as being male dominated such as farming and commerce. Of the 15 organizations that had over 30% of female members, all but one engaged in farming activities such as agricultural extension and outreach, livestock raising, irrigation, plant nurseries and crop storage. Thirty percent of these organizations focused specifically on environment-related activities, and 20% on business development and commerce. In general, all organizations expressed an active engagement in community development. In a 2011-2012 evaluation of community-based organizations in the watershed, it was found that women play an active role in decision-making at least 30% of the time in 42% of organizations (14 of 33 evaluated).

Though these figures highlight the crucial roles played by women in the social and economic life of the Port-à-Piment watershed, much remains to be done in terms of capacity building for women and gender equality. Thus, the median number of female members per organization was 26, compared to 136 for male members.

In the most recent household survey, it was found that in the Port-à-Piment watershed under a quarter (21%) of the population of women surveyed participate in local organizations. Among the communal sections that compose the watershed, 1ère Randel, 3ème Bony and 5ème Des Pas had the highest participation levels, at 29%, 29%, and 34% respectively; communal sections with the lowest participation include 1ère Paricot at 16% and 6ème Quentin at 12%.

11.3. PROPORTION OF WOMEN WHO PARTICIPATED IN EXTENSION TRAINING

Post-primary and secondary extension trainings, which include agricultural trainings, are available in the watershed. The proportion of women who have received some form of extension training within the past twelve months since the time of survey is 18% in the Port-à-Piment watershed. This number varies among the communal sections, with a higher participation rate in 5ème Des Pas (at 25%) and much lower participation in 4ème Condé (at 8%). Of these, 40% of women participated in trainings relating to health, followed by 22% of who participated in water and sanitation related trainings. Though agriculture is one of the most ubiquitous of professions, it is only the third most common subject for extension training, at

17% of women who participated in trainings. Environment (4%) and energy (1%) were low, as were business (4%) and home economics (2%). The participation numbers, both for trainings and in organizations, are partially a function of the organizations present in the watershed and the training services that are offered.

12. HEALTH SECTOR

As the health of the population underpins all efforts towards development and is paramount towards achieving any lasting progress, four of the eight MDGs directly relate to population health. MDG 4 is explicitly related to the rates of mortality among children under five years of age, with a focus on the most common causes of child mortality, including diarrhea, measles, and malaria. The MDG target indicator is to reduce child mortality to under 50 deaths per 1,000 live births. Progress towards MDG 5, improving maternal health and decreasing maternal mortality to under 150 deaths per 100,000 live births, is slow in Haiti and in the Southwest. MDG 6 aims to reduce the spread of preventable communicable diseases, particularly HIV/AIDs, malaria, and tuberculosis. MDG 7, ensuring environmental sustainability, also contains goals for improved sanitation facilities and improved drinking water, two factors that play an important role in reducing waterborne illnesses.

12.1. MDG FOUR: REDUCE CHILD MORTALITY

RATIONALE

Child mortality is a broad indicator of the progress of multiple sectors, as children under five are among the most vulnerable groups within a given population. Child mortality can be caused by a number of factors, from inadequate nutrition to unclean water, from a lack of access to adequate medical attention. Accordingly any progress achieved toward MDG 4 must be the result of multiple forms of progress across different fields, including increasing food production and availability, promoting and enabling access to quality healthcare, and improving water and sanitation.

Infant and child mortality in Haiti is the highest in the Western hemisphere, largely due to the manifestation of poverty and chronic political turmoil that inhibit efforts to improve health systems and ensure national access to health care. Food insecurity is high in Haiti, though both education and infrastructure are minimal – all of which need to be addressed in order to sustainably improve health indicators, most notably child mortality. Currently, the health sector is often unable to respond to these problems with even simple cost-effective interventions, due primarily to weak governance of the sector.

CHILD MORTALITY RATE

The two charts below compare levels of national child mortality over four reported periods, and levels of child mortality within the Port-à-Piment watershed.

The rates of child mortality are steadily decreasing at the national level towards the target of 50 deaths per 1,000 live births. From the 2011-2012 household data, the level of child mortality between 2007 and 2011 was estimated at 77, progress reported from 133 over the period of 1997-2002 and 107 from 2002-2007. Because child mortality is an indicator determined by many factors, attributing the progress in child mortality to any particular intervention or change in health seeking behavior is difficult.

	EMMUS-I 1987	EMMUS-II 1994-1995	EMMUS-III 2000-2001	EMMUS-IV 2005-2006
Infant mortality (0-1yrs)	99	74	80	57
Neonatal mortality (0- 28 days)	40	31	32	25
Postnatal mortality (1-11 months)	59	43	48	32
Young child mortality (1-4 yrs)	66	61	42	31
Infant and child mortality (0-4yrs)	158	131	119	86

Table 10 National levels of child mortality (deaths per 1000 live births). Data from EMMUS IV, 2005-06

There needs to be a sustained effort to improve child mortality in order to meet the targets established as a part of MDG 4, and to ensure that these gains are sustained beyond 2015. What follows are discussions on a few of the relevant indicators related to child health, and suggestions for how to continue to improve these indicators within the Port-à-Piment watershed.

	1996-2000	2001-2005	2006-2011
Under Five Mortality Rate (ten communes)	90	87	65
Under Five Mortality Rate (watershed)	133	107	77

Table 11 Under five mortality rates.

PROPORTION OF CHILDREN UNDER 1 IMMUNIZED AGAINST MEASLES

According to 2011-2012 survey data, among the children under one year of age in the Port-à-Piment watershed, approximately 60% have been immunized against measles. In 2005-06,

EMMUS-IV determined that 45.3% of children under one were immunized against measles nationally. This rate increased by 12.7% for a final percentage of 58% when children between 12 and 23 months were included in the survey.

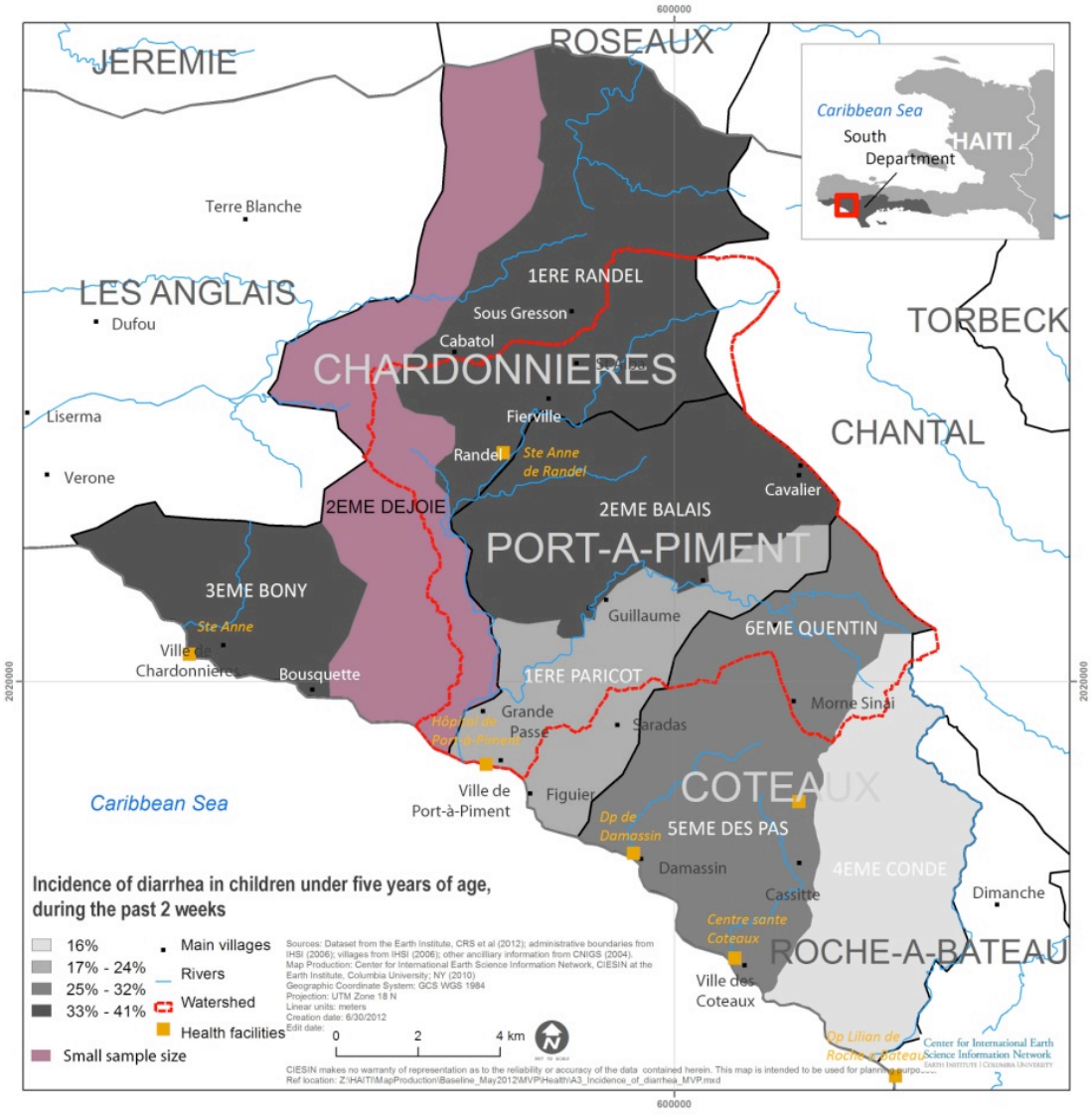
The 15% improvement in immunization rate seen in Port-à-Piment evidenced in the 2011-2012 survey compared to the national data from EMMUS-IV in 2005-06 can be understood by the massive immunization campaigns that have been conducted within the past years, including by international organizations such as Catholic Relief Services. This is also likely due to increased efforts at health outreach campaigns, where parents are educated as to the importance of a vaccination schedule for their children, including against measles, one of the top five causes of child mortality worldwide. Outreach directly to the community through education campaigns and through community health agents are direct, cost-effective method for increasing coverage for immunizations. The preventative care also reduces costs in the long-run for clinics and health services.

PROPORTION OF CHILDREN WHO HAD DIARRHEA IN THE PAST 2 WEEKS, AND TREATMENT WITH ORAL REHYDRATION THERAPY

Diarrhea is one of the five most common causes of child mortality globally, though it is entirely preventable and treatable. Within the Port-à-Piment watershed, 33% of children under five were reported as having diarrhea in the two weeks prior to the 2011-2012 survey (the survey was conducted in November and December 2011 which was not the rainy season and thus a lower prevalence of waterborne diseases). Of those children with reported cases of diarrhea, 85% were treated with an oral rehydration solution (ORS) or another form of fluid prepared at home.

The ability to prepare and deliver dosages of ORS can be done easily at home, and is a skill and commodity that Community Health Workers and other lower level cadres of health workers can teach mothers and other guardians, leaving the households with packets of ORS to be mixed with clean water and prepared without their assistance. When parents are trained in this very basic skill, their ability to act quickly on the first indicator of watery diarrhea can save their child's life and can combat a preventable cause of child mortality at the household level. This

The 2011 launch of the local health and hygiene local committees by the Catholic Relief Services is an important social organizational structure to inform, educate and support the families with treatment and response mechanisms for easily preventable and treatable diseases such as diarrhea. These skills and community structures are even more critical in the Port-à-Piment watershed, where water quality is poor and cholera is still present throughout the region. ORS packets are inexpensive treatments that have a tremendous impact on the health of a population, and are essential solutions to ensuring that no one dies from diarrhea unnecessarily.



Map 14 Incidence of diarrhea in children under five years of age during the past 2 weeks.

Rural regions in the upper, mountainous zones of the watershed, such as 2eme Balais demonstrated a higher incidence of reported diarrhea, particularly in comparison to towns in the lower watershed, such as the more urbanized Port-à-Piment. However only 80% of sick children under five experiencing diarrhea received oral hydration salts in 2eme Balais. In contrast, in rural zones like 6th Quentin, almost 100% of children under five were treated with oral rehydration solution.

Despite high levels of enterococcus found in water quality samples, an indicator of fecal contamination in the water supply, in the rivers of the watershed, no clear relation demonstrating higher incidence of diarrhea as a function of proximity to rivers was determined. This is most likely due to the hydrology of the watershed, with many smaller river streams that spread the risk around.

A March 2011 internal Red Cross report on cholera in the region found incidences of contamination in specific water sources. As a result, better water quality testing is a priority to help prevent cases and improve responsive capacity of water providers and the community. This low-cost rapid testing system is under discussion and the results can be disseminated through the social networks of the health and hygiene committees and the community health agents currently present throughout the Port-à-Piment watershed.

PROPORTION OF CHILDREN UNDER FIVE YEARS WHO RECEIVED VITAMIN A IN THE LAST 6 MONTHS

Vitamin A supplementation is a simple, cost-effective, and lifesaving intervention that is critical in communities where access to vitamin A through a balanced diet is limited. A low level of vitamin A in children increases their risks of various diseases as well as blindness and death, particularly from common childhood illnesses such as measles and diarrhea. (WHO 2003)

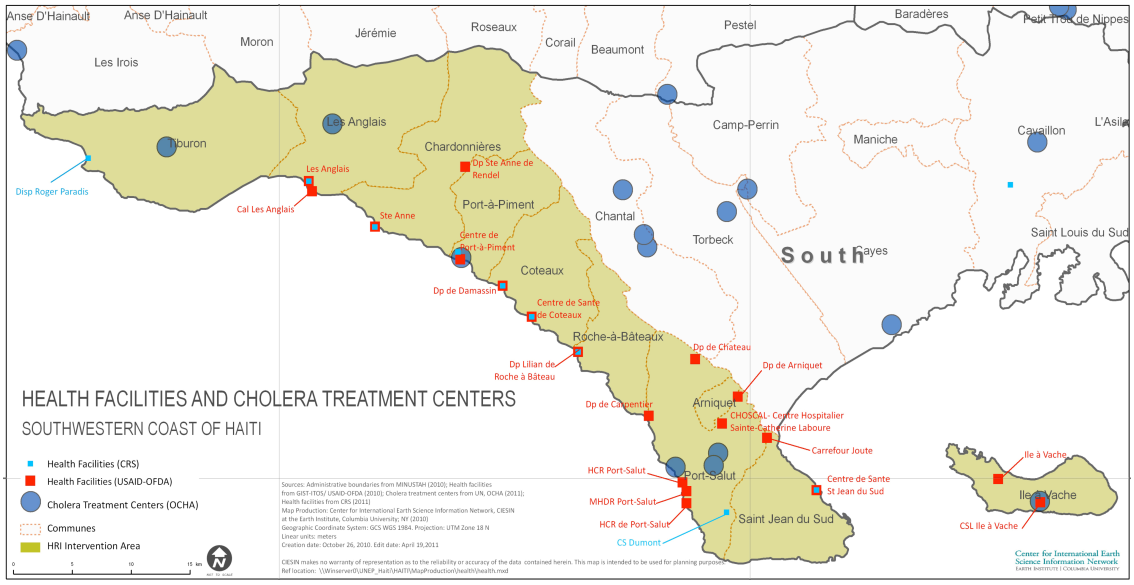
Prior to the 2011-2012 baseline survey organizations such as Catholic Relief Services (CRS) were implementing annual measles campaigns combined with vitamin A supplementation for children under five. Vitamin A supplements have also been distributed at the rally posts that CRS operates. With these various ongoing methods to deliver vitamin A to children under five, the baseline survey found that 65% of children under five in the watershed received vitamin A supplementation in the last 6 months. This is in stark contrast with the national proportion of children under five that received vitamin A supplements, which was determined to be 28.7% by World Health Statistics 2011.

The easiest method to increase levels of vitamin A supplementation throughout the watershed and region is to intensify vitamin A campaigns, and ensure that vitamin A is also an intervention provided by CHWs at the household level. Though vitamin A is not appropriate for pregnant women, at any antenatal care visits pregnant women should be educated about the importance of vitamin A for their children, and a system instituted that follows up on births and tracks vitamin A supplementation in addition to the required schedule of vaccines. The government issues identification cards for each newborn, referred to as Chemen Lasante, or Road to Health, that the parents keep with them and bring to each health visit. The government issued new cards in August 2011, tracking mid upper arm circumference (MUAC), and weight and height. Health workers could also use these cards, and a simple registration system, to track the distribution of other critical supplements and care, such as Vitamin A supplementation.

12.2. MDG FIVE: IMPROVE MATERNAL HEALTH

RATIONALE

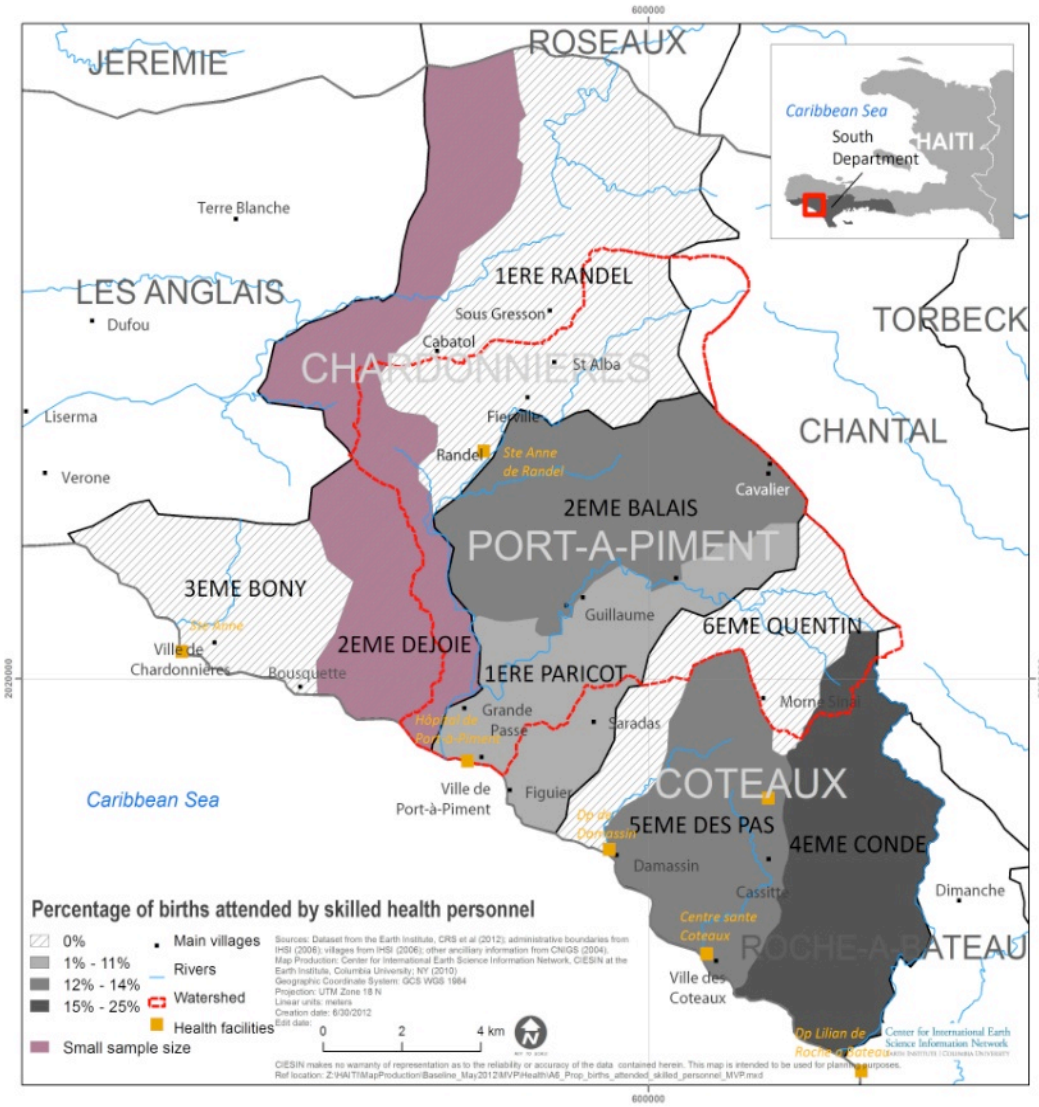
The most common causes of maternal deaths globally are largely preventable and treatable. The easiest and most effective way to improve maternal health and to decrease maternal mortality is to increase institutional deliveries, meaning the number of births that take place within a medical facility and attended by trained medical staff. While one of the most critical health objectives, it is among the most difficult priorities to address in the Port-à-Piment watershed given its topography and demography which limits access to health facilities, particularly during delivery. Specific to MDG 5, the indicators require that countries reduce maternal mortality ratios by three quarters, increase the number of antenatal visits and institutional deliveries, and address unmet needs for family planning and access to contraceptives.



Map 15 Map of health facilities and cholera treatment centers within the ten communes of Southwest Haiti.

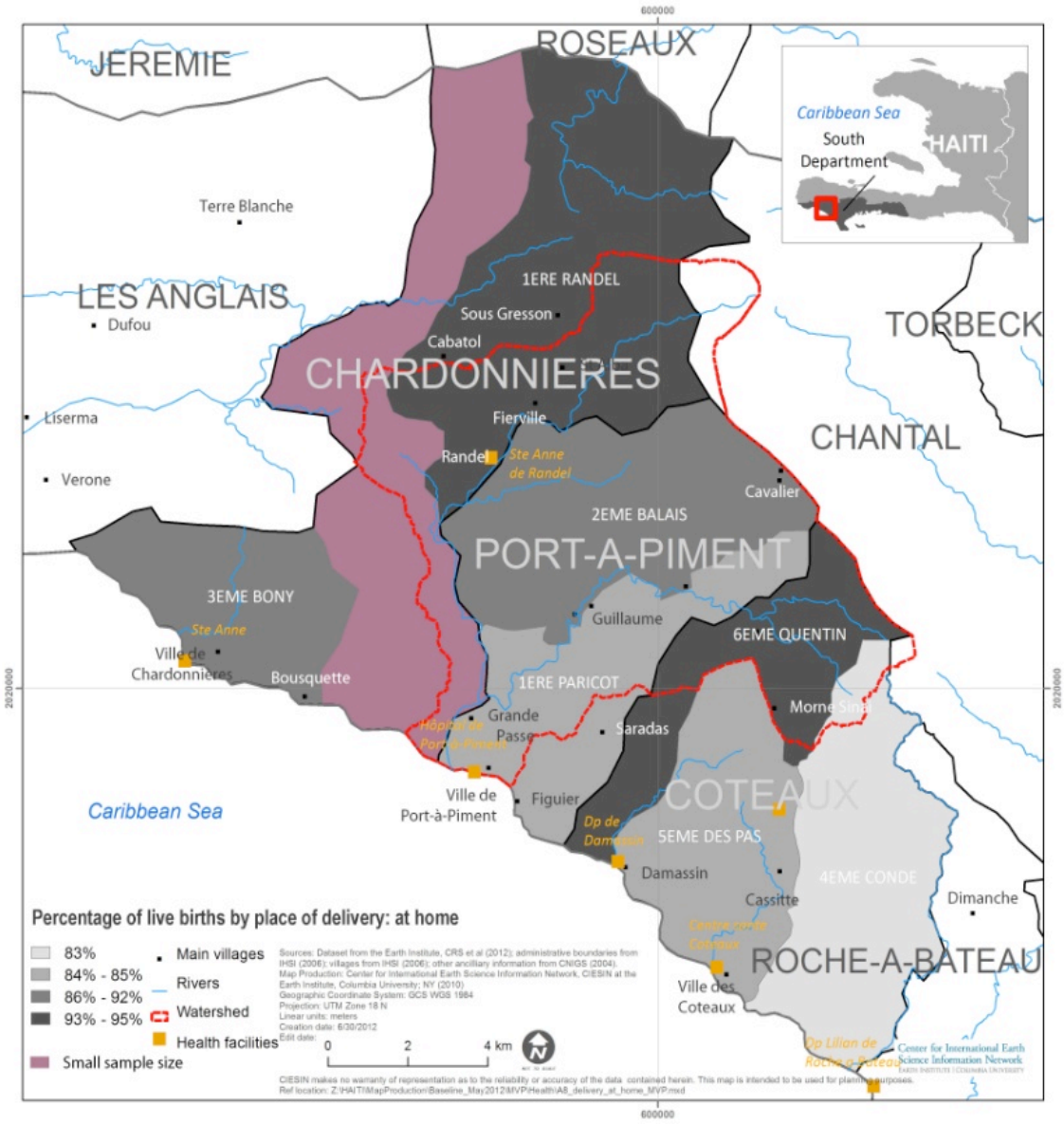
PROPORTION OF BIRTHS ATTENDED BY SKILLED HEALTH PERSONNEL

There are three health facilities in the Port-à-Piment watershed, one of which is a Cholera Treatment Center operated by various national Red Cross (Haitian, British and Japanese) and Ministry of Public Health and Population (MSPP) agencies. The hospital in Port-à-Piment town and the clinic in Randel have limited facilities and staffing, and no capacity for emergency deliveries. The clinic in Randel has the infrastructure for a delivery room, which is not currently operational. However, a plan to equip and staff the delivery room is being implemented by CRS and the MSPP as of 2012. For any emergency situations, patients are referred to either the hospital in Port Salut, which is approximately 31km away from Port-à-Piment, or the hospital in Les Cayes, which is 60km from Port-à-Piment. There is no permanent ambulance service to support this movement of the population. The hospital in Port Salut has a number of physicians on staff, with inpatient and laboratory capabilities. However, it does not offer Comprehensive Emergency Obstetric Care services (CEmOC), which can only be found at the hospital in Les Cayes.



Map 16 Proportion of births attended by skilled health personnel.

Within the Port-à-Piment watershed only 8% of live births were attended by skilled health personnel in 2012, far below the national average of 26% of live births, as found EMMUS-IV in 2005-06. The highest percentage of delivery in the presence of skilled health personnel was in 2nd Balais, with between 15% and 25% of births attended in 2012. In the same area and also in 6th Quentin, between 58% and 71% of deliveries are attended by Traditional Births Attendants (TBAs). TBAs assist with 71% while 25% of deliveries that are not performed by skilled health personnel in the Port-à-Piment watershed.



Map 17 Percentage of births by place of delivery: at home.

Compared to the national average of 14.6%, the 2011-2012 survey found that only 9% of deliveries occurred in a public health facility, despite the presence of clinics and the hospital of Port-à-Piment. The cost of a delivering in the Port-à-Piment hospital as of 2012 is US$ 35, which encompasses drugs, lab tests, basic materials such as gauze and towels, and hospitalization fees including potential complications such as pre-eclampsia and eclampsia. Therefore the cost of hospital births is generally unaffordable for the majority of the population. Thus to find that only 2% of births were attended by a physician, and only 6% by a skilled health professional.

The remaining 91% of births occurred in private homes, where access to medical doctors and health services, critical if complications with delivery should occur, is unavailable. TBAs, who

generally cost much less than a hospital birth at US $12.50, were present at 52% of the births in the watershed. No birth attendant, but rather family and friends, attended at 2% of births.

With the steep topography and low population density of the watershed (except in the town of Port- à-Piment), most households are located between three to four hours walk from the health facilities. Besides the long distance, other commonly cited barriers include lack of road access, knowledge, availability of trained personnel in the system, as well as financial and culture barriers causing 90% of deliveries in the watershed to occur in the home, while only 10% occur in the health facilities.

Another critical intervention needed for all health personnel are the skills and ability to address complications in childbirth. Recent evidence from studies with TBAs has demonstrated that having health workers trained in neonatal resuscitation reduces neonatal deaths by almost 50% and deaths by asphyxia by approximately 60% (Gill 2007). This will be addressed in the Port-à-Piment watershed by the introduction of the Helping Babies Breathe (HBB) campaign, a global campaign where health workers, including TBAs and community health workers are trained in neonatal resuscitation, and regularly practice these critical skills.

PREVALENCE OF ANTENATAL AND POSTNATAL CARE

The problem of access to healthcare for women evidenced in the Port-à-Piment watershed for delivery is indicative of a larger national problem. Even among the nation's wealthiest quintile, over 60% of women reported cost of treatment as a barrier to obtaining health care. 97% of women nationwide, regardless of economic situation, reported at least one hurdle when seeking care (Cayemittes et al 2007). In Port-à-Piment, the distance to health facilities and the difficult terrain is reported by the community as among the most common problems when seeking health care. With the locations of the existing health centers, pregnant women throughout the watershed would likely have to cross one of several rivers, and climb hills and mountains in order to attain services in existing health centers.

	South Department	National Average
Obtaining permission to seek care	7.9	16.7
Cost of evaluation and treatment	80.4	78.4
Distance to health facility	52.5	42.7
Lacking of transportation	49.7	44.7
Lacking a travel companion & not wanting to travel alone	24.4	28.1

Unease with male health care providers	40.9	42.0
Lack of staff at the facility	87.2	87.7
At least one problem of access	97.0	97.3

Table 12 Percentage of women who report problems of access to care by type of problem. Source: Cayemittes et al 2007.

While the Port-à-Piment hospital offers antenatal care services and a delivery room, the rates of delivery in the hospital, as noted above, are extremely low. Besides the reasons cited above, this might be attributed in part to the fact that currently at the hospital women are currently required to pay for medications and supplies needed during the delivery, which can be prohibitive for many of the women throughout the watershed given their income levels.

To encourage mothers to deliver in health facilities a key intervention is to provide "Mama Kits," which generally includes a towel, soap, a blanket for the infant, educational materials and similar supplies that are provided to the women free of charge.

The 2011-2012 survey specified that in the Port-à-Piment watershed, 36% of pregnant women benefited from an examination by a physician, 56% by a nurse or a midwife and 2% by a community health worker, prior to birth, defined as antenatal care. The WHO recommends that generally women without expected complications in their pregnancy have four antenatal care visits before birth (Abou-Zahr 2003). Considering the antenatal care coverage, 87% of pregnant women have at least one visit by a skilled health worker and 71% completed at least 4 visits by any health provider, which is a high rate of antenatal care coverage. Second Balais is the section communale where the highest percentage of women receive between one to four antenatal visits. On the same note, only 17% of the women who have delivered in the Port-à-Piment catchment area benefited from a postnatal care in the first 7 days with a doctor or a nurse[1].

Therefore, as evident by the relatively high rate of antenatal visits, the population is largely aware that antenatal care is required for the baby's well-being, and that services such as vaccines, blood and urine tests, and prescriptions that cannot be offered by traditional birth attendants, are important for a healthy delivery. However, always cited for cultural reasons, the post-natal care is not justified in some minds, as the mother and the baby appear to be in good health, and an extra visit to a health professional would seem to be an unjustified expense.

12.3. FAMILY PLANNING

CONTRACEPTIVE PREVALENCE RATE

In the Port-à-Piment watershed, the contraceptive prevalence rate for all methods of contraception for women who are married or living as married is 24%; of those using contraception, only 22% of those between the ages 15-49 are using modern methods. The most

frequent methods used by women in the watershed are injections (12%) and pills (5%). Interestingly, 8% of surveyed women rely on abstinence or withdrawal as contraceptive methods.

Similar to EMMUS IV findings, 32% of married women or those who were in union used all methods and 25% adopted modern methods. On a larger scale, among women between 15 and 49 years old married or living as married, 23% were using at least one method, 18% a modern method and 5% a traditional one. Norplant (7%) and male condoms (6%) were the most utilized of modern methods.

The lower uptake rates are likely due to limitations of supplies, stock-outs in the supply chain, and absence of skilled health providers, which symbolize some of the impediments for larger family planning coverage.

Knowledge and utilization of modern contraception is increasing. According to EMMUS IV 2005-06, over 98% of women knew that condoms afforded protection from unplanned pregnancies, and over 96% of women knew about contraceptive pills and medium-term injections. Contraceptive utilization is significantly less, with approximately 25% of women using some form of modern contraception. However, almost half of these women (11%) use injectable forms of contraception such as Depo-Provera while only 5% of the female populations reports using condoms, an increase from 3% in 2000. While the increase is important, condoms are the only form of contraception that concurrently prevents HIV and other sexually transmitted infection (STI) transmission. Therefore, the low utilization rate (similar among married and unmarried women) is concerning. Furthermore, these rates reflect demand. Only 6.2% of women who plan to use contraception in the future expressed an interest in condoms as opposed to 52% who preferred injectables.

UNMET NEED OF FAMILY PLANNING

Unmet need for family planning is defined as limiting births for those who are fecund and sexually active, but are not using any method of contraception and report not wanting any more children. This is a subcategory of total unmet need for family planning, which also includes unmet need for spacing births. The concept of unmet need points to the gap between women's reproductive intentions and their contraceptive behavior. For MDG monitoring, unmet need is expressed as a percentage based on women who are married or in a consensual union. The unmet need for family planning in the Port-à-Piment watershed in 2011-2012 is reportedly higher than the national average at 43%, as compared with the latest national figures at 38% (Cayemittes et al 2007). There is a strong need for family planning consultations and contraceptive methods in the watershed.

Problems associated with contraceptive method use such as side effects or personal health problems (55%), lack of knowledge (0.3%), disagreement with the spouse (2.3%), religious beliefs (7.5%), sterility (12%) symbolize a few of the major constraints for family planning methods to be accepted (Cayemittes et al 2007).

12.4. MDG SIX: COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES.

RATIONALE

The lack of primary health care in Haiti and in the Port-à-Piment watershed has led to a widespread prevalence of preventable communicable diseases, which can be deadly if contracted and not properly treated. Access to health care is limited due to geographic and economic factors. Accordingly the prevalence of specific communicable diseases, particularly those such as HIV/AIDS and malaria, which can be prevented through behavioral interventions but require intensive preventative measures and relatively expensive treatment, is indicative not only of the general health of the population but also the penetration rate of prevention campaigns and appropriate interventions, and access to these preventative and treatment options. For MDG 6, the target is to observe a reverse in the trend of cases for malaria, HIV/AIDS and other major diseases. Specifically with regard to HIV/AIDS, the indicator is to ensure universal access to treatment for HIV/AIDS for all those who need it.

PREVALENCE OF HIV

Nationally, Haiti has the highest HIV prevalence of any nation in the western hemisphere, estimated at 2.3% and 2% for women (15-49yrs) and men (15-59ys), respectively (Cayemittes et al 2007); more than 120,000 persons are estimated to be living with HIV/AIDS (UNAIDS 2009). Data on the prevalence of HIV is not available at the level of Port-à-Piment, due to the low frequentation rate of the hospital and the confidential nature of medical histories. However, it is known that in the South Department, positive blood tests for women are relatively elevated at 2.9% whereas for men they are lower at 1.5% (Cayemittes et al 2007). Additionally, age and sexual activity are correlating factors to positive testing (known as seropositivity), as is having had a first sexual relationship at younger than 16 years was correlated with a higher risk of seropositivity (3.3%), compared to 3.1% for 16-17 at first contact and 2.6% for older than 20 years. The same increase in seropositivity is seen when the number of partners over the past 12 months is also increased. In 2006-2007, HIV sentinel surveillance—clinics and hospitals reporting incidence of HIV—monitored pregnant women at 17 sites and found a median prevalence of 4.4% (range 0.8-11.8%; urban 5.9%, rural 2.7%). (MSPP 2007)

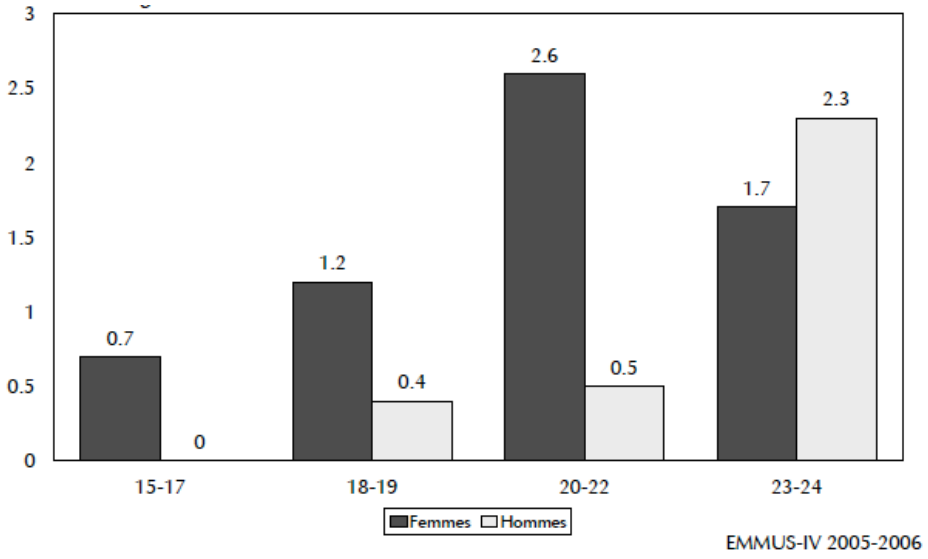


Figure 19. Prevalence of HIV (percentage) by age and gender.

PROPORTION OF WOMEN WITH COMPREHENSIVE, CORRECT KNOWLEDGE OF HIV/AIDS

Though actual rates of HIV/AIDS infection was not measured in the 2011-2012 household survey for the population of Port-à-Piment, the proportion of adult women with comprehensive correct knowledge of HIV/AIDS was measured. As HIV/AIDS is preventable with correct knowledge and proactive sexual behavior practice, this knowledge proportion is indicative of the vulnerability of the population due to ignorance on the disease and preventative actions. The baseline survey in Port-à-Piment indicates that only 8% of female respondents between 15 and 24 years old had a correct comprehensive knowledge of HIV/AIDS. However, when the age pool was increased to include women between the ages of 15-49, approximately 31% of women were attributed as having a comprehensive correct knowledge of the disease and transmission methods. This indicates that the older population surveyed, between 24-49 years, had a much higher rate of knowledge than the more vulnerable younger population of those between 15-24 years, which typically has a higher incidence rate of contracting the disease.

This presents a far different picture from the EMMUS-IV numbers from 2005, which stated that 100% of men and 99% of women nationally had knowledge of HIV/AIDS; 2005 numbers hold that 96% of men and 94% of women are aware of condoms as a prevention mechanism for HIV/AIDS, and 85% of women and 90.4% of men knew that someone appearing to be health could still be infected and transmit HIV. This discrepancy between national and departmental statistics and the reality on the ground in Port-à-Piment demonstrates that there exists a large gap in understanding, particularly among rural populations. This holds true especially in consideration of the age breakdown in the watershed and the comparative lack of knowledge among the most vulnerable section of women of childbearing age. HIV remains highly stigmatized in Haiti, though a reported four HIV-infected infants are born each day, among the 8,000 HIV- infected women who become pregnant each year.

Correct knowledge of HIV/AIDS can be corrected through several different methods. A simple way to educate women about prevention methods, particularly important in areas such as Port-à-Piment where access to contraceptives is low (per the indicator above), is to rely on cadres of health workers such as Community Health Workers (CHWs) or Community Volunteers, to educate women at their houses or at community gathering points on the disease. These CHWs or similar can carry simple cards or other illustrations to educate women on the disease, and how to care for themselves to both prevent and to seek treatment if infected. The stigma attached to HIV in many communities globally is a strong barrier to prevention and treatment, and only through education and outreach, and the provision of reliable services to address HIV and AIDS, can this barrier be reduced.

PROPORTION OF WOMEN WHO HAVE BEEN TESTED FOR HIV/AIDS

As determined through the 2011-2012 survey, 48% of women between 15-49 years old have ever been tested for HIV/AIDS in the Port-à-Piment watershed; and of these only 39% of women have ever received the test results. Of this cohort, 14% were screened in the past 12 months and only 11% of these women received all of the above. In the watershed, 0% of pregnant women were tested for HIV. The frequency of testing is important, as contraction of the disease can occur with each new exposure to a new partner.

The low numbers for women that are tested can be attributed largely to the availability of HIV testing. The public hospitals in Port Salut and Les Cayes offer HIV diagnostic and treatment services. There are no facilities that diagnose or treat HIV in Port-à-Piment, and patients are referred to the hospital in Port Salut (approximately 31 km away).

A critical intervention to address the low rates of women being tested for HIV/AIDS is first and foremost to establish Voluntary Counseling and Treatment (VCT) centers at the health facilities within the watershed. Rapid tests are available that can confirm the presence of HIV in the blood while the patient waits, which would address the indicator above that many women are not receiving the results of their tests. Women need to have access to safe, confidential, and free testing and counseling services.

PROPORTION OF CHILDREN WHO SLEPT UNDER A TREATED BED NET LAST NIGHT

Plasmodium falciparum malaria is endemic in Haiti. Generally, transmission is understood to be low, though higher transmission rates are experienced in certain communes and typical during the two rainy seasons, March - May and October – November. The primary malaria vector in Haiti is the mosquito *Anopheles albimanus*. Though its behavior patterns may vary geographically, this vector tends to bite and rest outside (exophilic and exophagic), and is more active early in the evening. The vector also bites animals as well as humans. Thus, it is not a highly efficient vector, but can proliferate in great abundance. The transmission season is

limited to rural lowland areas with the highest transmission rates evident during the nation's two rainy seasons, March to May and October to November (PAHO 2007). *A. albimanus* is resistant to DDT in Haiti. These features may limit the effectiveness of vector control tools such as indoor residual spraying or insecticide-treated nets. However, such measures have been effective in situations where Anopheline vectors of malaria exhibited similar behavior (CDC 2010).

PROPORTION OF HOUSEHOLDS WITH AT LEAST ONE INSECTICIDE TREATED NET

Across the Port-à-Piment watershed, only 2.33% of households possess at least one insecticide-treated net, which is less than half of the percentage of households across the country. This small proportion can be explained by the low malaria prevalence rate, which nationally is approximately 4.9%, and the use of smoke, insecticides, and special protection applied to the doors and specially the windows, which are common vector prevention methods employed in Haiti.

Ideally, households should receive at least one bednet per sleeping site distributed free of charge. This can be done through mass distribution campaigns, for example in Haiti at rally points, health facilities or other common community meeting places. In a site such as the Port-à-Piment watershed, where malaria transmission and incidence is so and estimated to be below the national average, bednet distribution campaigns should particularly focus on covering sleeping sites of children under five in order to decrease cases among this vulnerable age group.

	Homes with one mosquito net	**Homes with more than one net**
National avg.	6.4	1.6
South Department	2.1	0.2
Richest quintile	16.0	4.8
Poorest quintile	0.4	0.0

Table 13 Malaria prevention in homes (%). Source: Cayemittes et al 2007

PROPORTION OF CHILDREN UNDER 5 WHO SLEPT UNDER A BEDNET LAST NIGHT

With respect to MDG target 6.7, in 2011 only 1% of children under five are sleeping under insecticide-treated bednets in the Port-à-Piment watershed. However, approximately 5% of children under 5 years old slept under any type of bednet the night before the survey took place. The efficacy of untreated bed nets is extremely low in preventing malaria transmission, and thus in line with WHO standards bed nets impregnated with pyretheroid-based insecticide are the recommended bed nets, particularly for children under five. However, in a country such

as Haiti where the vectors are exophilic and exophagic (outdoor resting and outdoor biting), the efficacy of bed nets is limited in preventing malaria transmission.

PROPER DIAGNOSIS AND TREATMENT OF MALARIA

The 2011-2012 survey also measured the proportion of children under 5 with a fever who were treated with appropriate anti-malarial drugs and proportion of children under five years old reporting fever who received treatment for malaria within four days. For vulnerable populations like children, this is critical to measure not only as an indicator of healthy practices, but also the effectiveness of reaching vulnerable populations at the symptoms of infectious disease. For children under 5 that reported symptoms of fever within the watershed, only 4% were treated with appropriate anti-malarial drugs in 2011. Within the watershed, 33% of children were treated for malaria after reporting fever within two days, while another 33% of children were treated between two to four days.

The hospital in Port-à-Piment has the ability to diagnose and treat malaria. The hospital only utilizes microscopy for diagnosis, rather than the faster and more accurate method of Rapid Diagnostic Tests (RDTs), and there is therefore no capacity for diagnosis at the household or rally post level. Introducing RDTs, which are inexpensive, and can be carried by a CHW and used at health facilities, would greatly improve the incidence and accuracy of malaria diagnosis throughout the South Department.

First-line treatment for uncomplicated malaria in Haiti is chloroquine. No evidence exists of clinical failure of chloroquine (CQ) treatment in persons with *P. falciparum* infection acquired in Hispaniola. However, given vector resistance to CQ throughout most of sub-Saharan Africa and East Asia, it is critical to note that the WHO recommends that only febrile children that test positive for malaria be treated with CQ, while those that test negative be treated for fever and not malaria. Thus this must be addressed with health workers as to which patients they are treating for malaria, and ensuring that only those that test positive for malaria are being treated for the disease. This can only be done effectively with the introduction of RDTs as the first line diagnostic method throughout the South Department and Haiti, given that diagnosis can therefore be performed at the household level immediately, rather than with the long delays of microscopy as a diagnostic method.

13. MDG SEVEN: ENSURE ENVIRONMENTAL SUSTAINABILITY | AGRICULTURE

RATIONALE

Many countries in Latin America and the Caribbean benefitted from an agricultural Green Revolution that started in the 1960s (Hazell and Wood, 2008). Food production doubled or even tripled in many countries in 30 years; associated with this increased food production, the number of rural poor and the proportion the population that was undernourished were reduced dramatically.

These benefits, which have long been seen as the initial key steps to economic transformation, were not realized in Haiti. Haiti's staple food production has not recorded any increases in yield rates since the 1960's, and is reported at more than 50% lower than that of the neighboring Dominican Republic, despite similarities in climate, topography, and geology.

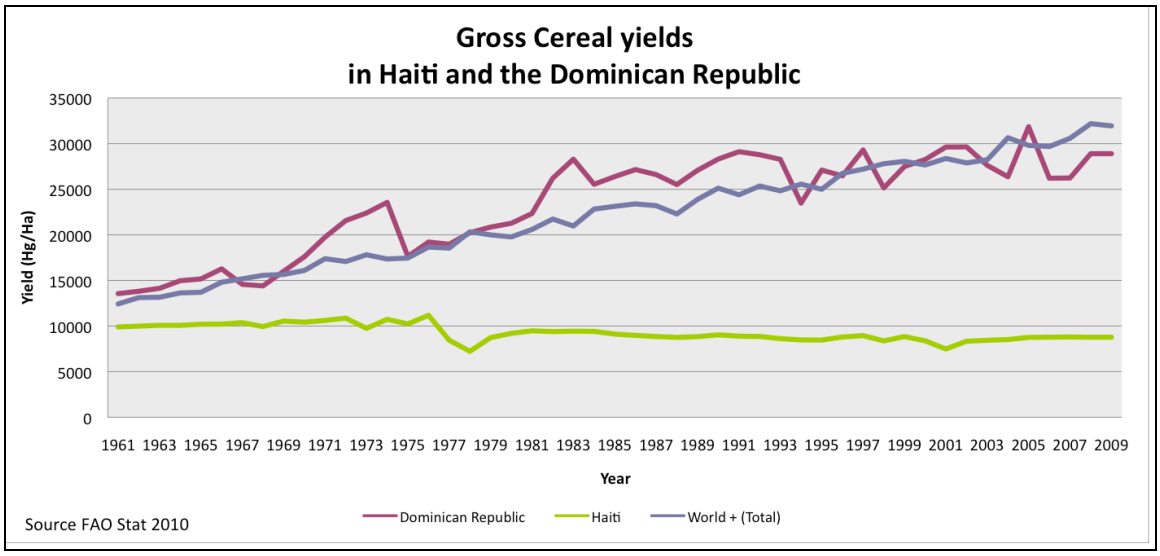


Figure 20 Gross Cereal Yields in Haiti and the Dominican Republic. Source FAO Stat 2010

As part of the post-earthquake recovery plans the Ministry for Agriculture, Natural Resources and Rural Development (2010) stated that "the agricultural sector will play a major role not only for food security of the population, but also for the economic recovery and the social stability of Haiti." To deliver on the role of agriculture as the engine that drives development and economic growth, it is necessary to understand the current environmental, economic and social situation surrounding agriculture and the constraints that need to be overcome to begin increasing agricultural production. Baseline information from the 2011 survey on household agricultural production practices in the Port-à-Piment watershed, paired with recent studies on the

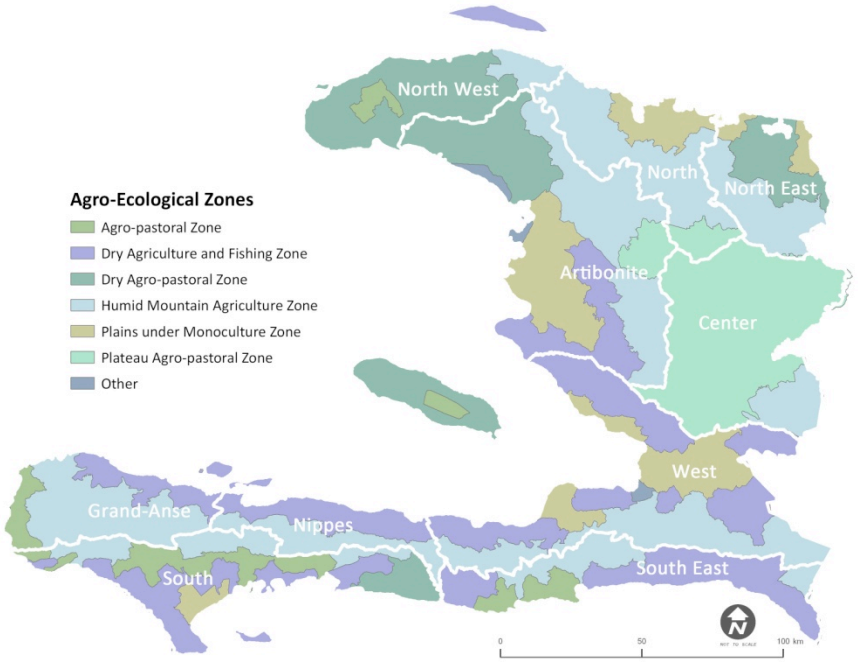
geophysical characteristics of the watershed, provide first steps for planning a similar agricultural green revolution in the region.

