UNEP

Integrated Baseline Study

Ten Communes of the Southwest Coast, South Department, Haiti

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

CÔTE SUD INITIATIVE

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- Center on Globalization and Sustainable Development (CGSD)
- Center for International Earth Science Information Network (CIESIN)
- Center for Research on Environmental Decisions (CRED)
- Center for Sustainable Urban Development (CSUD)
- Tropical Agriculture and Rural Environment Program (TropAg)
- Lamont-Doherty Earth Observatory (LDEO)
- The Modi Research Lab
- The Urban Design Lab (UDL)

Note on the Context of the Côte Sud Initiative

L'Initiative Côte Sud (CSI) est une plateforme de coopération coordonnée par les Nations Unies et accompagnant le Gouvernement d'Haïti afin de catalyser le développement durable du Département du Sud sur le long-terme. Opérant sous l'égide du Ministère de la Planification et de la Coopération Externe (MPCE) et en collaboration étroite avec les autres Ministères sectorielles, la CSI est l'interface entre d'un coté le gouvernement responsable pour le bien-être de la population du Sud et de l'autre l'ensemble des bailleurs de fonds avec leur agenda respectif pour le développement d'Haïti.

Durant la première phase de CSI- phase de démarrage d'un an (2011-2012), le bailleur de fond, le Fond de reconstruction d'Haïti, par la gouvernement norvégien, a supporté le démarrage de une programme de support, une programme de gestion des resources naturalles, une programme de development economique et infrastructure, et une programme des services sociale. Apres ils ont lancee une programme qui concentree sur six composantes sectorielles au niveau du Département du Sud -Terre Sud, Mer Sud, Energie Sud, Destination Sud, Route Sud, Social Sud et ; (ii) Une composante multisectorielle intensif dans la bassin versant de Port-à-Piment- la mise en place d'un programme de développement intégré.

Dans chaque composante/axe d'interventions (sectorielle ou intégré) pour la phase 1, les objectifs étaient les suivants :
1. Impacts Rapides pour la Population et transfert de connaissances
2. Etudes de base pour mesurer le changement au cours de la périod de cinq ans pour le gouvernemnt et les partenaires de CSI. Cela comprenait une enquête auprès des ménages complets, détaillés dans ce rapport, des cartes détaillées. Aussi, des cartes détaillées GIS de base qui seront utilisés par les partenaires de CSI et CSI pour les équipes à partager avec les communautés locales et le gouvernement, et une plate-forme pour la surveillance continue et d'évaluation du programme intensif des bassins versants.
3. Accompagnement à la planification stratégique sectorielles

Ces trois objectifs (achevés le 30 septembre 2012) portent les résultats immédiats suivants:
1. Un ensemble de réalisation de terrain et d'acquis pour la population - réhabilitation d'écoles, formation de travailleurs de santé, mise en place de système d'irrigation innovant, électrification solaire de centres de santé, renforcement des moyens pour la pêche en haute mer, visibilité touristique pour le Sud, installations de stations hydro-météorologiques, etc ;
2. Un état des lieux détaillé de la région couvrant plusieurs secteurs de manière interdisciplinaire et appuyés par des cartes thématiques facilitant la vue d'ensemble et la prise de décision par les Ministères;
3. L'identification des besoins, l'établissement de priorités et propositions budgétisées des interventions à mettre en place pour les prochaines années pour chaque secteur en collaboration avec le(s) Ministère(s) correspondants.

Dans ce cadre, ce rapport se réfère à la composante et résultat 2 en établissant une ligne de base intégré portant sur 10 communes du Département du Sud. Les membres de la CSI comprennent le Programme des Nations Unies pour l'environnement (PNUE), l'UNOPS, Catholic Relief Services (CRS), l'Organisation pour la Réhabilitation de l'Environnement (ORE), Earth Spark (ES), The Nature Conservancy (TNC), le gouvernement du Haïti, le gouvernement de la Norvège et de nombreuses organisations de développement local

ACRONYMS

AIDS	Acquired Immune Deficiency 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 Science 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	Côte Sud Initiative
CRS	The Catholic Relief Services
CQ	Chloroquine
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
TNC	The Nature Conservancy
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

List of acronyms for each commune:

ANG	Les Anglais
ARN	Arniquet
CHA	Chardonnières
COT	Coteaux
IAV	Ile à Vache
PIM	Port-à-Piment
PS	Port Salut
RAB	Roche à Bateau
SJS	Saint Jean du Sud
TIB	Tiburon

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1. INTRODUCTION

This report provides an integrated multi-sector analysis for ten communes in the southwest coast of the South Department of Haiti, designed to serve as a baseline for a larger ongoing monitoring platform. The new data contained within this study is meant to inform decision makers, guide policymakers and support ongoing project design. Robust information is fundamental to addressing complex development challenges and to ensuring high-quality technical assistance to planners and communities.