Though the majority of agricultural production in Port-à-Piment occurs at the small landholder scale, the effect of increased yields and production can still spur local and regional economic, environmental and social benefits. There is significant evidence that shows the continuing importance that agriculture contributes, both directly and indirectly, towards achieving the MDGs.

The MDG's identify several key targets for this sector and for agriculture. This section details the agro-forestry and land use, land cover analysis for Port-à-Piment watershed as a core component of the challenges to obtain environmental sustainability. Within MDG 7, a key target to integrate the principles of sustainable development into country policies and programs to reverse the loss of environmental resources, with specific target to decrease the rate of deforestation and to respond to climate change. The second important MDG target is to reduce biodiversity loss which is critical for the Pic Macaya and upper watershed areas. The pressures from livelihoods and poverty remedied through agricultural production and energy generation as detailed below, are driving rapid environmental degradation. Thus this section serves as a baseline for the watershed and provides information on production practices.

13.1. AGRO-ECOLOGICAL ZONES AND PRIMARY CROPS

USAID has identified three main agro-ecological zones in the watershed: 1) humid mountain agricultural zone; 2) agro-pastoral zone and 3) dry-agriculture and fishing zone (FEWS-NET 2007). Both agro-pastoral and dry-agriculture and fishing zones share the largest proportion of land area in the watershed (42% and 40%, respectively). The humid mountain agricultural zone only covers 18% of the total area.



Map 18. Agroecological zones in Haiti. Data source used: USAID, 2008.

The agro-ecological zones define both the type of main crops harvested as well as the corresponding cropping seasons. Within the watershed it is possible to find areas with enough humidity and altitude to plant high value crops such as cocoa and coffee. Likewise, semi-humid areas allow livestock raising and planting of staple subsistence crops, such as pigeon peas and maize, as well as high-value fruit trees. Drier areas also allow for the planting of staple crops, though to a lesser extent than semi-humid areas, as well as for trade and charcoal production. The figure below shows the main crops harvested by agro-ecological zone, and the main planting seasons in the Port-à-Piment watershed[10].

[10] According to anecdotal evidence collected during field trips: March/April and August, 2010.

Sud - CALENDRIER DES CULTURES					
Zone agro-écologique	Culture	1ère Saison		2ème Saison	
		Semis	Recolte	Semis	Recolte
Montagne humide et très humide	Haricot	Fevrier	Mai	Juillet	Septembre
	Igname	Janvier	Octobre		
	Maïs	Janvier	Mai		
Plaine humide	Haricot	Février	Mai	Août	Novembre
	Maïs	Mars	Juillet	Août	Décembre
	Pois congo	Avril	Décembre		
	Riz	Avril	Août		
	Sorgho	Mai-Août	Décembre- Janvier	Aout- Septembre	Décembre-Janvier
Plaine irriguée	Haricot	Novembre-Décembre	Janvier-Février	Janvier-Février	Mai-Juin
	Maïs	Février-Mars	Avril	Aout	Décembre
	Riz	Février	Juin	Aout	Décembre
	Sorgho	Aout	Novembre-Décembre		
Plaine sèche et semi-aride	Arachide	Février	Décembre		
	Maïs	mars-Avril	Juillet-Aout		
	Pois inconnu	Avril	Juin		
	Sorgho	Avril-juillet	Janvier	Juillet	Décembre-Janvier

Source: Coordination Nationale de la Sécurité Alimentaire (CNSA)

Figure 21. Seasonal calendar in the South department. Data source: CNSA.

Crop	Type	Agro-pastoral Zone		Dry Agriculture		Humid Mountain Agriculture Zone		Total Percent	Total Area (ha)
		Plot Count	Percent	Plot Count	Percent	Plot Count	Percent		
pigeon pea	annual	15	9%	14	9%	8	5%	23%	2313
cassavah	annual	12	8%	8	5%	3	2%	14%	1438
maize	annual	7	4%	11	7%	3	2%	13%	1313
black peas	annual	4	3%	7	4%	3	2%	9%	875
potatoes	annual	2	1%	2	1%	1	1%	3%	313
vetiver	annual	2	1%	0	0%	2	1%	3%	250
sorgum	annual	0	0%	1	1%	0	0%	1%	63
squash	annual	1	1%	0	0%	0	0%	1%	63
mango	perennial	23	14%	16	10%	11	7%	31%	3125
banana	perennial	16	10%	16	10%	10	6%	26%	2625
coffee	perennial	13	8%	4	3%	13	8%	19%	1875
guayavah	perennial	5	3%	8	5%	6	4%	12%	1188
avocado	perennial	7	4%	7	4%	3	2%	11%	1063
orange	perennial	9	6%	3	2%	2	1%	9%	875
breadfruit	perennial	5	3%	5	3%	0	0%	6%	625
palm	perennial	5	3%	0	0%	2	1%	4%	438
arbricot	perennial	5	3%	0	0%	1	1%	4%	375
coconut	perennial	4	3%	1	1%	1	1%	4%	375
jatropha	perennial	3	2%	1	1%	0	0%	3%	250
apple	perennial	1	1%	1	1%	0	0%	1%	125
cacao	perennial	1	1%	1	1%	0	0%	1%	125
cane	perennial	0	0%	0	0%	1	1%	1%	63
papaya	perennial	1	1%	0	0%	0	0%	1%	63

Table 14 Estimated crop coverage based on sample from LDSF, 2010.

The numbers the figure above show estimated production levels of specific crops listed by farmers as being grown within the Port-à-Piment watershed, by agro-ecological zone. Future planning models can use matrix estimates to look at how variation in production level can change overall nutrition, income and land use patterns in the watershed.

13.2. LAND USED FOR FARMING

Almost 76% of the watershed land area is under some form of agricultural production, including annual food cropping, agroforestry, and pasture. Roughly half of the watershed is being used for some form of forest or agro-forestry. Only 4% of the surface area of the watershed is dense forest.

These figures will be used to measure change over the following 5 years. With large reforestation programs and hillside conservation programs, one would expect an increase in forested areas and agro-forestry. The key indicators will be to increase agro-forestry, agro-forestry shrub or open woodland, wood lots or forest on the areas with slopes greater than 15%.

The Land Degradation Surveillance Framework (LDSF) study (full report available separately) in the watershed suggested that flat lowlands have the highest agricultural productivity (Smukler et al., 2012). However, given the pressure on land in the socio-economic context of watershed, and based on the FAO land evaluation framework, the study recommended that different cropping systems be established in level (0-16 %) moderate (16-30 %) and steep slopes (> 30 %). Parcels with level slopes would be ideal for intensive annual, mixed or mechanized cropping, requiring no, or few conservation measures. The researchers recommended and identified the zones where agroforestry, including annual crops (maize, beans) may be intercropped with semi-permanent (e.g., *Cajanus cajan*), or permanent crops (e.g., fruit trees) is the preferred activity due to moderate slopes. Nonetheless, intensive conservation techniques (e.g., vegetative barriers, mulching, narrow ridges and furrow, rock wall contours) would be required to prevent soil erosion. If the slope exceeds 40%, the risk of soil erosion is very high and it is recommended that these sites be ungrazed and planted with perennial forest species to allow vegetation to regenerate naturally. This report produced maps (please see report by Smuker et al) that should be integrated into community mapping and zoning to support.

13.3. PRIMARY CROPS

The top five crops grown, in the order of the number of households reporting harvesting it in the past year are maize, pigeon pea, black beans, yam and manioc. This reflects the frequency of household cultivation, not the quantity or the value.

MDG Indicator		**Watershed**			
			CHA	**PIM**	**COT**
Top ten crops harvested from November 2010 to October 2011 (1= Crop mentioned by most households; 10= crop mentioned in 10th place by households)	Pigeon pea	2	2	1	1
	Maize	1	1	2	2
	Sorghum	7	6	6	4
	Plantain	6	7	7	7
	Black bean	3	3	3	8
	Yam	4	5	5	6
	Manioc	5	4	4	5
	Potato	8	9	8	9
	Peanut	9	8	9	3
	Lima bean	NA	10	NA	10
	Malanga	10	NA	10	NA
	Rice	NA	NA	NA	NA
	Breadfruit	NA	NA	NA	NA
	Coconut	NA	NA	NA	NA

Table 15 Ranking of the top ten crops grown in the three communes comprising the Port-à-Piment Watershed in the past 12 months.

Despite this predominance of food crop agriculture, food insecurity is extremely high in southern Haiti, with over 90% of households reporting at least one month when they did not have sufficient food. In fact, food was deficient on average for eight to nine months over the course of a year; another indicator of low crop productivity.

ORE and CRS have had success in the South Department with hot peppers and passion fruit for export. There is also extensive work in Port-à-Piment with local markets, including mango and coffee. Within the town of Port-à-Piment, two warehouses and three small coffee mills are currently in operation.

In five years a repeat of this exercise would potentially see the number of high-value crop production should increase with market and business development in this area.

13.4. Crop and Soil Management

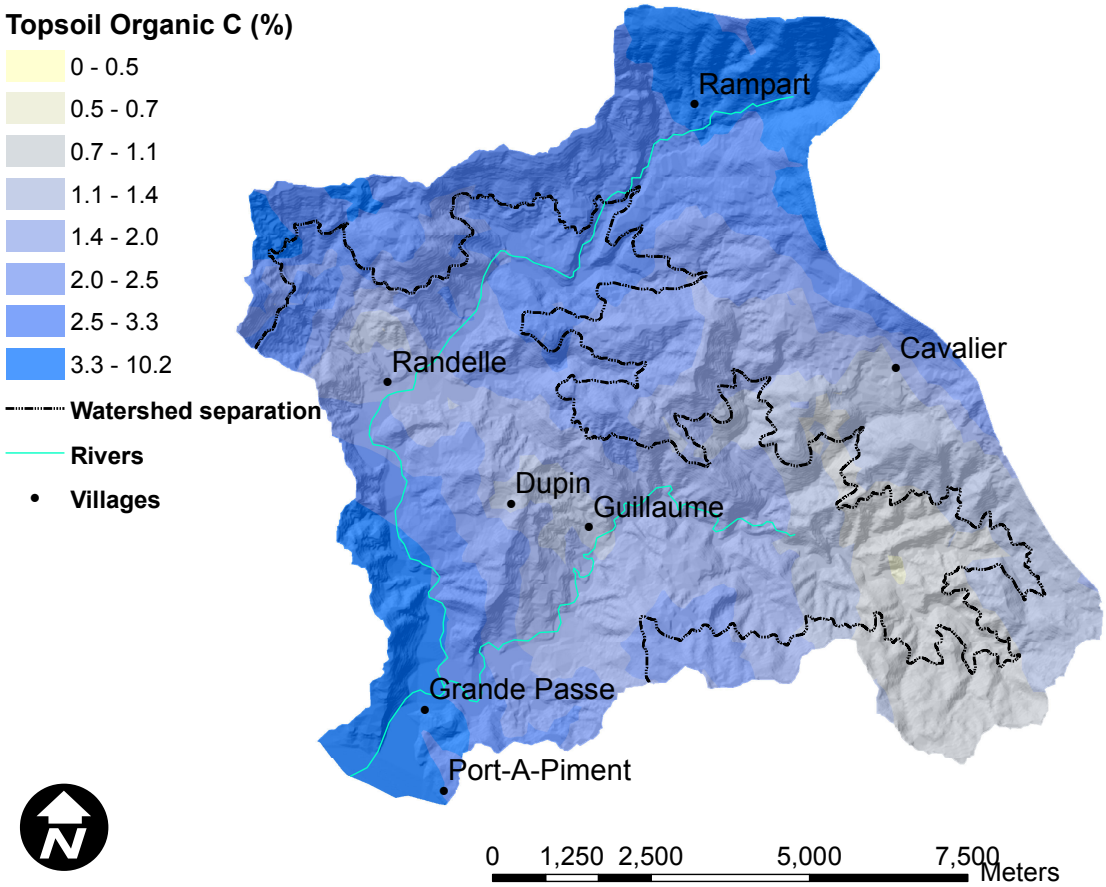
Soil Quality

The Land Degradation Surveillance Framework (LDSF) analysis of soil texture indicates the majority of the watershed is a clay loam with some areas in the lower watershed on moderate slopes having higher clay content. Predictions of soil depth suggest that there are only restrictions for plant roots in select locations, mainly on steep slopes. pH is generally within a range that will not limit most plant productivity, though soils at higher elevations have lower pH and may require trees and crops adapted for more acidic conditions such as coffee. Soils have fairly high concentrations of the basic cations (Ca, Mg) required for plant lige, and they are not likely limiting to crop production in most instances. The majority of the soils in the watershed are likely deficient in phosphorus, potassium and zinc. Salinium and magnesium are likely to be limiting for plant productivity in some parts of the watershed.

Indicators of topsoil erosion and depletion of carbon and nitrogen are low, therefore there is high potential to improve soil fertility through increase in organic matter in cropland soil. Analysis did not reveal any issues in regards to soil salinity or sodicity. Water infiltration was correlated positively with increased tree cover so increased tree cover would result in more water entering the soil and less water runoff eroding the hillsides.

Topsoil

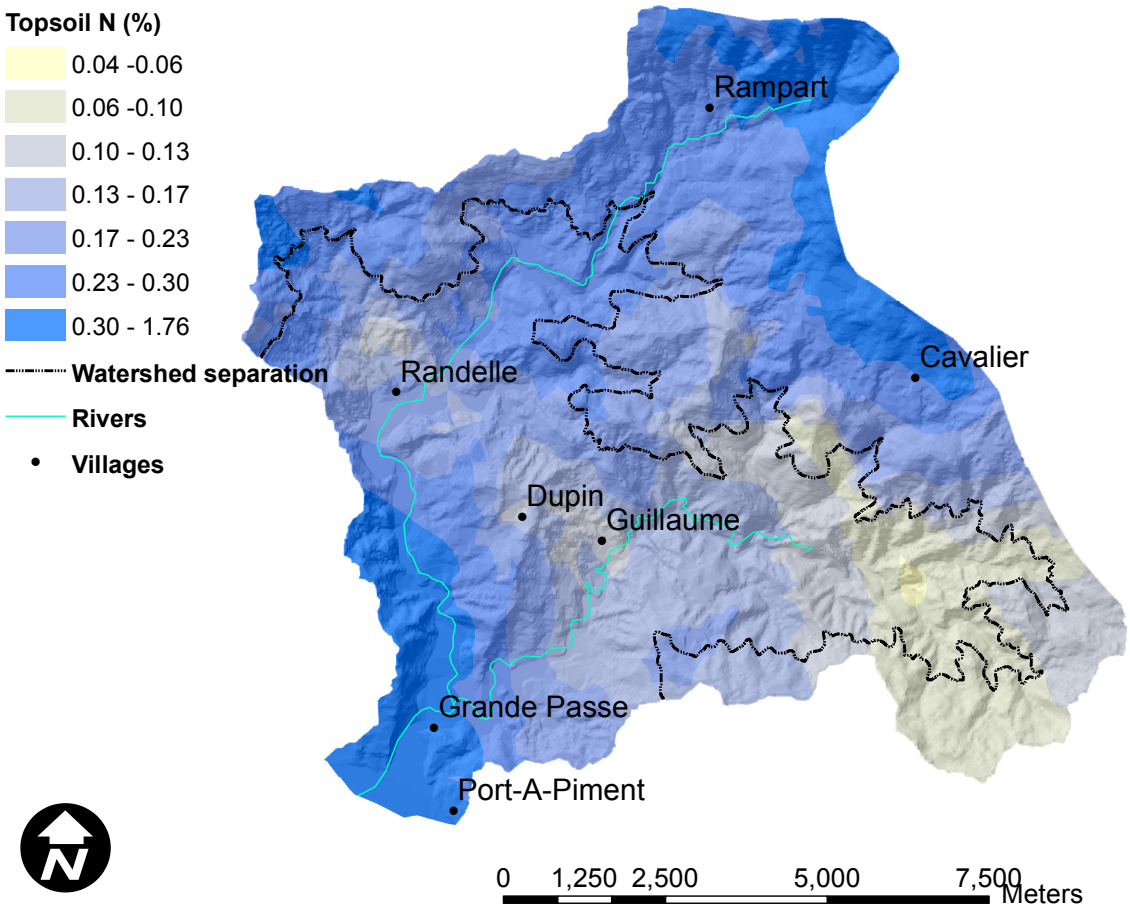
The highest concentration of soil organic carbon (SOC) was found in the forests at the top of the watershed and the lowest in the southeast. SOC is a key indicator of soil health, derived from organic materials from plant detritus, roots, leaves and stems, and the bodies of soil organisms. There was a wide range of values for SOC across the watershed, and there were significant differences in SOC concentrations in the topsoil depending on the land use or land cover ($p < 0.001$), elevation ($p < 0.05$) and slope ($p < 0.05$) in the lower watershed.



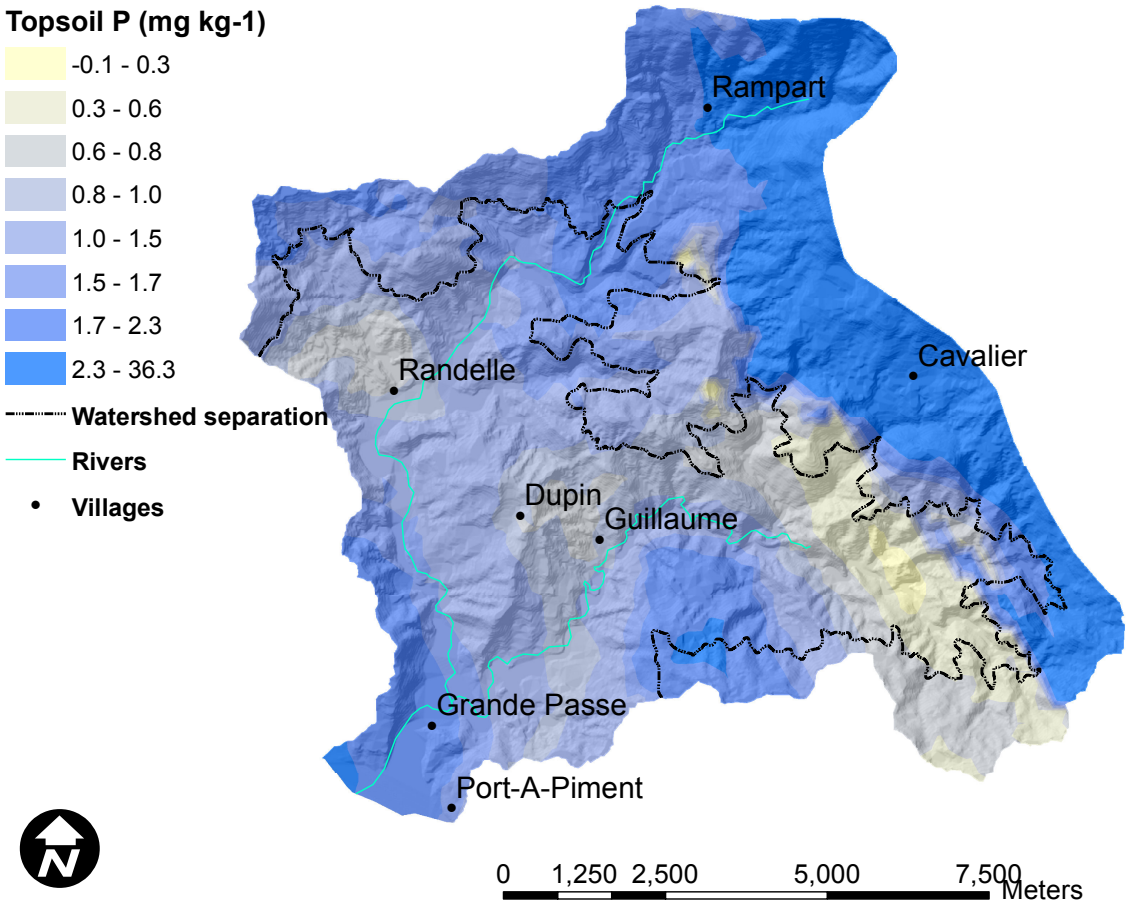
Map 19 Estimated map of Organic Carbon (OC) concentrated in topsoil for Port-à-Piment Watershed

13.5. SOIL COMPOSITION

Total nitrogen is a key indicator for soil health. Although nitrogen is critical for plant productivity it is only available to plants in its mineral forms, either ammonium or nitrate. The distribution of total nitrogen in the watershed is similar to that of organic carbon. Total N must be replenished to balance exports from harvest, erosion, leaching and gaseous emissions. Several studies have demonstrated that the increase in the amount of organic material being incorporated in to the soil by adoption of agroforestry, soil fertility management (ISFM), and soil conservation practices results in significant increase in soil nitrogen pool and crop yields (Yong, 1990).

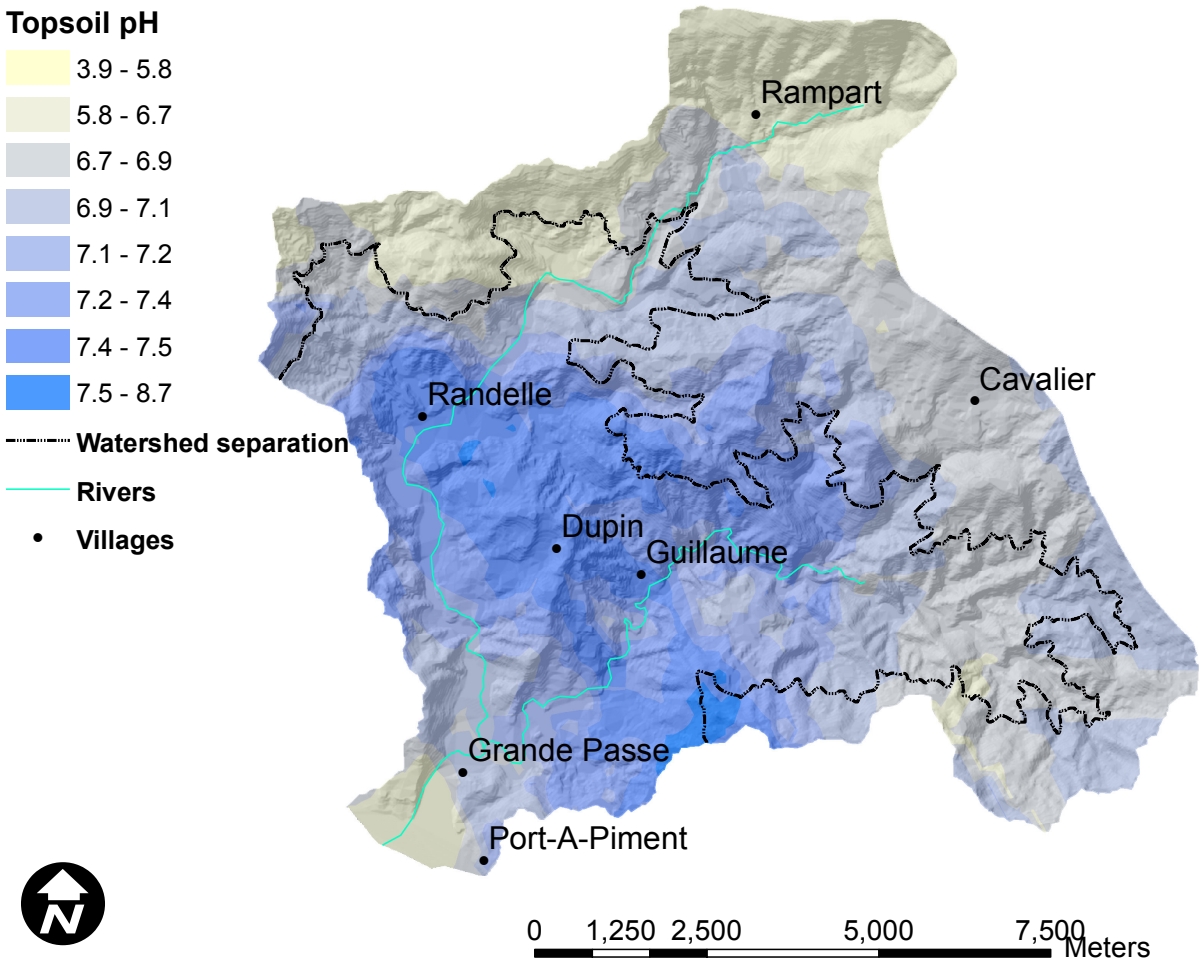


Map 20 Prediction map of nitrate concentration within the topsoil layers within the watershed.



Map 21 Prediction map on phosphorous concentrations within Port-à-Piment's top soil layer.

Phosphorous is an essential component of most biochemical processes. It enhances photosynthesis, nitrogen fixation, flowering, fruiting and maturation. Soils with < 30 mg kg-1 of M-3e phosphorus may limit crop productivity; nearly the entire watershed is predicted to be deficient in phosphorus.



Map 22 Prediction maps on pH concentrations within Port-à-Piments top soil layer.

Crop growth may be limited in soils < 5.5 or > 8.3 units, found at the top of the watershed and in the southeastern region. pH is not generally a constraint to crop production over most of the study area, though aluminum toxicity may be a problem in areas of low pH (<5.5). Soils at higher elevations may require trees and crops adapted to more acidic conditions such as coffee.

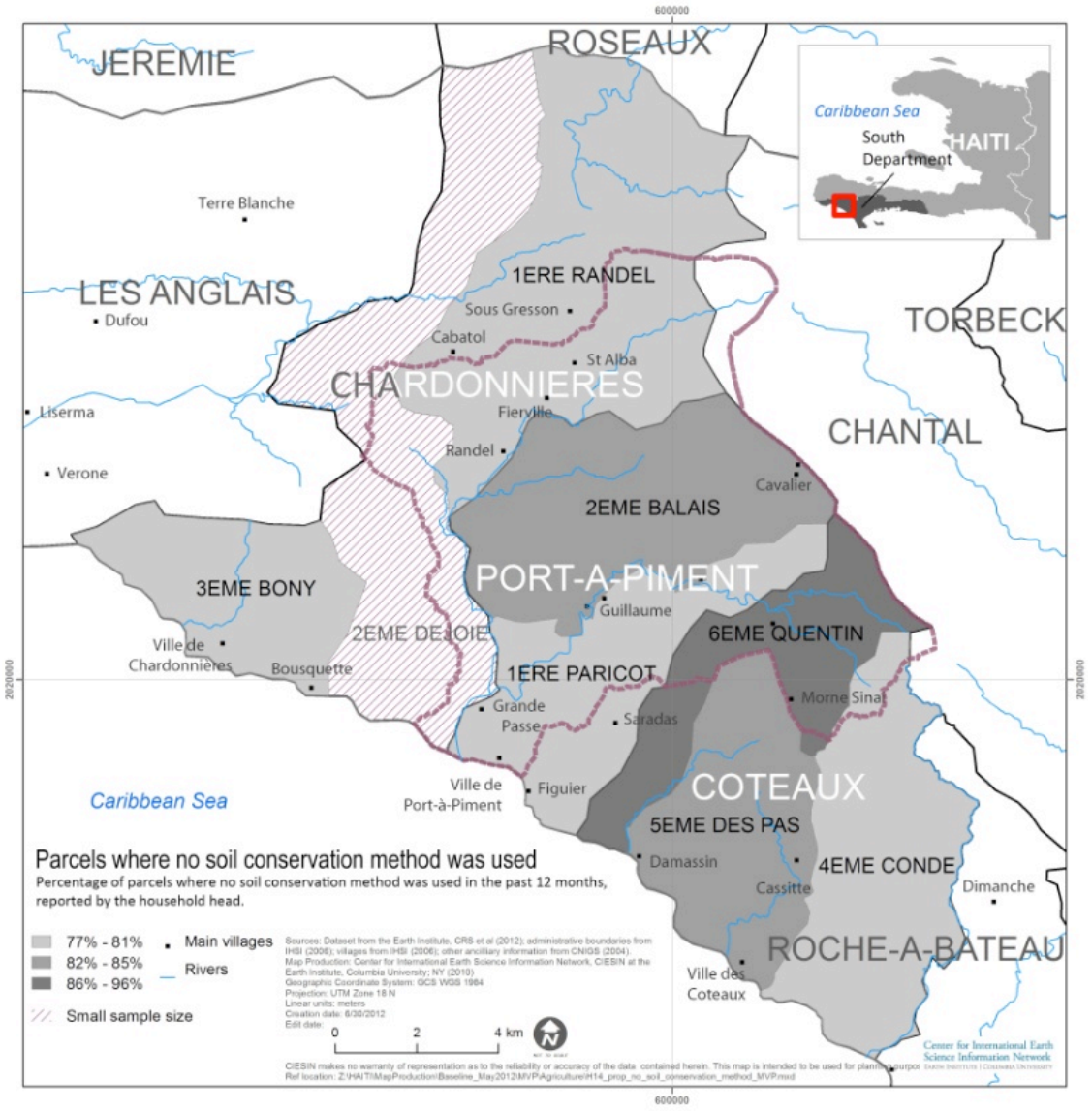
13.6. CROP YIELDS

The biggest constraint to crop production are the steep slopes and terrain of the area. As much as 75% of the watershed is covered by moderate (16-30%) to steep (>30%) slopes (50% is classified as steep slopes). Almost half (45%) of the steep slopes are covered by annual cropping – areas that are generally considered inappropriate without extensive soil conservation practices. Baseline information also indicate that half of the land that farmers crop is on sloping land, compared to about 30% on the tops of hills, and about 20% on the bottom lands.

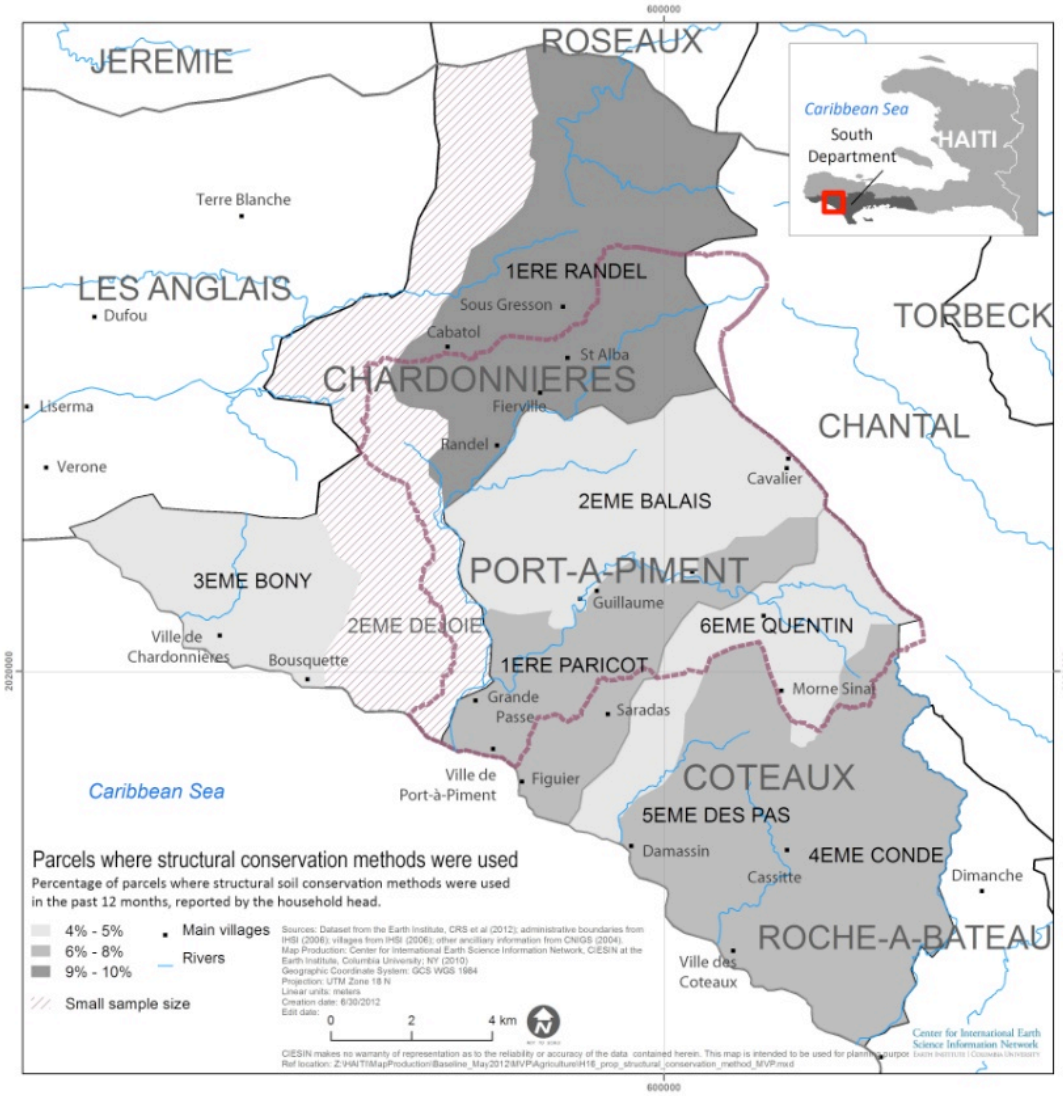
		Watershed	communes		
			CHA	PIM	COT
Proportion of parcels located at…	Flat land on top of a hill	31%	40%	27%	28%
	Side of a hill	50%	42%	51%	53%
	Flat land on the bottom of a hill	19%	18%	22%	19%

Table 16 Percentage of household parcels by place of location.

In spite of farming on sloping lands, less than 20% of the crop parcels were reported to have any soil conservation structures (vegetative barriers or structures to impede erosion).



Map 23 Parcels where no soil conservation methods were used in the past 12 months.



Map 24 Parcels where structural conservation methods were used in the past 12 months.

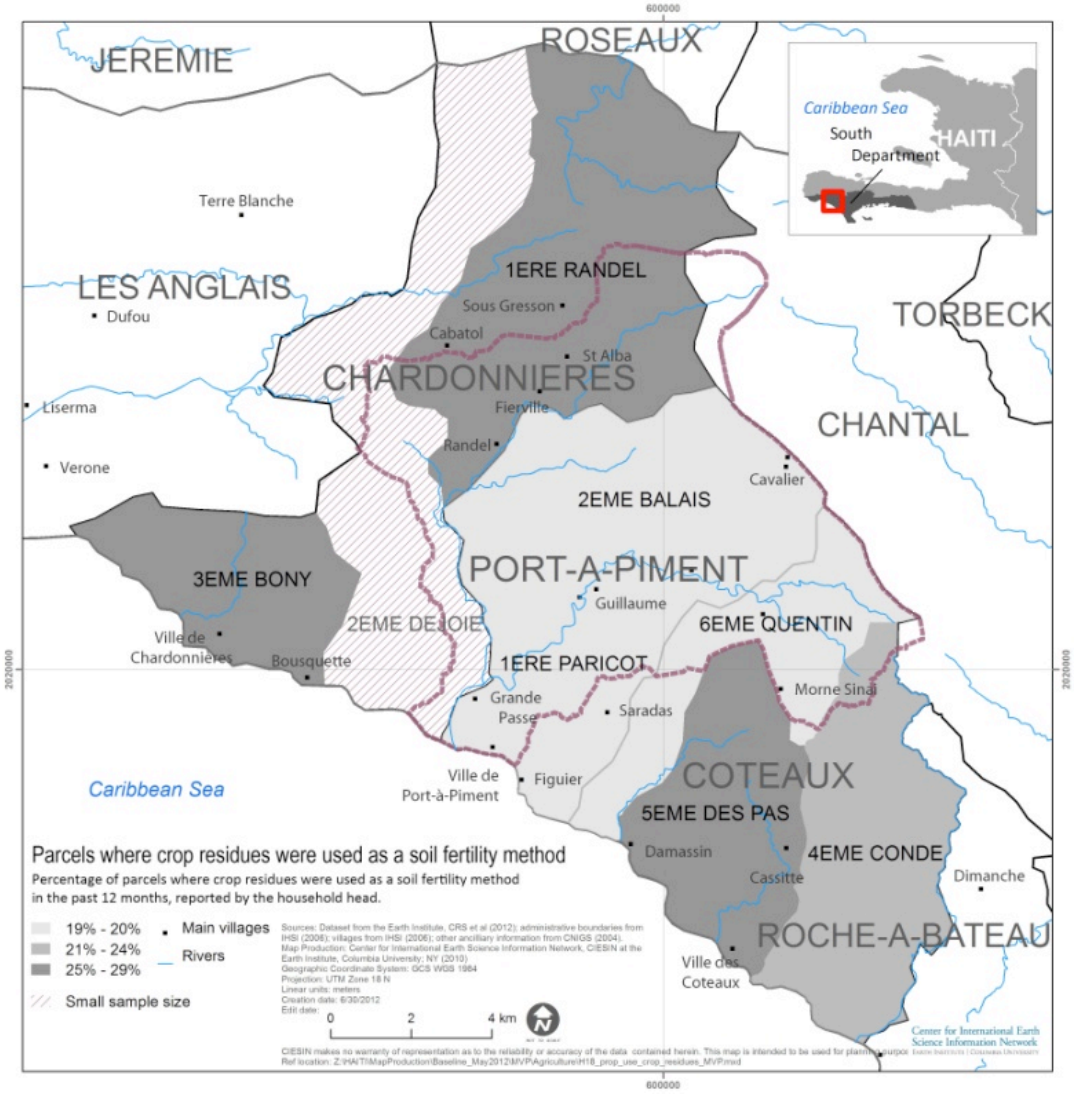
Indicator		Watershed	communes		
			CHA	PIM	COT
Proportion of parcels where the following soil conservation methods have been employed in the past 12 months	No method	82%	75%	81%	87%
	Vegetative	12%	17%	14%	8%
	Structural	7%	10%	6%	6%
Proportion of parcels where the following soil fertility methods have been used in the past 12 months	No method	69%	64%	69%	68%
	Crop residues	23%	27%	20%	24%
	Animal manure	10%	8%	10%	11%
	Fertilizer	1%	0%	1%	0%
	Natural fallow	8%	10%	10%	7%
	Improved fallow	0%	0%	0%	0%
	Legume cover crop	1%	2%	1%	1%
	Biomass transfer	0%	0%	0%	1%
	Compost	0%	0%	0%	2%
Proportion of parcels where any type of irrigation system, excluding rains, has been used in the past 12 months		3%	0%	4%	2%

Table 17 Soil and crop management practices in the Port-à-Piment watershed over the past year.

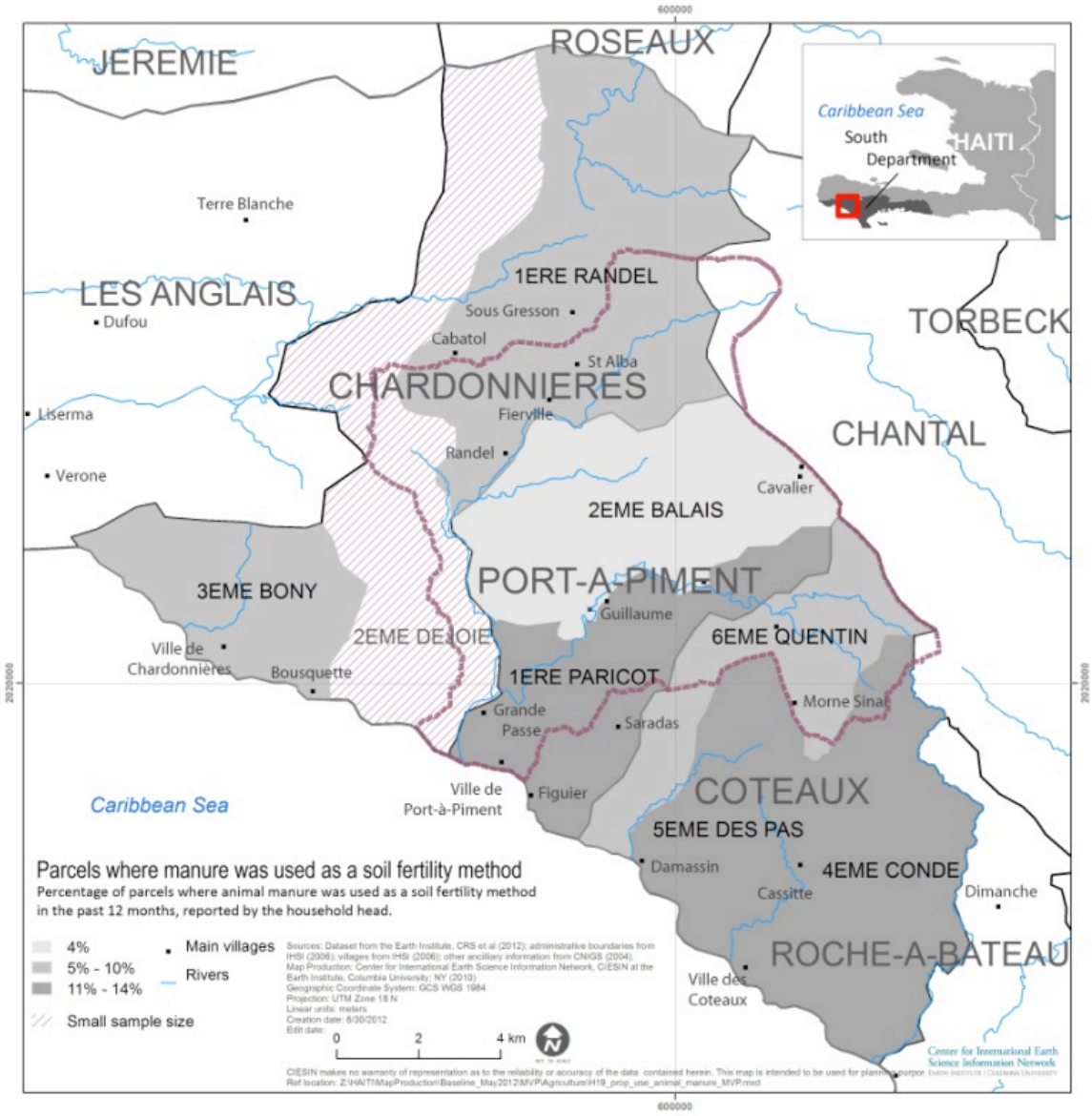
The impact of this lack of appropriate soil conservation structures has led to 34% of the cropland showing visible signs of gully erosion (Smukler et al., 2012). It is interesting to note that virtually none of the households that were interviewed reported soil erosion to be an environmental problem.

In addition to little soil erosion control management, less than half of the farmers are managing soil fertility (See figure above). The most common form of soil fertility management is the use of crop residues but with low yields the amounts of residues applied would be small and insufficient for maintaining soil fertility. As with soil erosion, farmers did not recognize soil fertility as a problem. A study was conducted in Port-à-Piment comparing bean yields among different varieties, fertilizer applications and plant densities (Smukler et al., 2011). The results

from that study clearly indicate 75 to 100% increases in yields with the addition of fertilizers compared to a baseline of 0.25 t ha-1 with the local variety and no fertilizer (farmer practice).



Map 25 Parcels where crop residues were used as a soil fertility method.



Map 26 Parcels where animal manure was used as a soil fertility method.

In order to increase yields, farmers will need to recognize the problems of soil erosion and soil fertility constraints. On the sloping lands, the use of trees and grasses as vegetative strips is highly recommended to control erosion, begin to stabilize the slopes, and build up soil organic matter. Farmers will definitely need to apply nitrogen-containing fertilizers – this can best be done as mineral fertilizer combined with organic inputs such as animal manures and leguminous cover crops and trees. Phosphorus and potassium are also likely needed to address soil fertility problems.

Trial plots in 2011 show the potential for significant yield increases with the proper combination of inputs: fertilizer, seed varieties, and planting techniques. Below are the results of been trials

throughout the watershed. The testing in multiple elevation zones reinforces potential varied agricultural strategies for the different production zones, influenced by variations in rainfall.

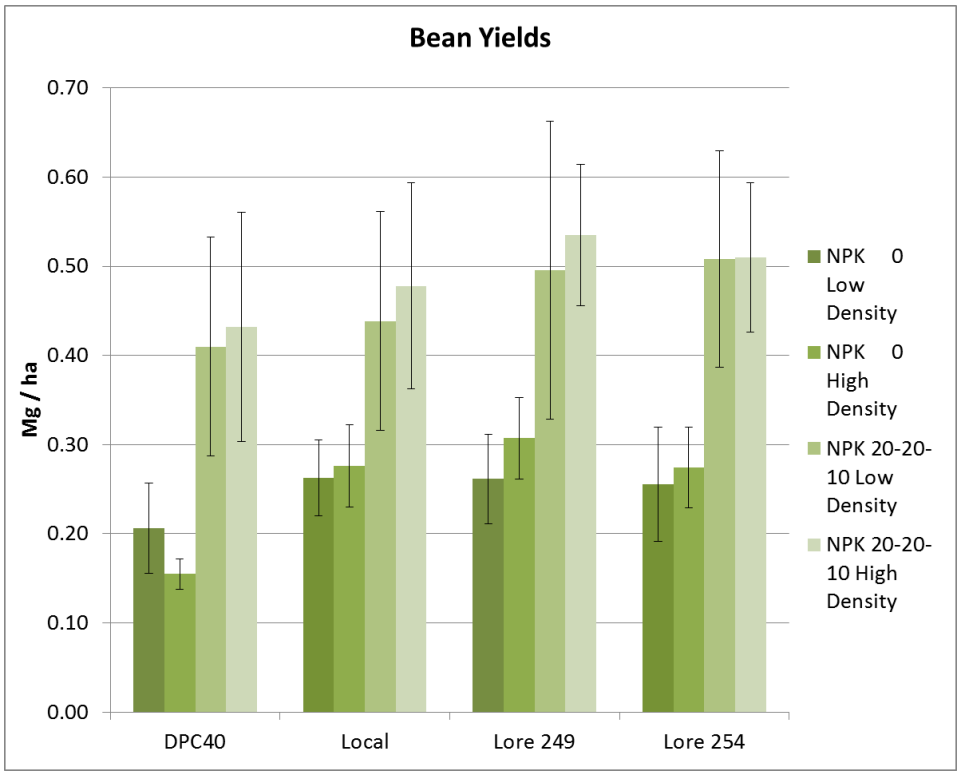
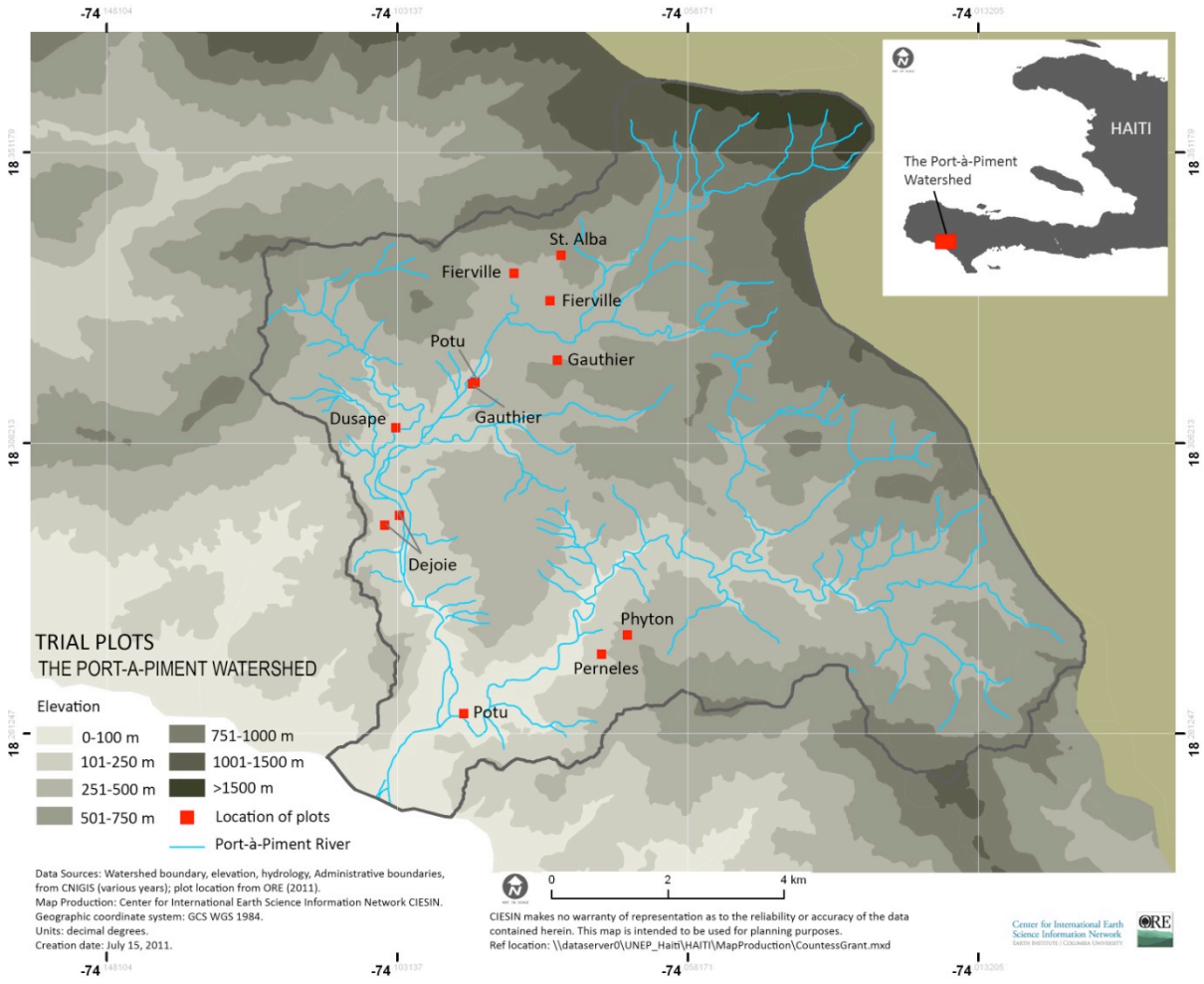


Figure 22. Bean yields from plot trials. The yield of four different bean varieties results of fertilizer and planting density on the bean yields showing the effectiveness of fertilizer on bean yield. Four bean varieties including three introduced (DPC40, Lore 249 and Lore 254) improved varieties and one local are compared at two planting densities, either with or without NPK fertilizer.



Map 27 Bean trial plots conducted showing variation in agro-ecological and elevation zones

13.7. LAND TENURE AND LAND HOLDINGS

ACCESS TO LAND AND LAND TENURE

Land tenure and land scarcity are both relevant issues in Haiti. Unsecure land tenure can influence decision making regarding management, in particular for investments with long term pay-offs, such as in tree-planting or soil organic matter. Nonetheless, there is an active land market throughout rural areas. Land ownership in Haiti is classified in three ways: (i) state public land, (ii) state private land or (iii) private land. State private land may be sold and rented by the government; rent is paid to the General Directorate of Taxation (DGI) or through a procurer. Ownership is formally noted through a legal land title (*Certificat d'Immatriculation Cadastrale*), although claims through oral or community history can also play a role. A survey by FANTA found that 37 percent of agricultural plots were acquired through purchase, 38 percent were acquired through inheritance, 10 percent were accessed through cash rents, 10 percent

accessed through sharecropping, and the remainder was freely accessed through informal arrangements (2003).

Interviews in a 2012 qualitative study of the land tenure system in and around the Port-à-Piment watershed revealed that while conflicts over land in southwestern Haiti are prevalent, particularly regarding issues of inheritance, this conflict is rarely violent. Consequently, any development strategies or interventions to increase agricultural productivity through improved land and natural resources management are likely to be further hindered by gaps identified in this report.

		Access to land in general	Agricultural use
Commune	**Obs (households)**	**Mean (Ha)**	**Mean (Ha)**
Chardonnières	124	1.7	1.27
Port-à-Piment	135	1.2	0.92
Coteaux	93	1.4	1.24

Figure 23. Average land size accessible to farmers (general and agricultural purposes).

The majority of Haitian farmers have landholdings of around 1.5 hectares (Bergeron and Deitchler 2003) which are often scattered throughout different areas of the watershed in several small plots (Versluis 2008). Farmers in the Port-à-Piment Watershed report on average access to about 1.4 hectare of land in general, and 1.15 Ha for agricultural purposes (See the figure above). Farmers have on average 1.40 parcels of 0.7 hectares. The parcels are located an average of 1.9 km from the house.

Therefore, the same individuals and families make decisions about upstream plots and downstream plots. This strategy can reduce household risk, as well as accommodate the requirements of different types of crops. Surveys in the neighboring watershed of Les Anglais found the average size of landholdings to be 1.4 hectares (McClain and Steibarger 1998). All farmers in Les Anglais had at least one plot that was over an hour's walk away, and 75% had a plot over 3 hours away (McClain and Steibarger 1998). The most fertile and coveted soils are in the alluvial soils in the lower part of the watershed (valleys and coastal plains), and are often used for banana plantations. These plots tend to be smaller than those in the upper watershed (FAO 2007).

Small farming parcels have two main implications. First, the limited availability of farmable land creates an incentive for farmers to cultivate as much land as they can in order to maximize

productivity. This return maximization strategy will also halt the farmer from using improved farming practices, such as rotation or diversification of crops that can reverse soil erosion and nutrient depletion. Second, small farming parcels limit the land-use planning potential on a larger scale. Since each individual farmer aims to extract as much as possible from their own small parcel, no attention is given to holistic planning at the community level (Mickerlange et al 2012). This perspective leads farmers to disregard any possibility of collective management of natural resources, which could be beneficial to the whole community.

Fragmentation and land tenure insecurity further complicate the way land is managed. Informal sharecropping or leasing contracts, in addition to being a source of conflict, may also cause insecurity over property rights that will influence farmers' land-use planning (Gurrier). In order to cope with the probability of losing access to land in the near future, sharecroppers and leasers often adopt short-term production strategies based on short-cycled crops and overexploitation of natural resources (mainly trees for the production of coal). Landowners, who have greater confidence in terms of future land ownership, often develop long-term production strategies based on higher-value products, such as tree fruits and longer-cycle crops (Gurrier). The informal contracts used to regulate the relationships between landowners and sharecroppers do not address the discrepancies between landowner and sharecropper interests, further compromising the way land and natural resources are managed.

However, there are a few community-based organizations (CBOs) working to minimize the effects of the above-mentioned problems. In the Port-à-Piment watershed, for example, *Fondation Macaya* works with farmers in Randel to increase agricultural yields while protecting the park's biodiversity (Vanel et al). Additionally, a local cooperative in Randel has developed a strategy to acquire land, with the support of the Catholic Church, to minimize conflicts and to plan the use of larger portions of land. In Les Anglais, a local women's association (OFDAN) provides technical training to farmers to improve rural productivity (Mario). Furthermore, in Tiburon, another women's association and a local NGO, Development Organization Movement of Tiburon (MOD-T), work to improve rural development and natural resource conservation (Mickerlange et al 2012). These institutions show how even small local land-use planning interventions can have significant positive impacts on the environmental and on the way land is collectively managed. Such CBOs are a valuable asset for the region and should be empowered through future rural planning and development initiatives.

13.8. FARMING SYSTEMS

Typically, one of these parcels is a *jaden lakou*, the land on which the family also has their house. This supplies the household with fruit, plantains, and coffee as well as medicinal plants, herbs and shade (Murray 1991; Baro 2002). The other plots, which are usually intercropped with major crops such as beans, corn, sorghum or onions, are often scattered throughout different zones of a watershed.

Within the rural setting, trading labor is common. Individuals, often landless themselves, hire themselves out on a work-for-hire labor system, performing both regular work for landowners or seasonal and sporadic farm labor. Irregular laborers, with inconsistent incomes, comprise much of the population seeking jobs. Laborers may also enter into contractual agreements with landowners or other employers, or may join a traditional labor organization, called *konbit*, *eskwad*, and *avan jou*. These traditional labor organizations are also comprised of landless individuals who hire themselves out through the organization, both in times of shortage and urgency, and for seasonal agricultural needs. The *konbit* is an organization of individuals that work in exchange for money or food. The *eskwad* is a collective form of work that provides rights and services, including labor and monetary support, to members. The *avan jou* most closely resembles a traditional labor union, where collective labor services are bought and sold together as a comprised unit. In the South Department, 1.6% of the economically active population participated in a free *konbit* within the last 12 months, while 8.1% participated in another form of traditional labor organization (Verner 2008).

13.9. HOUSEHOLD TREE PLANTING

Tree crops, both from native and exotic species are an important part of the Haitian agricultural system. While providing services such as fruit, fuel and shade for households, they play an important role in stabilizing soils, particularly on steep slopes. Tree planting is quite common in the watershed, with 40% of households reporting planting trees in the last 12 months. The most frequently planted species are listed in Table 1. In the watershed, the major fruit trees of Haiti – mango, avocado, and coconut—constitute the majority of household tree planting; although only two timber species and listed in the top fives (*Cedrela odorata* and *Simarouba glauca),* many other timber species were listed by households in smaller quantities. The average number of seedlings planted by type is listed in Table 2 for farmers planting that type; Timber and Pole trees and Fruit, nut and edible leaf trees are the most common primary uses. Seedling survival is good, with the majority of seedlings persisting on the landscape for twelve months (Table 3). While these numbers demonstrate the importance that trees already play in the agricultural system, the totals are still low at the household level, especially given the large numbers of trees that would need to be planted to protect exposed soils on steep land across the watershed (Smukler et al 2012).

Port-à-Piment	Kreyol	Subspecies	Uses
4	Fwenn or bwa blan	*Simarouba glauca*	Fast, straight growth and adaptability on shallow soils
5	kokoye	*Cocos nucifera*	Coconuts are planted as ornamentals, food and fiber , 5 varieties in Haiti
1	Mango	*Mangifera indica*	Most important tree in Haiti, lengthy fruiting season of the tree, important asset harvested for wood, charcoal, and lumber.
2	Sed or acajou	*Cedrela odorata*	*Cedrela odorata* is prized for its valuable aromatic wood. In Haiti, as elsewhere in the tropical America, the species is exploited heavily for domestic use or for sale in the urban market.
3	Zaboka	*Persea americana*	Avocado is a source of oil, nutrients, wood and shade in Haitian agroforestry systems

Figure 24. Tree descriptions. Data source used: Timyan 1996.

The tables below show the use planted trees that households report. Almost none of the families reported planting trees for fuel wood or firewood. The majority of families report agro-forestry and timbertrees as their main trees. If government and NGO programs in the region are to successfully increase reforestation programs, or a program specifically looking at sustainable charcoal production, change in five years would expect this number to increase. The bottom line number should increase regardless to have a large portion of households reporting planting trees.

	Port-à-Piment Watershed		
Primary use for planted trees	N	MEAN	STDEV
Timber and Pole trees	60	23	25
Medicinal trees	-	-	-
Nursery Tree seedlings	1	10	-
Palm trees	-	-	-
Fuelwood trees	1	7	-
Charcoal production trees	3	8	4
Fruit, Nut, and Edible Leaf Trees	59	13	20
Fodder Trees	-	-	-
Soil fertility and conservation trees	2	27	33
Hedge trees/bushes	-	-	-

Figure 25. Of farmers who planted each tree type, what is the total number of planted in the past 12 months?

This table below shows that households report a high survival rate of the trees they are planting. This should be triangulated with a randomized sampling of households who receive the seedlings and the satellite imagery in five years to show overall landscape level change. These figures below show that households generally report high survival rates of their seedlings.

	Port-à-Piment Watershed		
Primary Use	**N**	**MEAN**	**STDEV**
Timber and Pole trees	54	15	20
Medicinal trees	-	-	-
Nursery Tree seedlings	1	10	-
Palm trees	-	-	-
Fuelwood trees	1	7	-
Charcoal production trees	2	7	5
Fruit, Nut, and Edible Leaf Trees	56	9	13
Fodder Trees	-	-	-
Soil fertility and conservation trees	2	27	33
Hedge trees/bushes	-	-	-

Figure 26. Of those planted, what is the total number of each tree type on the farm now?

14. MDG SEVEN: ENSURE ENVIRONMENTAL SUSTAINABILITY | ENERGY CONSUMPTION.

RATIONALE

Haiti remains one of the countries in the world with the lowest per capita energy use. Despite the low energy consumption, the energy demanded continues be collected and harvested from sources in unsustainable ways. This enables an increased a reliance on biomass in the forms of charcoal and firewood while hydropower and oil remains less than a 1/3 of total energy production. This has a specific and disproportionately high impact on the Port-à-Piment watershed due to the abundance of woody bio-mass, recently completed paved road which increases access to national markets, and repeated economic shocks due to flooding, crop loss, and internal population fluctuations.

The lack of alternative energy sources results with the overexploitation of wood, leading to the deterioration of the Haitian ecosystems and rural landscape (Stevenson 1989; UNDP 1991; Smucker, White et al. 2000; Smucker 2005). While new and alternative forms of energy are increasingly available and supported by various initiatives, the national grid remains weak and poor energy production means the demand far outstrips the supply.

Even though no MDG refers to energy explicitly, improved energy services, including modern cooking fuels, improved cookstoves, increased sustainable biomass production, and expanded access to electricity and mechanical power—are necessary for meeting all the Goals, especially in the context of Haiti where energy, environmental sustainability, and economic developed are so closely intertwined.

NATIONAL ENERGY CONTEXT

The insufficient and unsustainable energy supply directly limits economic development. The current source of energy supply, driven by growing energy needs, is one of the main underlying causes of environmental degradation in Haiti. The remaining forests have to serve local energy needs through wood and charcoal production. Roughly 75% of total energy sources in the country come from biomass, and formal energy structures rarely extend beyond large urban areas (ICG). The resultant charcoal trade leads to natural disaster vulnerability, soil degradation, and reduced agricultural yields through watershed degradation, reinforcing one another in a vicious negative cycle.

The household sector represents 70% of the energy consumption in Haiti (CEPALC 17). The distribution of energy consumption by source of energy is as follows: more than 82% is from wood, 14% from charcoal, 2% from kerosene, 1% electricity and 1% from liquefied petroleum gas (LPG) (Angelier 2005).

The overall efficiency of the Haitian energy system is very low. Firewood, in the form of sticks and dead logs, can be used directly as fuel, but a large portion intended for commodification is first transformed into charcoal. Approximately 35% of the wood was transformed into charcoal in 1993 (BME 2002; Charles, Moise et al. 2004; ESMAP 2007). In Haiti, the charcoal production involves many small producers. The traditional production process for transforming wood to charcoal is inefficient, resulting in a low yield between 10% and 16%; modern techniques could achieve a yield of up to 30% transformation.

The electricity sector suffers from high inefficiency and lack of financial management. For example, the capacity factor amounted 25% in the fiscal year 2001-2002, the lowest in the Caribbean region (an average of 44.3% for the entire region) (MTPTC, BME et al. 2006; IEA 2009).

The industrial sector consumes 17% of all energy, and the transportation sector consumes 13%. Energy demand trends reveal that household demand has remained almost constant, while the industry sector has reduced its demand by 6% per year, the transportation sector has increased demand by 4.6% per year, and the greatest increase has been observed in the service sector at 32% per year (CEPALC 17).

URBAN DEMAND FOR CHARCOAL

Studies have found that charcoal accounts for 14% of energy consumption in the country but this is centered on urban areas – roughly 58% of urban household energy needs are met through charcoal. Observational studies by ESMAP in select 'key spots' in Port-au- Prince, which were extrapolated to cover the entire city, found that annual consumption of charcoal in the city is on the order of 300,000 tons per year, or 80% of all charcoal consumption in the country.

Charcoal costs fall well below kerosene and gas, making it the only affordable option for the majority of urban-dwellers. One charcoal bag cost 400 HTG in Port-au-Prince and would last an average household almost two weeks. However, most households cannot afford the upfront expense to buy bags and so charcoal is usually bought in piles, cans, (a unit of measurement called marmites) where it becomes the costliest energy source on a per unit basis. Common units in Port-au-Prince are the 0.50 gourde pile, the 1 gourde pile, and the 2.50 gourde can (Stevenson 64). In accounting terms, these units are always approximate and can vary in weight by as much as 20% from an average of about 0.9 kg per 1 gourde pile, according to Stevenson's 1985 survey (Stevenson 64). This resonates with other observations from around the world where the poorest households pay the highest per unit price for energy. In contrast, rural households furnish almost all of their energy needs through firewood as it can be obtained essentially free of cost. If the price of charcoal reflected the price of wood on the open market however, these cost dynamics would change drastically. Living trees would add between $20-30 per ton of wood to the charcoal price structure and would therefore bring the cost per large bag of charcoal up to between 600 and 780 HTG, at which price it would no longer be affordable to the majority of households.

14.1. PRODUCTION OF CHARCOAL IN RURAL ZONES

Studies have found that charcoal accounts for 14% of energy consumption in the country but this is centered on urban areas – roughly 58% of urban household energy needs are met through charcoal. Observational studies by ESMAP in select 'key spots' in Port-au- Prince, which were extrapolated to cover the entire city, found that annual consumption of charcoal in the city is on the order of 300,000 tons per year, or 80% of all charcoal consumption in the country.

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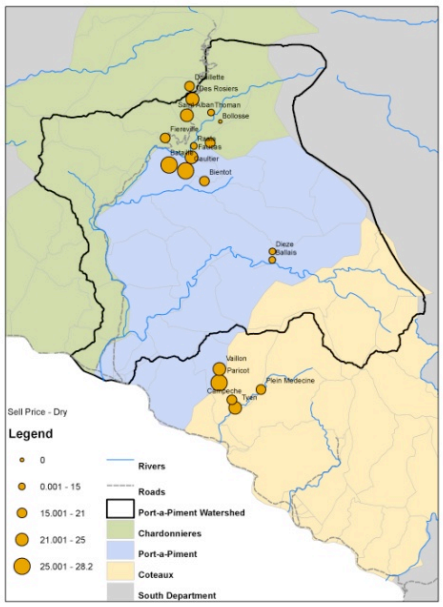
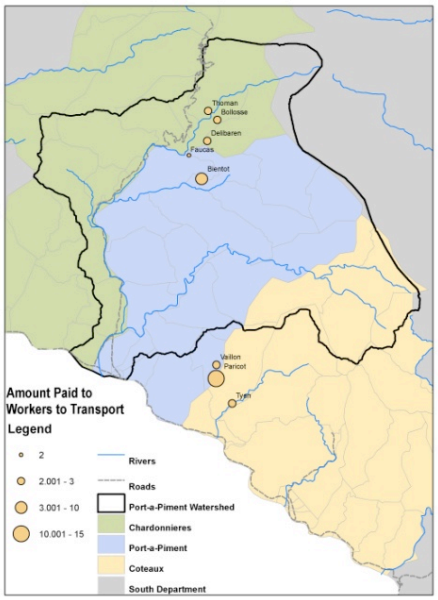
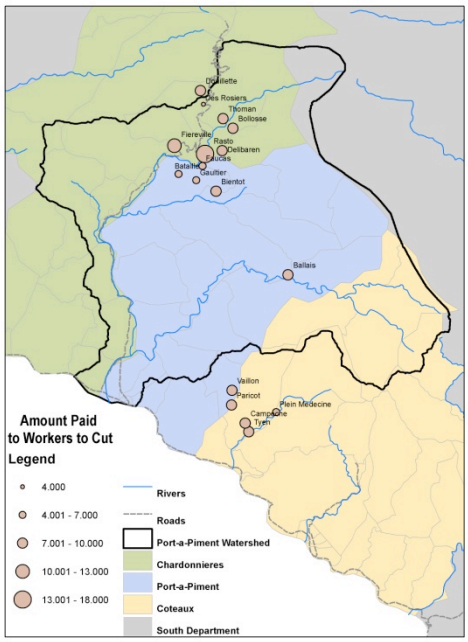
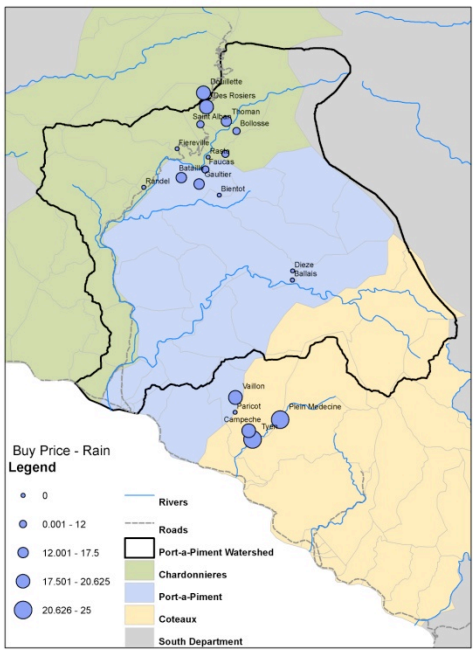
The maps below show the variation across the watershed in prices farmers are paid to cut wood for charcoal, the price point when wood is sold, the price point during the rainy season and the amount farmers are paid to cut wood. (Sprogis 2011) While this data is not conclusive, it's a step in the direction towards understanding the supply chain of charcoal production and the different levels of financial incentives. This type of monitoring could easily be done by local CBO's like the Konbit Pour Potapiman and their monthly tracking of prices. This could also be monitoring in a cost effective way using cell phone reporting on a daily or weekly basis. Understanding the changes in price, spatially, with rigorous data could help set prices for ecosystem service payments and help set prices for sustainable woodlots. Understanding the financial burden that needs to be removed in order to change behavior is critical if long-term sustainable reforestation is to be achieved. This data needs to be rigorous and more comprehensive. The work below by Sprogis is the first step in articulating the need complimented with a method and protocol to achieve this goal.









Map 28 Maps of the different spatial variation in price points for buying and selling wood for charcoal. Data Source: Arthur Sprogis, interviews 2011.

14.2. ENERGY FOR COOKING IN PORT-À-PIMENT

In the South Department, similar to the entire southern coast, charcoal used for cooking is reported as the primary cooking fuel by only 13% of households, while 65% list it as a secondary source. This varies from departments in central Haiti, which record a much higher proportion of

charcoal consumption, up to 55% of total energy used for cooking. In comparison, firewood is reported as primary by 82%, rising to 90% including also those who list firewood as a secondary source (Source: EI Household Survey, 2011). This firewood usage is higher in Port-à-Piment than compared to DHS data for both rural regions and the national average.

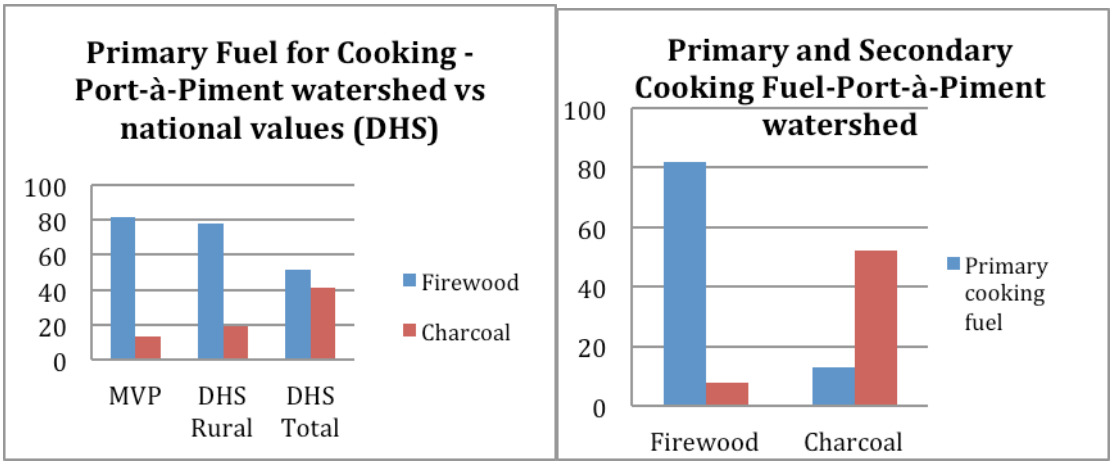


Figure 27 Primary and secondary fuel for cooking on households.

Within the Port-à-Piment watershed, the demand for fuels closely follows the supply and demand chain observed nationally. Households in most of the rural areas are reported to rely primarily on biomass and above all on firewood, mainly gathered as dead wood. While charcoal is produced in large quantities throughout the watershed, including the upper watershed area and those just above the watershed boundary in the Pic Macaya National Park, the charcoal is not all consumed within the same area. The charcoal production within Port-à-Piment is driven by demand from urban centers outside the watershed.

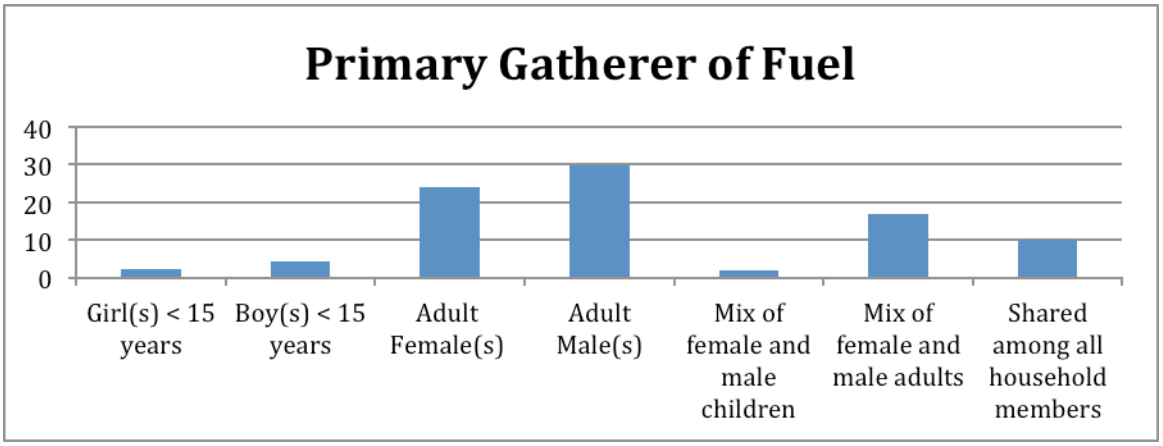


Figure 28 Primary household member responsible for gathering fuel.

14.3. ENERGY FOR LIGHTING IN PORT-À-PIMENT

Household lighting is mostly supplied by kerosene. Less than 1% of households use electric lighting in Port-à-Piment (where there is no EDH grid) vs. 7% in the ten communes along the southern coast (which includes grid-connected locations in Port Salut, Arniquet and St. Jean du Sud).[11] Similarly, usage of batteries or alternative sources of energy like solar or generators is also very limited, at less than 2%.

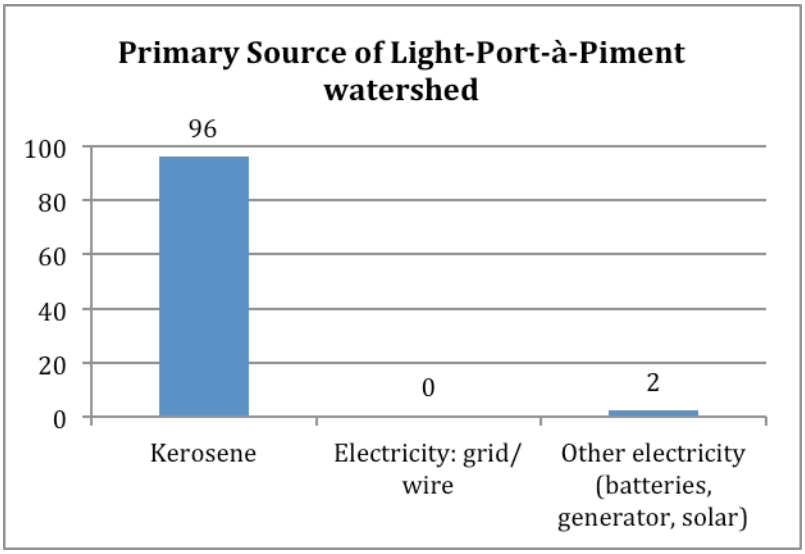


Figure 29 Primary source of light in households reported in the watershed

On average households obtain approximately 21 hours of lighting in the watershed area. More than 90% of the hours come from kerosene usage, mainly driven by the lower usage of electricity.

The overwhelming majority of households in the Port-à-Piment area cook meals at home (97%) and rely on traditional fuel as the primary source of energy. Firewood is the main source of energy used, with 82% of the households reporting it as the primary source and 90% ever using it as primary or secondary source. This usage is higher in Port-à-Piment than compared to DHS data for both rural regions and the national average. Charcoal is another traditional fuel used for cooking, though less used as a primary source but mainly as a secondary source, by 65% of the households.

[11] Only one respondent out of 300 in the household survey reported having access to "electricity: grid/wire", which could indicate either an error, or could refer to a household with access to the local diesel-powered mini-grid. In either case, access is clearly quite low.

	Average lighting hours (primary and secondary fuel)	% Of total lighting hours
Kerosene	19.8	91%
Electricity/grid	0.6	3%
Candles	0.8	4%
Rechargeable batteries	0.0	0%
Dry cell batteries	0.1	0%
Generator	0.0	0%
Solar	0.3	1%
Total	21.6	100%

Table 18 Average hours of lighting by fuel source per week (primary and secondary fuel sources)

There is a clear dominance of kerosene as the preferred energy source for lighting, with close to 91% of households using kerosene as the primary or secondary lighting fuel. The very low penetration of electric lighting represents an opportunity for the energy sector to increase household access to either solar power in the home (through market-driven sales of solar home systems or rechargeable solar lanterns) in the watershed, or through improved management, and ultimately expansion, of the existing mini-grid in Port-à-Piment town. Both processes should be market-led, responsive to the demand of purchasers, making it difficult to assign specific penetration targets.

Achieving greater penetration of solar power in the home is largely a question of establishing marketing and distribution mechanisms effective at reaching rural customers. Present in the region doing this type of private sector distribution of energy alternatives is EarthSpark and their Eneji Pwop social entreprise. Improving penetration of the mini-grid in Port-à-Piment town is, first and foremost, a question of improved management, which can be aided by better metering and payment systems, as well as perhaps addressing improper sizing of the generator itself. Improved management is essential for cost-recovery, which in turn leads to higher system reliability and more "up time" for the generator (which is currently for short periods a few times per week. Once management and reliability are improved, local power access can expand to more households in response to local demand, which is likely to rise once customers see a clearer link between payment and consumption. These issues are currently being analyzed by the Earth Institute and partners, beginning with load measurements at the Port-à-Piment

system. These preliminary measurements will serve as a basis for recommendation for changes in system equipment and management.

	Kerosene	Electricity: grid/ wire	Candles	Rechargeable batteries	Dry cell batteries	Generator	Solar
Average hours per week (# respondents)	22 (267)	72 (1)	0 (0)	17 (3)	0 (0)	3 (2)	15 (1)

Table 19 Average hours per week by fuel type.

The energy grid in Port-à-Piment town does not run frequently enough to impact grid or wire electricity and there is no rural electrification. With the emergence of a local energy, repeating this survey five years from now would imagine an increase in the number of solar and dry cell batteries used in the region. The critical question is if this distribution will penetrate off the coastal areas into the mountains and more remote areas.

14.4. HOUSEHOLD ENERGY EXPENDITURES

Spending on fuel per household in the Port-à-Piment watershed is approximately 157 gourdes (~US$3.70) per week, with 64 gourdes (~US$1.50) for lighting fuel and 93 (~US$2.20) for cooking fuel. The average in the Port-à-Piment watershed is higher than that of the surrounding Côte Sud region, despite the high rate of charcoal production in the watershed. Households using charcoal generally pay more than double the amount per week vs. households using fuel wood.

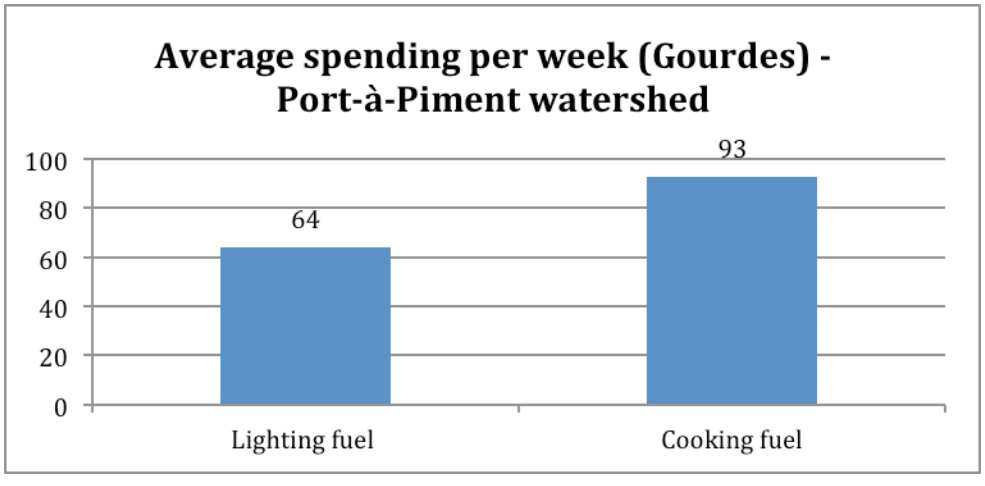


Table 20 Average spending per week on lighting and cooking fuel (gourdes) in the watershed

14.5. POTENTIAL APPROACHES TO ADDRESSING ENERGY INSECURITY

Finding a solution to urban charcoal dependency has been a priority for many NGOs and international organizations involved in Haiti over the years. Demand-side policies are dominant policy approaches aimed at switching consumers away from charcoal by promoting improved cook stoves and alternate fuel sources have been the primary avenues of intervention in the Haitian energy sector. Benefits of improved stoves include their health-related characteristics and improved burning efficiency. These schemes have, for the most part, failed to take root at a large enough scale due to reduce overall charcoal production. Due to the very low price for traditional stoves this technology, a cultural affinity for traditional stoves, poor distribution and marketing of improved stoves, a dependence on external markets for the raw material to construct many variants of improved stoves, and an inadequate consideration of local cooking needs, unimproved cookstoves remain the dominant or preferred technology. Stevenson found that the cost of traditional circular and square sheet-metal stoves used by the majority of the population account for only 1.5-2.1% of total fuel costs and this has remained consistent over the years, despite efforts to switch to improved stoves. There has been a major recent push for coordination amongst the various groups involved in this sector. UNEP has convened a Haiti Improved Stoves Network that is a "low cost forum for coordinating and promoting improved stove initiatives" (UNEP) and it is expected to gain a significant amount of traction among donors due to the enormous potential benefits that can arise from the switch.

Carbon credits for reforestation is one potential mechanism to provide sustained incentives for the transition off of rural charcoal production and into agro-forestry or sustainable wood lots. The easiest estimate of wood's environmental and economic value, as determined by an open market, may be to use markets for carbon credits in the EU Emission Trading System (EU ETS). Preliminary work, which is not conclusive and only the beginning of the multi-year effort to translate research into potential pathways, shows that carbon credits could potentially offer large economic benefits than the current charcoal values estimated by the Earth Institute and Sprogis.

Preliminary efforts estimate the following: given the market price of over 17 EUR per ton of CO2 equivalent offsets at the time of this report in 2011/2012, it is reasonable to assume that there exists a market price for the CO2 sequestered within the trees of the Port-à-Piment watershed. Using this metric, we estimate that the market price for a kilogram of wood is 1.85 HTG. When compared to the Port-au-Prince market price for the same kilogram of wood (0.70 HTG), there exists a significant potential source of new revenue for the watershed. The 20 million kg of wood cut each year for charcoal purposes, while valued at $350,000 (14m HTG) in Port-au-Prince, is valued at over $900,000 (36m HTG) using pricing based on the EU ETS if it is not cut down. Therefore, there exists in addition to the $250,000 lost to out-of-market traders, an estimated $550,000 left uncapitalized in the yearly export of wood out of the watershed. The

implications for incomes within the watershed are remarkable. Further, these estimates indicate that there are sources of funding that would not only provide financial incentives to decrease deforestation within the watershed, but also improve livelihoods for residents as well.

15. MDG SEVEN: ENSURE ENVIRONMENTAL SUSTAINABILITY- WATER AND SANITATION.

RATIONALE

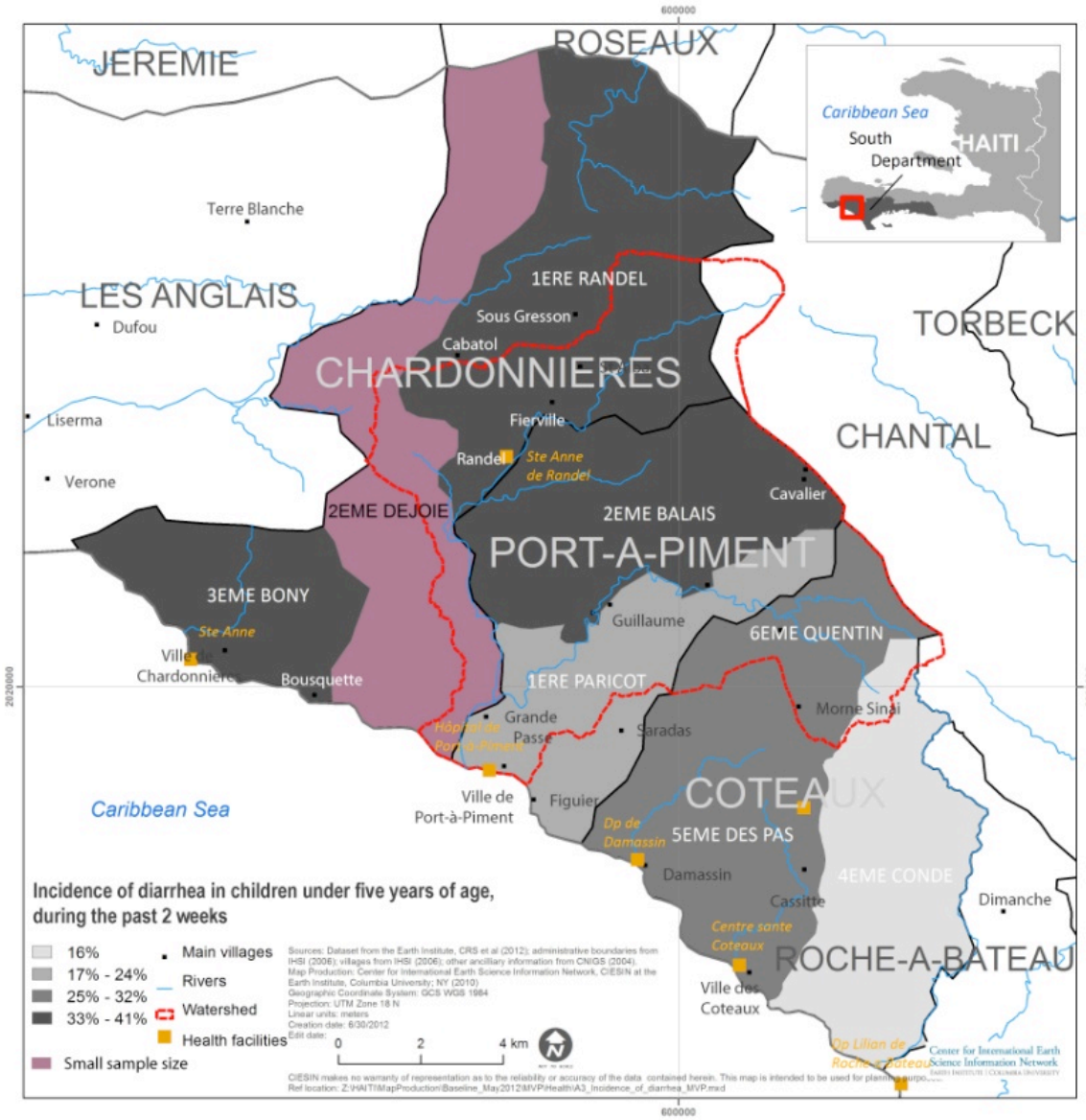
MDG 7 seeks to cut in half the proportion of households without access to safe drinking water or improved sanitation facilities. Both Port-à-Piment and Haiti as a whole have much work to be done to achieve progress in achieving this goal. The reality of water sanitation and hygiene (WASH) challenges in the Port-à-Piment watershed are both indicators of larger systemic challenges as well as a continual source of pressure on multiple systems. Largely lacking in piped water systems, the predominantly rural region of Port-à-Piment faces challenges in access to water and sanitation facilities and the health repercussions of poor nutrition and risk of diarrheal disease. The complexity of the water, sanitation and hygiene situation is exacerbated by the presence of cholera in the region following the 2010 outbreak in Haiti. The lack of sanitation facilities throughout the watershed zone add to the spread of disease through the predominant hydrological systems, and lack hygiene practices including water treatment and hand washing increase individual exposure to contaminants in the water supply.

Indicators on collected from the Port-à-Piment watershed aim to investigate the access to water as well as sources of water currently being used and the frequency of water treatment. In terms of hygiene, information on prevalence of sanitation and handwashing practices and incidence of diarrhea demonstrate that beyond the access and quality of the water itself, behavioral challenges, influenced by many compounding factors, only further the WASH-related risks. The water indicators together give a fuller picture of the water situation in the area than any one indicator alone. Overall the water, sanitation and hygiene indicators paint a picture of an extremely challenging WASH environment, with a number of areas where improvements may benefit both diarrhea rates and everyday living as well.

15.1. INCIDENCE OF DIARRHEA

Diarrhea is one of the five most common causes of child mortality globally, though it is entirely preventable and treatable. Within the Port-à-Piment watershed, 33% of children under five were reported as having diarrhea in the two weeks prior to the survey. This number was as high as 40% in the 2eme Balais communal section. Of those children only 85% were treated with an oral rehydration solution (ORS) or another form of fluid prepared at home by either their parent or guardian, or a health worker. On the same note, the proportion of under five years old with diarrhea was reported at 24% at the national level in 2005 according to EMMUS-IV[3, p132] and 57% of these patients were treated with ORS.

The ability to prepare and deliver dosages of ORS can be done easily at home, and is a skill that Community Health Workers and other lower level cadres of health workers can teach mothers and other guardians, and also provide packets of ORS to be mixed with clean water and prepared without their assistance. When parents are trained in this very basic skill they have the ability to literally save their child's life when the first symptoms of watery diarrhea appear. This is even more critical in a context such as Haiti, where water quality is poor, and particularly when the prevalence of cholera remains such a threat. ORS packets are inexpensive treatments that have a tremendous impact on the health of a population, and are essential solutions to ensuring that no one should die from diarrhea unnecessarily.



Map 29 Incidence of diarrhea in children under five years of age during the past 2 weeks.

Rural regions in the upper, mountainous zones of the watershed, such as 2eme Balais demonstrated a higher incidence of reported diarrhea, particularly in comparison to towns in the lower watershed, such as the more urbanized Port-à-Piment, however only 80% of sick children under five experiencing diarrhea received oral hydration salts in 2eme Balais. In contrast, in rural zones like 6th Quentin almost 100% of children under five were treated with oral rehydration solution.

Despite high levels of enterococcus, an indicator of fecal contamination in the water supply, in the rivers of the watershed, no clear relation demonstrating higher incidence of diarrhea as an function of proximity to rivers was determined; this is most likely due to the hydrology of the watershed, with many smaller river streams that spread the risk around. Proximity to health centers, dispensaries or hospitals also does not correlate to a noticeable increase or decrease in incidence of diarrhea.

15.2. CAUSES OF DIARRHEAL PREVALENCE

It is unclear what is driving the high rates of diarrhea in the area, but possible explanations include the challenging geography of the area, where steep mountainous areas with periodically flooding rivers means that all water sources are routinely contaminated with feces due to lack of safe sanitation. Other factors such as insufficient knowledge of hand and food hygiene are a possibility.

Diarrheal disease is caused by multiple pathways, as seen in the F diagram, below, which show how some of the water and sanitation indicators are linked to diarrheal outcomes. The clean water supply refers clean water sources as well as clean water in the household itself. The hygiene barriers include handwashing with soap and good food hygiene.

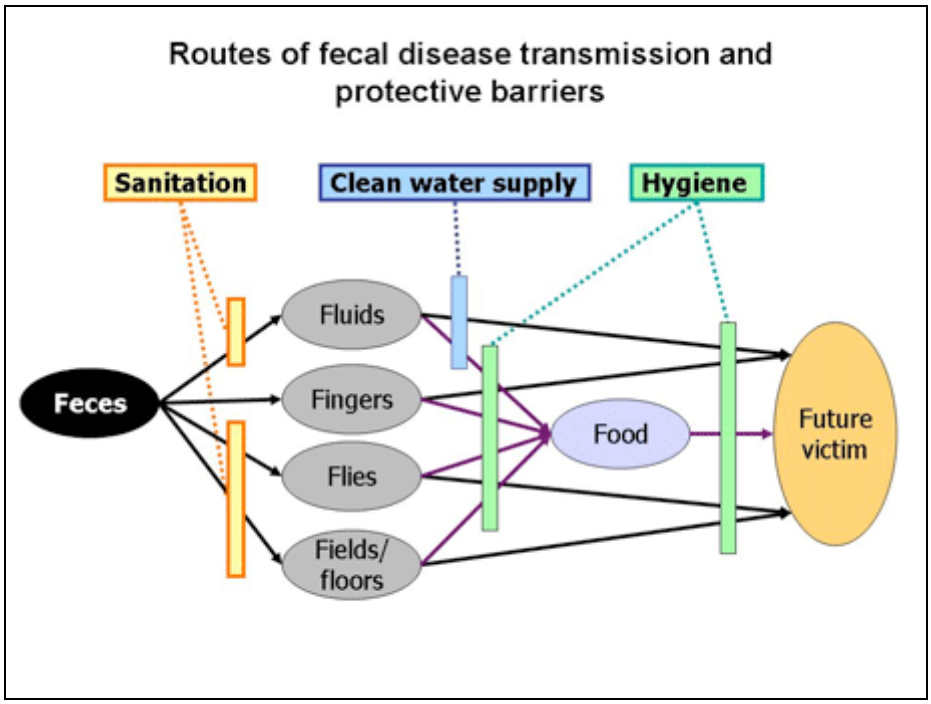


Figure 30 Routes for transmission of fecal diseases. Source: the World Bank.

Since diarrhea is transmitted in a variety of ways, no single barrier (water, sanitation or hygiene) will prevent disease. If there is a safe water supply, but no sanitation or handwashing or food hygiene, then diarrhea rates may remain high. In the Port-à-Piment watershed, many of these barriers are missing or incomplete.

Recommendations for reducing diarrheal disease include both prevention and treatment. Water and sanitation infrastructure improvements, supplemented by sanitation demand creation and hygiene behavior change are all likely to reduce diarrheal disease long term. The creation and strengthening of local WASH committees are another key intervention. Community sensitizations and education campaigns in local schools are also good interventions.