The ten commune region, known for its beautiful coastline and its proximity to the Pic Macaya National Park, is an area of high potential for tourism and business development. It is the area of intervention for numerous development programs and one of several growth poles and areas of focus within the national decentralization plans designated by the Government of Haiti and its partners. Despite the region's potential, the government and non-governmental organizations continually record chronic poverty and food insecurity. USAID identifies the greater Tiburon watershed as an area of severe environmental degradation and priority for watershed restoration. This is especially urgent, as the region comprises a sensitive conservation zone of the Pic Macaya with environmental influence over the entire southern peninsula.

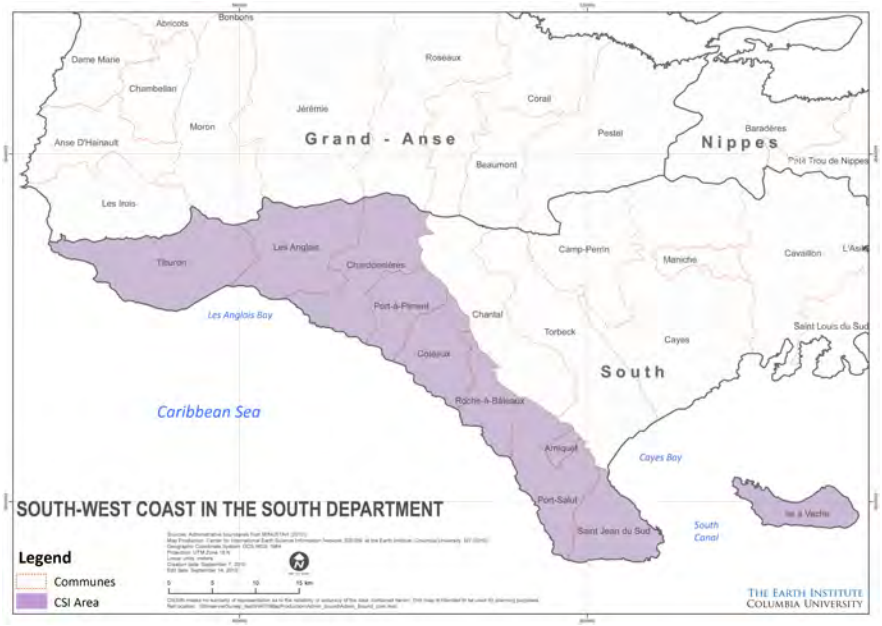
These elements of fragility in the region are linked to a perverse web of interactions. Natural disasters prevent sustained economic growth, limit execution of strategic planning, and undermine poverty reduction programs. Short-term aid interventions in Haiti that focus on disaster relief and security have failed to simultaneously address these multiple areas of vulnerability and reverse the negative cycles that characterize Haiti's stagnant growth and environmental degradation. Political, economic, and environmental shocks weaken the durability and capacity of community-led efforts and have repeatedly derailed otherwise well-designed programs. The absence of sustained engagement in development agendas based on data-driven decision and science-based design tools further undermines environmental stability and sustainable growth. Situational analyses and research on root causes are imperative for new development investments, as is a coherent monitoring system to measure programmatic effectiveness and changes over time. The monitoring platforms should also empower the government on regional scales, and compliment project specific monitoring systems. This baseline report was designed as part of a comprehensive monitoring and evaluation platform to address the current data insufficiencies and to contribute to efforts toward enhancing long-term planning capacity of the Government and local communities. It also serves as an impact assessment tool for new and ongoing projects.

This multi-sector baseline assessment for ten communes in southwest Haiti evaluates environmental and socioeconomic conditions, using progress towards the Millennium Development Goals (MDGs) as a framework of analysis. The study was prepared and conducted by the Earth Institute at Columbia University as part of the first year of the Côte Sud Initiative

(CSI), co-funded by the W.K. Kellogg Foundation, the Earth Institute and the Countess Moira Charitable Foundation. The research was undertaken in direct partnership with the Government of Haiti, the United Nations Environment Programme (UNEP), Catholic Relief Services (CRS), the Organization for the Rehabilitation of the Environment (ORE), and various community-based organizations and municipal representatives throughout the ten communes. The range of data was collected between April 2010 and January 2012, through a variety of research methods including a household survey, climate monitoring stations, a soil survey, and several qualitative assessments.