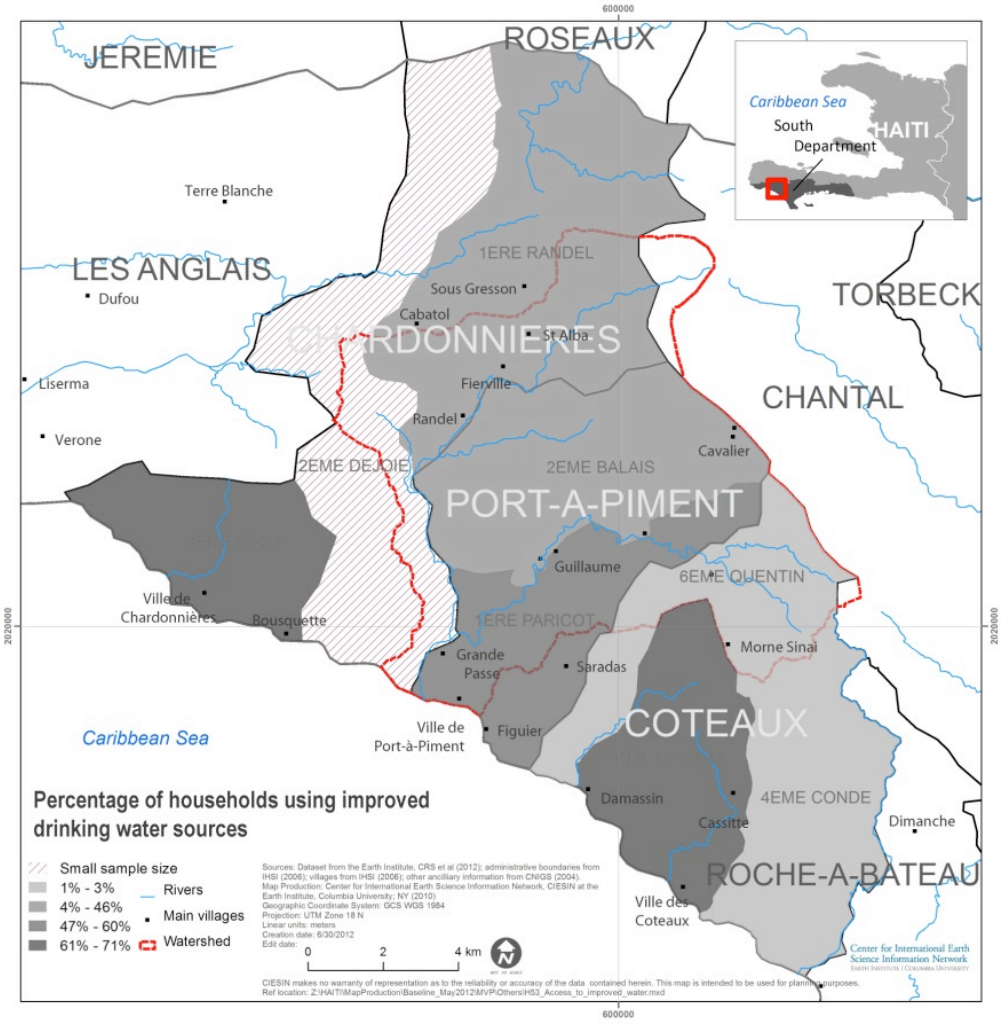
In the Port-à-Piment watershed, and especially where rates of diarrhea are above department and national averages, there should be special emphasis on knowledge of and rapid treatment of < 5s with ORS and zinc. This role is well played by Community Health Workers, who can provide an ample supply of both with proper instruction on usage and education on the needs, and reinforced by local WASH committee members who can help to make the connection between water, sanitation and hygiene behaviors and their health consequences. Nutrition interventions such as Vitamin A supplementation and support for exclusive breastfeeding would also help to mitigate the impact of diarrheal disease in the area.

15.3. DRINKING WATER

PROPORTION OF HOUSEHOLDS USING IMPROVED DRINKING WATER SOURCES.

Through its construction or through active intervention, an improved drinking water source is defined as protecting the water from outside contamination, particularly fecal contamination. Use of improved water sources is indicative of proactive behavior on the part of individuals or households to make water choices based on real or perceived water quality and understanding of the importance of clean water. Cited improved water sources used include bottled water, and public tap or standpipe, whereas unprotected sources include unprotected springs and surface water. The watershed average of proportion of population using an improved water source was similar, at 46% of the population, to the rural average in Haiti (50%).

Use of an improved water source is an important step towards reducing diarrheal disease, though it does not guarantee that households will have microbiologically pure water as water is often contaminated during transport and storage. Interestingly the 2006 DHS survey noted (p.134) that there was no significant difference between rates of diarrhea in children under 5 depending on whether or not they had access to improved water supplies, suggesting that safe source water alone will not prevent diarrhea given the number of causal pathways for contamination.



Map 30 Percentage of households using improved drinking water sources.

Future testing and mapping of water sources to show microbiological quality will be an important step in seeing whether or not they are safe for drinking. Community education and sensitization will then be needed to convey this information to the local population in a useful way. Communities may reject the assertion that a water source is contaminated and needs further household disinfection---given that it has been used for generations. Getting the support o f WASH committees for any messaging will be critical in changing local opinion.

Safe water treatment using Aquatabs, a commercial locally available tablet containing a chlorine derivative, or other methods ought to be encouraged even in areas where the source is improved. If there is a locally preferred disinfection method (possibly not captured by the survey) it ought to be examined for efficacy. (Note: some locals evidently use a method which seems to reduce turbidity, but may not improve the water quality microbiologically. Any behavior change efforts must be sensitive to local beliefs.)

PROPORTION OF HOUSEHOLDS WHO TREAT THEIR WATER

Within the Port-à-Piment watershed, the reported household water treatment is high at 94%. The overwhelming majority (94%) of treatment was with Aquatabs. The next most common means of filtration is adding bleach or chlorine to the water, at 30%. Very few households used boiling (5%) or other methods such as water filtration (1%).

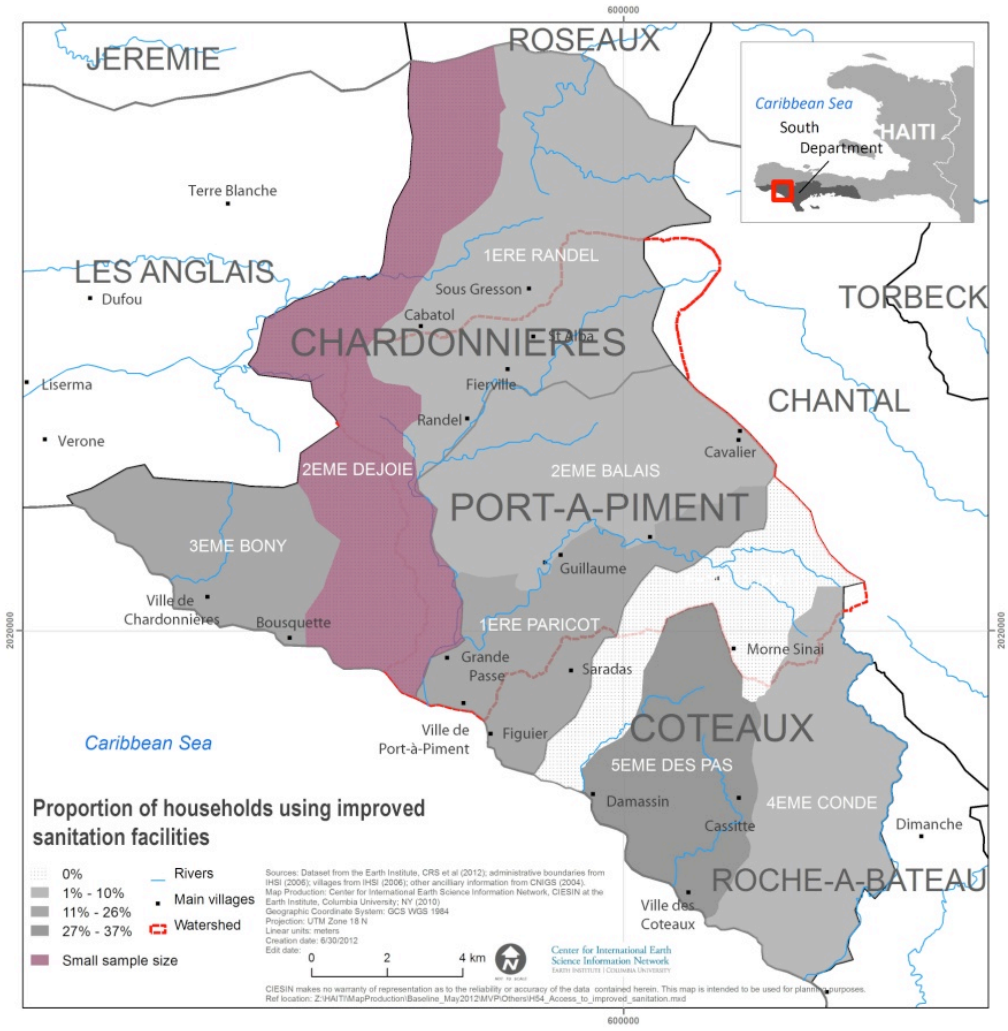
While the average reported usage of household water treatment was high, this may be misleading in terms of diarrhea and disease reduction. The survey question does not indicate how consistently the households used disinfection, as without regular use of disinfectant the water consumed may still have been of poor quality a majority of the time. However, very few people in Port-à-Piment ranked water as among their highest environmental risks, at only 3.7%. This may be due to a lack of understanding of the risks water poses to health, or it can be indicative that the population generally has more control over the risks posed by water as opposed to relatively uncontrollable environmental risks, such as flooding or hurricanes.

The data suggest a base to build from using community sensitization and other behavior change methodologies to encourage more consistent use of household level disinfection. Water quality testing results from local sources could serve as a basis for community awareness of the need to treat at the household level and practice safe storage. Additionally, the frequency and reasoning behind selective water quality testing (as in the case of a known cholera outbreak or in response to flooding or other increased-risk scenarios) can both assess and harness local existing knowledge and fit within existing practices. Gathering qualitative information on knowledge, attitudes and practices would help inform community sensitizations and local WASH committee activities to boost household water treatment. Countering local beliefs and misconceptions about what constitutes a safe source and adequate treatment could be critical to more consistent usage.

15.4. WATER AND SANITATION PRACTICE AND BEHAVIOR

PROPORTION USING AN IMPROVED SANITATION FACILITY

The proportion of the population using an improved sanitation facility is an important indicator of the likelihood of clean water and contraction of diarrhea and other diseases. Improved sanitation refers to a facility that hygienically separates human excrement from human contact, which unlike open defecation, has less of a likelihood to contaminate both the water supply and come into contact with food or people in a way that risks their health. Referring to the proportion of the population that uses improved sanitation in Port-à-Piment, the number is extremely low at 13%, well below the Haitian rural average of 17%, according 2006 WHO numbers. Of the 13% who do use improved facilities, the most common forms of improved facilities are ventilated improved pit latrines (11%), pit latrines with slabs (10%) and pit latrines without a slab, or open pit latrines (10%). In Port-à-Piment, 1% of respondents used a composting toilets.



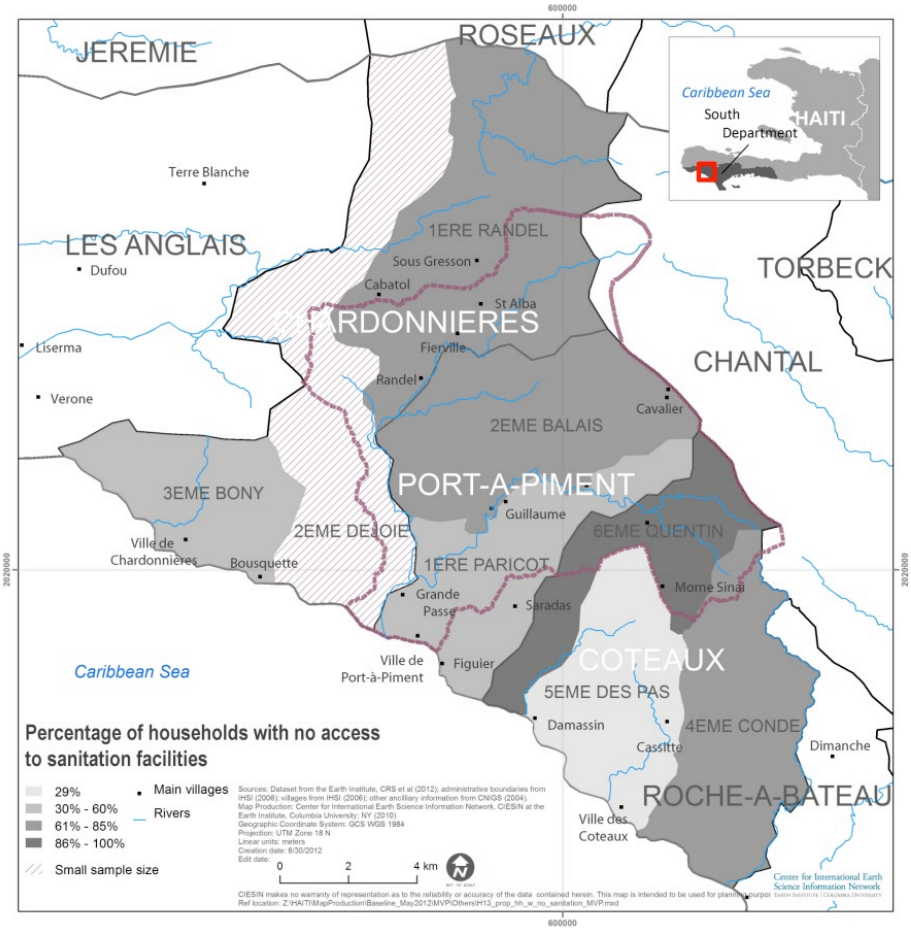
Map 31 Percentage of households using improved sanitation facilities.

The extremely low usage of improved sanitation facilities links to the high contraction of diarrhea in children in Port-à-Piment, and is in part a function of poverty, as households may not have access to proper materials to build pit latrines and other low-technology solutions. Conversely, the low rate is indicative of a high rate of open defecation, a harmful practice that requires serious interventions in community education alongside any improved infrastructure campaigns.

This low rate of improved sanitation represents a huge challenge in both creating appropriate infrastructure at the household level, assuring a safe water supply, and ultimately in reducing diarrheal disease. Without safe sanitation facilities that can survive the regular rains and flooding, local water sources will certainly be contaminated with human fecal matter.

When cholera is present in the region during a time of heavy rains and flooding, the disease travels all the more readily without use of improved sanitation facilities. In October 2011, heavy

rains isolated the upper watershed town of Randel and contributed to an outbreak of cholera in the zone.



Map 32 Proportion of households with no access to sanitation facilities.

Accordingly, it is necessary to increase the demand for improved sanitation at household level, rather than simply subsidizing latrines, as availability of latrines does not guarantee usage unless the motivation for a total behavior change is present as well. Anecdotally, there is evidence that latrines have been requested and built in the past by NGOs and community organizations but have gone mostly unused out of fear of filling the latrine and lack of funds to rebuild another; in these cases, latrines are reported to be used primarily in cases of emergence. Community sensitizations and improved school sanitation are longer-term ways to increase demand by starting with younger members of the family whose habits are not already engrained by practice; these efforts, while positive, need to be continually pursued and supported thought they may not show quick results. Continued support for latrine usage, potentially with acknowledgement of actual usage patterns and the decision-making process behind sanitation behavior, can help to craft a more tailored interim solution to address adult and child sanitation practices. Creation and strengthening of local WASH committees from within the community to act as a continual source of information regarding positive behaviors and aiding in policing poor

community sanitation behavior is a positive way to improve sanitation at the local and household level.

PROPORTION OF HOUSEHOLDS WITH SOAP OR WATER AVAILABLE AT HANDWASHING STATIONS.

While not included in MDGs, handwashing behavior is an important contributor to reducing diarrheal disease as it interrupts fecal-oral transmission of pathogens. Without regular hand washing with soap at critical times of the day such as before eating and after using the latrine, diarrheal disease will persist even with safe water and sanitation. In the Port-à-Piment watershed, approximately 24% of households had water at the handwashing station or area, and 49% had soap present.

The data on handwashing is most useful when accompanied by qualitative data on local knowledge, attitudes and practices around handwashing and other hygiene behaviors, however accurate assessments on handwashing behavior are difficult. If asked directly, most respondents will say they wash hands with soap as they know this is the desired response; in itself, this is indicative of education about the necessity of handwashing, though this does not directly imply that handwashing occurs. It is interesting that soap was more prevalent than water at handwashing stations, and somewhat suprising since the water is critical to handwashing, while soap is often seen as an optional luxury. It may be that water was not present at time of survey, but is regularly brought to the handwashing area when needed. Given that less than half of households had soap present the data suggest the need for more education around handwashing behavior and the need for soap in proper hygiene.

However, The presence of soap and water at the household handwashing station shows that the elements necessary for handwashing are present but doesn't confirm of which members of the household use the station, and at what times of day. Lack of any handwashing station with adequate soap and water does imply that proper handwashing cannot take place. Recent studies have found it useful to directly observe household handwashing stations. What we can say is that in the absence of a handwashing station with adequate soap and water, proper handwashing behavior is unlikely to take place.

A focus groups or another means to acquire qualitative information on handwashing, potentially through local WASH committees, would be useful in designing a behavior change strategy for the region, since it is unclear if it is water scarcity or cultural factors which are limiting uptake. Once the situation is better understood behavior change interventions at the local level are the best way to improve hand and other hygiene (such as food preparation). Programs in schools emphasizing handwashing can also boost usage at the household level.

TIME SPENT GATHERING WATER AND COMING BACK TO HOUSEHOLDS

Positive hygiene and sanitation behaviors can often have limiting factors to their successful upkeep, ranging from poverty-related choices that discourage latrine building or use or the lack of easy access to water for handwashing, food hygiene, and drinking. It is possible that in areas

where it takes longer to collect water there is less use of water for hygiene activities such as hand washing.

In Port-à-Piment as well as most of the rural regions along the south coast of Haiti, however, the time spent to go and collect water and come back is marginal, at an average of 19 minutes and ranging from 8 to 35 minutes. Compared to the time spent on other necessary daily activities, such as collecting fuel wood (45 minutes) and arriving at parcels for agricultural work (75 minutes), the access to water in Port-à-Piment is generally less of a problem. Though this measurement is indicative of access to water and the burden of water collection on households, it does not dictate the quality of the water that is collected. Much of the watershed is crossed by small streams and rivers and dotted with springs. Though water quality testing has demonstrated almost universal levels of contamination in tested ground water and springs, it may be the case that the quality of water collected is poorer (both microbiologically and visibly) when there is less time to collect it. Households may opt for less pure surface waters if the alternative is to spend longer times collecting from improved or safe sources.

WASH-related activities should focus less on the access to water in the interim between collection of water outside the home and arriving at piped water inside the home, and more on sanitation and hygiene education and encouraging positive behavior change with the water that is available.

16. MDG SEVEN: ENSURE ENVIRONMENTAL SUSTAINABILITY- DISASTER RISK REDUCTION

RATIONALE

Port-à-Piment's geographic placement, high levels of poverty, and extreme environmental degradation expose the regions to multiple risk factors; the watershed is incredibly fragile, with a high-interconnectivity of risks and resulting consequences. Reduction of disaster risk is crucial to ensure that the efforts at social, economic and environmental development are able to take root without threat of catastrophic events upturning progress.

Climatic risks	Main socio-economic and environmental impacts
Hurricanes	- loss of lives - infrastructure damage - crop damages - damage to coral reefs and mangroves
Floods	- loss of lives - infrastructure damage - crop damages - soil erosion - stream banks erosion
Drought	- decreased agricultural yields - decreased livestock numbers - reduced quantity and quality of water resources
Sea level rise	- saline intrusion into freshwater aquifers (both coastal and inland) due to impeded drainage and elevated water tables - coastal flooding, leading to population displacement, infrastructure damage and coastal ecosystem degradation.
Increased temperatures	- health effects of increased heat stress on humans - coral bleaching - biodiversity loss - increased emergence of vector borne diseases
Changes in rainfall patters	- disturbed agricultural seasons

Figure 31 Main climate risks and main socio-economic and environmental impacts.

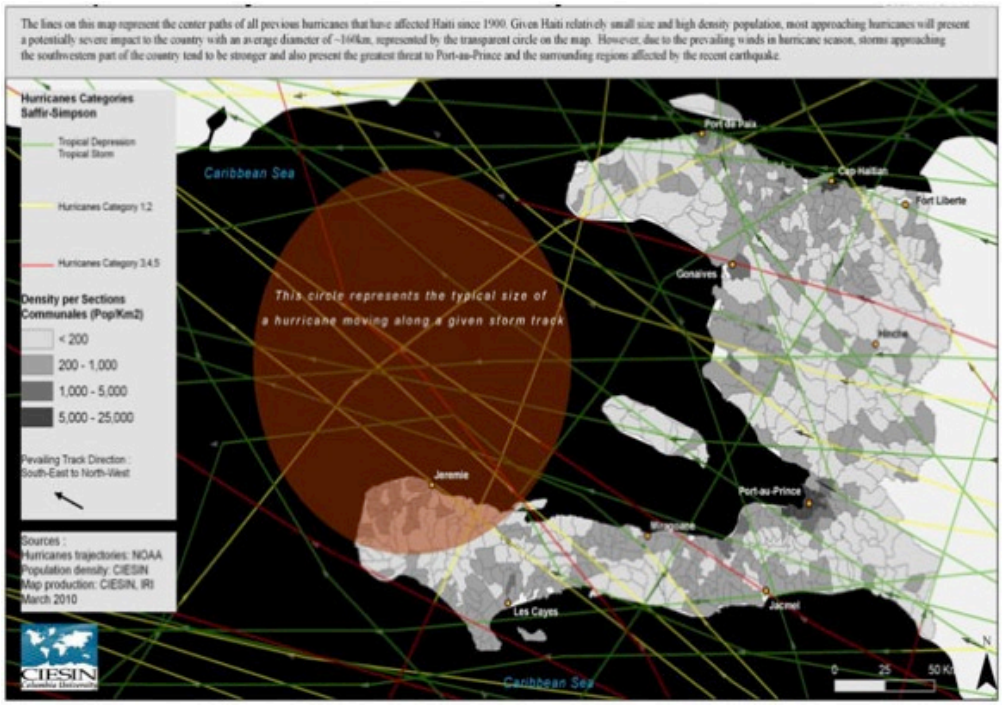
16.1. DISASTER RISK REDUCTION

HURRICANES

Haiti is geographically located in the middle of a hurricane corridor, and is seasonally subject to severe tropical storms during the rainy season from June through November. In Haiti, hurricanes have caused more deaths, displacement of people, and damage to infrastructure than any other

climate-induced factor in the twentieth century. From 1909 to 2008, 49 tropical storms category 1 and 2 on the Saffir-Simpson scale have hit Haiti. Similarly, Haiti has experienced six hurricanes category 3 and 4 with devastating aftermaths (NOAA). On average, a hurricane or tropical depression sweeps through the country every two years. Generally speaking, scientific studies demonstrate that hurricanes have increased in intensity and frequency over recent decades. Observations on the ground from farmers, fishermen, local village leaders, and the national government confirm the same observation.

Hurricanes are destructive as a result of both their immediate consequences of intense wind and rain, and its potential indirect consequences such as floods, landslides, and diseases' outbreaks. In Haiti, even hurricanes on lower ranks from the Saffir-Simpson scale can cause important damages to physical infrastructure, property investment, and the national economy.



Map 33 Last 100 years of hurricane trajectories that have hit Haiti (1908-2008). The red circle shows average size of the hurricane storm system. Data source: NOAA. CIESIN, IRI. Produced by CIESIN 2009.

Southwestern Haiti is the most vulnerable area given the prevailing paths of hurricane paths in the Caribbean basin. Hurricane damages are particularly destructive in the South department due to the fact that most of the cities in the region are located in coastal zones, exposing them to flooding from tide surges. The table below shows the frequency of hurricanes by department. From 1909 to 2008, 13 hurricanes hit the South Department.

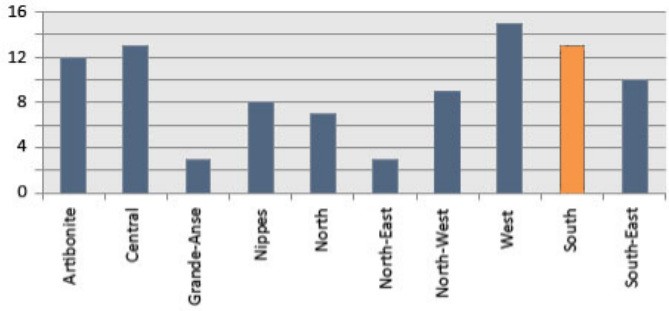


Figure 32. Frequency of hurricanes by department (1909- 2008). Data source: NOAA.

The figure above shows the trajectories of hurricanes that hit Haiti from 1908 to 2008. The 150km circle in red represents the average size of wind strength for each hurricane path, which means, each of the hurricanes that hit the southwestern part of the country will have some effects to the Port-à-Piment watershed.

FLOODS

Most of the settlements in the Port-à-Piment watershed are located along the rivers. The highest population density is concentrated along the water streams and coastline. On the other hand, the distribution of population in high-elevated areas is more dispersed and less dense. The settlements along the rivers are highly vulnerable to different hazards such as flooding and bench erosion.

The Port-à-Piment River has a minor and a major riverbed, even though the channel of its flow is not always permanent. The minor riverbed is the area usually flooded during normal rainfall episodes, and the major riverbed is the area flooded during extreme storm events. The minor riverbed can be visually delimited by the slope difference between the lowest point of the valley and the nearby plain. The major bed of the river can be a little be hard to delimit as this one can go over the land in proximity. The Port-à-Piment riverbed has been widening, and its alluvium channel expanding. Although the research team has not yet estimated how much the riverbed has widened in the last years, field observations suggested that the alluvium channel has been expanding northwards at an approximate rate of 5-10 ft/year. Settlements located within these two areas are dangerously exposed to flooding risk.

Flooding can occur rapidly and without much warning, by intense rainfall over its catchment that generates high volumes of run-off, which can both overrun the riverbanks and flow from streets and mountain runoff. Flooding in Haiti occurs with heavy rainfalls over short periods of time that does not allow the system to absorb the increased flow of water, particularly when soil saturation is already high. This type of flooding is not limited to hurricane events.

The Port-à-Piment watershed is at high risk of frequent flooding and damage, in large part to its high exposure to hurricanes, its frequent strong storm events, and its highly dense population. Similar to hurricanes, the frequency of floods has increased over the last decades in Haiti. As

hurricane activity doubled in the Caribbean basin, it is safe to assume that the frequency of flooding that accompanied those hurricane events has also increased. Many local residents have noted that while major floods used to occur about once every ten years, they now occur on a yearly basis. Furthermore, floods are more destructive than they used to be, due to degrees in soil water retention and deforestation, leading to less ground infiltration and more surface flow of storm water.

Since the deployment of the rain gauges in the Port-à-Piment watershed, two large flood events have been recorded and analyzed, one on October 11, 2011 and a half-day event on April 23, 2012. In both of these cases, a substantial amount of precipitation, unconnected from a hurricane or tropical storm system, caused a rapid build up of water in the hydrological system and fast flooding from both rivers and runoff. In the April 2012 rain event, the amount of rain at Randel and in Port-à-Piment is substantial. Randel is located in the upper watershed, thus the significant rainfall in Randel causes a deluge in the town of Port-à-Piment hours later, though often without warning as to the severity of the flooding itself. The flooding at lower elevations resulting in heavy precipitation in the mountainous zones acutely demonstrates the need for flood protection and early warning systems in this area. Increasing the response time of between rainfall and potentially severe flooding is crucial for ensuring the safety of the residents who live downstream.

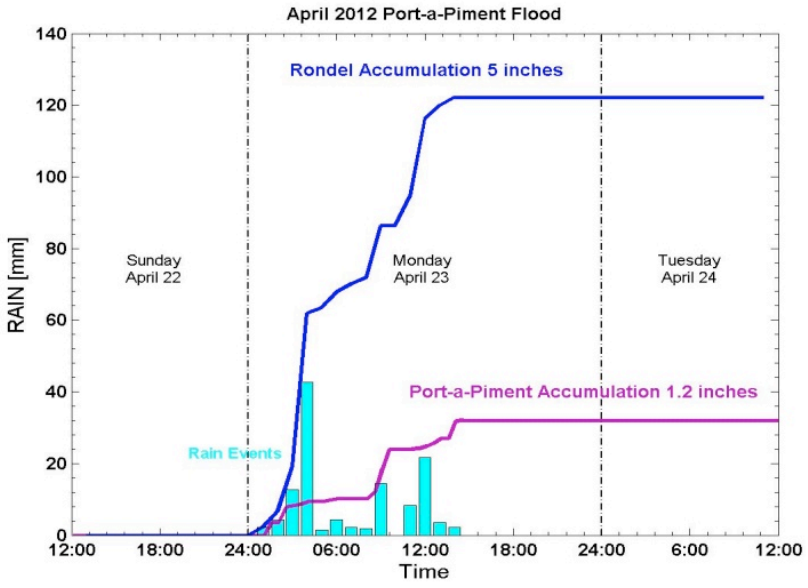


Figure 33 Rain accumulation measured by the Port- à- Piment climate station during April 2012 flood.

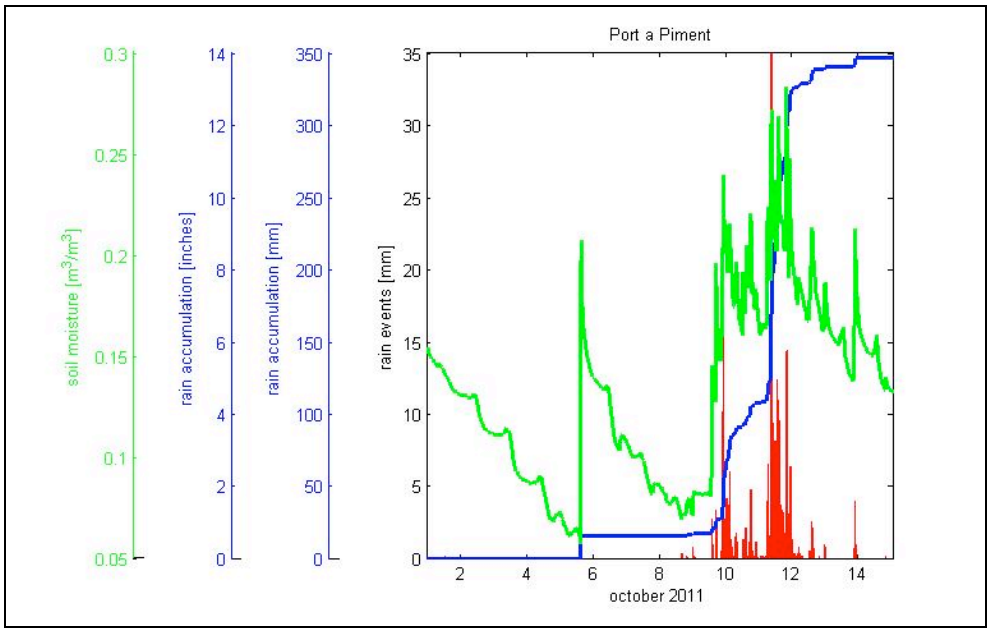


Figure 34 Rainfall and soil moisture for October 2011 showing accumulation during large rainfall events. Port-à-Piment climate station.

Often the areas that are at the highest risk for flooding are those that are densely populated. Flood plains are very important because these are the most cultivated areas with the highest relative soil fertility, thus usually preferred for human settlements. Additionally, the flood plain itself includes the rivers, which act as a means of transportation from upper to lower regions in the watershed. Transportation and communication is severely hampered in the event of flooding, with both economic and health-related consequences, as experienced in October of 2011.

The following map represents the flood plain areas in Port-à-Piment with altitude and slope values. Flooded plains were extracted from the national map of water usage developed by the BDPA in 1982. The definition of flood plain used here is highly related to the geological and soil conditions. The figures inside the map demonstrate that the alluvial plains in the Port-à-Piment watershed are located between 0 and 446m, with an average elevation of 142m; and the elevated plains are located between 0 and 100m, with an average elevation of 13m.

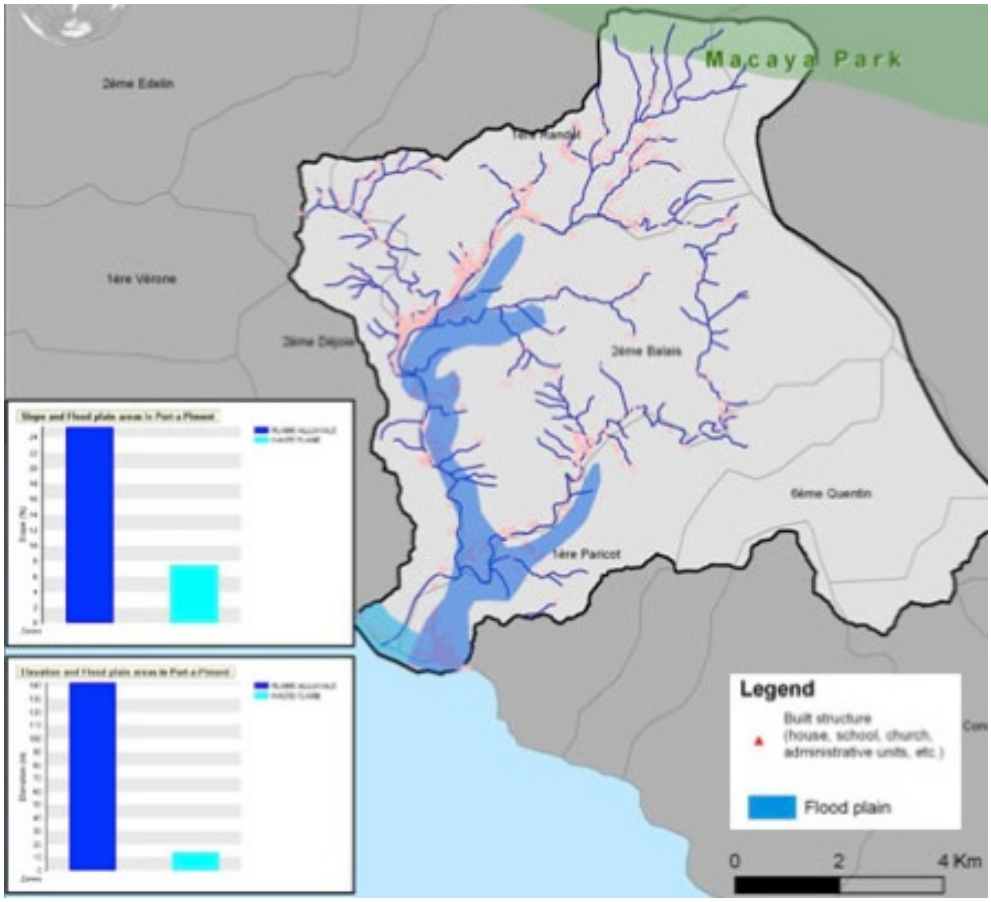


Figure 35. Flood plains in the Port-à-Piment Watershed. Data source used: CNIGS, 2004; BDPA, 1982.

EARTHQUAKES

The Caribbean region is a seismic region. Indeed, the island of Hispaniola is located in a zone of major tectonic faults separating the Caribbean and North American plates. These two plates slide between each other at a rate of 2cm/year, stressing over default existing fractures, which causes earthquakes. The January 12, 2010 earthquake in Port-au-Prince Haiti was the result of a 4-meter displacement between the Caribbean and the North America plates, within 10 seconds of span time. The movement disrupted 40km of fault segment from Petit Goave to Gressier. These eruptions triggered seismic waves that propagated along the faults.

Haiti is marked by four major geological faults: 1) the Enriquillo fault, which crosses the island from the Tiburon peninsula to Miragoane and Petionville, continuing to the Dominican Republic; 2) the Septentrional fault at the northern coast of Haiti; 3) the North Hispaniola fault, which lies in parallel to the island at its northern coast; 4) and the Muertos-Neiba-Matheux fault.

16.2. ENVIRONMENTAL RISK PERCEPTION

MAIN ENVIRONMENTAL PROBLEMS FACED BY HOUSEHOLDS

To better address disaster risk reduction from a population standpoint, it is important to take stock of the existing priorities and perceptions of the residents in the Port-à-Piment watershed. The 2011 household survey had survey participants to list the top 3 environmental problems faced in the past 3 years. The population of the Port-à-Piment watershed viewed hurricanes/cyclones and flooding as the greatest challenges. Survey participants in the Port-à-Piment watershed perceive hurricanes and cyclones as the most threatening to them when asked about the most important environmental problem faced in the past 3 years (mentioned by 54.7% of households); very damaging hurricanes occurred in the Port-à-Piment zone in 2008 as well as a severe storm in October of 2011. Over a quarter of residents (27.7%) indicate flooding as most important, most likely due to the high frequency and deadly nature of the fast and strong flooding experienced in the Port-à-Piment river, even when not associated with a hurricane (as evidenced by the strong storms of October 2011).

Few people identify earthquakes (7.7%) as major distress, despite the presence of the Enquirillo fault line in the region and the devastating aftermath of the 7.2 earthquake in January of 2010 that occurred in Port-au-Prince. As there have not been any earthquakes in the region in recent decades, this is most likely a far-off threat, much less likely to be considered than other immediate threats.

An even smaller group followed by an even smaller group talking about contaminated drinking water (3.7%) and wind (3.0%). A very small minority (less than 1%) thinks of the following as problematic: deforestation, inadequate rainfall/drought, inadequate sewage and sanitation, landslides, soil erosion. Dirty streams/rivers/lakes, infertile/poor soil, storm surges from the ocean, or any other problems are barely or not all referred to when asked to think about major environmental challenges in the past 3 years.

This pattern holds pretty much when asked if the interviewee can cite additional important problems. Although contaminated drinking water, wind, inadequate rainfall/drought, and landslides do come to mind as problems of secondary and tertiary priorities, they percentages of respondents who cite them range from roughly 1% to 8%. 15% and 16% percent of those who have three major concerns, mention earthquake as second most and third most important environmental problem in the past 3 years.

While flooding figures strongly on the minds of residents in the entire watershed, it is of greater concern in some sections. In particular, concern with flooding is most prevalent among households in Des Pas (Coteaux, 5ème Section) and Quentin (6ème Section, Port-à-Piment), followed by people in the sections of Paricot (1ère, Chardonnieres), Randel (1ère, Chardonnieres), and Balais (2ème, Port-à-Piment). These differences require a closer look, because local risk perceptions of flooding don't necessarily match flood risk based on

hydrological data. Based on in-depth interviews conducted in 2010, where we were able to dig deeper into the issue of flooding, two forms of inundation became evident: rising rivers and runoff from streets and mountain sites. For example an interviewee based in Fieville (1ère Randel in Port-à-Piment) explained that his house was surrounded by water that came gushing down the street. The drainage ditch along the side of the street in Fieville was quickly beyond capacity. A couple in Sèche (2ème Déjoie in Chardonnieres) described the 2008 floods as a water wall coming down the hillside, killing their goat and many pigs, literally sweeping them away.

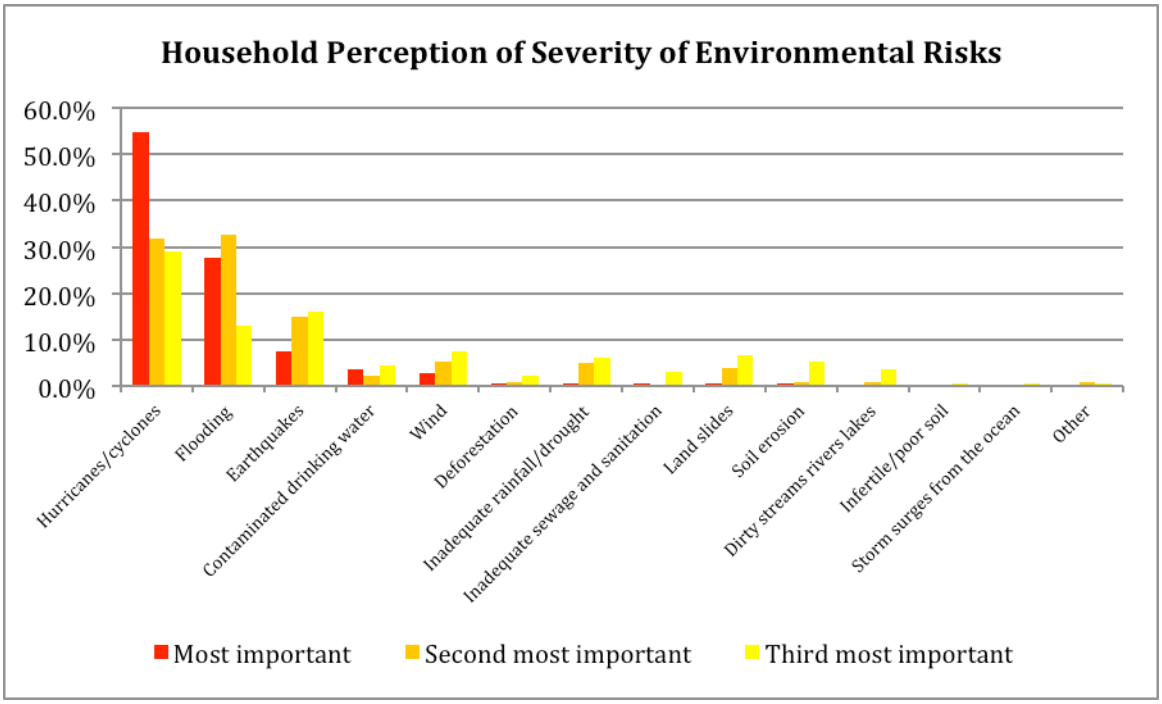


Figure 36. Household's perception of severity of environmental problems.

It is important to note that there are many environmental issues that are not at all perceived as risks. The figure above demonstrates a gap in risk awareness among fairly large segments of the population. There is a low awareness of possible future earthquakes. This table also reinforces that the large risk posed by insufficient water quality seems to be underestimated by people: 26.6% don't view inadequate sewage and sanitation as a threat at all, 24.2% are not worried about contaminated drinking water, and 17.8% don't feel threatened by dirty streams/rivers/lakes. It remains to be checked who the respondents are specifically; perhaps their living conditions and location allow them access to clean water and an advanced level of sanitation. It is noteworthy that roughly a quarter thinks of deforestation, soil erosion, and landslides as negligible.

Environmental issue seen as low severity or "not at all serious"	% households that responded
Earthquakes	51.9%
Climate change	36.4%
Storm surges from the ocean	34.7%
Inadequate sewage and sanitation	26.6%
Contaminated drinking water	24.2%
Landslides	24.2%
Soil erosion	23.6%
Deforestation	22.9%
Infertile/poor soil	19.2%
Inadequate rainfall/drought	18.9%
Dirty streams/rivers/lakes	17.8%
Wind	13.8%
Flooding	4.0%
Hurricanes/cyclones	3.7%

Table 21 Environmental risks not perceived as threat, even when prompted to think about the item specifically

EXPERIENCE OF LOSS OR DAMAGE DUE TO AN EXTREME WEATHER OR ENVIRONMENTAL EVENT

Almost every household in the watershed area (99%) claims to have been harmed due to an extreme event in the past 3 years. When asked about the most recent such event, two thirds of the households attribute damages and losses to hurricanes/cyclones (66.2%), and 28.4% blame flooding. 2% say they have had losses due to the earthquake (most likely in form of reduced or missing support from family members in Port au Prince). 1.7% state contaminated water as being responsible. Less than 1% mentions wind, soil erosion, and infertile/poor soil have hurt their household. Storm surges, landslides, dirty streams/rivers/lakes, soil erosion, inadequate sewage and sanitation, and deforestation were not mentioned as damage-causing events.

Type of extreme event that most recently caused damage/loss	**% of Respondents**
Infertile/poor soil	0.3%
Soil erosion	0.3%
other	0.3%
Wind	0.7%
Contaminated drinking water	1.7%
Earthquakes	2.0%
Flooding	28.4%
Hurricanes/cyclones	66.2%

Table 22 Experiences with damage/loss causing events

For three quarters (73.3%) of respondents, the harmful event took place in the very recent past, in 2011. A smaller portion of people refer to an event in 2010 (16.7%), 2009 (1.3%), 2008 (5.3%). A few people mention the year 2001 (0.3%), and 3% don't know the year of the most recent damaging extreme event.

16.3. DISASTER COMMUNICATION

A little more than half of the households (52.9%) state that they had some form of advance notice of approaching hurricanes. This means that almost half (47.1%) of the households in the watershed area has not received any warnings. The lead times for those who were alerted prior to an approaching storm ranged from 1 hour to 30 days. 5.8% had less than a day of warning, namely 1-5 hours. About 50% had 1-3 days warning: 7.1% had one day, 24.4% had two days, and 17.9% had 3 days. A total of 20% received an alert a week in advance of the storm.

Days of first warning prior to hurricane/cyclone	% of Respondents
1	7.1%
2	24.4%
3	17.9%
4	5.1%
5	9.0%
6	0.6%
7	10.3%
8	10.3%
9	0.0%
10	2.6%
15	0.6%
22	0.6%
30	0.6%
Don't know	4.5%

Table 23 Lead times for those who had any warning.

The majority of households which received hurricane warnings, obtained them via radio (51.3%). 13.5% heard about approaching storms in form of in-person discussion, followed by 10.3% who were alerted by way of SMS/text messages. Phone calls play a smaller role; only 4.5%.

A fifth of the interviewees mentioned some other form of communication. Megaphones play the largest role here (62% of respondents who answered "other"), almost as much as in-person discussion (12.2% of all respondents). Further means specified under "other" are Red Cross (Kwa Rouj), Protection civile/pwoteksyon sivil, Kolvel, Otorite nan zon nan (Authority in the area), Church (Legliz), and neighbor (vwazinaj). These appear to have been announcement rather than discussions of the topic.

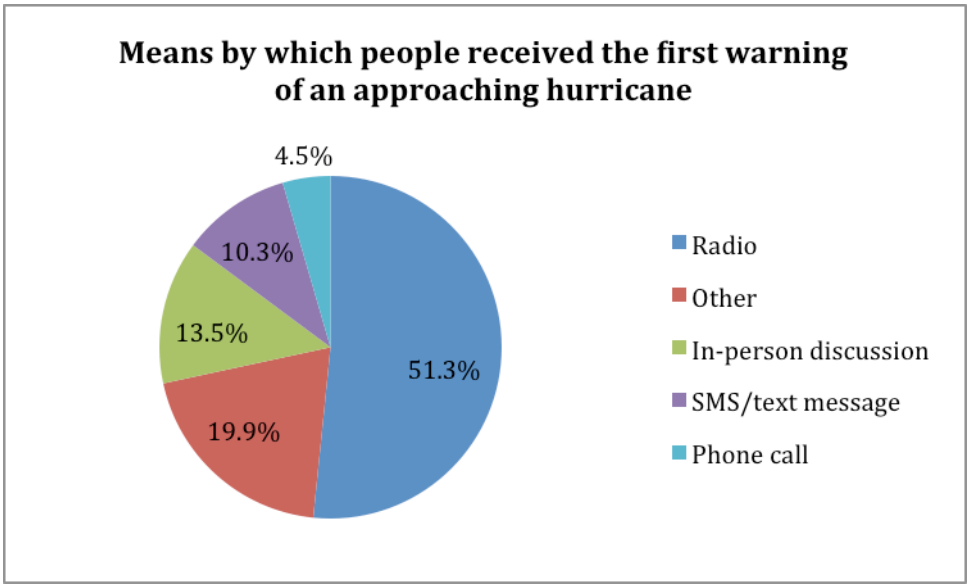


Figure 37: Means by which warnings were received.

As the figure above shows, local community organizers and leaders play the most important role when it comes to spreading the word in-person (27.8%). Family members or friends living in the community are equally important as automated machines for phone or SMS/text messages (each of these are cited by 22.8% or respondents). Government or NGO workers take a smaller part as messenger (12.7%). Family members or friends living outside the community serve a minor function (3.8%). Some of the items listed under "other" include City Hall/Mayor's Office (meri), which could be counted as government; Red Cross, which falls under the heading of NGO; the Church (Legliz).

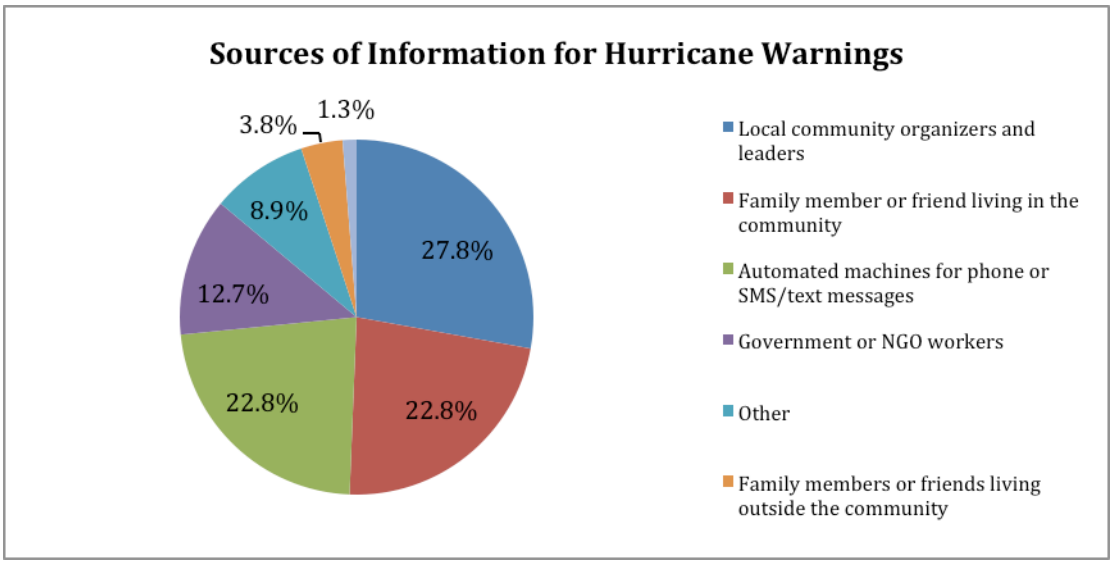


Figure 38. Type of messengers spreading hurricane warnings (in-person, SMS/text, phone call)

16.4. INTERPRETATION OF FINDINGS

The analysis of questions about environmental risk perceptions has important implications for risk communication in Haiti. Perceptions of risk are subjective and often don't align with modeled or actual risks. Information about chronic, persistent hazards or impending extreme events is usually considered, interpreted, and acted upon based on existing beliefs and prior experience, and within the context in which the information is distributed or shared. Decision makers are selective when attending to information and evaluate their options using both cognitive and affective processes. Especially when hearing about risk, people refer to known related phenomena and associations from their past to decide if they find the risk threatening or manageable.

Hurricanes and flooding (the latter may or may not be related to the former) loom the largest on people's minds. While devastating, hurricanes do not hit the country every year with the same frequency and intensity. However the damages and losses resulting from the 2008 and 2011 cyclone season can easily overshadow more chronic risk such as deficient water quality. Risk perception of flooding doesn't necessarily match flood risk based on hydrological data or models, and local perceptions can differ from the concern of scientists. We recommend a dialogue, an exchange of knowledge, to encourage reciprocal learning. Local insights can provide new research questions for hydrologists and climatologists, such as an examination into potentially emerging micro-climates in a particular watershed. Answers to locally relevant questions can be more valuable to residents than what scientists and engineers deem valuable at the onset of a project.

Underestimation of regular threats that may appear negligible or manageable (e.g., dirty streams), and overestimation of statistically rarer extreme events (e.g., a category 4 hurricane making landfall), are misperceptions that need to be addressed as part of a larger communication strategy.

It would be ineffective to simply provide more scientific knowledge. We need to develop meaningful information pertaining to risks that are currently underestimated, namely poor water quality, deforestation, landslides, soil erosion and the short-term and long-term risks associated with them. To increase the uptake of such information, it needs to be tied in with existing knowledge about the risks already perceived as very serious, namely hurricanes and flooding. Demonstrating the relationship between flooding and water quality, the relationships among deforestation, flooding, and soil erosion, etc., can bring risks to the foreground that are otherwise neglected. Yet, it is crucial to do so without decreasing or replacing other items on the list of risks that require equal attention.

Additionally, we need to provide better information about hurricane risk. During in-depth interviews conducted in 2010, most people expect to be hit by hurricanes every year. Sharing

historical data about hurricanes and their paths can be very useful as a basis for discussion of years that brought and didn't bring cyclones to the area, and what the probabilities are of another hurricane making landfall in the current year and coming years, as well as what can be expected in terms of wind speed and rainfall from hurricanes that pass by. More in-depth discussions or focus groups should take place regarding the specific variables associated with hurricanes that are most devastating to humans, animals, land and crops.

In the answers about the perceived severity of threats that affect the community, we see evidence of a "finite pool of worry," which means that people can only worry about so many things at once. However, in a multi-hazard region, where many hazards are interrelated, it is imperative to raise and keep awareness of the full range of environmental challenges. Therefore, we recommend avoiding discussion of one particular hazard in isolation; rather, we want to point out mutuality and interrelation.

Close to half of the households are caught off guard by hurricanes. It is critical that any information about hurricane activity in the region is shared as widely and quickly as possible. Based on what people, who have received prior warnings told us, the notifications and spreading of information appears to be taking place in a rather unsystematic way. It is a mix of radio, in-person discussion, text messaging, phone call, and megaphone announcements.

Among those who are alerted, a small majority of people find out through radio and about a tenth of households receive the information via text messages. In a next step, we should explore if radio broadcast could play a bigger role. From other survey answers we will be able to tell if those households who possess a radio use it to tune into weather forecasts, or if radios are currently underutilized as communication channel. Similarly, given that 70% of households in the South Department own a mobile phone, utilizing SMS and text message warnings could extend the reach and speed of warning tremendously. The characteristics of these warnings should be tested to assure they can be understood and followed up with protective actions. Landline phones are not very wide-spread and therefore not an appropriate means of communication.

While automated systems have great advantages, we caution against underestimating the importance of in-person discussion. Discussion is an important means for people to form protective action plans which will then lead to protective behavior. We should tap into the existing mechanisms where local community organizers and leaders talk to residents, as well as the communication among family members and friends living in the community.

We also recommend exploring the drawbacks of inevitable false alarms, rumors that can cause panic, and the erosion of trust of a previously trusted messenger.

In order for any communication strategy to be successful, we suggest the following principles:

- Early engagement of all relevant groups (users and producers of information)
- Participation in problem identification and brainstorming of solutions

- Encourage group discussion, which creates a social context that can alter the ways in which people acquire, learn, engage with, and act on new information
- Taking local variation into account and tailor and contextualize information
- There is no one-size-fits-all approach, modifications can be based on survey data and group discussion

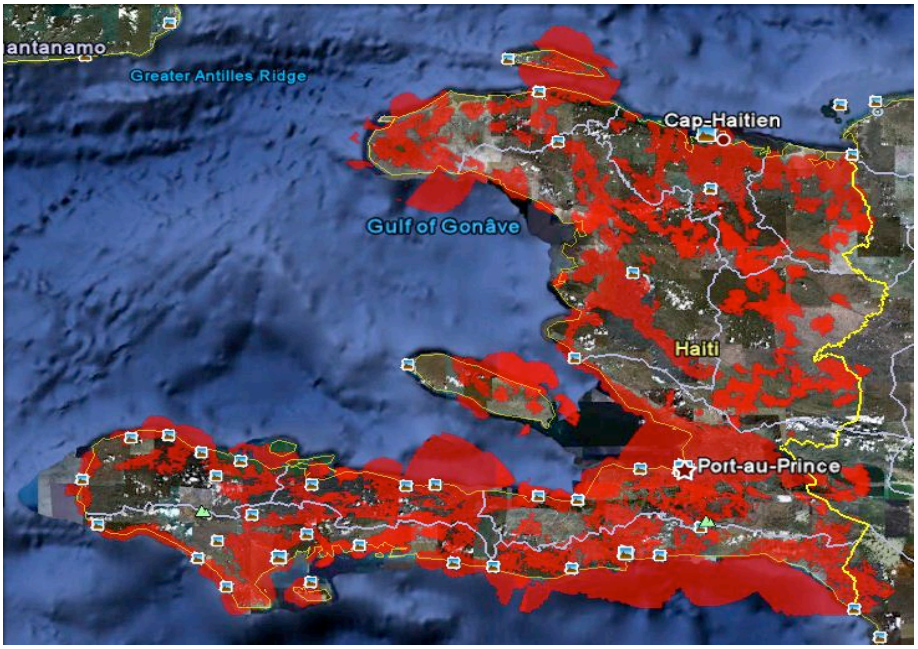
17. MDG EIGHT: DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT

RATIONALE

Haiti's position in the western hemisphere places it in a position to both receive large amounts of international aid and involvement and to experience a net flow of external population to other countries.

17.1. ACCESS TO MOBILE COMMUNICATION

Cell coverage in Haiti is very high in the urban centers and along the coasts of Haiti, with areas of low-to-no coverage in the rural regions in the north and south of Haiti. Cell phone companies include Digicel, which recently acquired Voila, and Natcom. Mobile operators often feature pay-as-you-go plans to accommodate the economic reality of users. In the town of Port-à-Piment, as with along the southern coast, coverage is generally consistent; the upper watershed regions, including the town of Randel, experience spotty to nonexistent coverage. Across the watershed, the proportion of adult females that own a cellular phone is 43%. The communes of Coteaux and Port-à-Piment have an ownership rate of 53%; Chardonnieres, the commune in which Randel is located, brings the average of the watershed down with its an ownership rate of 41%. The pattern of distribution generally follows the cell phone coverage, as displayed in the Digicel coverage map below.



Map 34 Digicel wireless coverage and location of Digicel stores.

Internet access is not widely available in rural Haiti, though satellite providers have increased in the area and the two largest mobile phone operators, Digicel and Natcom, offer portable wireless internet options. Nevertheless, the penetration rate is extremely low. In the watershed of Port-à-Piment, only 1% of households reported internet usage within the past year (email, web browsing, or other non-telephone usage). The rate of 0% reported usage in Chardonnieres and Coteaux contrasts with the 2% usage in Port-à-Piment. The College Stella Maris middle school, in the town Port-à-Piment, has a computer room with ICT education.

17.2. REMITTANCES AND ACCESS TO CREDIT

Throughout Haiti, much of the population relies on sustained contact with the diaspora community for supplemental income and familial connections. While agriculture presents the largest source of income for the majority of the population, supplemental income comes in the form of diaspora remittances and local money transfers. Remittances alone made up as much as 25% of the GDP ($1.5 Billion)[12] in 2010. The South Department has one of the highest proportions of remittances recipients in the country; in the South, IHSI estimated that more than half of households receive remittances as part of annual incomes, representing 18% of annual income (IHSI 2001).

Supplemental income in the form of remittances are particularly important in times of hardship, as traditional savings or insurance structures are not widely used. Traditional banking services such as checking accounts, saving accounts, money transfers and use of virtual money in the form of credit cards, debit or checks requires many customers in Haiti to physically go to a building housing a bank and stand in line for hours. According to the surcey, in the Port-à-Piment watershed only 18% of households have a bank account. That number is highest in Port-à-Piment at 23%, though as lower at 16% in Chardonnieres and 17% in Coteaux. Instead of bank accounts, credit is more widely employed among households in the watershed. Access to credit depends widely on the type of credit received, as many arrangements are informal in nature.

FONKOZE, has been operating in Haiti for fifteen years, implementing microcredit and banking services throughout the nine departments, including the communes of Coteaux and Les Cayes. They have begun activities in the watershed, including Randel, where an agent on a motorcycle comes twice a week. They have recently begun operating within the watershed.

17.3. ACCESS TO MOBILE BANKING OPTIONS

The availability of banking services in Port-à-Piment is currently being broadened through the recent advent of mobile banking, which is a viable option to circumvent having to physically access bank branches from rural areas; mobile transfers can also be used to deliver remittances. Different operators provide different services such as account creation, withdrawals, deposit and person-to-person transfer.

[12] Why Mobile Banking will take off in Haiti E. Pereira. Forbes. 29th October 2010

Mobile banking in Haiti is a fairly recent phenomenon. The January 2010 earthquake was a catalyst in kick starting this sector considering that many of the few existing physical banking services offered were no longer operational. Access to money, be it paying salaries, managing personal funds or receiving remittances, was key, prompting investment in 2010 by the Bill and Melinda Gates foundation to both Voilà and Digicel, then two of the biggest cell phone providers in Haiti. Currently in Haiti, all existing mobile banking options are operated by multinational organizations and centered with partnerships with specific banks.

In April 2012 Digicel Haiti bought out Voilà, making it as of 2012 the only mobile banking provider in Haiti. Digicel Haiti comes under Digicel Group Limited which has been in business for over nine years and has operations in the Caribbean, Central America and the Pacific. From 2010 estimates, Digicel has over 2.2 million cellphone subscribers in Haiti.

Digicel's Mobile Banking product, TchoTcho mobile was officially launched in March 2011 and is offered in partnership with Scotiabank. At that point in time there were 300 agents in Haiti for TchoTcho. Additional banking partnerships agreements have also been signed with Sogebank and Capital Bank. Technical expertise is provided by YellowPepper, a Latin American company and a local Haitian partner for agent registration purposes and initial marketing for TchoTcho for Digicel was carried out via the Spark Group.

Currently the service allows you to:

1. Deposit money
2. Withdraw money
3. Person-to-Person transfer
4. Buy phone credit

In the South Department, many of the bank branches are restricted to larger urban centers such as Les Cayes. Initial observations indicate that for many residents it takes far too long to travel to get to these banks and the costs of travel can be exorbitant for farmers practicing mostly subsistence farming. In rural areas, such as Port-à-Piment, there exist methods outside of the formal banking system for investment and storage, such as cash at home and livestock purchases. Certain crops, such as vetiver, are planted and harvested as needed as an as-needed source of income. In the rural regions, very few have heard of banking systems and even then have mostly heard of Caisses Populaires or Fonkoze as credit receiving mechanisms. In Port-à-Piment, two mobile agents operate in Port-à-Piment, though low knowledge of the service may impede rapid uptake of services. There is a general lack of information regarding financing and savings options, irrespective of whether they are traditional banking mechanisms or branchless banking.

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ANNEX 1

Study Protocol

1. Study Purpose and Rationale.

The Côte Sud Initiative's Integrated Baseline Assessment is a multidisciplinary study that covers social and economic aspects of rural dwellers in Haiti. This assessment is a research project lead by various Earth Institute's departments (EI) at Columbia University, and supported by two well-known Haitian-based organizations: the Catholic Relief Services (CRS) and the Organization for the Rehabilitation of the Environment (ORE). The purpose of the baseline study is to collect statistically significant evidence of the social and economic conditions of the population in the southwestern coast of Haiti, at the micro-scale (household) level. It will also provide evidence of the current state of the infrastructure and services offered, at the regional scale. Baseline results will provide the basis for impact evaluation using repeat data collection in out-years (planned for Year 2 and 4).

The Côte Sud Initiative (CSI) is a long-term sustainable development framework for ten communes (or districts) in the southwestern part of Haiti, 200 km from the nation's capital. One major component within this initiative is the Port-à-Piment Millennium Village Project (MVP), in the Port-à-Piment Watershed. The Port-à-Piment MVP will benefit from the well-established Millennium Village project model in order to incorporate a sequenced and integrated set of sustainable development interventions addressing key dimensions of extreme poverty – including income, hunger, disease, gender inequalities, access to quality education, and environmental degradation.

All the information collected during the baseline study will help the team best understand current social and economic conditions of rural dwellers in Haiti, as well as linkages between the livelihood strategies and physical parameters such as agro-ecological zones, soil types, vegetation cover, land use, hydrology systems, and elevation levels. The aggregated results (in the form of indicators and interpolations) will be made available through the project's website and shared, in principle, with all relevant Haitian agencies and governmental instances from the South Department.

2. Study Design and Statistical Procedures

A. Study Area

The Côte Sud Initiative's (CSI) Baseline Assessment covers ten communes, and integrates two areas of intervention: the Port-à-Piment Millennium Village, located at the Port-à-Piment Watershed, and the CSI area, which includes the remaining 7 communes. See map below.

The study area is located 200 km southwest of Port au Prince. It comprises a total land area of 780 km^2 divided in ten communes, including one island (Ile à Vache). Surveys will be conducted across all ten communes.

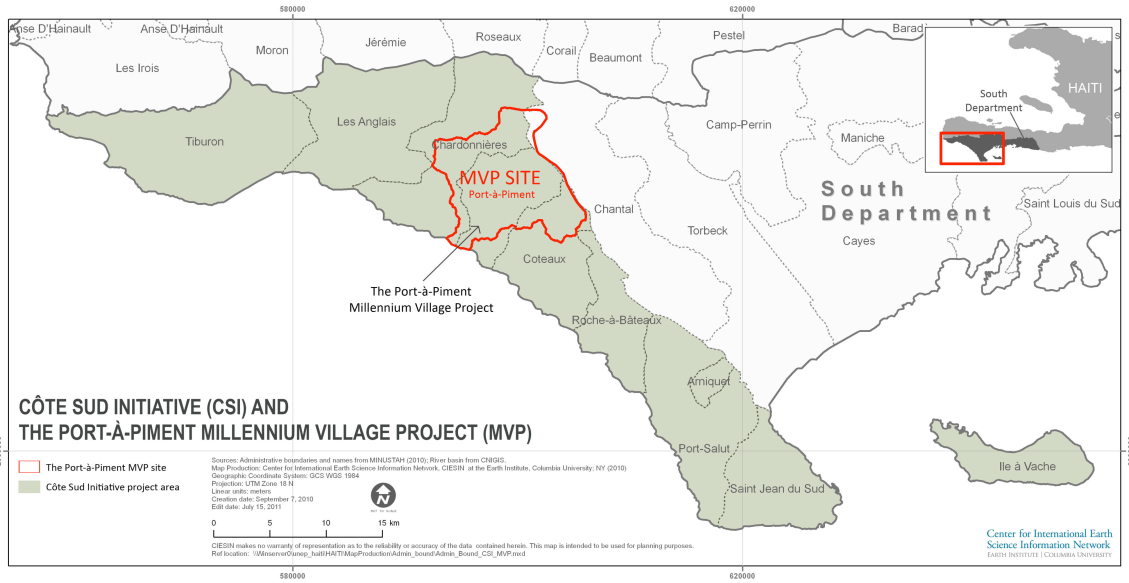

Figure 1. The map depicts the geographic coverage of the Côte Sud Initiative's Integrated Baseline Study. The red outline represents the Port-à-Piment Millennium Village. The shaded area represents 10 communes in the southwestern region, in Haiti. Source: the Earth Institute at Columbia University, 2011.

B. Sample size

The CSI Baseline study will target households, farms and facilities as units of analysis. The study anticipates registering information from 940 facilities, 300 farms, and 4,000 subjects from 1,570 households throughout the ten communes. Not all the communes will be sampled homogeneously. The Port-à-Piment MV site will be oversampled to best capture all the nuances and complex relationships between livelihood strategies, living conditions and environment, as well as changes in impact indicators, derived from further project interventions. See sample size breakdown in the table below.

Table 1. Breakdown of the study's sample size, and population figures. Source: IHSI, 2003; 2009.

Sample size:

				% respect to total population	
No	**Port-à-Piment MV site**	**Rest of the CSI area** (7 communes)	**Total**	Port-à-Piment MV site	Rest of the CSI area (7 communes)
Subjects	1,105	2,895	4,000	3.82 %	1.63 %
Households	500	1,070	1,570	8.95 %	4.48 %
Facilities	n/a	n/a	940	n/a	n/a

Total population size (estimations from 2009)

No	**Port-à-Piment MV site**	**Rest of the CSI area** (7 communes)	Total
Total Population	28,863	176,907	205,770
Households	5,582	35,024	40,606

C. Sampling Methodology

Since there is no official list of residents or registered households in the area per locality, the research team took enumeration areas (aka census tracts) from the last census as base units (Institut Haitien de Statistique et d'Informatique, IHSI, 2003). From there, the sampling methodology consisted on two phases that included random selection at two levels:

1) Randomly select **Segments** within the **Communes** for additional research; and
2) Randomly select **Household** within each selected **Research Segment**

A segment was defined as a geographic unit containing approximately 40 households. When the household population was large enough, the enumeration area was split into equally sized segments. To ensure equal probability of being sampled, each commune was split into 75 segments (of approximately 40 households each). Afterward, a random selection of research segments per commune was conducted. In the Port-à-Piment watershed, a random selection of 30 research segments was conducted. In the rest of the communes, a random selection of 10 research segments was conducted.

The second step consisted on randomly selecting households inside research segments. Prior to start implementing surveys, enumerators will make a rapid map of the research segment. Afterward, a random selection (depending on the research segment size) will be applied as to ensure equal probability of all households to be selected. Regardless of geographic area or commune, 10 households were randomly selected per research segment.

Note: the sampling methodology was based on the DHS-III Sampling Manual, 1996.

D. Research team

The research team is constituted by 72 individuals, including 35 staff members to be hired for this study. Forty-seven staff members (~67%) are based in Haiti whereas the remaining 33% is based in the US, Columbia University staff. Specific roles from each member are specified in the Research staff's roles and data access document, attached in the Documents section. Broadly speaking, the team in Haiti will be responsible of the enumeration as well as the initial phase of the data processing and management. Afterward, the team at Columbia will be in charge of the data quality, processing and analysis.

Almost half of the research team is constituted by Haitian enumerators (28) and field coordinators (4). CRS will hire students from the American University of the Caribbean (AUC) and/or the University of Notre Dame (UNDH), in Les Cayes, as enumerators. Professional surveyors will be hired as field coordinators. The recruitment and hire will take place close to the starting date of the study. Part of the selection criteria for enumerators and field coordinators will include academic/ professional background, previous academic/ professional experience, and fluency in all three French, Creole and English. CRS will process all applications and hire the best available candidates to perform the data collection. Whenever the hire is concluded, a list of names of both enumerators and field coordinators can be provided to the CU IRB.

E. Study sequencing

The present study will comprise three main stages: data collection, data processing and data analysis. The data collection stage consists of interviews to various subject types. The study will also incorporate measurements from children under 5 years old (see section 6- Study subjects for more details). It is estimated that the data collection will take approximately four months -- in different stages, depending on the tool. Due to the rough topography and lack of infrastructure in most of the upper watershed areas, enumerators and the data collection team will mostly move by foot, in order to cover all randomly selected villages. Transportation by vehicles and boats will be provided when feasible.

After the data collection is concluded, the data entry, processing and cleaning will be carried out, in Haiti. The first step of the data processing incorporates logic and other quality control checks. Secondly, a coding treatment for all HH ID numbers and farms' GPS points will be conducted. The HH ID coding treatment consists on removing original HH IDs and substituting them with randomly generated ID numbers. On the other hand, the coding treatment for geographic identifiers such as GPS points consists on shifting each point by a randomly developed XY coordinates. The original linking files will be kept in Haiti, encrypted. Only the data manager will have access to the key for these files.

After the data is coded, the datasets will be de-identified. The de-identification treatment consists on removing all direct identifiers such as subjects' names and villages. Researchers at Columbia will use only coded datasets with no sources of direct identification in it.

Previously, the study protocol v.1 considered the collection of GPS points for all households of the study. However, the research team decided to take the location of *research segments* instead of individual households for tools 1,2 and 3. This decision was made to: 1) enhance the privacy protection of human subjects; 2) avoid the collection of unnecessary GIS data—the spatial analysis will not be done using GIS household level data but research segment (aggregation of 10 households) level data. GPS points from research segments will not be shifted since they do not refer to household level data (aka direct sources of identification).

Note: tools 4 to 11 still considers the collection of GPS data, either at the farm or facility levels.

The final stage of the study refers to the data analysis. Mostly Columbia University researchers will conduct the data analysis. The data will be analyzed using ArcGIS and statistical software (STATA and R). The analysis of some baseline parameters will be made using descriptive statistics (mean, median, mode, range, standard deviation, standard error and proportions) and regression models combining physical data (spatial statistics). Indicators will be developed using pre-constructed scripts in CS Pro. Final results will include aggregated data in the form of indicators and/or maps, representing communes and/or agro-ecological zones. Rough estimations anticipate from 4-6 months of work derived from data analysis.

3. Study Procedures

A. Thematic Coverage and Survey Tools

The integrated baseline study includes the following thematic areas: basic demographic information, agriculture and forestry, health, nutrition and food security, water and sanitation,

education, energy, disaster risk management and perception, and land tenure. All thematic areas are covered throughout five survey tools targeting human subjects (at the household level) and six survey tools targeting facilities (clinics, schools, local authority offices, water sources, warehouses and plant nurseries). The table below (table 2) summarizes the geographic and thematic coverage, along with the unit of analysis and study subjects per tool.

It is possible to identify two types of tools:

a) From surveys **number 1 to number 5:** these tools aim to gather information from uses, customs and needs of human subjects as part of their daily lives. Names and dates of births from all household members will be gathered, in order to construct indicators. In addition, GPS location of households and cropland (in the case of ICT4Ag) will be also recorded in order to perform spatial analysis and areal calculations for land tenure and yields indicators. Measures to ensure the confidentiality of the data are addressed in section 9 and 10- Confidentiality of the data, and Privacy Protections, respectively.

b) From surveys **number 6 to number 11:** as the name indicates, these tools aim to build up inventories and gather information about any given facility; for example, types of services provided and the current state of the infrastructure. All the data obtained through these tools will be at the facility level, not at the individual level. A GPS point and a picture will be recorded in order to conduct spatial analysis at the regional level.

Table 2. Summary table of all tools to be used within the CSI Integrated Baseline Assessment

No	Survey tool	Unit of analysis	Study subjects	Geographic coverage (number of communes)	Thematic Coverage									
					Demography	Ag and Forestry	Health	Nutrition	Water and Sanitation	Education	Energy	Disaster Risk Mgt	Land Tenure	Other
1	Survey: Socio-economic	Household	Household head	All	X	X	X	X	X	X	X	X	X	
2	Survey: Adult female	Individual	Females 15 -49 years old	All	X		X	X	X			X		
3	Survey: Anthropometric	Individual	Children < 5 years old	All	X		X	X						
4	Survey: Agriculture (ICT4Ag)	Farms	Farmers	All	X	X							X	
5	Survey: Energy	Household	Household head	(One) Port-à-Piment	X					X	X			
6	Facilities inventory: clinics	Clinic	Manager	All			X							
7	Facilities inventory: schools	School	Manager	All						X				
8	Facilities inventory: local authorities	Offices	Manager	All										X
9	Facilities inventory: water sources	Water sources	N/A	All					X					
10	Facilities inventory: warehouses	Warehouses	Manager	All		X								
11	Facilities inventory: plant nurseries	Plant nurseries	Manager	All		X								

In order to avoid interview fatigue from respondents due to various tool types, some of these will be applied concurrently for any selected household. Tools number 1 to 3 (Socio-economic, Adult female and Anthropometric surveys) target different human subjects, hence their implementation can be done in one visit to the household by different enumerators grouped in teams of two. The strategy of not overwhelming household members denotes consideration for participants and increases the likelihood of high quality data. However, this same approach has important implications in terms of privacy protection and confidentiality of the data. These issues are explained in more detail in sections 9 and 10- Confidentiality of Study Data and Privacy Protections, respectively.

Tools number 4 and 5 (Agriculture and Energy surveys, respectively) will neither target the same households as the first three nor happen at the same time. The Agriculture survey follows the seasonal crop calendar, and the Energy survey will be conducted in a different period as the other three surveys. Even if the random selection of households from the Agriculture or Energy survey overlaps with some of the households from the Socio-economic survey, there is no possible way to link the data between these surveys. All the data will be coded at different times, with randomly computer-developed codes. These procedures are explained in more detail in sections 9 and 10- Confidentiality of Study Data and Privacy Protections, respectively.

All tools are listed individually within the Documents section. Each tool is designed to take maximum 2 hours from each respondent. If the interview is not concluded within 2 hours, a follow-up appointment will be made, in order to avoid fatigue on the subject. Interviews from tools number 1, 2, 3, and 5, will take place at the family's house. In case of tool number 4, interviews will most likely take place where croplands or parcels are located --in Haiti, it is common to find the family's parcel far away from the house. Interviews from tools number 6 to 11 will take place where each facility is located.

B. Training

All the research staff will be trained in conducting research with human subjects as well as in the implementation of tools and the use of the data collection equipment. Prior to the study's start date, EI's staff will conduct a one-week training of trainers in Haiti. The training of trainers will be conducted in English. Participants during this session will include staff members from CRS and ORE, as well as field coordinators hired for the data collection. Subsequently, field coordinators will train all enumerators in a one-week workshop (same location). Training will also include field-testing of tools and data collection equipment. Staff members from CRS, ORE and EI will provide technical support during the workshop. The training of enumerators will be conducted in French and Creole.

C. Language

Haitian Creole is one of the official languages in Haiti[1] and it is the most common language used in Haiti's countryside. Hence, all interviews will be conducted in Haitian Creole by trained enumerators. All enumerators and field coordinators will be Haitian Creole native speakers.

[1] The second official language in Haiti is French.

After CU IRB approval is conferred, all surveys, training manuals, recruitment text and consent forms will be translated to Haitian Creole. Certified translation of all consent forms will be provided after CU IRB approves this protocol. As recommended by the CU's IRB policy for Enrollment of Non-English speaking subjects, an acceptable interpreter will prepare all the translations.

4. Study Drugs or Devices

Due to technical issues, the research team considered necessary to administer surveys 1,2 and 3 using paper-based forms instead of using hand-held devices, as originally described in the study protocol v.1. The research team implemented the same tool versions that were included the protocol v.1. Tools 4 through 11 will be conducted using hand-held devices.

5. Study Instruments (e.g., Questionnaires, Interview Outlines, Focus Group Guides)

Structured interviews will be conducted following the questionnaires attached to this protocol (see Documents section). As noted in table 2, section 3 from this document, the CSI Baseline Assessment encompasses two types of tools:

a) The Socio-economic, adult female, anthropometric, agriculture, and energy surveys: these tools aim to gather information from uses, customs and needs of human subjects as part of their daily lives. Names and dates of birth from all household members will be gathered, in order to construct indicators. In addition, GPS location of farms will be also recorded, in order to perform spatial analysis and areal calculations for yield indicators. Measures on how the data will be protected and kept confidential are described in section 9 and 10- Confidentiality of the Study Data, and Privacy Protections, respectively

b) Facilities inventory questionnaires (clinics, schools, local authority's offices, water sources, warehouses and plant nurseries): as the name indicates, these tools aim to build up inventories and gather information about any given facility; for example, type of services provided and the current state of the infrastructure. All the data obtained through these tools will be at the facility level, not at the individual level. A GPS point and a picture will be recorded in order to conduct spatial analysis at the regional level.

All tools have been designed by the Earth Institute. Except for the Agriculture (ICT4Ag) survey, all tools have been tested and used in the EI's Millennium Villages project, in Africa (see http://millenniumvillages.org/), and the Nigeria MDG Scale-Up project, in Nigeria.

All tools are listed individually within the Documents section in English. After CU IRB approval is conferred, all tools and training manuals will be translated to Haitian Creole. Haitian Creole is one of the official languages in Haiti[2] and it is the most common language in Haiti's countryside. Certified translation of all tools will be provided after CU IRB confers approval to this protocol, based on CU's IRB policy for Enrollment of Non-English speaking subjects. An acceptable certified interpreter will prepare all the translations.

6. Study Subjects.

[2] The second official language in Haiti is French.

Table 3 summarizes study subjects per tool. It can be noted that there are only two cases where study subjects are other than non-gender specific population of 18 years or older. The first case, tool number 2: Adult Female survey, the research team targets females of ages between 15 to 49 years old. Women between 15-49 years old are within the human reproductive age. The research team targets women at reproductive health in order to obtain information related to maternal and reproductive health, food security, hygienic household practices, among other topics. In Haiti, it is common to hear cases of both birth cases attended by non-skilled health workers, or birth cases without any health attention at all; not to mention the lack of antenatal or postnatal health care, among other issues. As part of the baseline assessment, these indicators will be critical to understand the basic health and social services in most need as to plan further for sustainable and long-term solutions.

In order to obtain a strong statistical power at the commune level throughout the ten communes, a sample of 900 women between ages of 15 and 49 will be pursued. The same consideration to oversample the three communes within the Port-à-Piment Watershed, Chardonnières, Port-à-Piment and Côteaux, will be conducted with a sample of 230 female subjects. The rest of the sample will be proportionally distributed across the remaining communes, depending on the population size.

The second case, tool number 3: Anthropometric survey, targets only non-gender specific children under five years old[3]. Relevant nutrition related measurements (weight for age, height for age and the medium upper arm circumference) in children under fiver years old are critical indicators for the CSI Integrated Baseline Assessment. Previous research has showed that nutrition related indicators (the different levels of malnutrition and stunting, for example) could be associated with poverty levels and vulnerability to natural hazards, at the household level. In that sense, a deep understanding on how poverty is distributed throughout the region, and among different agro-ecological zones provides valuable information for future intervention planning.

The research team will pursue a sample of 1,530 children under 5 years old across the ten communes. The same consideration to oversample the three communes within the Port-à-Piment Watershed, Chardonnières, Port-à-Piment and Côteaux, will be taken with a sample of 375 for children under the previously referred ages. The rest of the sample, 1,155 infant subjects, will be proportionally distributed within the remaining communes, depending on population size.

Except for the two previously referred cases (tools number 2: Adult Female survey and tool number 3: Anthropometric survey) the rest of the surveys target non-gender specific adults of 18 years or older as subjects of research. In these cases, the constraint for participation refers to the person's occupation and role within the household; for example, head of the household or farmer. The research team estimates a sample size of 1,570 households, with the following breakdown. Tool number 1: Socio-economic survey (1,170 respondents); tool number 4, Agriculture survey (300 respondents); tool number 5, Energy survey (100 respondents). Similar to the first two survey tools, the Port-à-Piment Watershed will be oversampled, respect to the

[3] The reference date will be confirmed at a later stage.

rest of the study area (see table 3).

In order to avoid interview fatigue from respondents due to various tool types, some of these will be applied concurrently for any selected household. Tools number 1 to 3 (Socio-economic, Adult female and Anthropometric surveys) target different human subjects, hence their implementation can be done in one visit to the household by different enumerators grouped in teams of two. The strategy of not overwhelming household members denotes consideration for participants and increases the likelihood of high quality data. However, this same approach has important implications in terms of privacy protection and confidentiality of the data. These issues are explained in more detail in sections 9 and 10- Confidentiality of Study Data and Privacy Protections, respectively.

Table 3. Population targeted (by tool and by subject type) within the CSI Integrated Baseline Assessment.

Summary per tool:

No	Survey tool	Sample size	Oversample in Port-à-Piment	Unit of analysis	Population gender	Age
1	Survey: Socio-economic	1,170	300	Household	Non-specific	18 or older
2	Survey: Adult female	900	230	Individual	Females	15-49 years
3	Survey: Anthropometric	1,530	375	Individual	Non-specific	0-4 years old
4	Survey: Agriculture (ICT4Ag)	300[a]	0	Farms	Non-specific	18 or older
5	Survey: Energy	100[b]	n/a	Household	Non-specific	18 or older

Summary per subject type:

No	Human Subject	Sample size
1	Females 15- 49 years old	900
2	Adult 18 years or older[c]	1,570
3	Children under 5 years old	1,530
	Total	**4,000**

Note:

[a] Tool number 4: Agriculture (ICT4Ag) does not consider an oversample for the Port-à-Piment Watershed.

[b] Tools number 5: Energy will be only conducted within the Port-à-Piment Watershed. Hence an oversample for the Port-à-Piment Watershed here is not applicable.

[c] Farmers and household heads have been summarized as adult subjects.

Tools number 4 and 5 (Agriculture and Energy surveys, respectively) will neither target the same households as the first three nor happen at the same time. The Agriculture survey follows the seasonal crop calendar, and the Energy survey will be conducted in a different period as the other three surveys. Even if the random selection of households from the Agriculture or Energy survey overlaps with some of the households from the Socio-economic survey, there is no possible way to link the data between these surveys. All the data will be coded at different times, with randomly computer-developed codes. These procedures are explained in more detail in sections 9 and 10- Confidentiality of Study Data and Privacy Protections, respectively.

In addition, interviews in this study might involve individuals who are vulnerable to natural disasters or persons with economically disadvantaged status. Previous research studies indicate that residents of the Southern Departments are more vulnerable to extreme weather events,

food insecurity and poverty than other rural dwellers in the rest of the country. It is therefore expected to find and interview subjects within this status, although this study does not aim to target them as such. In any case, questions are not designed to be intrusive or offensive, and they will be asked in the most respectful way. In the event that a person finds a question in any way offensive or intrusive, the participant has the right to skip the question and may continue with the rest. Subjects can opt to finish the interview at any time if they feel uncomfortable with the type of questions being asked.

7. Recruitment

Recruitment for participation consists on verbally asking targeted subjects if they would be willing to be interviewed. Participation will depend upon their agreement to engage into an interview at a given place (most likely their homes) and time. Enumerators will conduct one-to-one recruitment. No other mean of advertisement or recruitment media will be used. Participation will be entirely voluntary. Subjects who choose to participate will not receive any direct financial reward. Subjects can opt to finish the interview at any time if they feel uncomfortable with the setting in which the interview is being conducted, as well as with the type of questions and data collected.

The text to be read to recruit subjects per tool is attached in the documents section of this protocol. All recruitment texts are currently in English. After CU IRB approval is conferred, the recruitment texts will be translated to Haitian Creole. Haitian Creole is one of the official languages in Haiti[4] and it is the most common language in Haiti's countryside. Certified translation of all texts will be provided after CU IRB confers approval to this protocol, based on CU's IRB policy for Enrollment of Non-English speaking subjects. An acceptable certified interpreter will prepare all the translations.

8. Informed Consent Process

According to recent figures from the Stratégie Nationale d'Action por l'Education pour Tous (SNA EPT, 2007) six out of ten Haitians are illiterate. Therefore, for all participants of 15 years and older, verbal consent will be requested. A consent text will be read in Haitian Creole to the participants, discussing any unclear points that they may have. The interviewer will explain the objectives of the research study, the type of questions for each tool, the procedures of the study, the risks and benefits of participation, and the privacy protection measures that the research team will engage into. All these topics and their rights as participants will be described in simple terms, free of discipline- specific jargon. Subjects will not be requested to sign anything, as they may be suspicious about signing forms in general, and writing their names specifically. A witness apart from the enumerator will be requested to sign, on behalf of the respondent.

The aspect of parental consent during the data collection of children between 0 and 5 years old is also being considered for the Anthropometric survey. The research team assumes that the assent of the child to participate in this research activity can be waived because the research involves no more than minimal risk to subjects; the waiver will not adversely affect the rights and welfare of the subjects; the research could not practicably be carried out without the waiver; and aggregated results from this study will be made public to subjects and whoever else

[4] The second official language in Haiti is French.

interested in the topic.

However, the research team will adjust this process if CU IRB requires it. The research team considers that these activities fall into the category of research with no more than minimal risk.

Consent forms for each tool are attached to the Documents section within this protocol, in English. After CU IRB approval is conferred, all consent forms will be translated to Haitian Creole. Haitian Creole is one of the official languages in Haiti[5] and it is the most common language in Haiti's countryside. Certified translation of all consent forms will be provided after CU IRB approves this protocol. As recommended by the CU's IRB policy for Enrollment of Non-English speaking subjects, an acceptable interpreter will prepare all the translations.

9. Confidentiality of Study Data

Confidentiality of the data will be secured by the following:

A. In Haiti

Consent forms and paper-based questionnaires will be stored in locked boxes in the in project office, in Haiti. Only the data manager will hold the key to the cabinets. This office will be locked whenever project personnel are not present.

For tools 1,2 and 3:

After the data is collected, a team of trained Haitian data entry clerks will enter the data using CSPro v 4.1. All data entry clerks were trained on IRB procedures, on the implementation of tools and use of the software. In addition, all data entry clerks signed the Individual Investigator Agreement provided by Columbia University at the beginning of the study. The computers used for data entry are connected to a local server where only the data entry team can access. All computers are password protected. All the data is backed up in a daily basis using CDs. All backups are encrypted (using GPG or PGP encryption) and stored in a closed drawer inside the project office. Only the data manager has access to the daily backup CDs.

After the data collection is concluded, the data entry, processing and cleaning will be carried out. The first step of the data processing incorporates logic and other quality control checks. Secondly, a coding treatment for all HH ID numbers and farms' GPS points will be conducted. The HH ID coding treatment consists on removing original HH IDs and substituting them with randomly generated ID numbers. On the other hand, the coding treatment for geographic identifiers such as GPS points consists on shifting each point by a randomly developed XY coordinates. The original linking files will be kept in Haiti, encrypted. Only the data manager will have access to the key for these files.

After the data is coded, the datasets will be de-identified. The de-identification treatment consists on removing all direct identifiers such as subjects' names and villages. Researchers at Columbia will use only coded datasets with no direct identifiers in it.
As requested by the Haitian Bioethics Committee, all paper-based records will be kept on file for five years. Afterward, all paper-based records will be permanently destroyed.

[5] The second official language in Haiti is French.

For the other tools:

During the data collection, enumerators will collect data through hand-held electronic units. These units operate under an android-based platform called ODK (Open Data Kit). On a daily basis, all the data collected through these devices will be uploaded into a password-protected online system, backed-up on a portable media device, and erased from each device's local memory. Data will be encrypted at all times: during transfer (using SSL encryption), while stored (using 256 bit AES), and at back up (using GPG or PGP encryption). Only the data team will have access to the password-protected server and to the uploaded files. The data team will make sure all the data is safely uploaded to the server and erased from the hand-held devices, for the next day's use.

In cases where the wi-fi is not available for electronic transfer, the data will be manually downloaded to password-protected laptops. These are project owned laptops which will be carried, at all times, by field coordinators. Only the field coordinators and the Data Manager in Haiti know the password to these laptops. After the data is downloaded, it will follow the same security procedures for storage, backup and deletion.

After the data collection, initial data processing (coding and data cleaning) will be conducted. The coding process regards both types of data: the statistical farm level data, and spatial data. The coding process will consist on substituting direct farm identifiers for randomly computer-developed codes, and removing all sources of direct identification. The coding treatment of GPS locations will consist on shifting each point by some randomly computer- developed XY coordinate in order to conduct zonal (aggregated) statistics. Researchers at Columbia will have access to coded datasets with no direct identifiers in it.

For the data processing, the data will be downloaded from the password-protected online system into password-protected computers, located at the project office. This office will be locked whenever project personnel are not present.

Once the data is coded and cleaned, the data team will upload the final versions into the password-protected online system. The system cares for file versioning, hence the probability of confusing files due to multiple transfers is null. All the data will be encrypted at all times: during transfer (using SSL –Secure Sockets Layer-- encryption), while stored (using 256 bit AES), and at back up (using GPG or PGP encryption).

B. At Columbia University

Quality assurance will be completed to ensure consistency and data quality. The electronic files containing the survey data will be downloaded for data quality assurance processing, from the secured online system to password-protected computers, using SSL encryption transfer. This data will be located at the Columbia University Center for International Earth Science Information Network (CIESIN), on the Lamont Campus, in Palisades, NY. Each member will use their own password- protected computer to log on to the password-protected system and download the data files that he or she has been assigned to. The online system cares for file versioning, hence the probability of confusing files due to multiple transfers is null. All the data will be encrypted at all times: during transfer (using SSL –Secure Sockets Layer-- encryption), while stored (using 256 bit AES), and at back up (using GPG or PGP encryption).

C. Data Analysis

The data analysis will only be undertaken by IRB- approved investigators and assistants included in the protocol. All the data files used during the analysis will be coded. No member from the NYC based research staff will have access to data files with direct identifiers.

During the data analysis, all data files will be kept in password-protected computers and only accessible to users who have been authorized by the IRB to work with those data sets. Passwords used to access machines where the data will be stored will be a minimum of eight total characters, and use a combination of letters, numbers, and special characters.

D. Data Archive

Once the data analyses are finalized, the data files will be archived on CIESIN's secure internal network, which is subject to bi-annual security audits by the federal government in compliance with NASA funding regulations. The data will be then accessible only to staff at CIESIN who are part of the research team, and who are able to access the data using secure, password-protected computers. External data users (anyone not on the Côte Sud Initiative protocol approved by Columbia University IRB) who wish to access the final versions of the datasets are encouraged to follow the companion document to this plan, the Côte Sud Initiative Data Access, Data Access Requirements and Data Use Agreements Policy (attached to this protocol).

The process to ensure the confidentiality and processing of the data is explained in the Quality Assurance and Data Analysis Plan. This document will be shared with all the research staff, as part of the training workshop to be conducted in Haiti before the data collection. The document will be also shared among the research staff based at Columbia University.

E. Mechanisms for Sharing Data Among Authorized Project Staff

All data users, including the research staff, Columbia affiliates, and external data users must take the IRB Human Subject Trainings. Data are stored on password-protected computers and only accessible to users who have been authorized by the IRB to work with those data sets. Passwords used to access machines where the data will be stored will be a minimum of eight total characters, and use a combination of letters, numbers, and special characters.

If at any point data transfer via email is required, an online password-protected link to the online sharing system will be provided. All file-sharing links containing data sets will have a 1-month expiration date, after its creation date. Depending on the user's needs and requirements, different permission levels can be assigned: previewer, downloader and/or editor.

10. Privacy Protections

At all times, participants' identities and household locations will be kept confidential for publication and presentation purposes. All data will be coded before the analysis, and results will be always presented as aggregates (statistically and spatially speaking). The identity of subjects and direct farm locations will not be disclosed with any other institution, government office or individual. Results will not contain any direct identifiers that could link the data with participants. The file linking codes and dataset with direct sources of identification will be kept in the project office, encrypted and under the safeguard of the Data Manager in Haiti.

The research team does not intend, in any way, to use the data for deception purposes. It is the team's best interest and duty to protect the privacy of those individuals who agreed to participate in this study.

11. Potential Risks

From previous literature review on the topic and feedback from researchers who are knowledgeable to specific conditions on the ground, the team does not anticipate that the risk of participation exceeds the normal risk that people run in working and living in the area. The interviewer's role is meant to be non-intrusive; therefore subjects are not expected to do anything other than what they do during a normal day.

For some people, some of the questions might seem intrusive or offensive. Enumerators will let subjects know about their rights as participants of a research study. In this regard, participants may skip questions that make them feel uncomfortable, or opt out of the interview, at any moment.

In terms of misleading expectations as a potential risk, the interviewer will be very specific during the reading and explanation of the consent text that participation does not give special advantages, direct compensation or aid to their families. While the team would like to encourage their participation as the key pillars of later interventions, it also needs to be sensitive of setting false expectations. Columbia University's role as a research institution will be emphasized at all times.

12. Data and Safety Monitoring

A. In Haiti

Consent forms and paper-based questionnaires will be stored in locked boxes in the in project office, in Haiti. Only the data manager will hold the key to the cabinets. This office will be locked whenever project personnel are not present.

For tools 1,2 and 3:

After the data is collected, a team of trained Haitian data entry clerks will enter the data using CSPro v 4.1. All data entry clerks were trained on IRB procedures, on the implementation of tools and use of the software. In addition, all data entry clerks signed the Individual Investigator Agreement provided by Columbia University at the beginning of the study. The computers used for data entry are connected to a local server where only the data entry team can access. All computers are password protected. All the data is backed up in a daily basis using CDs. All backups are encrypted (using GPG or PGP encryption) and stored in a closed drawer inside the project office. Only the data manager has access to the daily backup CDs.

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B. At Columbia University

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secured online system to password-protected computers, using SSL encryption transfer. This data will be located at the Columbia University Center for International Earth Science Information Network (CIESIN), on the Lamont Campus, in Palisades, NY. Each member will use their own password- protected computer to log on to the password-protected system and download the data files that he or she has been assigned to. The online system cares for file versioning, hence the probability of confusing files due to multiple transfers is null. All the data will be encrypted at all times: during transfer (using SSL –Secure Sockets Layer-- encryption), while stored (using 256 bit AES), and at back up (using GPG or PGP encryption).

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D. Data Archive

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13. Potential Benefits

The purpose of this baseline study is to collect statistically significant evidence of the social and economic conditions of the population in the southwestern coast of Haiti, at the micro-scale (household) level. It will also provide evidence of the current state of the infrastructure and services offered, at the regional scale.

The primary benefit from this study is to provide statistically significant data of social, economic, environmental and livelihoods aspects of rural dwellers in southern Haiti. Many researchers at Columbia have noted that some data sources available neither fit the project's scale nor provide current information that could be taken as baseline[6]. The data collected during this study will close, to a certain extent, this data gap. After the data collection and analysis, aggregated results will be made available through the project's website and baseline reports. Direct feedback of indicators and results will be also provided to community members with no internet access in the Port-à-Piment Watershed and CSI area.

Secondly, the data analysis will provide enough evidence to support tailor-based interventions in the Port-à-Piment Watershed and the rest of the communes. Interventions are planned to cover the following areas: agriculture, sustainable energy, health, education, early warning and disaster risk reduction, tourism, and private sector support. Baseline results will provide the basis for impact evaluation using repeat data collection in out-years (planned for Year 2 and 4).

14. Alternatives

Not applicable

15. Research at External Sites

A scanned copy of the approval letter from the Haitian Bioethics Committee has been included in the Documents section of the protocol.

[6] The last Living Conditions Survey in Haiti was conducted in 2001, and published in 2003 by the Institut Haitien de Statistique et d'Informatique (IHSI); the Demographic and Health Surveys does not provide enough detail information at the commune level.

References:

Cayemittes, Michel, Marie Florence Placide, Soumaïla Mariko, Bernard Barrère, Blaise Sévère, Canez Alexandre. 2007. *Enquête Mortalité, Morbidité et Utilisation des Services, Haïti, 2005-2006.* Calverton, Maryland, USA : Ministère de la Santé Publique et de la Population, Institut Haïtien de l'Enfance et Macro International Inc.

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Coordination Nationale de la Sécurité Alimentaire (CNSA) (2007). Analyse Compréhensive sur la Sécurité Alimentaire et de la Vulnerabilité en Milieu Rurale Haitïene. CNSA. Port-au-Prince, République d'Haïti.

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-- (2003). Recensement Général de la Population et de l'Habitat. Port-au-Prince, Institut Haitien des Statistique et d'Informatique (IHSI). 4: Santé.

-- (2003). Enquête sur les conditions de vie en Haïti. Port-au-Prince, Institiut Haïtien de Stastistique et d'Informatique. 1: Logement et Infrastructures.

-- (2003). Enquête sur les conditions de vie en Haïti. Port au Prince, Institute of Applied International Studies (FAFO); United Nations Development Programme (UNDP) and Institut Haitien de Statistique et d'Informatique (IHSI). 6: Force du travail.