The baseline study includes the following thematic areas: a demographic profile, agriculture and agro-forestry, health, nutrition and food security, socio-economic situational analysis, water and sanitation, education, energy, institutions, land tenure, and environment, disaster risk and environmental perception. Other sectors, such as marine and tourism, can be found in separate documents produced by CSI partner organizations. The first section provides a high-level overview of the progress towards achieving the MDG objectives. The following sections provide a detailed analysis of each individual sector.

Development outcomes in each sector are benchmarked against the MDGs, which constitute the organizing framework used in this study for evaluating overall development in the region. The MDG targets are globally accepted, quantitative and time-bound, and capable of objective measurement; the goals were adopted and signed by the Government of Haiti in 2000. Based on the body of research contained in this report, it is apparent that throughout the ten commune region none of the MDGs are on track to be achieved by 2015, though progress is notable in places where the Government of Haiti and its NGO partners have maintained multi-year interventions. The key findings are summarized below.



Map 1 Ten communes analyzed within this report.

2. METHODOLOGY OVERVIEW

This integrated Baseline Report, stemming primarily from the 2011-2012 household survey data, the biophysical field studies and the continuous climate monitoring, aims to serve as a comprehensive report on progress towards the MDGs in southwest Haiti. The 2011-2012 household survey was designed as a monitoring tool to provide year zero baseline indicators to be compared with data collected in intervals of two to three years to track progress towards achieving the MDGs. This baseline study was designed to accompany the launch of a 5-year, MDG-based development project and as part of the monitoring and evaluation platform. This baseline assessment is hence tailored to accompany an ongoing data collection around program implementation. The report also incorporates relevant national and departmental scale data sets to contextualize progress towards the MDGs, specifically for indicators that the household survey did not measure, such as health-specific indicators including incidence of HIV/AIDs and malaria. It includes findings from desk research conducted by EI and its partners since 2010.

Altogether, this report provides critical impact evaluation and planning tools for regional government officials, their NGO partners, and local communities. The comprehensive nature of the survey is meant to overcome the existing piecemeal data collection and sources, often for project-specific uses, and thus comprises a range of geographic and thematic datasets.[1] The 2011-2012 household survey incorporates one-on-one interviews of 1,170 households across ten communes in southwest Haiti. It also included responses from 749 women under reproductive age and anthropometric measurements from 818 children under five years of age. For a complete breakdown on the methodology implemented for the 2011-2012 household survey, please refer to Annex I of this report.

For the methodology for the LDSF, climate stations and other studies referred to herein, please see the full-length reports available separately.

[1] 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 few details at the commune level.

[3] http://data.unaids.org/pub/Report/2009/JC1700_Epi_Update_2009_en.pdf

3. STATUS OF THE MDGS IN TEN COMMUNES OF SOUTHWEST HAITI

The MDGs emerged from the Millennium Declaration, a global framework for development agreed upon in 2000 by all member states of the United Nations General Assembly and formally endorsed by Haiti. The MDGs establish quantitative, time-bound targets for improving the lives of people in each country. Ranging from poverty reduction to universal primary education to environmental sustainability, the MDGs constitute an integrated development framework with focused target indicators of progress along the way to eradication of extreme poverty.

The ten communes are not on track to achieve the goals by 2015; this section highlights the status on progress, as of 2012, towards each goal. The report analyzes each MDG in an integrated manner to determine patterns of incidence and identify priority areas for intervention in southwest Haiti.

This information should support planning and development objectives of government ministries, NGOs, and local communities. The information contained within this report helps identify priority zones and potential areas for applied interventions. This is a geographically bound analysis that provides a baseline for comparison, originally designed to be repeated as part of a long-term sustainable development project after three and five years to demonstrate change over time throughout the ten commune zone.

The 2011-2012 socioeconomic household survey demonstrates that the regional MDG indicators in the ten communes of southwest Haiti is uneven. Spatial comparison revealed that for most indicators, Les Anglais, Tiburon and Chardonnieres report below average MDG progress rates. Households in urban areas fare better than those in rural zones; similarly, coastal households fare better than households at high elevations.