-- (2003). Enquête sur les conditions de vie en Haïti. Port au Prince, Haiti, Institut Haitien de Statistique et d'Informatique (IHSI), United Nations Development Program (UNDP), Institute of Applied International Studies (FAFO). 2: Population, ménages et familles.

-- (2003). Enquête sur les conditions de vie en Haïti. Port au Prince, Institiut Haïtien de Stastistique et d'Informatique (IHSI). 7: Economie des Ménages.

Macro International Inc (1996). Sampling Manual DHS-III Basic Documentation No 6. Calverton, Maryland.

REPUBLIQUE D'HAITI

MINISTERE DE LA SANTE PUBLIQUE

ET DE LA POPULATION

Comité National de Bioéthique

Réf : 1011-44 13 septembre 2011

Mr Marc Levy,
Investigateur Principal

Réf : "Evaluation de base intégrée de la Côte Sud initiative.", Protocole No IRB-AAAi1704 v.1

Mr Levy,

Le Comité National de Bioéthique a étudié le protocole intitulé : " Evaluation de base intégrée de la Côte Sud initiative." Après constat que cette étude non invasive permettra d'améliorer les connaissances actuelles et pratiques sur les stratégies vaccinales, il approuve la conduite de cette étude du 13 septembre 2011 au 20 juin 2012.

Cette approbation couvre le protocole, la forme de consentement, le questionnaire. Le comité s'attend à recevoir pour approbation avant leur implémentation toute modification apportée dans le protocole, la forme de consentement ou le questionnaire.

Le comité veut recevoir une copie du rapport final et une copie de toute publication qui sera faite de cette étude.

Le comité vous souhaite du succès dans la réalisation de cette étude.

Gerald Lerebours
Président

Cc : Dr Alex Larsen, Ministre de la Santé Publique et de la Population
Dr Gabriel Thimothé, Directeur Général

Sampling Method for Household Surveys

Baseline Data Collection

Based on Macro International Inc. 1996. **Sampling Manual DHS-111** Basic Documentation No 6. Calverton, Maryland.

Overview

This document describes the general sampling methodology for the baseline CSI Household Surveying activities. The sampling method will consist of two (2) levels and a total of seven (7) specific tasks [A-G below]. The two (2) sampling phases include the random selection at two levels:

1) Randomly select **Segments** within the **Communes** for additional research; and
2) Randomly select **Household** within each selected **Research Segment**

Basic Procedures and Responsibilities

To complete the sampling method the following tasks must be undertaken:

#	Tasks	Responsibility
A)	Map the **Census Enumeration Areas** for each Commune using GIS – showing geographic range and household counts.	EI
B)	Define the **number of Segments** per Enumeration Area. Note: Each commune must total 75 segments with approximately 40 households in each segment.	EI
C)	Randomly select the **number of Research Segments** in each Enumeration Area. Note: Each Enumeration Area may have 0, 1, 2, or more Research Segments; therefore, not all Enumeration Areas will be visited while other may require significant enumeration.	EI
D)	If an Enumeration Area includes a Research Segment, then define the **Geographic Boundaries of each Segment** within the Enumeration Area. 1. If the Enumeration Area has only one (1) Segment then the boundaries of the Enumeration Area can be used as the Segment's boundaries with no additional work. 2. If the Enumeration Area has multiple Segments, then the team must **split** the Enumeration Area into the number of necessary Segments (see *Task B*) within the Enumeration Area. Each Segment must have approximately 40 households. This work will require travel to the Enumeration Area. [See Figure 1 & 2 below].	CRS
E)	**Randomly select** appropriate number of the **Research Segments within each Enumeration Area**. See *Task C* for number of Research Segments in each Enumeration Area	CRS
F)	Create a **Detailed Map of each Research Segment** including total number and location of each household. Create a list of Households with identifying information, such as household head name and address [See Figure 3 & 4 below]. This work will require travel to the Enumeration Area.	CRS
G)	**Randomly select ten (10) Households within each Research Segment.** Use the identification number from the Detailed Map, so	CRS

	the enumerator can find the selected household.	
>>	**Begin Enumeration of Research Households.** This work will require travel to the Enumeration Area.	CRS

FIGURE 1: EXAMPLE OF HIGH RESOLUTION MAPS CREATED TO ASSIST ENUMERATORS IN THE LOCALIZATION OF RESEARCH SEGMENTS IN THE FIELD [Task C]

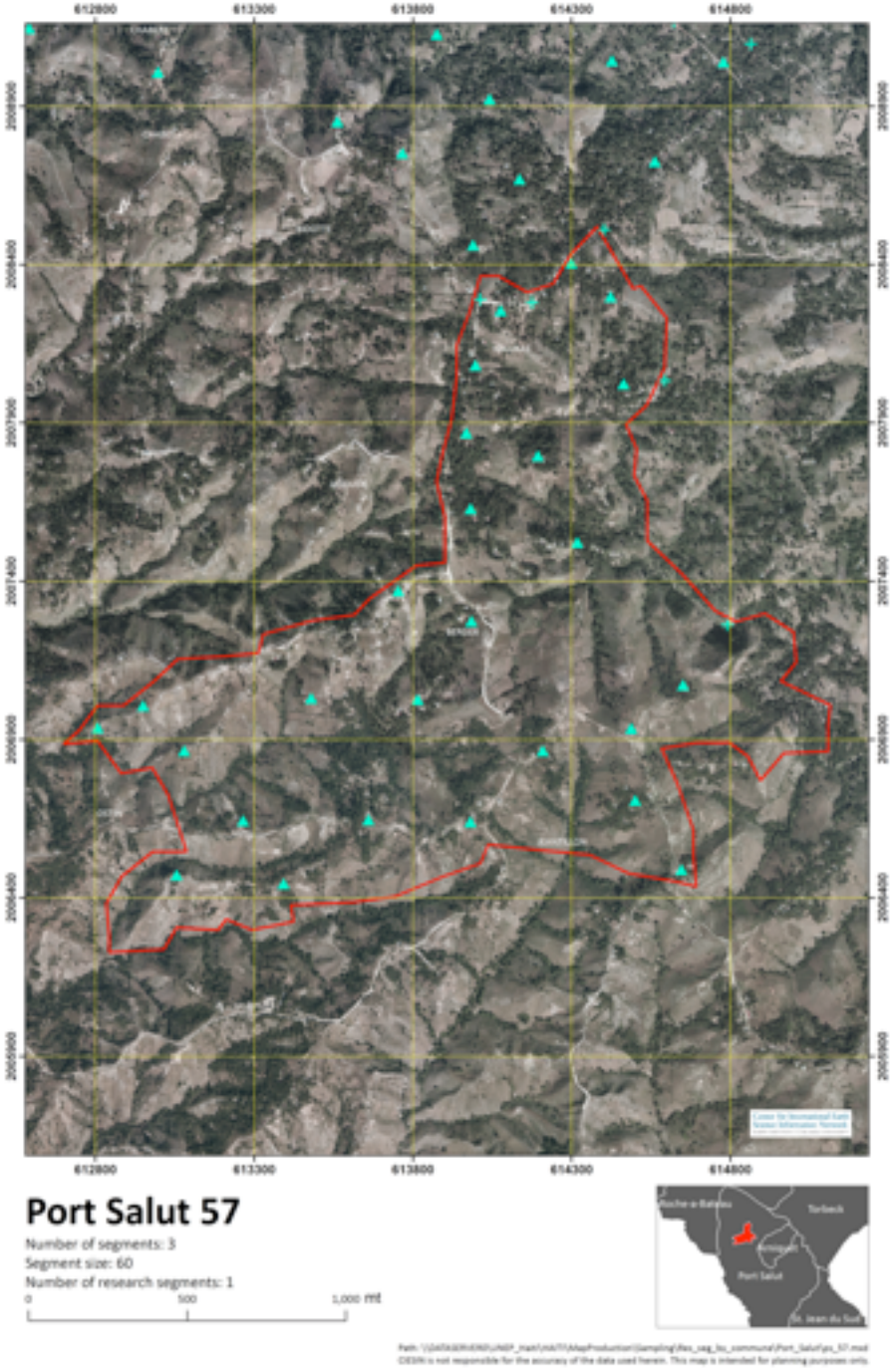

FIGURE 2: NUMBER OF HOUSEHOLDS IN EACH SEGMENT [Task D]

IDENTIFICATION			
PROVINCE	KOULIKORO	PROVINCE CODE	4
DISTRICT	DIOLA	DISTRICT CODE	02
TOWN~~/VILLAGE~~	DIONGAGA	TOWN/VILLAGE CODE	06
NAME OF MAPPER	WOLDE CONATE	CLUSTER CODE	023
NAME OF LISTER	ANDRE LUENA	DHS CLUSTER Nº	015

NUMBER OF SEGMENTS TO BE CREATED 03

Segment Number	Number of dwellings	Percent	Cumulative percent
1	220	35%	35%
2	190	30%	65%
3	210	35%	100%
4			
5			
6			
7			
8			
9			
10			
11			
12			

RANDOM NUMBER BETWEEN 1 AND 100: 067

SEGMENT SELECTED: 03

FIGURE 3: GEOGRAPHIC BOUNDARIES OF SEGMENT [Task D]

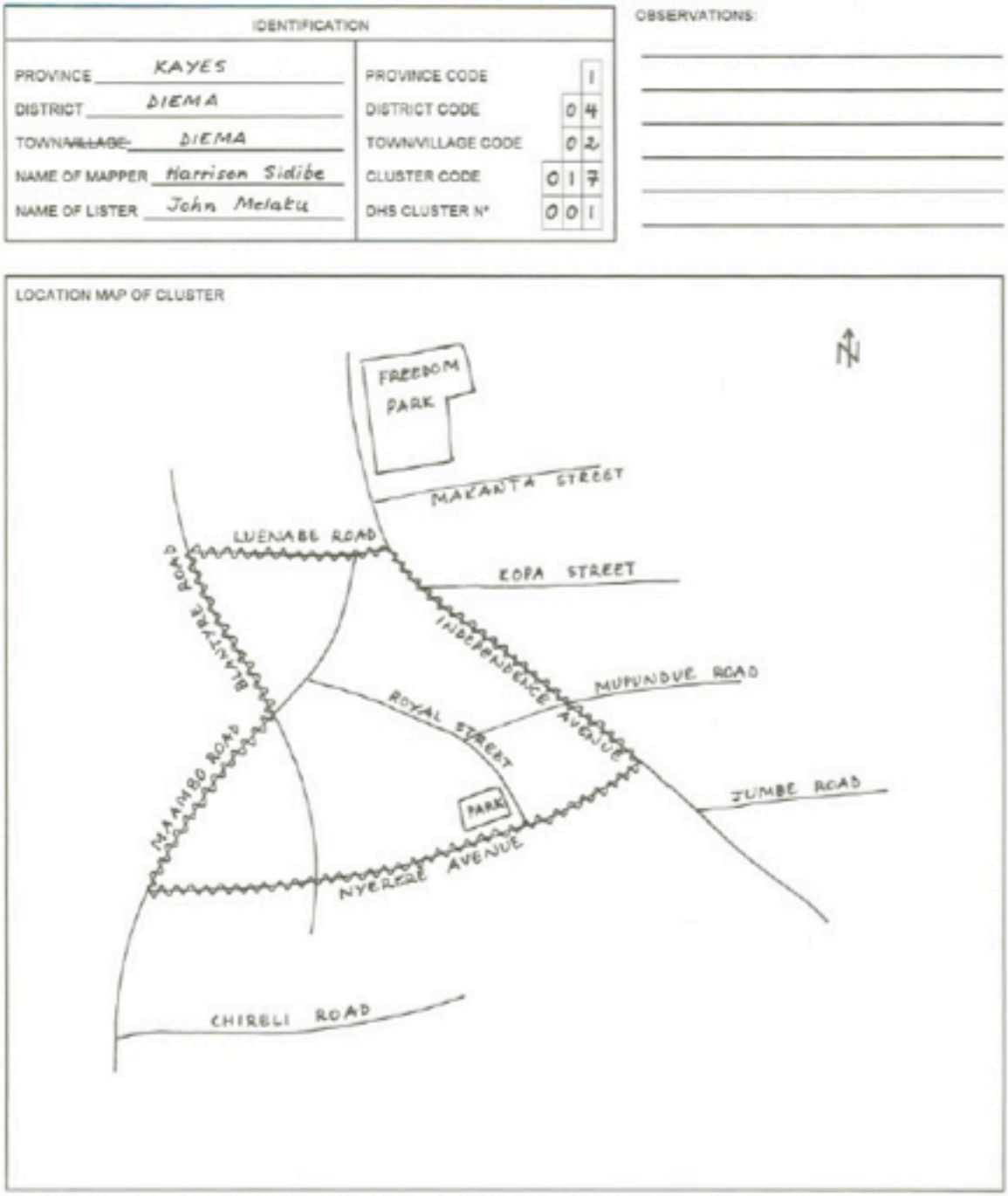

FIGURE 4: DETAILED MAP OF RESEARCH SEGMENT [Task F]

FIGURE 5: LIST OF HOUSEHOLDS WITH IDENTIFICATION NUMBER AND HOUSEHOLD HEAD NAME [Task F]

LEAVE BLANK		SERIAL N° OF STRUCTURE (1)	ADDRESS/DESCRIPTION OF STRUCTURE (2)	RESIDENCE Y/N (3)	SERIAL N° OF HOUSEHOLD IN STRUCTURE (4)	NAME OF HEAD OF HOUSEHOLD (5)	OBSERVATIONS (6)
HH TO INTERVIEW	HH NUMBER						
		1	Nyerere Avenue	N			Pharmacy Star
		2	6 Nyerere Avenue	Y	1	Diane Cloete	
		3	8 Nyerere Avenue	Y	1	Eugene Kariba	
					2	Dorothy Uchi	
		4	10 Nyerere Avenue	Y	1		No one at home.
		5	12 Nyerere Avenue	Y	1	Sam Lowa	
		6	14 Nyerere Avenue	Y	1	Harrison Coelibali	
					2	Paul Liande	
					3	Harry Fiwale	
		7	Avenue Nyerere	N			In construction
		8	Nyerere Avenue	N			In construction
		9	22 Royal Street	Y	1	George Sidibi	
		10	20 Royal Street	Y	1		Refused.
		11	18 Royal Street	Y	1	Chief Seidou	
		12	16 Royal Street	Y	1	Ana Tonde	
		13	Mupundue Road	N			Mosque
		14	4 Mupundue Road	N			Vacant
		15	6 Mupundue Road	Y	1	Suzanne Ilunga	
		16	8 Mupundue Road	Y	1	David Chowta	
					2	Joseph Lupiya	
		17	10 Mupundue Road	Y	1	Eleni Fahmi	
		18	10A Mupundue Road	Y	1	Doctor Tadesse	Home upstairs, clinic downstairs

Millennium Villages Project, Columbia University (Revised 2011-12-03)

HAITI: COTE SUD INITIATIVE

HOUSEHOLD SURVEY

COMMUNE _____

SECTION COMMUNAL _____

ENUMERATION AREA …… |____| |____| |____|

RESEARCH SEGMENT NUMBER……..… |____| |____|

HOUSEHOLD NUMBER ……..…….... |____| |____| |____|

HOUSEHOLD HEAD NAME _____

DIRECTIONS TO FIND THE HOUSEHOLD _____

_____

|___| |___| |___| Structure Number on Map _____

	VISIT #1	VISIT #2	VISIT #3	FINAL VISIT
DATE	___ / ___ / _____	___ / ___ / _____	___ / ___ / _____	DAY |___| |___|
				MONTH |___| |___|
				YEAR	2		0	|___| |___|
INTERVIEWER NAME	_____	_____	_____	INT. ID |___| |___| |___|
RESULT	|___| |___|	|___| |___|	|___| |___|	RESULT |___| |___|
NEXT VISIT: DATE	___ / ___ / _____	___ / ___ / _____	___ / ___ / _____	TOTAL NUMBER
TIME	__ __ : __ __	__ __ : __ __	__ __ : __ __	OF VISITS |___|

RESULT CODES
1 = Completed interview
2 = No competent household member at home
3 = Entire household absent for extended period of time
4 = Postponed
5 = Refused
6 = Partly completed interview
7 = Dwelling vacant / destroyed
8 = Dwelling not found
96 = Other (specify) _____

TOTAL PERSONS IN HOUSEHOLD |___| |___|

TOTAL ELIGIBLE WOMEN |___| |___|

LINE NO. OF RESPONDENT TO HOUSEHOLD QUESTIONNAIRE |___| |___|

SUPERVISOR	***FIELD EDITOR***	***FIRST DATA ENTRY***	***SECOND DATA ENTRY***
NAME: _____	*NAME:* _____		
ID: |___| |___| |___|	*ID:* |___| |___| |___|	*ID:* |___| |___| |___|	*ID:* |___| |___| |___|

►►► READ THE "INFORMED CONSENT STATEMENT" AND ANSWER ANY QUESTIONS.

1	At this time, do you want to ask me anything about the purpose or content of this interview? … Anything else? [RESPOND AS NECESSARY THEN ASK QUESTION BELOW.]	
2	May I begin the interview now?	1 = YES: RESPONDENT AGREES TO INTERVIEW 2 = NO: RESPONDENT DOES NOT AGREE → END INTERVIEW

IF THE INTERVIEWEE GIVES UNAMBIGUOUS AND CLEAR CONSENT TO BE INVOLVED, THEN SIGN BELOW:

FOR INTERVIEWER: I CONFIRM THAT THE "INFORMED CONSENT STATEMENT" HAS BEEN READ TO THE INTERVIEWEE AND THAT HE/SHE UNDERSTANDS AND CONSENTS TO PARTICIPATE IN THE INTERVIEW.

Print Name: _____ Signed: _____ Date: _____

START TIME: |___| |___| : |___| |___| → am / pm	END TIME: |___| |___| : |___| |___| → am / pm

102 Codes: Relation to HH Head	**108 Codes: Marital Status**	**109 Codes: Orphan Status**
0 = Head 1 = Spouse 2 = Parent 3 = Child (son/daughter) 4 = Grand child 5 = Nephew/Niece 6 = Son/daughter-in-law 7 = Brother/Sister 96 = Other relative 97 = Other non-relative	1 = Single 2 = Married partnership (living together) 4 = Widowed/Widower 5 = Separated / Divorced 90 = Don't Know	1 = Not an orphan 2 = Maternal orphan (only mother deceased) 3 = Paternal orphan (only father deceased) 4 = Double orphan (both father and mother deceased) 90 = Don't know
122-125-129: Level of Education	**131: Primary Occupation**	
STANDARD EDUCATION 10 = Pre-school 11 = Primary 12 = Secondary 13 = Vocational (post-primary) 14 = Vocational (post-secondary) 15 = University / College NON-STANDARD EDUCATION 16 = Non-standard pre-school 18 = School for adults (alphabetization) 19 = Adult vocational / technical training 90 = Don't Know	100 = Farmer/Livestock/Animal Husbandry/Fisherman 1 = Salaried (Professional, Government, NGO) with full time, regular pay 2 = Casual farm labor (not own farm) 3 = Casual non-farm labor 4 = Self employment in household or business enterprise 5 = Student 6 = Child care/Housework 7 = No occupation 96 = Other 90 = Don't Know	

SECTION A: DEMOGRAPHY

► Mark if additional pages for this section were used |____|

	SKIP PATTERN →							If Age > 15 years	If Age < 18 Years		
100	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**112**
LINE #	What are the names of all the Household members	What is [NAME] relation to HH head?	**Sex**	How many months has [NAME] lived in the house over the last 12 months?	What is [NAME] month and year of birth?		How old is [NAME]? [IF < 12 MONTHS ENTER '0']	What is [NAME] marital status?	Is one or both of [NAME] birth parents deceased? IF YES: Which parent?	CIRCLE LINE NO. OF ALL **WOMEN** AGE 15-49	CIRCLE LINE NO. OF ALL **CHILD-REN** AGE 0-5
	RESPONSE CODES →	SEE CODES PG 3	1 = M 2 = F	0-12	Month 90 = DK	Year 9990=DK	# YEARS	SEE CODES PG 3	SEE CODES PG 3		
LINE	**Name / Initials**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**112**
01			1 2	|____||____|			|____||____|			01	01
02			1 2	|____||____|			|____||____|			02	02
03			1 2	|____||____|			|____||____|			03	03
04			1 2	|____||____|			|____||____|			04	04
05			1 2	|____||____|			|____||____|			05	05
06			1 2	|____||____|			|____||____|			06	06
07			1 2	|____||____|			|____||____|			07	07
08			1 2	|____||____|			|____||____|			08	08
09			1 2	|____||____|			|____||____|			09	09
10			1 2	|____||____|			|____||____|			10	10
11			1 2	|____||____|			|____||____|			11	11
12			1 2	|____||____|			|____||____|			12	12
13			1 2	|____||____|			|____||____|			13	13
14			1 2	|____||____|			|____||____|			14	14
15			1 2	|____||____|			|____||____|			15	15

Section B: EDUCATION

	>>> FOR AGES 3+ YEARS			>>> FOR AGES 3-25 YEARS							If Age > 5 Years
120	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**
LINE #	Has [NAME] ever attended school or pre-school?	What is the highest **level** [NAME] **attended**? What is the highest **class or form** [NAME] **completed** at this level?		Did [NAME] attend school or pre-school at any time during the current (2011–2012) school year?	During this/that school year what level and class is/was [NAME] attending?		Did [NAME] receive a meal at school during the last day s/he attended school?	Did [NAME] attend school or pre-school at any time during the previous school year, that is (2010-2011)?	During that previous school year, what level and class did [NAME] attend?		During the past 12 months, what is the **primary occupation** of [NAME]?
	1 = Yes 2 = No ► **131** 90=DK ► **131**	LEVEL: SEE CODES PG 3	*CLASS OR FORM #* 90 = DK -9 =NA	1 = Yes 2 = No ► **128** 90=DK ► **128**	LEVEL: SEE CODES PG 3	*CLASS OR FORM #* 90 = DK -9 =NA	1 = Yes 2 = No 90 = DK -9 =NA	1 = Yes 2 = No ► **131** 90=DK ► **131**	LEVEL: SEE CODES PG 3	*CLASS OR FORM #* 90 = DK -9 =NA	SEE CODES PG 3
LINE	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**
01	1 2 90			1 2 90				1 2 90			
02	1 2 90			1 2 90				1 2 90			
03	1 2 90			1 2 90				1 2 90			
04	1 2 90			1 2 90				1 2 90			
05	1 2 90			1 2 90				1 2 90			
06	1 2 90			1 2 90				1 2 90			
07	1 2 90			1 2 90				1 2 90			
08	1 2 90			1 2 90				1 2 90			
09	1 2 90			1 2 90				1 2 90			
10	1 2 90			1 2 90				1 2 90			
11	1 2 90			1 2 90				1 2 90			
12	1 2 90			1 2 90				1 2 90			
13	1 2 90			1 2 90				1 2 90			
14	1 2 90			1 2 90				1 2 90			
15	1 2 90			1 2 90				1 2 90			

SECTION C: MIGRATION

140	141	142	143	144	145	146	147
LINE #	CHECK 104: IS MONTHS < 12?	What is the main reason that [NAME] lived outside of the household for part of the last 12 months?	CHECK 142: IS 142 = '1' OR RELATED TO WORK / EMPLOY-MENT?	In what months did [NAME] conduct this work? RECORD START AND END MONTH		In what country was this work conducted?	In what Haitian commune was this work conducted?
	1 = YES 2 = NO ► **104 NEXT LINE, IF NO MORE HH MEMBERS GO TO 150.**	1 = For Work 2 = For School 3 = To Live with or Care for Family / Friend 4 = Emergency due to household damage 90 = Don't Know 96 = Other (specify)	1 = Yes 2 = No ► **104 NEXT LINE**	STARTING MONTH (JAN-DEC) 1-12	ENDING MONTH (JAN-DEC) 1-12	1 = Haiti ► **147** 2 = Dominican Republic ► **104 NEXT LINE** 3 = USA ► **104** 4 = France ► **104** 90 = Don't Know ► **104** 96 = Other (specify) ► **104**	
LINE	**141**	**142**	**143**	**144**	**145**	**146**	**147**
01	1 2		1 2				
02	1 2		1 2				
03	1 2		1 2				
04	1 2		1 2				
05	1 2		1 2				
06	1 2		1 2				
07	1 2		1 2				
08	1 2		1 2				
09	1 2		1 2				
10	1 2		1 2				
11	1 2		1 2				
12	1 2		1 2				
13	1 2		1 2				
14	1 2		1 2				
15	1 2		1 2				

Section D: MALARIA PREVENTION

Now I would like to ask you about mosquito prevention.

150	At any time in the past 12 months, has anyone come into your dwelling to spray the interior walls against mosquitoes?	1 = Yes 2 = No → **152** 90 = Don't Know → **152**
151	Who sprayed the dwelling?	1 = Government Worker / Program 2 = Private Company 3 = Non-governmental organization (NGO) 96 = Other (specify) _____ 90 = Don't Know

152	Does your household have any mosquito nets that can be used while sleeping?	1 = Yes 2 = No → **170** 90 = Don't Know → **170**
153	How many functioning mosquito nets does your household have? [FUNCTIONING: NO MAJOR DAMAGE OR LARGE HOLES]	|____| |____|

		NET # 1	NET # 2	NET # 3
154	ASK THE RESPONDENT TO SHOW YOU ALL THE NETS IN THE HOUSEHOLD IF MORE THAN 3 NETS, USE ADDITIONAL QUESTIONNAIRE(S)	1 = OBSERVED 2 = NOT OBSERVED	1 = OBSERVED 2 = NOT OBSERVED	1 = OBSERVED 2 = NOT OBSERVED
155	How many months ago did your household get the mosquito net? IF LESS THAN ONE MONTH AGO, RECORD '00'	MONTHS |____| |____| AGO 95 = MORE THAN 36 MONTHS AGO 90 = DON'T KNOW	MONTHS |____| |____| AGO 95 = MORE THAN 36 MONTHS AGO 90 = DON'T KNOW	MONTHS |____| |____| AGO 95 = MORE THAN 36 MONTHS AGO 90 = DON'T KNOW
156	OBSERVE OR ASK THE BRAND/TYPE OF MOSQUITO NET	LONG-LASTING INSECTIDE TREATED NET (LLIN) 11 = BRAND POLESÈT▶ **160** 12 = DAWA ▶ **160** 16 = OTHER / DK BRAND ▶ **160** PRETREATED' NET 21 = SERENA ▶ **158** 26 = OTHER / DK BRAND ▶ **158** 96 = OTHER BRAND 90 = DK BRAND	LONG-LASTING INSECTIDE TREATED NET (LLIN) 11 = BRAND POLESÈT▶ **160** 12 = DAWA ▶ **160** 16 = OTHER / DK BRAND ▶ **160** PRETREATED' NET 21 = SERENA ▶ **158** 26 = OTHER / DK BRAND ▶ **158** 96 = OTHER BRAND 90 = DK BRAND	LONG-LASTING INSECTIDE TREATED NET (LLIN) 11 = BRAND POLESÈT▶ **160** 12 = DAWA ▶ **160** 16 = OTHER / DK BRAND ▶ **160** PRETREATED' NET 21 = SERENA ▶ **158** 26 = OTHER / DK BRAND ▶ **158** 96 = OTHER BRAND 90 = DK BRAND
157	When you got the net, was it already treated with an insecticide to kill or repel mosquitos?	1 = Yes 2 = No 90 = Don't Know	1 = Yes 2 = No 90 = Don't Know	1 = Yes 2 = No 90 = Don't Know
158	Since you got the net, was it ever soaked or dipped in a liquid to kill or repel mosquitoes?	1 = Yes 2 = No ▶ **160** 90 = Don't Know ▶ **160**	1 = Yes 2 = No ▶ **160** 90 = Don't Know ▶ **160**	1 = Yes 2 = No ▶ **160** 90 = Don't Know ▶ **160**
159	How many months ago was the net last soaked or dipped? IF LESS THAN ONE MONTH AGO, RECORD '00'	MONTHS |____| |____| AGO 95 = MORE THAN 24 MONTHS AGO 90 = DON'T KNOW	MONTHS |____| |____| AGO 95 = MORE THAN 24 MONTHS AGO 90 = DON'T KNOW	MONTHS |____| |____| AGO 95 = MORE THAN 24 MONTHS AGO 90 = DON'T KNOW
160	Did anyone sleep under this mosquito net last night?	1 = Yes 2 = No ▶ **162** 90 = Don't Know ▶ **162**	1 = Yes 2 = No ▶ **162** 90 = Don't Know ▶ **162**	1 = Yes 2 = No ▶ **162** 90 = Don't Know ▶ **162**

		NET # 1	NET # 2	NET # 3
161	Who slept under this mosquito net last night? RECORD THE PERSON'S NAME AND LINE NUMBER FROM THE HOUSEHOLD SCHEDULE	NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____|	NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____|	NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| .... NAME _______________ LINE # |____| |____| ....
162		GO BACK TO **154** IN NEXT COLUMN OR, IF NO MORE BEDNETS, GO TO **170**	GO BACK TO **154** IN NEXT COLUMN OR, IF NO MORE BEDNETS, GO TO **170**	GO TO **154** IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE BEDNETS, GO TO **170**

► Mark if additional pages for this section were used |____|

Section E: FOOD, WATER, AND ENERGY SECURITY

Now I would like to ask you about your household's food, water, and energy supply during different months of the year. When responding to these questions, please think back over the last 12 months.

170	In the past 12 months, were there months in which you did not have enough **food** to meet your family's needs?	1 = Yes 2 = No → **174** 90 = Don't Know → **174**
171	Which were the months (in the past 12 months) in which you did not have enough food to meet your family's needs? [PROMPT]: Are there any other months? [DO NOT READ THE LIST OF MONTHS] [CIRCLE ALL THAT APPLY]	01 = January 02 = February 03 = March 04 = April 05 = May 06 = June 07 = July 08 = August 09 = September 10 = October 11 = November 12 = December 90 = Don't Know
172	How did your household cope with the **food** deficiency**?** [CIRCLE ALL THAT APPLY]	1 = Purchase Food 2 = Assistance from others 3 = Food for work 4 = Selling assets 5 = Reducing number of Meals 6 = Reducing size of meals 7 = Nothing 8 = Cash for work 96 = Other (Specify) _____ 90 = Don't Know
173	How many days in the last 30 days did you not have enough **food** to meet your family's needs?	|_____| |_____| 90 = Don't Know
174	In the past 12 months, were there months in which you did not have enough **water** to meet your family's needs (for drinking or cooking)?	1 = Yes 2 = No → **176** 90 = Don't Know → **176**

175	Which were the months (in the past 12 months) in which you did not have enough **water** to meet your family's needs? [PROMPT]: Are there any other months? [DO NOT READ THE LIST OF MONTHS] [CIRCLE ALL THAT APPLY]	01 = January 02 = February 03 = March 04 = April 05 = May 06 = June 07 = July 08 = August 09 = September 10 = October 11 = November 12 = December 90 = Don't Know
176	In the past 12 months, were there months in which you had difficulty obtaining fuel that caused your household to go entirely without sufficient fuel for essential daily tasks (cooking, etc.)? [FUEL INCLUDES: FUELWOOD, CROP WASTE, DUNG, CHARCOAL, LPG (Liquid Petroleum Gas), ETC.]	1 = Yes 2 = No → **180** 90 = Don't Know → **180**
177	Which were the months (in the past 12 months) in which you did not have enough **fuel** to meet your family's needs? [PROMPT]: Are there any other months? [DO NOT READ THE LIST OF MONTHS] [CIRCLE ALL THAT APPLY]	01 = January 02 = February 03 = March 04 = April 05 = May 06 = June 07 = July 08 = August 09 = September 10 = October 11 = November 12 = December 90 = Don't Know

180	Now I would like to talk about food availability over the last 7 days. In the past one week, has it happened that because of insufficient food you experienced the following during at least one or more days:		YES	NO	DON'T KNOW
A.	… You had a day without eating anything all day?	A)	1	2	90
B.	… You reduced the size and/or number of meals eaten?	B)	1	2	90
C.	… You changed the family diet to cheaper or less-preferred foods?	C)	1	2	90
181	Now I would like to talk about food availability over the past 12 months. In the past year, has it happened that because of insufficient food you experienced the following		YES	NO	DON'T KNOW
A.	… One or more children from your family discontinued school in order to save money or to work for additional income?	A)	1	2	90
B.	… One or more of your family went to another neighborhood, village, town or city to find work?	B)	1	2	90
182	In the past year did your family have to do any of the following in order to buy food?		YES	NO	DON'T KNOW
A.	… Use money that was intended for investing in small business?	A)	1	2	90
B.	... Sell some household possessions, agricultural tools (e.g. hoes, rakes, ploughs), or productive tools (e.g. sewing machine carpentry tools)?	B)	1	2	90
C.	... Borrow food or borrow money for food from relatives, friends, neighbors, bank, or money lenders?	C)	1	2	90
D.	... Sell (or consume) seeds meant for planting next season's crops?	D)	1	2	90
E.	... Sell livestock (e.g. cows, oxen, camel donkey, mule, goats, sheep, chicken, other fowl, or rabbits)?	E)	1	2	90
F.	... Sell or pledge your land or house?	F)	1	2	90

Section F: ENVIRONMENTAL RISK

Now I would like to talk to you about environmental events.

185	**A.**	In the past three (3) years, what are the most important environmental problems that you have faced? [USE CODES BELOW]	1ST MOST IMPORTANT: |_____| |_____| 95 = None → **186** 90 = Don't Know → **186** 96 = Other (Specify) _____
	B.	[OPTIONAL]	2ND MOST IMPORTANT: |_____| |_____| 96 = Other (Specify) _____
	C.	[OPTIONAL]	3RD MOST IMPORTANT: |_____| |_____| 96 = Other (Specify) _____

280 CODES	5 = Flooding	10 = Land slides
1 = Contaminated drinking water	6 = Hurricanes / Cyclones	11 = Soil erosion
2 = Deforestation	7 = Inadequate rainfall / drought	12 = Storm surges from the ocean
3 = Dirty streams, rivers, lakes	8 = Inadequate sewage and sanitation	13 = Wind
4 = Earthquakes	9 = Infertile / poor soil	96 = Other (Specify)

186. Here is a list of environmental problems facing many communities. Please tell me how serious of a threat you consider each one to be to your community. Please rate them as 'not at all serious', 'somewhat serious', or 'very serious'.

	1 = Not at all Serious; 2 = Somewhat Serious; 3 = Very Serious; 90 = Don't Know			
a) Inadequate sewage and sanitation	1 = Not	2 = Somewhat	3 = Very	90 = DK
b) Land slides	1 = Not	2 = Somewhat	3 = Very	90 = DK
c) Earthquakes	1 = Not	2 = Somewhat	3 = Very	90 = DK
d) Contaminated drinking water	1 = Not	2 = Somewhat	3 = Very	90 = DK
e) Flooding	1 = Not	2 = Somewhat	3 = Very	90 = DK
f) Inadequate rainfall / drought	1 = Not	2 = Somewhat	3 = Very	90 = DK
g) Hurricanes / Cyclones	1 = Not	2 = Somewhat	3 = Very	90 = DK
h) Storm surges from the ocean	1 = Not	2 = Somewhat	3 = Very	90 = DK
i) Dirty streams, rivers, lakes	1 = Not	2 = Somewhat	3 = Very	90 = DK
j) Soil erosion	1 = Not	2 = Somewhat	3 = Very	90 = DK
k) Deforestation	1 = Not	2 = Somewhat	3 = Very	90 = DK
l) Infertile/poor soil	1 = Not	2 = Somewhat	3 = Very	90 = DK
m) Wind	1 = Not	2 = Somewhat	3 = Very	90 = DK
n) Climate change	1 = Not	2 = Somewhat	3 = Very	90 = DK

187	In the past three (3) years, have you experienced any damage or loss due to an extreme weather or environmental event (flooding, earthquake, etc.)?		1 = Yes 2 = No → **200** 90 = Don't Know → **200**
188	What was the most recent such event**?**	1 = Contaminated drinking water 2 = Deforestation 3 = Dirty streams, rivers, lakes 4 = Earthquakes 5 = Flooding 6 = Hurricanes / Cyclones 7 = Inadequate rainfall / drought 8 = Inadequate sewage and sanitation	9 = Infertile / poor soil 10 = Land slides 11 = Soil erosion 12 = Storm surges from the ocean 13 = Wind 96 = Other (Specify) _____ 90 = Don't Know
189	When did the most recent such event occur?	MONTH: YEAR:	|_____| |_____| 90 = Don't Know Month |_____| |_____| |_____| |_____| 9990 = Don't Know Year
190	CHECK 188: WAS THE MOST RECENT EVENT A 'HURRICANE / CYCLONE' [6]?		1 = YES → **192** 2 = NO
191	When was the last time you experienced any damage or loss due to a hurricane / cyclone?	95 = Never → **200** MONTH: YEAR:	 |_____| |_____| 90 = Don't Know Month |_____| |_____| |_____| |_____| 9990 = Don't Know Year
192	Did you have any warning before this hurricane / cyclone happened?		1 = Yes 2 = No → **200** 90 = Don't Know → **200**
193	How long before the hurricane / cyclone happened did you receive the **<u>first</u>** warning?	0 = Less than one (1) hour HOURS: DAYS:	 |_____| |_____| |_____| |_____| 990 = Don't Know
194	How did you **<u>first</u>** receive the warning before the hurricane / cyclone happened?		1 = Radio / television → **200** 2 = In person discussion or meeting 3 = Phone call 4 = SMS / text message 5 = Internet → **200** 96 = Other (Specify) _____ 90 = Don't Know

195	Who gave you the **first** warning before the hurricane / cyclone happened?	1 = Family member or friend living in local community 2 = Family member or friend living elsewhere (outside community) 3 = Local community organizer or leader 4 = Government or NGO worker 5 = Automated machine for phone or SMS / text message 96 = Other (Specify) _____ 90 = Don't Know

Section G: WATER USE

Now, I would like to talk with you about your household's energy and water use. If someone else in the household is the primary person responsible for fetching fuel or water, would it be possible for them to join the interview?

200	What is the main source of drinking-water for members of your household?	31 = Piped water into dwelling → **205** 32 = Piped water to yard/plot → **205** 33 = Public tap/standpipe 34 = Tubewell/borehole 35 = Protected dug well 36 = Unprotected dug well 37 = Protected spring 38 = Unprotected spring 39 = Rainwater collection 40 = Bottled water 41 = Cart with small tank/drum 42 = Tanker-truck 43 = Surface water (river, dam, lake, pond, stream, canal, irrigation channels) 96 = Other (specify) 90 = Don't Know
201	Where is that water source located?	1 = In own dwelling → **205** 2 = In own yard / plot → **205** 3 = Elsewhere
202	What is the distance in meters from your household to that water source?	-90 = Don't know |____| |____| |____| |____| METERS
203	How long does it take to go there, get water, and come back?	-90 = Don't know |_____| |_____| |_____| MINUTES
204	Who usually goes to this source to fetch the water for your household? PROBE: IS THIS PERSON UNDER AGE 15 YEARS? WHAT SEX? CIRCLE THE CODE THAT BEST DESCRIBES THIS PERSON.	1 = Adult Woman 2 = Adult Man 3 = Female child – Under 15 4 = Male child – Under 15 5 = Mix of female and male children 6 = Mix of female and male adults 7 = Shared among all household members 96 = Other (specify) _____ 90 = Don't Know

205	Is that drinking-water source the primary source during the dry season, wet season, or both seasons?	1 = Dry season 2 = Wet season 3 = Both seasons → **206** 90 = Don't know → **206**
205.A	During the [OTHER] season, what is the main source of drinking-water for members of your household? [NOTE: IF Q205 = '1 – DRY SEASON' THEN ASK ABOUT WET SEASON. IF Q205 = '2 – WET SEASON' THEN ASK ABOUT DRY SEASON.]	31 = Piped water into dwelling 32 = Piped water to yard/plot 33 = Public tap / standpipe 34 = Tubewell / borehole 35 = Protected dug well 36 = Unprotected dug well 37 = Protected spring 38 = Unprotected spring 39 = Rainwater collection 40 = Bottled water 41 = Cart with small tank / drum 42 = Tanker-truck 43 = Surface water (river, dam, lake, pond, stream, canal, irrigation channels) 96 = Other (specify) 90 = Don't Know

Now, I would like to talk to you about water treatment.

206	Do you treat your water in any way to make it safer to drink?	1 = Yes 2 = No → **210** 90 = Don't Know → **210**
207	What do you usually do to the water to make it safer to drink? …Anything else? [CIRCLE ALL THAT APPLY]	1 = Boil 2 = Add bleach / chlorine 3 = Strain it through a cloth 4 = Use a water filter (ceramic, sand, composite, etc.) 5 = Solar disinfection 6 = Let it stand and settle 7 = Aquatab _ 90 = Don't Know 96 = Other (specify) _____

Section H: SANITATION

Now, I would like to talk to you about sanitation and hygiene.

210	Can you show me where members of your household **most often** wash your hands? (ASK TO SEE AND OBSERVE. RECORD ONLY ONE HAND WASHING PLACE. THIS IS THE HAND WASHING PLACE THAT IS USED MOST OFTEN BY THE RESPONDENT OR HOUSEHOLD.)	1 = Inside/within 10 paces of the toilet facility 2 = Inside/within 10 paces of the kitchen/cooking place 3 = Elsewhere in home or yard 4 = Outside yard 5 = No specific place 6 = No permission to see → 214
211	OBSERVE: IS WATER PRESENT AT THE SPECIFIC PLACE FOR HAND WASHING? [IF THERE IS A TAP OR PUMP PRESENT AT THE	1 = Water is available 2 = Water is NOT available

	SPECIFIC PLACE FOR HAND WASHING, OPEN THE TAP OR OPERATE THE PUMP TO SEE IF WATER IS COMING OUT. IF THERE IS A BUCKET, BASIN, OR OTHER TYPE OF WATER CONTAINER, EXAMINE IT TO SEE WHETHER WATER IS PRESENT IN THE CONTAINER. RECORD OBSERVATION.]	
212	OBSERVE: IS SOAP OR DETERGENT PRESENT AT THE SPECIFIC PLACE FOR HAND WASHING? [CIRCLE ALL THAT APPLY]	1 = None 2 = Bar soap (for hand or clothes) 3 = Detergent (powder) FAB 4 = Liquid soap (including shampoo)
213	OBSERVE: IS LOCALLY USED CLEANSING AGENT PRESENT AT THE SPECIFIC PLACE FOR HAND WASHING? [CIRCLE ALL THAT APPLY.]	1 = None 2 = Ash 3 = Mud/sand 4 = Leaves 96 = Other (specify) _____
214	What kind of toilet facility do members of your household usually use? * [IF "Flush" OR "Pour Flush" THEN ASK: "Where does it flush to?"]	* Flush / Pour flush to: 11 = Flush to Piped sewer system 12 = Flush to Septic tank 13 = Flush to Pit latrine 14 = Flush to elsewhere 15 = Flush to unknown place / not sure / don't know 21 = Ventilated Improved Pit latrine (VIP) 22 = Pit latrine with slab 23 = Pit latrine without slab / open pit 24 = Composting toilet 25 = Bucket 26 = Hanging toilet / hanging latrine 30 = No facilities or bush or field → **220** 90 = Don't know 96 = Other (specify) _____
215	Do you share this facility with other households?	1 = Yes 2 = No → **220** 90 = Don't Know → **220**
216	How many households use this toilet facility?	-90 = Don't Know → **220** |_____| |_____| |_____| households 95 = 10 or more households
217	How many households outside of your own homestead use this toilet facility?	-90 = Don't Know |_____| |_____| |_____| households 95 = 10 or more households

Section J: ENERGY USE

220	Do you or any household members cook meals at home?	1 = Yes 2 = No → **231** 90 = Don't Know

221	What is your household's **primary** type of energy / fuel used for cooking household meals? [NOTE: THIS DOES NOT INCLUDE COOKING FOR SELLING OR INCOME GENERATION.] [NOTE: "PRIMARY TYPE" MEANS MOST NUMBER OF MEALS COOKED.]	1 = Firewood 2 = Charcoal 3 = Gas / LPG 4 = Kerosene 5 = Electricity – grid / wire 11 = Biogas 12 = Sawdust 13 = Candles 14 = Farm Residue / Crop Waste 15 = Dung / Manure	16 = Electricity – batteries, rechargeable 17 = Electricity – batteries, dry cell 18 = Electricity - water or wind 19 = Electricity - diesel or petrol generator 20 = Electricity - Solar Panel 21 = Solar Heater or Cooker / Solar Thermal 96 = Other (specify) _____ 90 = Don't Know → **231**
222	Where do you find your primary source of energy?	1 = Fallow lands owned by household 2 = Other land / trees / field owned by household 3 = Roadside / community land / forest 4 = Some else's land/field 5 = Purchased 6 = Obtained by exchange for other items (but not purchased) 7 = Received as a gift	8 = Produced by household (e.g. biogas, sawdust; NOT firewood) 9 = Waste from non-farm work (e.g. carpentry, building, etc.) 10 = Nature (e.g. wind, water, sun) 11 = From Household Fuel Storage / Reserves 12 = Recharging service 96 = Other (specify) _____ 90 = Don't Know → **231**
223	What percentage of your household's energy/fuel is acquired from this source?		-90 Don't Know |_____| |_____| |_____| %
224	What is the distance in meters from your household to that fuel source?		-90 = Don't know |____| |____| |____| |____| METERS
225	How long does it take to go there, get fuel, and come back?		-90 = Don't know |_____| |_____| |_____| MINUTES
226	During a normal week, how many hours are spent gathering this type of energy / fuel?		-90 = Don't know |_____| |_____| |_____| HOURS/WEEK
227	Who is the primary household member(s) responsible for gathering this type of energy / fuel?	1 = Girl(s) < 15 years 2 = Boy(s) < 15 years 3 = Adult Female(s) 4 = Adult Male(s) 5 = Mix of female and male children 6 = Mix of female and male adults	7 = Shared among all household members (combinations of adults and children) 96 = Other (specify) _____ 90 = Don't Know
228	During a normal week, how many trips do the primary household member(s) go to collect this type of energy / fuel?		-90 = Don't Know |_____| |_____| |_____| TRIPS per WEEK
229	What is your household's **secondary** type of energy / fuel used for cooking household meals? [NOTE: THIS DOES NOT INCLUDE COOKING FOR SELLING OR INCOME GENERATION.]	95 = No Secondary Type of Energy / Fuel Used 1 = Firewood 2 = Charcoal 3 = Gas / LPG 4 = Kerosene 5 = Electricity – grid / wire 11 = Biogas	16 = Electricity – batteries, rechargeable 17 = Electricity – batteries, dry cell 18 = Electricity from water or wind 19 = Electricity (diesel or petrol generator) 20 = Electricity from Solar Panel 21 = Solar Heater or Cooker / Solar Thermal 96 = Other (specify)

		12 = Sawdust 13 = Candles 14 = Farm Residue / Crop Waste 15 = Dung / Manure _____ 90 = Don't Know
230	In a normal week, how much does your household spend on your primary and secondary sources of cooking fuel?	9990 = Don't Know |_____| |_____| |_____| |_____| . |_____| |_____| GOURDES/WEEK

Now, I would like to talk to you about energy for lighting.