GOAL 1: ERADICATE EXTREME POVERTY AND HUNGER

The 2011-2012 household survey shows a consistent pattern in socioeconomic status and poverty indices directly related to the urban and rural spatial divides in the ten communes. The low-elevation coastal areas consistently reported higher socioeconomic status than the sparsely populated upper elevations. The determining factors of relative socioeconomic status, however, are more nuanced and complex. Key indicators identify the areas of need and indicate the necessity of an integrated approach to achieve large-scale poverty reduction and improvements in socioeconomic status indices.

The size and type of access to land is closely linked to household socioeconomic status. The survey found that 85% of households with access to land currently have their parcels under cultivation in one hectare, on average. Of households who harvested crops last year, 88% intercropped their land.

MDG 1 sets the target to halve the proportion of the population that suffers from hunger. Indicators of this target are proportion of children who are underweight and a proxy measurement of the proportion of the population below the minimum level of dietary consumption. Malnutrition is very high across the region. Despite the predominance of food crop agriculture, food insecurity is extremely high in southwestern Haiti, with over 90% of households reporting at least one month when they did not have sufficient food. Small plots and low yield rates for staple crops, close to four times below the international averages, contribute to a situation of high food insecurity indicative of the high rates of poverty (FAO 2009).

Table 1 MDG Indicators Hunger and Poverty (MDG1)

MDG Indicator	South west average	TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
Proxy 1.9 **Months of adequate food provision**	3.5	3.4	3.7	3.5	3.1	3.1	4.1	4.0	3.6	3.7	3.8
1.8 **Prevalence of underweight in children under 5 years**	10%	8%	15%	13%	15%	11%	3%	10%	3%	2%	14 %

GOAL 2: ACHIEVE UNIVERSAL PRIMARY EDUCATION

To achieve MDG 2, the target aims for all boys and girls to complete a full course of primary school. Indicators of this include net enrollment for boys and girls, primary school completion rates and literacy rates.

Approximately two-thirds of the primary school age children in the ten communes are attending primary school, as the net attendance rate, or NAR, for primary education is an average of 74% across the ten communes. Primary school is referred to as Cycles 1 and 2 in Haiti, or first through sixth grade. Gross attendance rates (GAR) for both primary and secondary are much higher, at 135% and 36% respectively, indicating that many of the children are attending primary and secondary school outside of the appropriate age. NAR measures the attendance of students within the official school age group, while GAR measures the attendance of any student. Most students who comprise the difference between the NAR and GAR are students attending school at ages older than appropriate for their educational cycle.

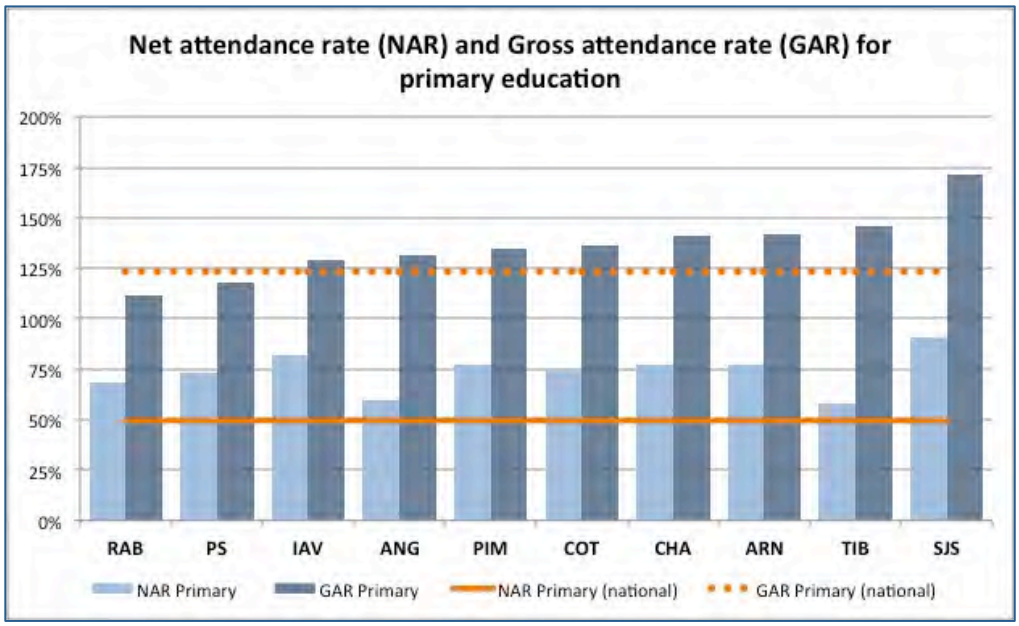


Figure 1. Net attendance rates (NAR) and gross attendance rates (GAR) for primary education. National averages from Cayemittes et al 2007.

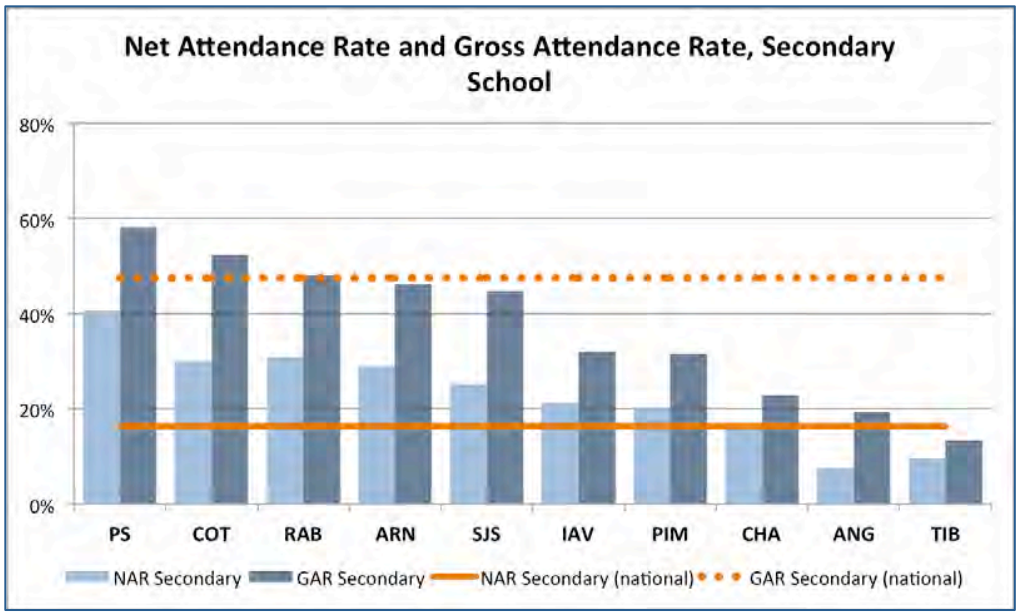


Figure 2. Net attendance rate (NAR) and gross attendance rate (GAR) for secondary education. National averages from Cayemittes et al 2007.

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. The 2011-2012 household survey shows that the net intake rates in the ten communes region varies, with a low of 18% in Les Anglais and Arniquet, and a high of 59% in Saint Jean du Sud; the southwest average is 36% of children at age six who start fundamental cycle 1 (grade 1).

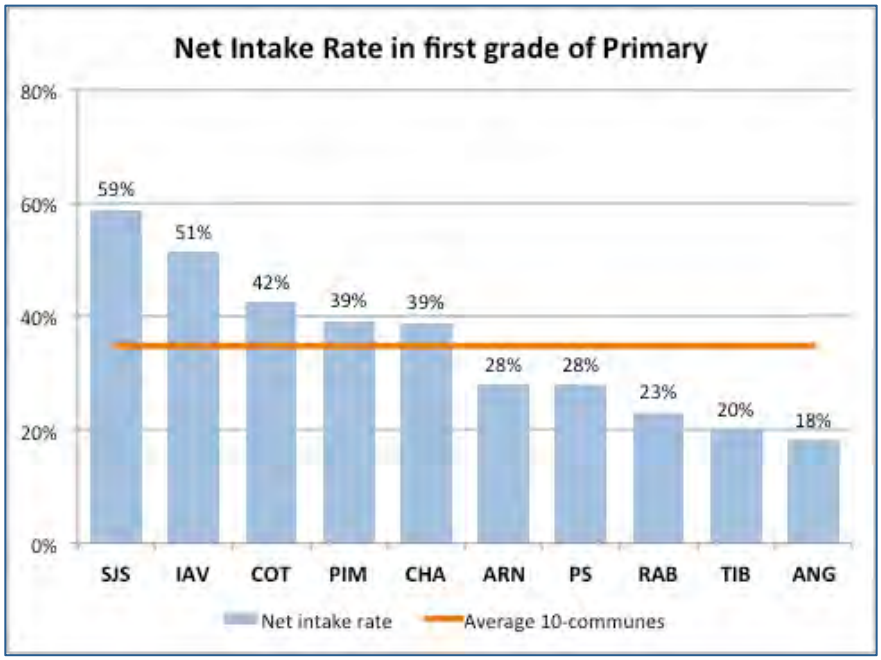


Figure 3. Net intake rate in first grade of primary education.