231	What is the primary energy source that your household uses for lighting?	95 = No light source used → **236** 4 = Kerosene / White Gas 5 = Electricity – grid / wire 11 = Biogas 13 = Candles 16 = Electricity – batteries, rechargeable 17 = Electricity – batteries, dry cell 18 = Electricity - water or wind 19 = Electricity - diesel or petrol generator 20 = Electricity - Solar PV 90 = Don't Know 96 = Other (specify) _____
232	In a normal week, how many hours of lighting does your household use from this primary source?	-90 = Don't Know |_____| |_____| |_____| hours / week
233	What is the secondary energy source that your household uses for lighting?	95 = No other light source used → **235** 4 = Kerosene 5 = Electricity – grid / wire 11 = Biogas 13 = Candles 16 = Electricity – batteries, rechargeable 17 = Electricity – batteries, dry cell 18 = Electricity - water or wind 19 = Electricity - diesel or petrol generator 20 = Electricity - Solar PV 90 = Don't Know 96 = Other (specify) _____
234	In a normal week, how many hours of lighting does your household use from this secondary source?	-90 = Don't Know |_____| |_____| |_____| hours per week
235	In a normal week, how much does your household spend on your primary and secondary sources of lighting? GOURDES/WEEK:	9990 = Don't Know |_____| |_____| |_____| |_____| . |_____| |_____|
236	In a normal week, how much does your household spend on battery recharging including mobile phone recharging? GOURDES/WEEK:	9990 = Don't Know |_____| |_____| |_____| |_____| . |_____| |_____|

Section K: COMMUNICATIONS AND MEDIA

	240	241	241.A	241.B	241.C	241.D	241.E	241.F
#	During the past 12 months, has anyone in the household used [ITEMS]…?		During the past 12 months, how many household members have used [ITEM]?	How frequently do you or one of your household members use [ITEM]?	What is the primary activity that you or your household members use [ITEM] for?	Do you have this (ITEM) at home	Where do you access this (ITEM)?	How far do you have to travel to access [ITEM]?
	1 = Yes 2 = No → ▼ **NEXT ITEM** 90 = DK → ▼ **NEXT ITEM**		#	SEE LIST	SEE LIST	1 = Yes → ▼ NEXT ITEM 2 = No	SEE LIST	meters -90 = DK
	240	**241**	**241.A**	**241.B**	**241.C**	**241.D**	**241.E**	**241.F**
1	Landline telephone?							meters
2	Mobile phone?							meters
3	Internet phone / Email?							meters

241.B. Frequency	241.C. Purpose	241.E. Access Location
11 = At least once a day 12 = At least once a week but not every day 13 = At least once a month but not every week 14 = Less than once a month 90 = Don't Know	1 = Social communication (friends, family) 2 = Work or Employment related (not buying or selling) 3 = Business transaction related (buying & selling) 4 = Search for public information, browse the web, internet 5 = Educational purposes 6 = Access news and entertainment 7 = Health or health services 96 = Other 90 = Don't Know	11 = Own home → ▼ NEXT ITEM 12 = Friend / neighbor (outside home) 13 = Commercial provider (business, kiosk) 14 = School 15 = Health facility 16 = Other community center (non-commercial) 96 = Other 90 = Don't Know

Section L: TRANSPORTATION

Now, I would like to talk to you about transportation.

	245	246	247
#	During the past 12 months, how frequently do you or one of your household members take [TYPE] trip?		What kind of transportation do you typically use for most of a [TYPE] trip?
	11 = At least once a day 12 = At least once a week but not every day 13 = At least once a month but not every week 14 = Less than once a month 15 = Not at all →▼ **NEXT ITEM** 90 = Don't Know		1 = On foot 2 = Bicycle / bicycle taxi 3 = Motorcycle 4 = Car van / minibus 5 = Bus 6 = Walk to paved road then public transport 7 = Donkey, horse, mule 8 = Boat 96 = Other 90 = Don't know
	245	**246**	**247**
A	Business/Shopping (purchasing, selling, exchange, trade)		
B	Social or family visits or functions		
C	Attending School		
D	Medical (visiting a clinic, hospital, or health service)		
E	Agricultural Employment Away from own home / farm		

Section M: Credit and Savings

Now, I would like to talk to you about loans, remittances, and other assistance. Please remember this information is confidential and you can refuse to answer any question.

250	Has any member of this household received credit, loan, or payment-plan in the past 12 months?		1 = Yes 2 = No → **254** 90 = Don't Know → **254**
251	What is the total value of credit, loans, or payment-plans received during the past 12 months by all the household members combined? Gourdes Amount:		-90 = Don't Know -80 = Refused to answer _____
252	What source(s) provided the credit, loans, or payment-plans? …Anywhere else? [CIRCLE ALL THAT APPLY]	1 = Commercial Bank 2 = Micro finance Institutions 3 = Non-Governmental Organization (NGO) 4 = Local organization / Community-Based Organization (CBO) 5 = Women's group 6 = Private organizations 7 = Relative 8 = Friend 9 = Neighbour	10 = Vendor / seller (of item, device, etc.) 11 = Moneylender / Shylock (Jaholo) 12 = Cooperative / Credit union 13 = Employer 14 = MVP 90 = Don't Know 96 = Other (specify) _____
253	What is the purpose of these credit, loans, or payment-plans? …Anywhere else? [CIRCLE ALL THAT APPLY]	1 = Fertilizer / seeds 2 = Purchase livestock 3 = Agricultural equipment (motorized) 4 = Agricultural equipment (non-motorized) 5 = Education 6 = Establish business 7 = Upgrade business 8 = Food 9 = Funeral expenses 10 = Health related expenses 11 = Motorized vehicle 12 = Non-motorized vehicle	13 = Communication or computing equipment 14 = Power equipment (solar PV, generator, engine) 15 = Household/business appliance 16 = Television, radio, other entertainment device 17 = Home improvement 19 = Furniture 20 = Portable rechargeable solar lantern 90 = Don't Know 96 = Other (specify) _____

Now, I would like to talk to you about other bank services.

254	Does any member of your household have a bank account?	1 = Yes 2 = No 90 = Don't Know

Section N: Housing Construction

[NOTE: ENUMERATOR MAY OBSERVE THE CONDITION OF THE HOUSE AND RECORD ANSWER WITHOUT ASKING THE RESPONDENT.]
Now, I would like to ask you about the construction of your home.

260	What is the main material of the wall of your house?	NATURAL WALLS 11 = No walls 12 = Cane / palm / trunks 13 = Dirt / mud RUDIMENTARY WALLS 21 = Wood / bamboo with mud 22 = Stone with mud 23 = Uncovered adobe (Klise) 24 = Plywood 25 = Cardboard 26 = Reused wood	FINISHED WALLS 31 = Cement 32 = Stone with lime / cement 33 = Bricks 34 = Cement blocks 35 = Covered adobe 36 = Wood planks / shingles 96 = Other (Specify) _____ 90 = Don't Know
261	What is the main material of the floor of your house?	NATURAL FLOOR 11 = Earth / sand 12 = Dung RUDIMENTARY FLOOR 21 = Wood planks 22 = Palm / bamboo	FINISHED FLOOR 31 = Parquet or polished wood 32 = Vinyl or asphalt strips 33 = Ceramic tiles 34 = Cement 35 = Carpet / mats 96 = Other (Specify) _____ 90 = Don't Know
262	What is the main roofing material of your house?	NATURAL ROOFING 11 = No roof 12 = Thatch / palm leaf 13 = Sod RUDIMENTARY ROOFING 21 = Rustic mat 22 = Palm / reed / bamboo 23 = Wood planks (and mud) 24 = Cardboard 25 = Plastic/Tent	FINISHED ROOFING 31 = Metal / corrugated iron 32 = Wood 33 = Calamine / cement fiber 34 = Ceramic tiles 35 = Cement 36 = Roofing shingles 96 = Other (Specify) _____ 90 = Don't Know
263	What type of windows (if any) does your house have?	1 = No windows 2 = Open or uncovered 3 = Wooden window shutters 4 = Screen or glass	5 = Corrugated iron / zinc 96 = Other (Specify) _____ 90 = Don't Know
264	How many bedrooms does your main house have?		|____| |____| Number of Rooms
265	Do you or any of your household members' own this main house?		1 = Yes 2 = No 90 = Don't Know

Section P: HOUSEHOLD ASSETS

Now I would like to talk to you about your household assets. Please answer 'Yes' if you own any of the following items, unless the item does not currently work / function. Please include only assets that are owned by your household members and not those assets owned by other homestead members.

ENUMERATORS: ► FIRST, COMPLETE Q270 FOR THE FULL SET OF ASSETS ► THEN ASK Q271- Q272

		270	271	272
	ITEMS	Do you own the following functioning assets? 1 = Yes 2 = No ▼ **NEXT ITEM**	(If Q270=1 'Yes') How many [ITEM] do you own that are functioning?	If you were to sell this / these [ITEM] today, how much money would you receive for it? IF MORE THAN ONE ITEM OWNED, ASK ABOUT TOTAL VALUE OF ALL ITEMS Gourdes DON'T KNOW = -9999
CODE				
701	Table			
702	Chair			
703	Bed			
704	Sofa			
705	Wardrobe			
708	Kerosene Lamp			
709	Torch / Lamp powered by disposable batteries			
795	Torch / Lamp powered by solar panel / module			
796	Improved cookstove (modern)			
766	Bucket			
732	Radio			
733	Tape Recorder / Cassette Player			
734	Mobile phone			
738	Landline telephone into household (non-mobile)			
736	Wall Clock			
798	Watch			
735	Computer			
737	Camera			
750	Television			
761	Engine / generator (includes multi-function platform)			
797	Solar home system – solar panel and battery			
754	Refrigerator			
791	Animal-drawn cart (wheels)			
756	Bicycle			
759	Motorcycle or scooter			
760	Any other motor vehicle (car, truck, bus, etc.)			
799	Grid Electricity connection in the home (EDH)			
798	Other Electricity (non-EDH, other type)			

Section R: LIVESTOCK

Now I would like to talk to you about your livestock.

280	Do you own any livestock or other animals?	1 = Yes 2 = No → **300** 90= DK → **300**

Please answer 'Yes' if you own any of the following livestock. Please include only livestock that are owned by your household members and not those livestock owned by other homestead members.

ENUMERATORS: ► FIRST, COMPLETE Q281 FOR THE FULL SET OF LIVESTOCK ► THEN ASK Q282

			281	**282**
CODE		**TYPE OF LIVESTOCK**	Do you own any [TYPE OF LIVESTOCK]?	How many [TYPE OF LIVESTOCK] do you own?
			1 = Yes 2 = No ▼ **NEXT ITEM**	## DK = -90
			281	**282**
CODE		**LIVESTOCK**		
801	a.	Cows		
802	b.	Goats		
803	c.	Heifers		
804	d.	Bulls		
805	e.	Donkeys		
807	g.	Sheep		
808	h.	Chicken		
809	i.	Ducks or other birds		
810	m.	Horse		
813	p.	Pigs		
815	r.	Rabbits		
816	s.	Beehive		
817	t.	Other (specify)		
818	u.	Other (specify)		

Section S: LAND OWNERSHIP AND USE

Now, I would like to talk to you about your land use and ownership. [CONVERSION: 1 KAWO = 16 SEIZIEM]

300	What is the total amount of land you or your household own, use and/or operate on?	|___||___||___||___| • |___||___| -90 = Don't Know
301	DID RESPONDENT REPORT KAWO OR SEZIEME IN THE PREVIOUS QUESTION?	1 = ACRES 2 = HECTARES 3 = KAWO _ 4 = SEIZIEM _ 96 = OTHER (SPECIFY)_____

Section T: AGRICULTURAL ACTIVITIES

Now, I would like to talk about the land that you have used during the most recent major and minor seasons (November 2011 – October 2012).

310	From November 2010 to October 2011, did you use any land for ….. A.) …. farming / crop production? B.) …. wood-based products, such as fuelwood, timber, or charcoal? C.) …. animal-based products, such as milk, eggs, or honey?	YES / NO / DK A. 1 2 90 B. 1 2 90 C. 1 2 90
311	CHECK 310.A, 310.B, AND 310.C FOR ANY LAND USE: IS '1=YES' CIRCLED IN AT LEAST ONE (1) CASE? IF 'NO', PROBE: "Just to make sure that I have this right: You did not use any land for farming, wood-, or animal-based products. Is this correct?"	1 = Land Used 2 = No Land Used → **PROBE, IF STILL 'NO LAND USED' THEN → 500**
312	CHECK 310.A: DID RESPONDENT USE LAND FOR FARMING / CROP PRODUCTION '1=YES'?	1 = Yes 2 = No → **320**
313	From November 2010 to October 2011, what is the total amount of land you used for farming / crop production? [CHECK 300: AMOUNT IN THIS QUESTION SHOULD NOT BE MORE THAN TOTAL AMOUNT IN Q300]	|___||___||___||___| • |___||___| -90 = Don't Know
314	DID RESPONDENT REPORT KAWO OR SEIZIEM IN THE PREVIOUS QUESTION?	1 = ACRES 2 = HECTARES 3 = KAWO _ 4 = SEIZIEM _ 96 = OTHER (SPECIFY)_____

Section T.1: LAND USE - PARCELS

320	Now I would like to talk to you about your parcels of land. A parcel of land is a continuous area of land that has been previously managed or is planned to be managed. How many different parcels of land do you own, use, and/or operate on? [USE PICTURE IF NEEDED]	|____| |____|

Please list your parcel from the largest size parcel to the smallest size parcel.

		PARCEL # 01	PARCEL # 02	PARCEL # 03
321	What is the land area of this parcel?	|___| |___| |___| • |___| - 90 = Don't Know	|___| |___| |___| • |___| - 90 = Don't Know	|___| |___| |___| • |___| - 90 = Don't Know
322	LAND AREA UNIT?	1 = ACRES 2 = HECTARES 3 = KAWO _ 4 = SEIZIEM _ 96 = OTHER (SPECIFY) ____________________	1 = ACRES 2 = HECTARES 3 = KAWO _ 4 = SEIZIEM _ 96 = OTHER (SPECIFY) ____________________	1 = ACRES 2 = HECTARES 3 = KAWO _ 4 = SEIZIEM _ 96 = OTHER (SPECIFY) ____________________
323	Do you own the parcel or have secure land tenure?	1 = Yes 2 = No 90 = Don't Know	1 = Yes 2 = No 90 = Don't Know	1 = Yes 2 = No 90 = Don't Know
324	What is the distance in meters from your household to this parcel?	|___| |___| |___| |___| METERS -90 = Don't know	|___| |___| |___| |___| METERS -90 = Don't know	|___| |___| |___| |___| METERS -90 = Don't know
324.A	How long does it take to go this parcel from the household?	|___| |___| |___| MINUTES -90 = Don't know	|___| |___| |___| MINUTES -90 = Don't know	|___| |___| |___| MINUTES -90 = Don't know
325	Where is this parcel located – on flat land at the top of a hill, on side of a hill, or on flat land at the bottom of a hill? [CIRCLE ALL THAT APPLY] [USE PICTURE IF NEEDED]	1 = Flat land on top of a hill 2 = Side of hill 3 = Flat land on the bottom of hill	1 = Flat land on top of a hill 2 = Side of hill 3 = Flat land on the bottom of hill	1 = Flat land on top of a hill 2 = Side of hill 3= Flat land on the bottom of hill
326	From November 2010 to October 2011, what was this parcel used for? [CIRCLE ALL THAT APPLY]	1 = Crop cultivation 2 = Tree cover / planting 3 = Woodlot 4 = Grazing 5 = Fallow 6 = Fish farm 7 = Unmanaged 8 = To make charcoal _ 96 = Other (specify) ___________________ 90 = Don't Know	1 = Crop cultivation 2 = Tree cover / planting 3 = Woodlot 4 = Grazing 5 = Fallow 6 = Fish farm 7 = Unmanaged 8 = To make charcoal _ 96 = Other (specify) ___________________ 90 = Don't Know	1 = Crop cultivation 2 = Tree cover / planting 3 = Woodlot 4 = Grazing 5 = Fallow 6 = Fish farm 7 = Unmanaged 8 = To make charcoal _ 96 = Other (specify) ___________________ 90 = Don't Know

327	CHECK 326: ARE TWO OR MORE CODES CIRCLED?	1 = YES 2 = NO → **328.A**	1 = YES 2 = NO → **328.A**	1 = YES 2 = NO → **328.A**
328	What is the primary land use for this parcel? [USE CODES FROM 326]	Primary Land Use …...... |___| |___|	Primary Land Use …...... |___| |___|	Primary Land Use …...... |___| |___|
328.A	CHECK 326: WAS CROP CULTIVATION (1) SELECTED?	1 = YES 2 = NO → **329**	1 = YES 2 = NO → **329**	1 = YES 2 = NO → **329**
328.B	From November 2010 to October 2011, what were the crops that you harvested in this parcel? [SEE LIST ON PAGE 32]	1st………. |___| |___| |___| 2nd………. |___| |___| |___| 3rd………. |___| |___| |___| 4th………. |___| |___| |___|	1st………. |___| |___| |___| 2nd………. |___| |___| |___| 3rd………. |___| |___| |___| 4th………. |___| |___| |___|	1st………. |___| |___| |___| 2nd………. |___| |___| |___| 3rd………. |___| |___| |___| 4th………. |___| |___| |___|
329	From November 2010 to October 2011, what land preparation method(s) did you use on this parcel? [CIRCLE ALL THAT APPLY]	1 = No tillage 2 = By hands / jembe / hoe 3 = Ploughing with oxen / horse / donkey 4 = Mechanized	1 = No tillage 2 = By hands / jembe / hoe 3 = Ploughing with oxen / horse / donkey 4 = Mechanized	1 = No tillage 2 = By hands / jembe / hoe 3 = Ploughing with oxen / horse / donkey 4 = Mechanized
330	From November 2010 to October 2011, what soil conservation method(s) did you use on this parcel? [CIRCLE ALL THAT APPLY]	95 = No method 1 = Vegetative (using plants) 2 = Structural (using soil, rocks)	95 = No method 1 = Vegetative (using plants) 2 = Structural (using soil, rocks)	95 = No method 1 = Vegetative (using plants) 2 = Structural (using soil, rocks)
331	From November 2010 to October 2011, what soil fertility method(s) did you use on this parcel? [CIRCLE ALL THAT APPLY]	95 = No method 1 = Crop residues 2 = Animal manure 3 = Fertilizer 4 = Natural fallow 5 = Improved fallow 6 = Legume cover crop 7 = Biomass transfer 8 = Compost	95 = No method 1 = Crop residues 2 = Animal manure 3 = Fertilizer 4 = Natural fallow 5 = Improved fallow 6 = Legume cover crop 7 = Biomass transfer 8 = Compost	95 = No method 1 = Crop residues 2 = Animal manure 3 = Fertilizer 4 = Natural fallow 5 = Improved fallow 6 = Legume cover crop 7 = Biomass transfer 8 = Compost
332	Excluding normal rains, was water redistributed or any type of irrigation system used on this parcel from November 2010 to October 2011?	1 = Yes 2 = No → **336** 90 = Don't Know → **336**	1 = Yes 2 = No → **336** 90 = Don't Know → **336**	1 = Yes 2 = No → **336** 90 = Don't Know → **336**
333	From November 2010 to October 2011, what type of irrigation system did you use on this parcel?	1 = Flood irrigation 2 = Furrow irrigation 3 = Bucket irrigation 4 = Drip irrigation 96 = Other (specify) __________________ 90 = Don't Know	1 = Flood irrigation 2 = Furrow irrigation 3 = Bucket irrigation 4 = Drip irrigation 96 = Other (specify) __________________ 90 = Don't Know	1 = Flood irrigation 2 = Furrow irrigation 3 = Bucket irrigation 4 = Drip irrigation 96 = Other (specify) __________________ 90 = Don't Know

334	What is the most common source of water for your irrigation system?	1 = Pond / river / canal 2 = Storage (dam / tank) 3 = Well (shallow / hand dug) 4 = Borehole 96 = Other (specify) ____________________ 90 = Don't Know	1 = Pond / river / canal 2 = Storage (dam / tank) 3 = Well (shallow / hand dug) 4 = Borehole 96 = Other (specify) ____________________ 90 = Don't Know	1 = Pond / river / canal 2 = Storage (dam / tank) 3 = Well (shallow / hand dug) 4 = Borehole 96 = Other (specify) ____________________ 90 = Don't Know
335	What type of delivery method does this irrigation system use? …..Anything else? [CIRCLE ALL THAT APPLY]	1 = Gravity 2 = Manual / By hand 3 = Hand pump or treadle pump MECHANIZED 4 = Mechanized – diesel 5 = Mechanized – windmill 6 = Mechanized – solar 7 = Mechanized – grid electricity (EDH) 8 = Mechanized – other type of electricity 96 = Other (specify) _____________________ 90 = Don't Know	1 = Gravity 2 = Manual / By hand 3 = Hand pump or treadle pump MECHANIZED 4 = Mechanized – diesel 5 = Mechanized – windmill 6 = Mechanized – solar 7 = Mechanized – grid electricity (EDH) 8 = Mechanized – other type of electricity 96 = Other (specify) _____________________ 90 = Don't Know	1 = Gravity 2 = Manual / By hand 3 = Hand pump or treadle pump MECHANIZED 4 = Mechanized – diesel 5 = Mechanized – windmill 6 = Mechanized – solar 7 = Mechanized – grid electricity (EDH) 8 = Mechanized – other type of electricity 96 = Other (specify) _____________________ 90 = Don't Know
336		GO BACK TO 321 IN NEXT COLUMN OR, IF NO MORE PARCELS, GO TO 360	GO BACK TO 321 IN NEXT COLUMN OR, IF NO MORE PARCELS, GO TO 360	GO TO 360

Section T.3: CROPPING YEAR - AGRICULTURAL CROP / PLANT HARVEST

Now, I would like to talk to you about agricultural production.

360	Did you harvest any crops or plants from November 2010 to October 2011?	1 = Yes 2 = No → **380** 90 = Don't Know → **380**
361	What were the most important crops or plants that you harvested from November 2010 to October 2011? ...Anything else? [LIST NAMES OF UP TO THE FIVE (5) HARVESTED CROPS / PLANTS IN 362 → THEN THE CORRESPONDING CODE IN 363 → THEN COMPLETE THE FOLLOWING QUESTIONS FOR EACH CROP / PLANT. IF MORE THAN FIVE (5) LIST THE MOST IMPORTANT IN 362 AND THE REMAINING CODES IN 374]	

362	**363**	**364**	**365**	**366**	**367**	**368**	**369**	**370**	**371**	**372**	**373**
NAME OF CROP / PLANT	CROP / PLANT CODE	What is the estimated quantity of [CROP] harvests for the entire household from November 2010 to October 2011?		How much of this total [CROP] harvest was consumed at home?		How much of this total [CROP] harvest was sold?		How much land area was used for this [CROP] harvest?	DID RESPOND-ENT REPORT HECTARES OR ACRES?	How much of the land area for this [CROP] harvest was intercropped?	DID RESPOND-ENT REPORT HECTARES OR ACRES?
CROP NAME	CROP CODE SEE LIST ON PG. 32	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Size -90 = DK	1 = Acres 2 = Hectares 3 = Karow _ 4 = Seiziem _ 96 = Other (sp) _____	Size -90 = DK	1 = Acres 2 = Hectares 3 = Karow _ 4 = Seiziem _ 96 = Other (sp) _____
362	**363**	**364**	**365**	**366**	**367**	**368**	**369**	**370**	**371**	**372**	**373**
	|___|___|___|									
	|___|___|___|									
	|___|___|___|									
	|___|___|___|									
	|___|___|___|									

374	ENUMERATOR: IF MORE THAN FIVE (5) CROPS LISTED IN 362 THEN RECORD REMAINING CODES IN 374 Besides the crops just listed, did you harvest any other crops or plants from November 2010 to October 2011?	1 = Yes 2 = No → **376**
375	a. |___|___|___| b. |___|___|___| c. |___|___|___| d. |___|___|___| e. |___|___|___| f. |___|___|___| g. |___|___|___| h. |___|___|___| i. |___|___|___|	

376	Besides the crops just listed, are you currently growing any other crops or plants?	1 = Yes 2 = No → **380**
377	a. |___|___|___| b. |___|___|___| c. |___|___|___| d. |___|___|___| e. |___|___|___| f. |___|___|___| g. |___|___|___|	h. |___|___|___| i. |___|___|___|

Section T.4: WOOD-BASED PRODUCTS HARVEST

Now, I would like to talk to you about wood-based products, such as fuelwood, timber, and charcoal.

380	Did you harvest any wood-based products, such as fuelwood, timber, and charcoal from November 2010 to October 2011?	1 = Yes 2 = No → **400** 90 = Don't Know → **400**

381	**382**	**383**	**384**	**385**	**386**	**387**	**388**	**389**	**390**	**391**
NAME OF WOOD PRODUCT	WOOD PRODUCT CODE	Did you harvest any [PROD-UCT]?	What is the estimated quantity of [PRODUCT] harvests for the entire household from November 2010 to October 2011?		How much of this total [PRODUCT] harvest was consumed at home?		How much of this total [PRODUCT] harvest was sold?		How much land area was used for this [PRODUCT] harvest?	DID RESPOND-ENT REPORT HECTARES OR ACRES?
PRODUCT NAME	CROP CODE SEE LIST ON PG. 32	1 = Yes 2 = No ▼LINE	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Quantity / Amounts # -90 = DK	Units SEE LIST PG. 33	Size -90 = DK	1 = Acres 2 = Hectares 3 = Karow 4 = Seiziem 96 = Other (sp) _____
381	**382**	**383**	**384**	**385**	**386**	**387**	**388**	**389**	**390**	**391**
Fuel wood Trees ?	**195**	1 2 ▼								
Timber and Pole Trees ?	**190**	1 2 ▼								
Charcoal production?	**289**	1 2 ▼								
Any other trees? ……..	|___|___|___|	1 2 ▼								

MASTER AGRICULTURE CODES

CROP / PLANT CODES

CEREALS
101 = Maize
102 = Sorghum
104 = Rice

TUBERS & ROOTS
110 = Manioc
112 = Irish potatoes
113 = Yams
114 = Carrots
117 = Taro

LEGUMES
120 = Beans
121 = Peanuts
123 = Lima beans
127 = Pigeon peas
128 = Green beans

NUTS
131 = Coconut

VEGETABLES
143 = Onions/Shallots
144 = Green peppers
145 = Eggplants
146 = Pumpkin
147 = Chilies (whole)
149 = Okra
150 = Spinach
153 = Lettuce
154 = Cucumber
155 = Chayote Squash
156 = Lyann panye (leafy vegetable)
157 = Bobo koden (leafy vegetable)

FRUITS
161 = Sweet Bananas
162 = Plantains
163 = Tomatoes
164 = Guava
165 = Avocado
166 = Pineapple
167 = Mango
168 = Papaya
169 = Orange
170 = Lemon
171 = Watermelon
172 = Passion fruit
175 = Breadfruit
176 = Pomegranate
178 = Grenade fruit
179 = Apricot (Haitian variation)
300= Grapefruit

SPICES
184 = Black pepper
187 = Lavender
188 = Thyme
189 = Garlic
301 = Leek

TREES
190 = Timber and Pole trees
191 = Medicinal trees / Moringa
192 = Nursery Tree seedlings
194 = Palm trees (for palm oil)
195 = Fuelwood trees
196 = Charcoal production trees
197 = Fruit, Nut, and Edible Leaf Trees
198 = Fodder Trees
199 = Soil fertility and conservation trees
200 = Hedge trees/bushes

COMMODITIES / MISCELLANEOUS
202 = Sugarcane
204 = Tea
205 = Coffee
206 = Cocoa
209 = Chocolate
210 = Cookies / candies
289 = Charcoal (after processing)
302 = Vetiver (Grass for perfume)

OTHER
290 = Other (specify) _____
291 = Other (specify) _____
292 = Other (specify) _____
293 = Other (specify) _____

MASTER UNIT CODES

01	=	Kilogram, KG
02	=	Gram
03	=	Liter
04	=	Number, Item, Piece, Unit, Count
08	=	Pair
10	=	Bunch (large)
11	=	Bunch (small)
12	=	Basket Large
13	=	Basket Small
14	=	Bundle Large
15	=	Bundle Small
18	=	Tin Large
19	=	Tin Small
52	=	Small Sack
53	=	Average Sack
54	=	Large Sack
30	=	Bottle/Plastic/Tin, 0.5 Liters
31	=	Bottle/Plastic/Tin, 1 Liter
32	=	Bottle/Plastic/Tin, 2 Liters
33	=	Bottle/Plastic/Tin, 3 Liters
34	=	Bucket, 1 Gallon
37	=	Bucket, 20 Liters
38	=	Bucket, 25 Liters
39	=	Bucket, 50 Liters
55	=	Gallon
56	=	1/12 Tin Large
57	=	Plate
58	=	Sack (for mules, donkeys)
59	=	Bundle (specifically used for bananas, plantains)
60	=	Pole
61	=	Dozen

FARM INPUT CODES

401 = Improved Seeds
402 = Local Seeds
403 = Pesticides
404 = Herbicides

ORGANIC FERTILIZERS
411 = Animal manure
412 = Compost
413 = Biomass transfer
414 = Leguminous tree fallows
415 = Leguminous cover crop

CHEMICAL FERTILIZERS
421 = DiAmmonium Phosphate (DAP)
422 = Urea
423 = Nitrogen Phosphorus Potassium (NPK)
424 = Calcium ammonium nitrate (CAN)
425 = MonoAmmonium Phosphate (MAP)
426 = Triple super phosphate (TSP)
427 = Single super phosphate (SSP)
428 = Ammonium Sulfate
429 = Phosphate Rock
430 = Unknown chemical fertilizer
431 = Other chemical fertilizer (specify)
_____

OTHER
496 = Other (specify) _____
497 = Other (specify) _____

Section T.5: AGRICULTURAL INPUTS

400	From November 2010 to October 2011, did you use any agricultural inputs, such as chemical fertilizer, organic fertilizer, improved seeds, local seeds, or pesticides, for farming?	1 = Yes 2 = No → **410** 90 = Don't Know →**410**
401	What types of inputs did you use for farming? …..Anything else? [LIST ALL THE AGRICULTURAL INPUTS IN 402 → THEN ENTER THE CODE IN 403 AND COMPLETE THE FOLLOWING QUESTIONS FOR EACH INPUT.]	

402	**403**	**404**	**405**	**406**	**407**
NAME OF FARM INPUT	INPUT CODE	How much of this [INPUT] was used from November 2010 to October 2011? [IF 'DON'T KNOW' THEN CODE '-90']		What is the primary crop or agricultural activity that is supported with this [INPUT]?	What is the secondary crop or agricultural activity that is supported with this [INPUT]?
FARM INPUT NAME	SEE FARM INPUT CODES ON PG. 32	Quantity / Amounts # -90 = DK	Unit SEE LIST ON PG. 33	SEE CROP / PLANT CODES ON PG. 32	SEE CROP / PLANT CODES ON PG. 32
402	**403**	**404**	**405**	**406**	**407**
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|
	4 |___|___|			|___|___|___|	|___|___|___|

Section T.6: TREE PLANTING

410	During the past 12 months, did you plant any trees?	1 = Yes 2 = No → **420** 90 = Don't Know → **420**
411	What types of trees did you plant? …..Anything else? [LIST ALL THE TYPES OF TREES IN 412 → THEN ENTER THE CODE IN 413 AND COMPLETE THE FOLLOWING QUESTIONS FOR EACH TREE TYPE]	

412	**413**	**414**	**415**
TREE TYPE	TREE CODE	What is the total number of [TREE TYPE] that you planted in the past 12 months?	Of those planted, what is the total number of [TREE TYPE] on the farm now?
	SEE CODES BELOW	# -90 = DK	# -90 = DK
412	**413**	**414**	**415**
	|___||___||___|		
	|___||___||___|		
	|___||___||___|		
	|___||___||___|		
	|___||___||___|		

TREE CODES
190 = Timber and Pole trees
191 = Medicinal trees / Moringa
192 = Nursery Tree seedlings
194 = Palm trees (for palm oil)
195 = Fuelwood trees
196 = Charcoal production trees
197 = Fruit, Nut, and Edible Leaf Trees
198 = Fodder Trees
199 = Soil fertility and conservation trees
200 = Hedge trees/bushes

Section T.7: ANIMAL-BASED PRODUCTS HARVESTED IN THE PAST 12 MONTHS

420	Now, I would like to talk to you about animal-based products, such as milk, eggs, honey, manure, etc. This does not include whole animal selling, such as selling cows, chickens, goats, etc. In Past 12 Months, did you produce any animal-based products?	1 = Yes 2 = No → **500** 90 = Don't Know → **500**
421	In Past 12 Months, what animal-based products did you produce? …Anything else? [LIST ALL THE ANIMAL PRODUCT NAMES IN 422 → THEN THE CORRESPONDING CODE IN 423 → THEN COMPLETE THE FOLLOWING QUESTIONS FOR EACH ANIMAL PRODUCT.]	

422	**423**	**424**	**425**	**426**	**427**	**428**	**429**
NAME OF ANIMAL PRODUCT	ANIMAL PRODUCT CODE	What is the estimated quantity of [PRODUCT] harvests for the entire household in the past 12 months?		How much of this total [PRODUCT] harvest was consumed at home?		How much of this total [PRODUCT] harvest was sold?	
ANIMAL PRODUCT NAME	ANIMAL PRODUCT CODE SEE LIST	Quantity / Amounts -90 = DK	Units SEE LIST PG. 3	Quantity / Amounts -90 = DK	Units SEE LIST PG. 33	Quantity / Amounts -90 = DK	Units SEE LIST PG. 33
422	**423**	**424**	**425**	**426**	**427**	**428**	**429**
	3 |___|___|						
	3 |___|___|						
	3 |___|___|						
	3 |___|___|						
	3 |___|___|						

ANIMAL-BASED PRODUCTS CODES

301 = Milk / dairy
302 = Eggs
303 = Honey
304 = Manure
305 = Hides and Skins
306 = Meat
307 = Fish farming
396 = Other (specify) _____
397 = Other (specify) _____
398 = Other (specify) _____

Section U: ANTHROPOMETRY

500	CHECK 112: ARE ANY CHILDREN 0-5 YEARS OF AGE LIVING IN THE HOUSEHOLD?	1 = Yes 2 = No → **END**
501	RECORD THE LINE NUMBER AND NAME FOR ALL ELIGIBLE CHILDREN 0-5 YEARS IN QUESTION 502. IF MORE THAN THREE (3) CHILDREN, USE ADDITIONAL QUESTIONNAIRE(S).	

		CHILD # 1	**CHILD # 2**	**CHILD # 3**
502	LINE NUMBER FROM 100 NAME FROM 101	LINE # |____| |____| NAME _______________	LINE # |____| |____| NAME _______________	LINE # |____| |____| NAME _______________
503	COPY MONTH AND YEAR OF BIRTH FROM 105, 106 ►ASK: What is (NAME)'s birth date?	DAY |___| |___| MONTH |___| |___| YEAR |___| |___| |___| |___|	DAY |___| |___| MONTH |___| |___| YEAR |___| |___| |___| |___|	DAY |___| |___| MONTH |___| |___| YEAR |___| |___| |___| |___|
504	CHECK 503: CHILD BORN IN JANUARY 2006 OR LATER?	1 = Yes 2 = No ► GO TO 502 IN NEXT COLUMN OR, IF NO MORE CHILDREN GO TO END	1 = Yes 2 = No ► GO TO 502 IN NEXT COLUMN OR, IF NO MORE CHILDREN GO TO END	1 = Yes 2 = No ► GO TO 502 IN NEXT COLUMN OR, IF NO MORE CHILDREN GO TO END
505	CALCULATE AGE OF CHILD IN MONTHS	AGE IN MONTHS |____| |____|	AGE IN MONTHS |____| |____|	AGE IN MONTHS |____| |____|
506	WEIGHT IN KILOGRAMS	CHILD WEIGHT |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other	CHILD WEIGHT |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other	CHILD WEIGHT |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other
507	HEIGHT / LENGTH IN CENTIMETERS	HEIGHT |___| |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other	HEIGHT |___| |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other	HEIGHT |___| |____| |____| • |____| 9991 = Not Present 9992 = Refused 9996 = Other
508	MEASURED LYING DOWN OR STANDING UP?	1 = Lying Down 2 = Standing Up	1 = Lying Down 2 = Standing Up	1 = Lying Down 2 = Standing Up
509	MID-UPPER ARM CIRCUMFERENCE (MUAC) IN MILLIMETERS	MUAC: LEFT ARM |____| |____| |____| 9991 = Not Present 9992 = Refused 9996 = Other	MUAC: LEFT ARM |____| |____| |____| 9991 = Not Present 9992 = Refused 9996 = Other	MUAC: LEFT ARM |____| |____| |____| 9991 = Not Present 9992 = Refused 9996 = Other

		CHILD # 1	CHILD # 2	CHILD # 3
510	DOES CHILD HAVE OEDEMA OF THE FEET?	1 = Yes 2 = No 90 = DK / Not Sure 91 = Not Present 92 = Refused	1 = Yes 2 = No 90 = DK / Not Sure 91 = Not Present 92 = Refused	1 = Yes 2 = No 90 = DK / Not Sure 91 = Not Present 92 = Refused
		GO BACK TO 502 IN NEXT COLUMN OR, IF NO MORE CHILDREN, GO TO END	GO BACK TO 502 IN NEXT COLUMN OR, IF NO MORE CHILDREN, GO TO END	IF MORE CHILDREN GO TO 502 IN FIRST COLUMN OF A NEW QUESTIONNAIRE; OR, IF NO MORE CHILDREN, GO TO END

► Mark if additional pages for this section were used |____|

► The survey is now over. Thank you very much for your assistance. We really appreciate your time.

ENUMERATOR: RECORD END-TIME OF INTERVIEW ON PAGE 2 OF QUESTIONNAIRE

INTERVIEWER'S OBSERVATIONS

COMMENTS ON RESPONDENT

_____

_____

_____

COMMENTS ON SPECIFIC QUESTIONS

_____

_____

_____

ANY OTHER COMMENTS

_____

_____

_____

SUPERVISOR'S OBSERVATIONS

_____

_____

_____

_____

Supervisor's Name: _____ Date: _____ / _____ / _____

EDITOR'S OBSERVATIONS

_____

_____

_____

_____

Editor's Name: _____ Date: _____ / _____ / _____

KEY EDITING CHECKS: LIST OF KEY EDITING CHECKS FOR HOUSEHOLD QUESTIONNAIRE				
REVIEW THE FOLLOWING EDITING CHECKS AND MARK (√) IF THE RESPONSES ARE RECORDED ACCURATELY. EACH QUESTIONNAIRE SHOULD BE EDITED AT LEAST THREE (3) TIMES BY THREE (3) DIFFERENT PEOPLE.				
EDITING #1 >>> ENUMERATOR EDITING #2 >>> EDITOR (or SUPERVISOR) EDITING #3 >>> SUPERVISOR (or DATA MANAGER)		EDITING		
		1	2	3
1	Consistency between Date of Birth (Qs. 105, 106) and Age (Q107)			
2	Consistency between eligibility in Q110 (Woman aged 15-49) and Sex (103) and Age (Q107).			
3	Consistency between eligibility in Q112 (Child aged 0-5) and Age (Q107).			
4	Consistency of education level and grade achieved (Q122, Q123) with the education level and grade currently attending (Q125, Q126): the achieved education level and grade must not be higher than the education level and grade currently attended			
5	Consistency of class/grade/ form with education level: grade is not applicable (Q123, Q126, Q130) for non-standard education			
6	Consistency of education level and grade currently attending (Q125, Q126) with the education level and grade previously attending (Q129, Q130): the education level and grade currently attended must not be lower than the education level and grade previously attended			
7	Check the consistency between AGE and class/form attended (Q126, Q130).			
10	Consistency of the number of mosquito nets recorded in the bednet table with Q153			
11	Record correct LINE NUMBER (Q161) for people who slept under the mosquito nets last night			
12	Check distance to primary (Q224) fuel source. Note if energy source was purchased, distance should be ZERO.			
13	Check time takes to go there, get fuel, and come back for primary (Q225) fuel source. Note if energy source was purchased time should be ZERO.			
14	Check distance to drinking water source (Q202)			
15	Check time takes to go there, get water, and come back for drinking water source (Q203)			
16	If there is a crop listed (Q362) in the crop harvest table make sure there are no ZERO values reported for the quantity of crop harvests (Q364).			
17	Check estimated amount of land used for crop harvests listing in crop harvest table (370).			
18	Harvests consumed +sold+ losses (Q366, 367 + Q368,369) is not greater than Total harvests (Q364,365)			
19	Confirm calculation of Q505 “Current Age in months”			
20	Weight (Q506) within WHO reference range for corresponding Age and Sex			
21	Height / Length (Q507) within WHO reference range for corresponding Age and Sex.			
22	MUAC (Q509) within WHO reference range for corresponding Age and Sex.			

DATE (dd/mm):			
EMPLOYEE ID:			

HAITI: COTE SUD INITIATIVE
EARTH INSTITUTE, COLUMBIA UNIVERSITY

Nov-20-2011

FEMALE 15-49 YEAR-OLD MODULE

IDENTIFICATION

COMMUNE _____

SECTION COMMUNAL _____

ENUMERATION AREA NUMBER ..... [ ][ ][ ]

RESEARCH SEGMENT NUMBER ..... [ ][ ]

HOUSEHOLD NUMBER ..... [ ][ ][ ]

NAME OF HOUSEHOLD HEAD _____

LINE NUMBER OF WOMAN AGED 15-49 (FROM HH QUESTIONNAIRE) ..... [ ][ ]

NAME OF WOMAN AGED 15-49 _____

OTHER IDENTIFICATION NOTES OR DIRECTIONS TO HOUSEHOLD _____

_____

_____

[ ][ ] STRUCTURE NUMBER ON MAP _____

INTERVIEWER VISITS

	VISIT 1	VISIT 2	VISIT 3	FINAL VISIT
DATE	_____	_____	_____	DAY ..... [ ][ ]
				MONTH ..... [ ][ ]
				YEAR [2][0][ ][ ]
INTERVIEWER NAME	_____	_____	_____	INT. NUMBER [ ][ ][ ]
RESULT*	_____	_____	_____	RESULT* ..... [ ][ ]
NEXT VISIT: DATE	_____	_____	_____	TOTAL NUMBER OF VISITS ..... [ ]
TIME	_____	_____	_____	

RESULT CODES

1 = Completed interview
2 = No competent household member at home
3 = Entire household absent for extended period of time
4 = Postponed
5 = Refused
6 = Partly completed interview
7 = Dwelling vacant / destroyed
8 = Dwelling not found
96 = Other (specify) _____

SUPERVISOR	FIELD EDITOR	FIRST DATA ENTRY	SECOND DATA ENTRY
NAME: _____	NAME: _____		
ID: [ ][ ][ ]	ID: [ ][ ][ ]	[ ][ ][ ]	[ ][ ][ ]

INTERVIEW INTRODUCTION

1. READ THE "INFORMED CONSENT STATEMENT" AND ANSWER ANY QUESTIONS.
2. IF THE INTERVIEWEE GIVES UNAMBIGUOUS AND CLEAR CONSENT TO BE INVOLVED, THEN SIGN BELOW:

At this time, do you want to ask me anything about the purpose or content of this interview?

May I begin the interview now?

YES: RESPONDENT AGREES TO INTERVIEW . 1 → NO: RESPONDENT DOES NOT AGREE . 2 → END

FOR INTERVIEWER: I CONFIRM THAT THE "INFORMED CONSENT STATEMENT" HAS BEEN READ TO THE INTERVIEWEE AND THAT HE/SHE UNDERSTANDS AND CONSENTS TO PARTICIPATE IN THE INTERVIEW.

PRINT NAME: _____ SIGN NAME: _____ DATE: _____

CHECK FOR THE PRESENCE OF OTHERS. BEFORE CONTINUING, MAKE EVERY EFFORT TO ENSURE PRIVACY.

NO.		CODING CATEGORIES	SKIP
A	**DEMOGRAPHIC INFORMATION**		
101	RECORD THE TIME	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ] CIRCLE ONE ► AM PM	
102	In what month and year were you born?	MONTH . . . . . [ ][ ] DON'T KNOW MONTH . . . . . 90 YEAR . . . . . [ ][ ][ ][ ] DON'T KNOW YEAR 9990	
103	How old were you at your last birthday? [COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT]	AGE IN COMPLETED YEARS [ ][ ][ ] DON'T KNOW 990	
104	CHECK 103: UPDATED AGE IS RESPONDENT BETWEEN 15-49 YEARS OLD?	YES OR DON'T KNOW → NO → END	

B	BIRTH HISTORY		
201	Now I would like to ask about all the births you have had during your life. Have you ever given birth?	YES . . . . . 1 NO 2	→ 206
202	Do you have any sons or daughters to whom you have given birth who are now living with you?	YES . . . . . 1 NO 2	→ 204
203	How many sons live with you? How many daughters live with you? IF NONE RECORD '00'	SONS AT HOME . . . . . [ ][ ] DAUGHTERS AT HOME . . . . . [ ][ ]	
204	Do you have any sons or daughters to whom you have given birth who are alive but do not live with you?	YES . . . . . 1 NO 2	→ 206
205	How many sons are alive but do not live with you? How many daughters are alive but do not live with you? IF NONE RECORD '00'	SONS ELSEWHERE . . . . . [ ][ ] DAUGHTERS ELSEWHERE . . . . . [ ][ ]	
206	Have you ever given birth to a boy or girl who was born alive but later died? IF NO, PROBE: Any baby who cried or showed signs of life but did not survive?	YES . . . . . 1 NO 2	→ 208
207	How many boys have died? How many girls have died? IF NONE RECORD '00'	BOYS DEAD . . . . . [ ][ ] GIRLS DEAD . . . . . [ ][ ]	
208	SUM ANSWERS TO 203, 205, 207 - AND ENTER TOTAL. IF NONE,RECORD '00'.	TOTAL . . . . . [ ][ ]	
209	CHECK 208: Just to make sure that I have this right: you have had in **total** _____ births during your life. Is this correct? YES ↓ NO → PROBE AND CORRECT 201-207 AS NECESSARY		
210	CHECK 208 ONE OR MORE BIRTHS ↓ NO BIRTHS → 230		

211 Now I would like to record the names of all your births, whether still alive or not. Please also include babies who were born alive but died right after birth. Please start with the first baby you had.
RECORD NAMES OF ALL THE BIRTHS IN NEXT TABLE. RECORD TWINS AND TRIPLETS ON SEPARATE LINES
(IF THERE ARE MORE THAN 12 BIRTHS, USE AN ADDITIONAL QUESTIONNAIRE, STARTING WITH THE SECOND ROW).

212 What name was given to your (first/next) baby?	213 Is [NAME] a boy or a girl?	214 Were any of these births twins?	215 In what month and year was [NAME] born? PROBE: What is his/her birthday?	216 Is [NAME] still alive?	217 IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COM-PLETED YEARS	218 IF ALIVE: Is (NAME) living with you?	219 IF ALIVE: RECORD HOUSE-HOLD LINE NUMBER OF CHILD (RECORD 00' IF CHILD NO LISTED IN HOUSE-HOLD)	220 IF DEAD: How old was [NAME] when he/she died? * IF 1 YEAR, PROBE: How many months old was (NAME)? RECORD: DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN 2 YEARS; OR YEARS.	221 Were there any other live births between (NAME OF PREVIOUS BIRTH) and (NAME) including any children who died after birth?
01	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (NEXT BIRTH)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	
02	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
03	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
04	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
05	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
06	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS ..... MONTHS ..... YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH

211 [CONTINUED]
RECORD NAMES OF ALL THE BIRTHS IN NEXT TABLE. RECORD TWINS AND TRIPLETS ON SEPARATE LINES

212	213	214	215	216	217	218	219	220	221
What name was given to your (first/next) baby?	Is [NAME] a boy or a girl?	Were any of these births twins?	In what month and year was [NAME] born? PROBE: What is his/her birthday?	Is [NAME] still alive?	IF ALIVE: How old was (NAME) at his/her last birthday? RECORD AGE IN COMPLETED YEARS	IF ALIVE: Is (NAME) living with you?	IF ALIVE: RECORD HOUSEHOLD LINE NUMBER OF CHILD (RECORD 00' IF CHILD NO LISTED IN HOUSEHOLD)	IF DEAD: How old was [NAME] when he/she died? * IF 1 YEAR, PROBE: How many months old was (NAME)? RECORD: DAYS IF LESS THAN 1 MONTH; MONTHS IF LESS THAN 2 YEARS; OR YEARS.	Were there any other live births between (NAME OF PREVIOUS BIRTH) and (NAME) including any children who died after birth?
07	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
08	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
09	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
10	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
11	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH
12	BOY 1 GIRL 2	SING 1 MULT 2	MONTH YEAR	YES 1 NO 2 → 220	AGE IN YEARS	YES 1 NO 2	HOUSEHOLD LINE NUMBER (GO TO 221)	**AGE AT DEATH** DAYS MONTHS YEARS	YES . 1 ADD BIRTH NO . . 2 NEXT BIRTH

222 Have you had any live births since the birth of (NAME OF LAST BIRTH)? IF YES, RECORD BIRTH(S) IN TABLE.

YES 1
NO 2

NOTE: IF THERE ARE MORE THAN 12 BIRTHS, PLEASE CIRCLE "CONTINUATION" ON THE RIGHT
USE ADDITIONAL QUESTIONNAIRE; COMPLETE IDENTIFICATION INFORMATION ON COVER SHEET.
START THE BIRTH HISTORY WITH THE 2ND ROW AND BEGIN RENUMBERING AT '13'.