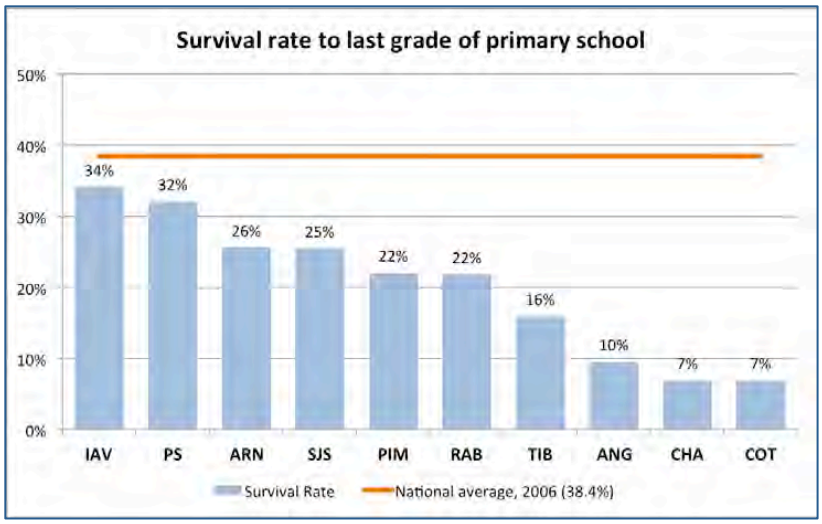


Figure 4 Survival rate to last grade of primary school

Per MDG target 2.2, the survival rate of children who enroll in the first year of primary and complete the final year, a full cycle of six years, is very low across the ten communes, at 17% overall. Seventy-four percent of the adult population surveyed in the ten communes region has not completed primary school, 23% having completed primary school only and 3% completing secondary or higher.

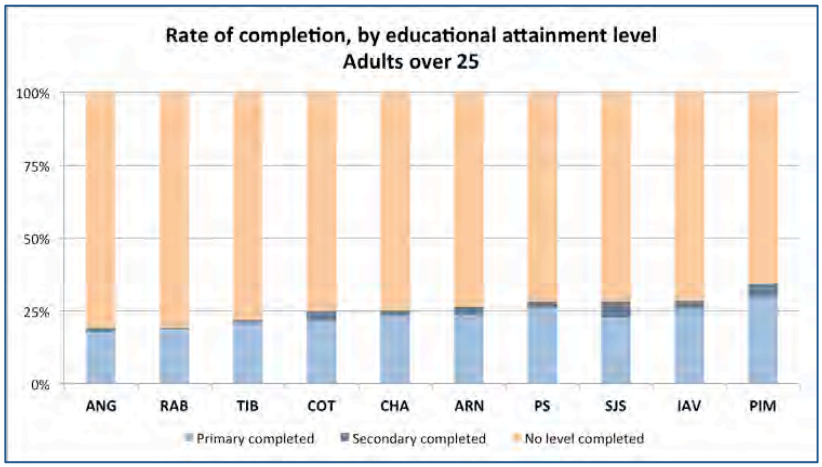


Figure 5. Rate of completion by educational attainment level for adults over 25 years

The young adult literacy rate—measured among female respondents 15-24 years in age—is 60%, indicating that while more than half of the population have gained important skills relating to literacy, there is still 40% that remain who have not attained any achievement. Since attendance rates in the southwest region are higher than the national average, the low literacy rates may be due to poor quality of schools or a recent increase in attendance that has not yet affected the youth literacy rate. The youth literacy rate is much lower for communal sections classified as rural, at 56%, than those classified as urban, at 76%. The adult literacy rate, of women 15-45, is also much lower for communal sections classified as rural, at 46%, than those classified as urban, at 68%.

GOAL 3: PROMOTE GENDER EQUALITY AND EMPOWER WOMEN

Haiti, unlike many countries of similar socioeconomic status, does not have a significant difference in educational achievement between men and women at the primary level. MDG 3 promotes gender equality with its core target to eliminate gender disparity in primary and secondary education by 2015.