CONTINUATION
FOR > 12 BIRTHS

223	COMPARE 208 WITH NUMBER OF BIRTHS IN HISTORY ABOVE AND MARK: NUMBERS ARE SAME ↓ NUMBERS ARE DIFFERENT → (PROBE AND RECONCILE) CHECK: FOR EACH BIRTH: YEAR OF BIRTH IS RECORDED. ☐ FOR EACH BIRTH IN 2006 OR LATER (2006-2011): MONTH AND YEAR OF BIRTH ARE RECORDED. ☐ FOR EACH DEAD CHILD: AGE AT DEATH IS RECORDED. ☐ FOR AGE AT DEATH 12 MONTHS OR 1 YEAR: PROBE TO DETERMINE EXACT NUMBER OF MONTHS. ☐		
224	CHECK 215 AND ENTER THE NUMBER OF BIRTHS IN 2006 OR LATER. (BIRTHS IN 2006, 2007, 2008, 2009, 2010 or 2011) IF NONE, RECORD '0'. ☐		
230	Are you currently pregnant now?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW/ NOT SURE 90	→ 240
231	When you got pregnant, did you want to get pregnant at that time?	YES . . . . . 1 NO 2	→ 240
232	Did you want to have a baby later on or did you not want any (more) children?	LATER . . . . . 1 NO MORE 2	

C	CONTRACEPTION		
240	Now I would like to talk about family planning - the various ways or methods that a couple can use to delay or avoid pregnancy. Have you ever heard of (METHOD)?		
A.	**Female Sterilization.** PROBE: Women can have an operation to avoid having any more children	YES . . . . . 1 NO 2	
B.	**Male Sterilization**. PROBE: Men can have an operation to avoid having any more children.	YES . . . . . 1 NO 2	
C.	**Pill.** PROBE: Women can take a pill every day to stop them from becoming pregnant.	YES . . . . . 1 NO 2	
D.	**IUD.** PROBE: Women can have a loop or coil placed inside them by a doctor or a nurse.	YES . . . . . 1 NO 2	
E.	**Injectables.** PROBE: Women can have an injection by a health provider which stops them from becoming pregnant for one or more months.	YES . . . . . 1 NO 2	
F.	**Implants.** PROBE: Women can have several small rods placed in their upper arm by a doctor or nurse which can prevent pregnancy for one or more years.	YES . . . . . 1 NO 2	
G.	**Condom.** PROBE: Men can put a rubber sheath on their penis before sexual intercourse.	YES . . . . . 1 NO 2	
H.	**Female Condoms.** PROBE: Women can place a sheath in their vagina before sexual intercourse.	YES . . . . . 1 NO 2	
I.	**Rhythm Method.** PROBE: Every month that a woman is sex-sexually active she can avoid pregnancy by not having sexual intercourse on the days of the month she is most likely to get pregnant.	YES . . . . . 1 NO 2	
J.	**Withdrawal.** PROBE: Men can be careful and pull out before climax.	YES . . . . . 1 NO 2	
K.	**Emergency Contraception**. PROBE: Women can take pills up to three days after sexual intercourse to avoid becoming pregnant.	YES . . . . . 1 NO 2	
L.	Have you heard of any other ways or methods that women or men can use to avoid pregnancy?	YES . . . . . 1 _____ (SPECIFY) _____ (SPECIFY) NO 2	

241	CHECK 230: NOT PREGNANT OR UNSURE ↓ / PREGNANT →		→ 244
242	Are you currently using any birth control method?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW/ NOT SURE 90	→ 244
243	What birth control methods are you currently using? CIRCLE ALL THAT APPLY	FEMALE STERILISATION . . . . . 01 MALE STERILISATION . . . . . 02 PILL . . . . . 03 IUD . . . . . 04 INJECTIONS . . . . . 05 IMPLANTS / NORPLANT . . . . . 06 CONDOM . . . . . 07 FEMALE CONDOM . . . . . 08 RHYTHM, NATURAL, PERIODIC . . . . . 09 ABSTINENCE . . . . . 10 WITHDRAWAL . . . . . 11 OTHER _____ 96 (SPECIFY) UNSURE 90	
244	In the last 12 months, did you have a visit with a health worker who talked to you about family planning?	YES . . . . . 1 NO 2	
245	In the last 12 months, have you visited a health facility for care for yourself (or your children)?	YES . . . . . 1 NO 2	→ 250
246	Did any staff member at the health faiclity speak to you about family planning methods?	YES . . . . . 1 NO 2	

D PREGNANCY, POSTNATAL CARE AND BREAST FEEDING

250	CHECK TABLE 224: ONE OR MORE BIRTHS IN 2006 OR LATER ↓ / NO BIRTHS IN 2006 OR LATER →		→ 350
251	CHECK 212: ENTER THE TABLE BELOW THE LINE NUMBER AND NAME OF EACH BIRTH IN 2006 OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, RECORD THE THREE MOST RECENT BIRTHS IN THE TABLE BELOW.) Now I would like to ask you some questions about the health of all your children born in the last five years. We will talk about each one separately.		

		LAST BIRTH	SECOND-TO-LAST BIRTH	THIRD-TO-LAST BIRTH
252	RECORD BIRTH HISTORY NUMBER FROM 212 AND NAME OF EACH CHILD BORN IN **2006** OR LATER	BIRTH HISTORY NUMBER ☐☐ NAME	BIRTH HISTORY NUMBER ☐☐ NAME	BIRTH HISTORY NUMBER ☐☐ NAME
253	CHECK 216: IS CHILD STILL ALIVE?	ALIVE ↓ / DECEASED ↓	ALIVE ↓ / DECEASED ↓	ALIVE ↓ / DECEASED ↓
254	When you got pregnant with (NAME), did you want to get pregnant at that time?	YES . . . . . 1 (SKIP TO 257) ← NO 2	YES . . . . . 1 (SKIP TO 257) ← NO 2	YES . . . . . 1 (SKIP TO 257) ← NO 2
255	Did you want to have a baby later on, or did you not want any (more) children?	LATER . . . . . 1 NO MORE . . . . . 2 (SKIP TO 257) ←	LATER . . . . . 1 NO MORE . . . . . 2 (SKIP TO 257) ←	LATER . . . . . 1 NO MORE . . . . . 2 (SKIP TO 257) ←
256	How much longer did you want to wait?	MONTHS . ☐☐ YEARS . . . ☐☐ DON'T KNOW 990	MONTHS . ☐☐ YEARS . . . ☐☐ DON'T KNOW 990	MONTHS . ☐☐ YEARS . . . ☐☐ DON'T KNOW 990

257	Did you see anyone for ante-natal care while pregnant with this child?	YES . . . . . 1 NO . . . . . 2 (SKIP TO 262) ← DON'T KNOW . . . 90		
258	Whom did you see? ...Anyone else? CIRCLE ALL THAT APPLY	DOCTOR/ CLINICAL OFFICER . . . 1 NURSE / MIDWIFE 2 TRADITIONAL BIRTH ATTENDANT . 4 COMMUNITY HEALTH WORKER . . . . . 5 OTHER _____ 96 (SPECIFY)		
259	Where did you receive antenatal care for this pregnancy? ...Anywhere else? CIRCLE ALL THAT APPLY	HOME OWN HOME . . . 01 OTHER HOME . 02 GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION / CLINIC/ CLINIC . . . . . 13 HEALTH POST . 14 OTHER GOV. _____ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE MEDICAL HOSPITAL / CLINIC . 41 PVT. DOCTOR . 42 OTHER PVT. _____ 49 (SPECIFY) OTHER _____ 96 (SPECIFY)		
260	How many months pregnant were you when you first received ante-natal care for this pregnancy?	MONTHS . . . . . ☐ DON'T KNOW . . . 90		
261	How many times did you receive antenatal care during this pregnancy?	NUMBER . . . . . ☐		
262	During this pregnancy, were you given or did you buy any iron tablets or iron syrup? [SHOW TABLETS]	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . 90		
263	During this pregnancy, did you take any drugs to prevent you from getting malaria? ONLY CONCERNED WITH DRUGS FOR PREVENTION NOT TREATMENT	YES . . . . . 1 NO . . . . . 2 (SKIP TO 265) ← DON'T KNOW . . . 90		
264	What antimalarial drugs did you take? CIRCLE ALL THAT APPLY [SHOW SAMPLES OF ANTIMALARIAL DRUGS]	CHLOROQUINE . . . 2 ARTESUNATE . . . 3 DOXICYCLINE . . . 4 QUININE . . . 5 DON'T KNOW . . . 90 OTHER _____ 96 (SPECIFY)		

265	During this pregnancy did you receive a test for the HIV/AIDS virus?	YES .... 1 NO .... 2 DON'T KNOW ... 90		
266	When (NAME) was born, was he/she very large, larger than average, average, smaller than average, or very small?	VERY LARGE ... 1 LARGER THAN AVERAGE ... 2 AVERAGE ..... 3 SMALLER THAN AVERAGE ... 4 VERY SMALL ... 5 DON'T KNOW ... 90	VERY LARGE ... 1 LARGER THAN AVERAGE ... 2 AVERAGE ..... 3 SMALLER THAN AVERAGE ... 4 VERY SMALL ... 5 DON'T KNOW ... 90	VERY LARGE ... 1 LARGER THAN AVERAGE ... 2 AVERAGE ..... 3 SMALLER THAN AVERAGE ... 4 VERY SMALL ... 5 DON'T KNOW ... 90
267	Was the child weighed at birth?	YES .... 1 NO .... 2 (SKIP TO 269) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 269) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 269) DON'T KNOW ... 90
268	How much did (NAME) weigh? RECORD WEIGHT FROM HEALTH CARD, IF AVAILABLE.	KG FROM CARD 1 ☐ . ☐ KG FROM RECALL 1 ☐ . ☐ DON'T KNOW ... 90	KG FROM CARD 1 ☐ . ☐ KG FROM RECALL 1 ☐ . ☐ DON'T KNOW ... 90	KG FROM CARD 1 ☐ . ☐ KG FROM RECALL 1 ☐ . ☐ DON'T KNOW ... 90
269	Who assisted with the delivery of (NAME)? Anyone else? PROBE FOR THE TYPE OF PERSON AND RECORD ALL PERSONS ASSISTING CIRCLE ALL THAT APPLY	DOCTOR/ CLINICAL OFFICER ... 1 NURSE/ MIDWIFE 2 TRADITIONAL BIRTH ATTENDANT . 4 COMMUNITY HEALTH WORKER ..... 5 FAMILY MEMBER 6 RELATIVE OR FRIEND ..... 7 OTHER ___________ 96 (SPECIFY) NO ONE 8	DOCTOR/ CLINICAL OFFICER ... 1 NURSE/ MIDWIFE 2 TRADITIONAL BIRTH ATTENDANT . 4 COMMUNITY HEALTH WORKER ..... 5 FAMILY MEMBER 6 RELATIVE OR FRIEND ..... 7 OTHER ___________ 96 (SPECIFY) NO ONE 8	DOCTOR/ CLINICAL OFFICER ... 1 NURSE/ MIDWIFE 2 TRADITIONAL BIRTH ATTENDANT . 4 COMMUNITY HEALTH WORKER ..... 5 FAMILY MEMBER 6 RELATIVE OR FRIEND ..... 7 OTHER ___________ 96 (SPECIFY) NO ONE 8

270	Where did you give birth to (NAME)?	HOME OWN HOME . . . 01 OTHER HOME . 02 (SKIP TO 273) GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION /CLINIC/CLINIC . . . . . 13 HEALTH POST . 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE MEDICAL HOSPITAL OR CLINIC . . . . . 41 PVT. DOCTOR . 42 OTHER PVT. ______ 49 (SPECIFY) OTHER __________ 96 (SPECIFY) (SKIP TO 273)	HOME OWN HOME . . . 01 OTHER HOME . 02 (SKIP TO 273) GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION /CLINIC/CLINIC . . . . . 13 HEALTH POST . 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE MEDICAL HOSPITAL OR CLINIC . . . . . 41 PVT. DOCTOR . 42 OTHER PVT. ______ 49 (SPECIFY) OTHER __________ 96 (SPECIFY) (SKIP TO 273)	HOME OWN HOME . . . 01 OTHER HOME . 02 (SKIP TO 273) GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION /CLINIC/CLINIC . . . . . 13 HEALTH POST . 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE MEDICAL HOSPITAL OR CLINIC . . . . . 41 PVT. DOCTOR . 42 OTHER PVT. ______ 49 (SPECIFY) OTHER __________ 96 (SPECIFY) (SKIP TO 273)
271	I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health while you were still in the facility?	YES . . . . 1 (SKIP TO 274) NO 2		
272	Did anyone check on your health after you left the facility?	YES . . . . 1 (SKIP TO 274) NO . . . . 2 (SKIP TO 276)		
273	I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health after you gave birth to (NAME)?	YES . . . . 1 NO . . . . 2 (SKIP TO 276)		
274	How long after delivery did the first check take place? IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS . . . [ ][ ] DAYS . . . . . [ ][ ] WEEKS . . . [ ][ ] DON'T KNOW . . . 990		
275	Who checked on your health at that time? PROBE FOR MOST QUALIFIED PERSON	DOCTOR/ CLINICAL OFFICER . . . 1 NURSE/ MIDWIFE 2 TRADITIONAL BIRTH ATTENDANT . 4 COMMUNITY HEALTH WORKER . . . . 5 FAMILY MEMBER 6 RELATIVE OR FRIEND . . . . . 7 OTHER ___________ 96 (SPECIFY)		
276	Did you ever breast feed this baby?	YES . . . . 1 NO . . . . 2 (SKIP TO 282)	YES . . . . 1 NO . . . . 2 (SKIP TO 282)	YES . . . . 1 NO . . . . 2 (SKIP TO 282)

277	CHECK 253: IS CHILD STILL ALIVE?	ALIVE DECEASED (GO TO 281)		
278	How long after birth did you first put the baby to the breast? CIRCLE '00' IF LESS THAN 1 HR; RECORD HOURS IF < 24 HRS; OTHERWISE, RECORD DAYS.	IMMEDIATELY OR IN LESS THAN ONE HOUR AFTER DELIVERY . . . . . 00 HOURS .....2 DAYS 3 2		
279	In the first three days after delivery, before your milk began flowing regularly, Was (NAME) given anything to drink other than breast milk?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . 90		
280	Are you still breastfeeding (NAME)?	YES . . . . . 1 (SKIP TO 282) NO 2		
281	For how long did you breast feed (NAME)?	MONTHS . . . . . DON'T KNOW . . . 90	MONTHS . . . . . DON'T KNOW . . . 90	MONTHS . . . . . DON'T KNOW . . . 90
282	How old in months or days was (NAME) when you introduced liquid foods?	DAYS . . . . . MONTHS . . . . . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90	DAYS . . . . . MONTHS . . . . . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90	DAYS . . . . . MONTHS . . . . . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90
283	How old in months was (NAME) when you introduced semi-solid foods?	MONTHS . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90	MONTHS . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90	MONTHS . ONLY BREAST MILK . . . . . 99 DON'T KNOW . . . 90
284	CHECK 253: IS CHILD STILL ALIVE?	ALIVE DECEASED (GO TO 286)	ALIVE DECEASED (GO TO 286)	ALIVE DECEASED (GO TO 286)
285	Did (NAME) drink anything from a bottle with a nipple yesterday or last night?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . 90	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . 90	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . 90
286		GO BACK TO 252 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 300	GO BACK TO 252 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 300	GO TO 300

E	CHILD HEALTH: VACCINATIONS, DIARRHEA, AND FEVER			
		LAST BIRTH	SECOND-TO-LAST BIRTH	THIRD-TO-LAST BIRTH
300	RECORD BIRTH HISTORY NUMBER FROM 212 AND NAME OF EACH CHILD BORN IN **2006** OR LATER	BIRTH HISTORY NUMBER ☐☐ NAME	BIRTH HISTORY NUMBER ☐☐ NAME	BIRTH HISTORY NUMBER ☐☐ NAME
301	CHECK 215: IS CHILD STILL ALIVE?	ALIVE ☐ DECEASED ⚑ (GO TO 301 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 340)	ALIVE ☐ DECEASED ⚑ (GO TO 301 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 340)	ALIVE ☐ DECEASED ⚑ (GO TO 340)
302	Do you have a card where (NAME'S) vaccinations are written down? IF YES: May I please see it?	YES, SEEN . . . . . 1 YES, NOT SEEN . . 2 (SKIP TO 306) NO CARD 3	YES, SEEN . . . . . 1 YES, NOT SEEN . . 2 (SKIP TO 306) NO CARD 3	YES, SEEN . . . . . 1 YES, NOT SEEN . . 2 (SKIP TO 306) NO CARD 3
303	(1) COPY VACCINATION DATE FOR EACH VACCINE FROM THE CARD. (2) WRITE '44' IN 'DAY' COLUMN IF CARD SHOWS THAT A VACCINATION AS GIVEN, BUT NO DATE IS RECORDED.			
		DAY MONTH YEAR	DAY MONTH YEAR	DAY MONTH YEAR
	BCG	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	POLIO 0 (POLIO GIVEN AT BIRTH)	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	POLIO 1	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	POLIO 2	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	POLIO 3	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	DPT – HEP – HIB 1	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	DPT – HEP – HIB 2	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	DPT – HEP – HIB 3	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	MEASLES	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	OTHER _____	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	VITAMIN A (MOST RECENT)	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
	VITAMIN A (2ND MOST RECENT) .	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐	☐☐ ☐☐ ☐☐
304	CHECK 303: IS BCG TO MEASLES ALL RECORDED FOR THE CHILD?	BCG TO MEASLES ALL RECORDED ⚑ NOT ALL ☐ (SKIP TO 308)	BCG TO MEASLES ALL RECORDED ⚑ NOT ALL ☐ (SKIP TO 308)	BCG TO MEASLES ALL RECORDED ⚑ NOT ALL ☐ (SKIP TO 308)

305	Has (NAME) had any vaccinations that are not recorded on this card, including vaccinations given in a national immunization day campaign? RECORD 'YES' ONLY IF THE RESPONDENT MENTIONS AT LEAST ONE OF THE VACCINATIONS IN 303 THAT ARE NOT RECORDED AS HAVING BEEN GIVEN	YES .... 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 303) (SKIP TO 308) NO .... 2 (SKIP TO 308) DON'T KNOW ... 90	YES .... 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 303) (SKIP TO 308) NO .... 2 (SKIP TO 308) DON'T KNOW ... 90	YES .... 1 (PROBE FOR VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 303) (SKIP TO 308) NO .... 2 (SKIP TO 308) DON'T KNOW ... 90
306	Did (NAME) ever have any vaccinations to prevent him/her from getting diseases, including vaccinations received in a national immunization day campaign?	YES .... 1 NO .... 2 (SKIP TO 308) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 308) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 308) DON'T KNOW ... 90
307	Please tell me if (NAME) received any of the following vaccinations: A. BCG vaccination against tuberculosis, that is, an injection in the upper arm/shoulder that usually causes a scar?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
	B. Polio vaccine, that is, drops in the mouth?	YES .... 1 NO .... 2 (SKIP TO 307.E) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 307.E) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 307.E) DON'T KNOW ... 90
	C. When was the first polio vaccine received - in the first two weeks after birth or later?	FIRST TWO WEEKS .... 1 LATER .... 2 DON'T KNOW ... 90	FIRST TWO WEEKS .... 1 LATER .... 2 DON'T KNOW ... 90	FIRST TWO WEEKS .... 1 LATER .... 2 DON'T KNOW ... 90
	D. How many times was the polio vaccine received?	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90
	E. Did the child get a DPT vaccination, that is, an injection in the thigh or buttock, sometimes given at the same time as polio drops?	YES .... 1 NO .... 2 (SKIP TO 307.G) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 307.G) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 307.G) DON'T KNOW ... 90
	F. How many times was the DPT vaccine received?	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90	NUMBER OF TIMES .... ☐ DON'T KNOW ... 90
	G. An injection in the upper arm to prevent measles?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
308	Did (NAME) receive a vitamin A dose like this during the last 6 months? SHOW CAPSULE	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
309	Has (NAME) taken any drug for intestinal worms in the last 6 months?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
310	Has (NAME) had diarrhea in the last 2 weeks?	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90
311	Was there any blood in the stools?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90

312	Was (NAME) given a fluid made from a special packet called ORS?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
313	Was (NAME) given a government recommended home-made fluid?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
314	Was anything (else) given to treat the diarrhea?	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 316) DON'T KNOW ... 90
315	What (else) was given to treat the diarrhea? ...Anything else? CIRCLE ALL TREATMENTS MENTIONED	PILL OR SYRUP ANTIBIOTIC 11 LOPERAMIDE 12 ZINC 13 OTHER PILL 14 INJECTION ANTIBIOTIC 15 OTHER INJ. 16 (I.V.) INTRAVENOUS REMEDIES ... 17 HERBAL OR HOME REMEDIES ... 18 OTHER __________ 96 (SPECIFY)	PILL OR SYRUP ANTIBIOTIC 11 LOPERAMIDE 12 ZINC 13 OTHER PILL 14 INJECTION ANTIBIOTIC 15 OTHER INJ. 16 (I.V.) INTRAVENOUS REMEDIES ... 17 HERBAL OR HOME REMEDIES ... 18 OTHER __________ 96 (SPECIFY)	PILL OR SYRUP ANTIBIOTIC 11 LOPERAMIDE 12 ZINC 13 OTHER PILL 14 INJECTION ANTIBIOTIC 15 OTHER INJ. 16 (I.V.) INTRAVENOUS REMEDIES ... 17 HERBAL OR HOME REMEDIES ... 18 OTHER __________ 96 (SPECIFY)
316	Has (NAME) been ill with a fever at any time in the last two weeks?	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90	YES .... 1 NO .... 2 DON'T KNOW ... 90
317	Has (NAME) had an illness with cough at any time in the last 2 weeks?	YES .... 1 NO .... 2 (SKIP TO 320) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 320) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 320) DON'T KNOW ... 90
318	When (NAME) had an illness with a cough, did s/he breathe faster than usual with short rapid breaths, or have difficulty breathing?	YES .... 1 NO .... 2 (SKIP TO 321) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 321) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 321) DON'T KNOW ... 90
319	Was the fast or difficult breathing due to a problem in the chest or due to a blocked or runny nose?	CHEST ONLY ..... 1 NOSE ONLY ..... 2 BOTH .... 3 OTHER (SPECIFY) 96 __________ DON'T KNOW ... 90 (SKIP TO 321)	CHEST ONLY ..... 1 NOSE ONLY ..... 2 BOTH .... 3 OTHER (SPECIFY) 96 __________ DON'T KNOW . 90 (SKIP TO 321)	CHEST ONLY ..... 1 NOSE ONLY ..... 2 BOTH .... 3 OTHER (SPECIFY) 96 __________ DON'T KNOW . 90 (SKIP TO 321)
320	CHECK 316: HAD FEVER?	YES NO [IF 'NO' OR 'DON'T KNOW' IN 316 GO TO NEXT CHILD: 300]	YES NO [IF 'NO' OR 'DON'T KNOW' IN 316 GO TO NEXT CHILD: 300]	YES NO [IF 'NO' OR 'DON'T KNOW' IN 316 GO TO 340]
321	Did you seek advice or treatment for the fever/cough?	YES .... 1 NO .... 2 (SKIP TO 334) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 334) DON'T KNOW ... 90	YES .... 1 NO .... 2 (SKIP TO 340) DON'T KNOW ... 90

322	Where did you seek treatment? …Anywhere else? CIRCLE ALL THAT APPLY	GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION / CLINIC/ CLINIC . . . . . 13 HEALTH POST 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE HOSPITAL / CLINIC . . . . . 41 PVT. DOCTOR . 42 PVT. PHARMACY 43 OTHER PVT. ______ 49 (SPECIFY) COMMUNITY HEALTH WORKER . . . 71 TRADITIONAL HEALER . . . . 51 HOLY WATER . . . 61 OTHER __________ 96 (SPECIFY)	GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION / CLINIC/ CLINIC . . . . . 13 HEALTH POST 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE HOSPITAL / CLINIC . . . . . 41 PVT. DOCTOR . 42 PVT. PHARMACY 43 OTHER PVT. ______ 49 (SPECIFY) COMMUNITY HEALTH WORKER . . . 71 TRADITIONAL HEALER . . . . 51 HOLY WATER . . . 61 OTHER __________ 96 (SPECIFY)	GOVERNMENT HOSPITAL . . . . . 11 HEALTH CENTER 12 HEALTH STATION / CLINIC/ CLINIC . . . . . 13 HEALTH POST 14 OTHER GOV. ______ 19 (SPECIFY) NON-GOVERNMENTAL NGO HEALTH FACILITY . . . 31 PRIVATE HOSPITAL / CLINIC . . . . . 41 PVT. DOCTOR . 42 PVT. PHARMACY 43 OTHER PVT. ______ 49 (SPECIFY) COMMUNITY HEALTH WORKER . . . 71 TRADITIONAL HEALER . . . . 51 HOLY WATER . . . 61 OTHER __________ 96 (SPECIFY)
323	CHECK 322: ARE TWO OR MORE CODES CIRCLED?	2+ CODES CIRCLED <=1 CODE CIRCLED (SKIP TO 325)	2+ CODES CIRCLED <=1 CODE CIRCLED (SKIP TO 325)	2+ CODES CIRCLED <=1 CODE CIRCLED (SKIP TO 325)
324	Where did you first seek advice or treatment? [USE CODES FROM 322]	FIRST PLACE	FIRST PLACE	FIRST PLACE ......
325	At any time during this illness, was (NAME) tested for malaria?	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90
326	Did (NAME) receive a positive test result for malaria? IF CHILD RECEIVED MULTIPLE TESTS DURING ILLNESS, PLEASE RECORD 'YES' IF ANY TEST RESULT WAS POSITIVE	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90
327	At any time during this illness, did (NAME) receive a malaria test from a Community Health Worker at your home?	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 329) DON'T KNOW . . . 90
328	Did (NAME) receive a positive test result for malaria from a Community Health Worker at your home? IF CHILD RECEIVED MULTIPLE TESTS FROM CHW, PLEASE RECORD 'YES' IF ANY TEST RESULT WAS POSITIVE	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 DON'T KNOW . . . 90
329	Did you give (NAME) any pharmaceutical drugs during this illness?	YES . . . . 1 NO . . . . 2 (SKIP TO 334) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 334) DON'T KNOW . . . 90	YES . . . . 1 NO . . . . 2 (SKIP TO 340) DON'T KNOW . . . 90

330	What drugs did (NAME) take? Any other drugs? CIRCLE ALL THAT APPLY [CONSULT LIST OF BRAND NAME DRUGS IF NEEDED]	ANTI-MALARIALS . 1 ANTIBIOTICS . . . 2 PARACETAMOL . 3 OTHER (SPECIFY) . 96 __________ DON'T KNOW . . . 90	ANTI-MALARIALS . 1 ANTIBIOTICS . . . 2 PARACETAMOL . 3 OTHER (SPECIFY) . 96 __________ DON'T KNOW . . . 90	ANTI-MALARIALS . 1 ANTIBIOTICS . . . 2 PARACETAMOL . 3 OTHER (SPECIFY) . 96 __________ DON'T KNOW . . . 90
331	CHECK 330: DID CHILD TAKE ANY ANTI-MALARIALS = '1'?	YES NO (SKIP TO 334)	YES NO (SKIP TO 334)	YES NO (SKIP TO 340)
333	How long after the fever started did (NAME) begin to take the anti-malarial drugs?	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . 2 THREE DAYS AFTER FEVER . . . . 3 FOUR OR MORE DAYS AFTER . . . 4 DON'T KNOW . . . 90	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . 2 THREE DAYS AFTER FEVER . . . . 3 FOUR OR MORE DAYS AFTER . . . 4 DON'T KNOW . . . 90	SAME DAY . . . . . 0 NEXT DAY . . . . . 1 TWO DAYS AFTER FEVER . . . . 2 THREE DAYS AFTER FEVER . . . . 3 FOUR OR MORE DAYS AFTER . . . 4 DON'T KNOW . . . 90
334		GO BACK TO 300 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 340	GO BACK TO 300 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 340	GO TO 340

F	INFANT AND YOUNG CHILD FEEDING	
340	CHECK 215, 218, ALL ROWS: NUMBER OF CHILDREN BORN IN 2009 OR LATER AND LIVING WITH THE RESPONDENT NONE ☐ → 350 RECORD NAME OF YOUNGEST CHILD **LIVING WITH** HER AND CONTINUE WITH 341 _____ (NAME) BIRTH HISTORY NUMBER . . . . . ☐☐	
341	Was [NAME FROM 340] breastfed yesterday during the day or at night?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90

342 Now I would like to ask you about some liquids that (NAME) may have had yesterday during the day or at night. Did (NAME) have any (ITEM FROM LIST)?

READ THE LIST OF LIQUIDS STARTING WITH 'PLAIN WATER'.

Did (NAME) [drink/eat]:		Yes	No	Don't Know
a) Plain water?	**a)**	1	2	90
b) Infant formula such as (INSERT LOCAL EXAMPLE)?	**b)**	1	2	90
IF YES: How many times did (NAME) drink infant formula? IF 7 OR MORE TIMES, RECORD '7'.		NUMBER OF TIMES DRANK FORMULA ☐		
c) Milk such as tinned, powdered, or fresh animal milk?	**c)**	1	2	90
IF YES: How many times did (NAME) drink milk? IF 7 OR MORE TIMES, RECORD '7'.		NUMBER OF TIMES DRANK MILK ☐		
d) Juice or juice drinks?	**d)**	1	2	90
e) Clear broth?	**e)**	1	2	90
f) Yogurt?	**f)**	1	2	90
IF YES: How many times did (NAME) eat yogurt? IF 7 OR MORE TIMES, RECORD '7'.		NUMBER OF TIMES ATE YOGURT ☐		
g) Thin porridge?	**g)**	1	2	90
h) Any [BRAND NAME OF COMMERCIALLY FORTIFIED BABY FOOD, E.G. Cerelac]?	**h)**	1	2	90
i) Any other liquids such as (LIST OTHER WATER-BASED LIQUIDS AVAILABLE IN THE LOCAL SETTING)?	**i)**	1	2	90
j) Any other liquids?	**j)**	1	2	90

343 Please describe everything (NAME) ate yesterday during the day or night, whether at home or outside the home.

1) Think about when (NAME) first woke up yesterday. Did (NAME) eat anything at that time?
IF YES: Please tell me everything (NAME) ate at that time. PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE
IF NO: CONTINUE TO QUESTION (2)

2) What did (NAME) do after that? Did (NAME) eat anything at that time?
IF YES: Please tell me everything (NAME) ate at that time. PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE
REPEAT QUESTION (2) ABOVE UNTIL RESPONDENT SAYS THE CHILD WENT TO SLEEP UNTIL THE NEXT DAY

IF RESPONDENT MENTIONS MIXED DISHES LIKE PORRIDGE, SAUCE OR STEW, PROBE:
3) What ingredients were in that (MIXED DISH)? PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE.

AS THE RESPONDENT RECALLS FOODS, UNDERLINE THE CORRESPONDING FOOD AND CIRCLE '1' IN THE COLUMN NEXT TO THE FOOD GROUP. IF THE FOOD IS NOT LISTED IN ANY OF THE FOODS GROUPS BELOW, WRITE THE FOOD IN THE BOX LABELED 'OTHER FOODS'. IF FOODS ARE USED IN SMALL AMOUNTS FOR SEASONING OR AS A CONDIMENT, INCLUDE THEM UNDER THE CONDIMENTS FOOD GROUP.

ONCE THE RESPONDENT FINISHED RECALLING FOODS EATEN, READ EACH FOOD GROUP WHERE '1' WAS NOT CIRCLED, ASK THE FOLLOWING QUESTION AND CIRCLED '1' IF RESPONDENT SAYS YES, '2' IF NO AND '90' IF DON'T KNOW:

Yesterday during the day or night, did (NAME) drink/eat any (FOOD GROUP ITEMS)?

OTHER FOODS: PLEASE WRITE DOWN OTHER FOODS IN THIS BOX THAT RESPONDENT MENTIONED BUT ARE NOT IN THE LIST BELOW

		Yes	No	DK
a) Bread, rice, noodles, porridge, or other foods made from grains?	**a)**	1	2	90
b) Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside?	**b)**	1	2	90
c) White potatoes, white yams, manioc, cassava, or any other foods made from roots?	**c)**	1	2	90
d) Any dark green, leafy vegetables?	**d)**	1	2	90
e) Ripe mangoes, papayas or [INSERT ANY OTHER LOCALLY AVAILABLE VITAMIN A-RICH FRUITS]?	**e)**	1	2	90
f) Any other fruits or vegetables?	**f)**	1	2	90
g) Liver, kidney, heart or other organ meats?	**g)**	1	2	90
h) Any meat, such as beef, pork, lamb, goat, chicken, or duck?	**h)**	1	2	90
i) Eggs?	**i)**	1	2	90
j) Fresh or dried fish, shellfish or seafood?	**j)**	1	2	90
k) Any foods made from beans, peas, lentils, nuts, or seeds?	**k)**	1	2	90
l) Cheese, yoghurt, or other milk products?	**l)**	1	2	90
m) Any oil, fats, or butter, or foods made with any of these?	**m)**	1	2	90
n) Any sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits?	**n)**	1	2	90
o) Condiments for flavor, such as chilies, herbs, or fish powder?	**o)**	1	2	90
q) Foods made with red palm oil, red palm nut, or red palm nut pulp sauce?	**q)**	1	2	90

344 CHECK 343 (CATEGORIES "a" THROUGH "q"):

NOT A SINGLE "YES" → ↓

AT LEAST ONE "YES" → 346

345 Did (NAME) eat any solid, semi-solid, or soft foods yesterday during the day or at night?

IF 'YES' PROBE: What kind of solid, semi-solid or soft foods did (NAME) eat?

YES 1
(GO BACK TO 343 TO RECORD FOOD EATEN YESTERDAY) ←

NO . . . . . 2 → 350

346	How many times did (NAME) eat solid, semi-solid, or soft foods yesterday during the day or at night? IF 7 OR MORE TIMES, RECORD '7'.	NUMBER OF TIMES . . . . . ☐ DON'T KNOW 90

G ADULT FOOD VARIETY

350	Now I will ask you about the amount of food available to **you** yesterday. How many meals did you eat yesterday? IF 7 OR MORE TIMES, RECORD '7'.	NUMBER OF TIMES . . . . . ☐

351 Please describe everything **you** ate yesterday during the day or night, whether at home or outside the home.

1) Think about when **you** first woke up yesterday. Did **you** eat anything at that time?
IF YES: Please tell me everything (NAME) ate at that time. PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE
IF NO: CONTINUE TO QUESTION (2)

2) What did **you** do after that? Did **you** eat anything at that time?
IF YES: Please tell me everything (NAME) ate at that time. PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE
REPEAT QUESTION (2) ABOVE UNTIL RESPONDENT SAYS THE CHILD WENT TO SLEEP UNTIL THE NEXT DAY

IF RESPONDENT MENTIONS MIXED DISHES LIKE PORRIDGE, SAUCE OR STEW, PROBE:
3) What ingredients were in that (MIXED DISH)? PROBE: Anything else? UNTIL RESPONDENT SAYS NOTHING ELSE.

AS THE RESPONDENT RECALLS FOODS, UNDERLINE THE CORRESPONDING FOOD AND CIRCLE '1' IN THE COLUMN NEXT TO THE FOOD GROUP. IF THE FOOD IS NOT LISTED IN ANY OF THE FOODS GROUPS BELOW, WRITE THE FOOD IN THE BOX LABELED 'OTHER FOODS'. IF FOODS ARE USED IN SMALL AMOUNTS FOR SEASONING OR AS A CONDIMENT, INCLUDE THEM UNDER THE CONDIMENTS FOOD GROUP.

ONCE THE RESPONDENT FINISHED RECALLING FOODS EATEN, READ EACH FOOD GROUP WHERE '1' WAS NOT CIRCLED, ASK THE FOLLOWING QUESTION AND CIRCLED '1' IF RESPONDENT SAYS YES, '2' IF NO AND '90' IF DON'T KNOW:

Yesterday during the day or night, did (NAME) drink/eat any (FOOD GROUP ITEMS)?

OTHER FOODS: PLEASE WRITE DOWN OTHER FOODS IN THIS BOX THAT RESPONDENT MENTIONED BUT ARE NOT IN THE LIST BELOW

		Yes	No	DK
a) Bread, rice, noodles, porridge, or other foods made from grains?	**a)**	1	2	90
b) Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside?	**b)**	1	2	90
c) White potatoes, white yams, manioc, cassava, or any other foods made from roots?	**c)**	1	2	90
d) Any dark green, leafy vegetables?	**d)**	1	2	90
e) Ripe mangoes, papayas or [INSERT ANY OTHER LOCALLY AVAILABLE VITAMIN A-RICH FRUITS]?	**e)**	1	2	90
f) Any other fruits or vegetables?	**f)**	1	2	90
g) Liver, kidney, heart or other organ meats?	**g)**	1	2	90
h) Any meat, such as beef, pork, lamb, goat, chicken, or duck?	**h)**	1	2	90
i) Eggs?	**i)**	1	2	90
j) Fresh or dried fish, shellfish or seafood?	**j)**	1	2	90
k) Any foods made from beans, peas, lentils, nuts, or seeds?	**k)**	1	2	90
l) Cheese, yoghurt, or other milk products?	**l)**	1	2	90
m) Any oil, fats, or butter, or foods made with any of these?	**m)**	1	2	90
n) Any sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits?	**n)**	1	2	90
o) Condiments for flavor, such as chilies, herbs, or fish powder?	**o)**	1	2	90
q) Foods made with red palm oil, red palm nut, or red palm nut pulp sauce?	**q)**	1	2	90

H	**MARRIAGE STATUS**		
360	Have you ever been married or lived as married?	YES . . . . . 1 NO 2	→ 370
361	Are you currently married or living as married? [IF YES, MUST DEFINE THE STATUS]	MARRIED . . . . . 1 LIVING AS MARRIED . . . . . 2 NO 3	
362	How old were you at the time of your first marriage or when you first began living as married?	AGE IN YEARS . . . . . [ ][ ] DON'T KNOW 90	
J	**HIV / AIDS KNOWLEDGE**		
370	Now I would like to talk about something else. Have you ever heard of a disease called HIV/AIDS?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 390
371	Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
372	Can a person get the AIDS virus from mosquito or other insect bites?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
373	Can people reduce their chances of getting the AIDS virus by using a condom every time they have sex?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
374	Can people get the AIDS virus by sharing food with a person who has AIDS?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
375	Is it possible for a healthy-looking person to have the AIDS virus?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
376	Can the virus that causes AIDS be transmitted from a mother to her baby:	Yes / No / Don't Know	
A.	During pregnancy?	1 / 2 / 90	
B.	During delivery?	1 / 2 / 90	
C.	By breastfeeding?	1 / 2 / 90	
377	CHECK 376: AT LEAST ONE 'YES' ↓ ZERO 'YES' RESPONSES →		379

378	Can a mother who is infected with the AIDS virus reduce the risk of giving the virus to the baby by taking certain drugs during pregnancy?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
379	I do not want to know the results, but have you ever been tested to see if you have the AIDS virus?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW . . . . . 90 → 390	
380	I don't want to know the results of the test, but did you ever get the results of the test?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
381	CHECK 361: IS RESPONDENT "MARRIED" OR "LIVING AS MARRIED"? MARRIED OR LIVING AS MARRIED ↓	NO → 390	
382	The last time you received the HIV test, were you tested with your partner?	YES . . . . . 1 NO 2	
383	How many months ago was your most recent HIV test?	MONTHS . . . . . ☐☐ 2 YEARS OR MORE AGO . . . . . 95 DON'T KNOW 90	
K	**LITERACY**		
390	Now, I would like to ask you about your reading and mathematics skills. Can you please try to read this line (1) of words out-loud for me? ▶ The child is playing with the ball.	RECORD RESPONDENT'S ABILITY TO READ LINE 1 READ ALL OF THE WORDS . . . . . 1 READ SOME OF THE WORDS . . . . . 2 READ NONE OF THE WORDS . . . . . 3 DID NOT TRY / PARTICIPATE 98	
391	Can you please try to read this line (2) of words out-loud for me? ▶ Farming is hard work.	RECORD RESPONDENT'S ABILITY TO READ LINE 2 READ ALL OF THE WORDS . . . . . 1 READ SOME OF THE WORDS . . . . . 2 READ NONE OF THE WORDS . . . . . 3 DID NOT TRY / PARTICIPATE 98	
392	Can you please try to answer this math problem (1) for me? If you have 9 cows and are given 4 more cows how many cows do you have in total? ▶ 9 + 4 = _____	RECORD RESPONDENT'S ABILITY TO CALCULATE PROBLEM 1 YES . . . . . 1 NO . . . . . 2 DID NOT TRY / PARTICIPATE 98	
393	Can you please try to answer this math problem (2) for me? If there are 4 villages with 5 houses each, how many houses are there in total in the 4 villages? ▶ 4 x 5 = _____	RECORD RESPONDENT'S ABILITY TO CALCULATE PROBLEM 1 YES . . . . . 1 NO . . . . . 2 DID NOT TRY / PARTICIPATE 98	

L	**MOBILE PHONE USE**		
400	Did you have personal use of a mobile telephone during some or all of the last 12 months?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 405
401	How often do you typically use a mobile phone?	AT LEAST ONCE PER DAY . . . . . 1 AT LEAST ONCE A WEEK, BUT NOT EVERY DAY . . . . . 2 AT LEAST ONCE A MONTH, BUT NOT EVERY WEEK . . . . . 3 LESS THAN ONCE A MONTH . . . . . 4 DON'T KNOW 90	
402	Did you use a mobile phone yesterday?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 405
403	How many calls did you make yesterday to speak with another person?	NONE 00 NUMBER OF CALLS ☐☐☐☐ DON'T KNOW 990	→ 405
404	About how many minutes yesterday were you talking on a mobile phone to another person?	NONE 00 NUMBER OF MINUTES ☐☐☐☐ DON'T KNOW 990	
405	Do you personally own a functioning mobile telephone? [NOTE: THIS DOES NOT INCLUDE OWNERSHIP BY OTHER HOUSEHOLD MEMBERS]	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	
M	**LOCAL ORGANIZATIONS**		
410	Do you participate in or belong to any local or government organizations?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 420
411	What type(s) of organizations do you participate in or belong to? …Anything else? [CIRCLE ALL THAT APPLY]	LOCAL GOVERNMENT . . . . . 1 CBO / NGO . . . . . 2 CHURCH / PRAYER GROUP OR BURIAL SOCIETY . . . . . 3 WOMEN'S GROUP . . . . . 4 YOUTH GROUP . . . . . 5 FARMER'S GROUP . . . . . 6 VILLAGE COMMITTEE (E.G. SCHOOL WATER, HEALTH) . . . . . 7 SPORTS CLUB . . . . . 8 ECONOMIC ORG. (SAVINGS, MICROFINANCE) . . . . . 9 OTHER (SPECIFY) . . . . . 96 _____ DON'T KNOW 90	
412	Are you a leader or do you have an elected position in any of these organizations?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 420
413	What type(s) of organization are you a leader or have an elected position in? …Anything else? [CIRCLE ALL THAT APPLY] [CHECK 411: MAKE SURE ORGANIZATIONS IN THIS QUESTION (413) ARE ALSO LISTED IN 411]	LOCAL GOVERNMENT . . . . . 1 CBO / NGO . . . . . 2 CHURCH / PRAYER GROUP OR BURIAL SOCIETY . . . . . 3 WOMEN'S GROUP . . . . . 4 YOUTH GROUP . . . . . 5 FARMER'S GROUP . . . . . 6 VILLAGE COMMITTEE (E.G. SCHOOL WATER, HEALTH) . . . . . 7 SPORTS CLUB . . . . . 8 ECONOMIC ORG. (SAVINGS, MICROFINANCE) . . . . . 9 OTHER (SPECIFY) . . . . . 96 _____ DON'T KNOW 90	

N	**EXTENSION TRAINING**		
420	During the past 12 months, have you received training or had contact with extension agents?	YES . . . . . 1 NO . . . . . 2 DON'T KNOW 90	→ 423
421	What were the topics of the trainings / extensions? …Anything else? [CIRCLE ALL THAT APPLY]	AGRICULTURE . . . . . 1 WATER . . . . . 2 HEALTH . . . . . 3 ENVIRONMENT . . . . . 4 ENERGY . . . . . 5 TRANSPORTATION . . . . . 6 COMMUNICATION / COMPUTER / INTERNET . . . . . 7 BUSINESS / FINANCE . . . . . 8 HOME ECONOMICS . . . . . 9 OTHER (SPECIFY) . . . . . 96 _____ DON'T KNOW 90	
422	How long has it been since a Community Health Worker visited your home to check on the health of you or any of your household members?	DAYS . . . . . [ ][ ] WEEKS . . . . . [ ][ ] MONTHS . . . . . [ ][ ] YEARS . . . . . [ ][ ] NEVER . . . . . 999 DON'T KNOW 990	
P	**GENERAL HEALTH AND TREATMENT SEEKING BEHAVIOR**		
423	Please mention all of the occasions when is it important to wash your hands. [CIRCLE ALL THAT APPLY] [DO NOT READ THE ANSWERS. WHEN ZERO, ONE, OR MORE ANSWERS ARE GIVEN BY THE RESPONDENT, ASK TWO MORE TIMES IF THERE IS ANYTHING ELSE. RECORD RESPONSES. CIRLE ALL THAT APPLY. IF THE RESPONDENT INDICATES THAT SHE DOES NOT KNOW, DO NOT PROBE FOR ADDITIONAL RESPONSES. AFTER RECORDING ALL RESPONSES, PROBE TWICE ASKING FOR ANY OTHER OCCASIONS.]	BEFORE EATING . . . . . 1 AFTER EATING . . . . . 2 BEFORE PRAYING . . . . . 3 BEFORE BREASTFEEDING OR FEEDING A CHILD . . . . . 4 BEFORE COOKING OR PREPARING FOOD . . . . . 5 AFTER DEFECATION OR URINATION 6 AFTER CLEANING A CHILD THAT HAS DEFECATED OR CLEANING A CHILD'S NAPPY . . . . . 7 WHEN MY HANDS ARE DIRTY 8 AFTER CLEANING THE TOILET OR POTTY . . . . . 9 OTHER _____ 96 (SPECIFY) DON'T KNOW 90	
	Thank you very much for sparing time to answer these questions. Your assistance is highly appreciated.		
430	RECORD THE END TIME	HOURS . . . . . [ ][ ] MINUTES . . . . . [ ][ ] CIRCLE ONE ► AM PM	

R OBSERVATIONS

INTERVIEWER'S OBSERVATIONS

COMMENTS ABOUT RESPONDENT

COMMENTS ON SPECIFIC QUESTIONS

ANY OTHER COMMENTS

SUPERVISOR'S OBSERVATIONS

NAME OF SUPERVISOR: _____ DATE: _____

EDITOR'S OBSERVATIONS

NAME OF EDITOR: _____ DATE: _____

S KEY EDITING CHECKS

REVIEW THE FOLLOWING EDITING CHECKS AND MARK (√) IF THE QUESTIONS ARE RECORDED ACCURATELY.
EACH QUESTIONNAIRE SHOULD BE EDITED AT LEAST THREE (3) TIMES BY THREE (3) DIFFERENT PEOPLE.

EDITING #1 >>> ENUMERATOR
EDITING #2 >>> EDITOR or SUPERVISOR
EDITING #3 >>> SUPERVISOR or MANAGER

LIST OF KEY EDITING CHECKS FOR ADULT QUESTIONNAIRE	EDITING #1 ▼▼	EDITING #2 ▼▼	EDITING #3 ▼▼	
1. Range and consistency of Qs. 102, 103, and 104	☐	☐	☐	*
2. Value of Q. 362 must be less than or equal to current age (Q. 103)	☐	☐	☐	
3. Numerical consistency of Qs. 203, 205, 207, and 208	☐	☐	☐	*
4. Consistency of the number of Children recorded in Birth History (212) with Q. 208	☐	☐	☐	*
5. Consistency of the number of Deaths recorded in Q. 216 with Q. 207 (evaluate boys and girls separately)	☐	☐	☐	*
6. Q. 220 reported in days if less than one month and in months if less than two years	☐	☐	☐	*
7. Consistency of birth order with Q. 215	☐	☐	☐	
8. Birth intervals (Q. 215) nine months apart or more	☐	☐	☐	
9. Mother's age at first birth 12 years or older (using Qs. 103 and 215)	☐	☐	☐	*
10 All births since [2006] listed in Q. 252 Birth History Number with last birth on left	☐	☐	☐	*
11 Consistency of line number, name, and survival in Qs. 252 and 253 with the Birth History (Qs. 212, 216)	☐	☐	☐	*
12 Consistency of entries in Qs. 300 and 252 (line number, name, and survival status)	☐	☐	☐	
13 Consistency of dates in vaccination record (Q. 303)	☐	☐	☐	
DATE (dd/mm):	___	___	___	
EMPLOYEE ID:	___	___	___	

Further technical information may be obtained from the UNEP Post-Conflict and Disaster Management Branch website at: **www.unep.org/disastersandconflicts** or by email: **postconflict@unep.org**

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