Girls and boys are already participating in primary school at nearly equal rates. The national 2006 DHS data reports that the national ratio of girls to boys in primary school at 1.02, and for secondary school at 0.94. In the ten communes, the 2011-2012 household survey reported that the ratio of girls to boys in primary school is 1.06 and in secondary schools is 1.31. However, for adults over 25, only 8% of female respondents across the region, as opposed to 13% of male respondents, have completed secondary school.

Another proxy indicator of gender equality is participation of women in community organizations and post-secondary professional development. In the ten communes, 24% of surveyed women[2] participate in local organizations. Among the southwest communes, Ile à Vache (42%), Les Anglais (31%) and Chardonnières (29%) had the highest female participation levels; communes with the lowest participation include Roche-à-Bateau at 16% and Port Salut at 19%.

With respect to the share of women in wage employment outside the agricultural sector, the 2011-2012 household survey found that just 5% of respondents have salaried occupations. Men held a greater ratio across the ten communes of salaried jobs, either professional or with government or NGOs, with full-time regular pay. Of the 5% of the population with salaried occupations, 59% are men and 41% are women.

GOAL 4: REDUCE CHILD MORTALITY

MDG 4 sets a target to reduce child mortality, between 1990 and 2015, by two thirds. This goal measures progress through the percentage of one-year old children immunized against measles, the rate of under five year old children mortality per 1,000 live births, and infant mortality (0-1 year old infants) per 1,000 live births.

Table 2 MDG 4: Under-Five Mortality Rates.

MDG 4: Under-Five Mortality	Southwest average
2007-2011	65
2002-2007	87
1997-2002	90

In Haiti the rates of under-five mortality are steadily decreasing at the national level, as seen below in national EMMUS data. From the 2011-2012 household data, the average under-five mortality rate for 2007-2011 has been estimated at 65 in southwest Haiti, which represents progress from the slowly declining rates estimated at 90 over the period of 1997-2002 and to 87 from 2002-2007.

Table 3 Mortality rate of children under five years old, from 1987 to 2006 (different data points). Data source: Cayemittes et al 2007.

MDG 4 Indicators at a National Level	EMMUS-I 1987	EMMUS-II 1994-1995	EMMUS-III 2000-2001	EMMUS-IV 2005-2006
Under Five mortality rate (per 1,000 live births)	158	131	119	86

According to the household survey 2011-2012 data, among the children under one year surveyed, 57% have been immunized against measles. This indicator represents not only preventative measures to guard against child mortality, but also the penetration rate of critical government services to a highly vulnerable population. Only two thirds of the way towards achieving the target, there are populations that continue to be isolated from the basic attention at a critical age.

Additional contributing factors for healthy children include the percentage of children who have received vitamin A supplementation in the last six months, and the percentage that have experienced diarrhea, a leading cause of child mortality. Nearly 67% of children under five surveyed in the ten communes received vitamin A supplementation, largely due to the programs run by regional NGOs. The frequency of sickness in children under five is very high across the southwest. Within the two weeks prior to the survey, 42% of surveyed children were reported as having been sick. In the ten communes, 27% of surveyed children under five were reported as having diarrhea in the two weeks prior to the survey.

Access to health care services is low. Of children who had been sick in the past two weeks, only 38% percent received treatment for their sickness. As with the rates of measles immunizations, this indicates that health care penetration remains low across the region. Within the South Department, the difficult terrain makes it difficult to seek health services with most clinics located along the coastal areas as seen in the map below.

Map 2 Health facilities in the southwestern coast, Haiti.

GOAL 5: IMPROVE MATERNAL HEALTH

MDG 5 sets targets to improve maternal health through the achievement of two quantitative targets: reducing maternal mortality by 75%, between 1990 and 2015, and achieving, by 2015, universal access to reproductive health care. The relevant indicators are the maternal mortality ratio, derived from national-scale data, and the proportion of births attended by skilled health personnel; the household survey also measured institutional deliveries and antenatal and postnatal care.

In the ten communes, skilled health personnel attended only 21% of live deliveries from surveyed women in 2012. Only 9% of births were attended by a physician, and 12% by a skilled health professional such as a nurse or a trained midwife. Traditional birth attendants play a large role among the attendants that are present at births. This prevalence can be attributed to the fact that their cost to mothers is much less than the few facilities available, all of which are located in areas classified as urban, and that the health facilities are difficult to access as explained above. Over three quarters (79%) of births occur in private homes.

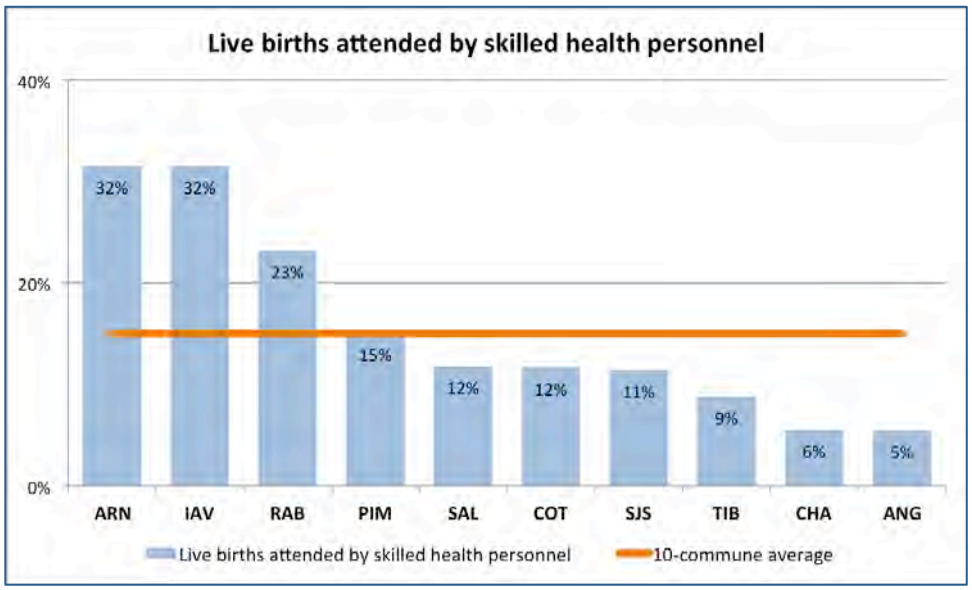


Figure 6 Percentage of live births attended by skilled health personnel

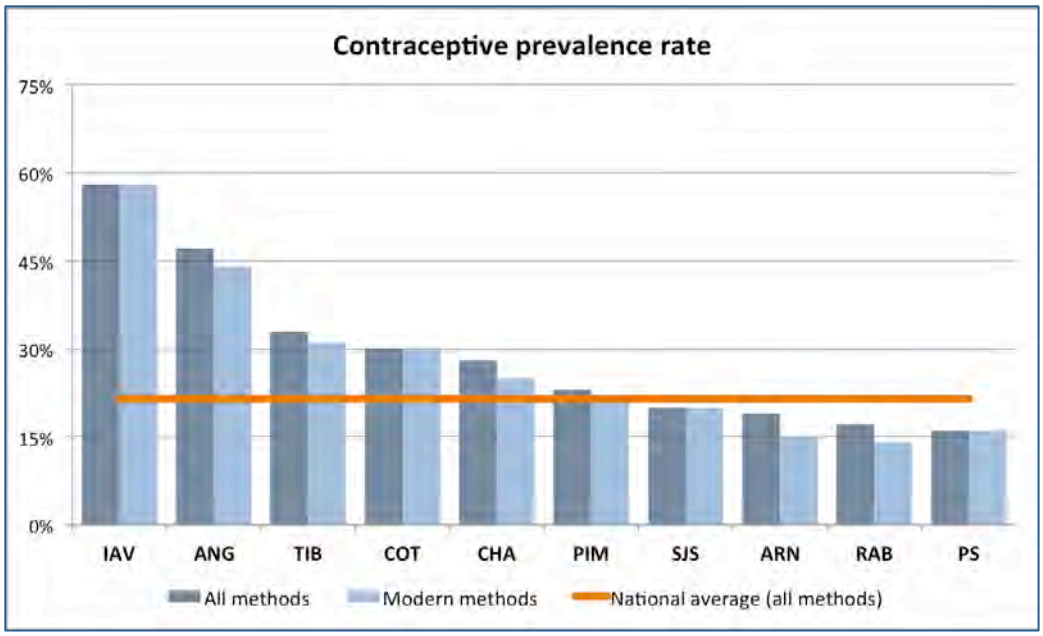


Figure 7 Improve maternal health, MDG 5

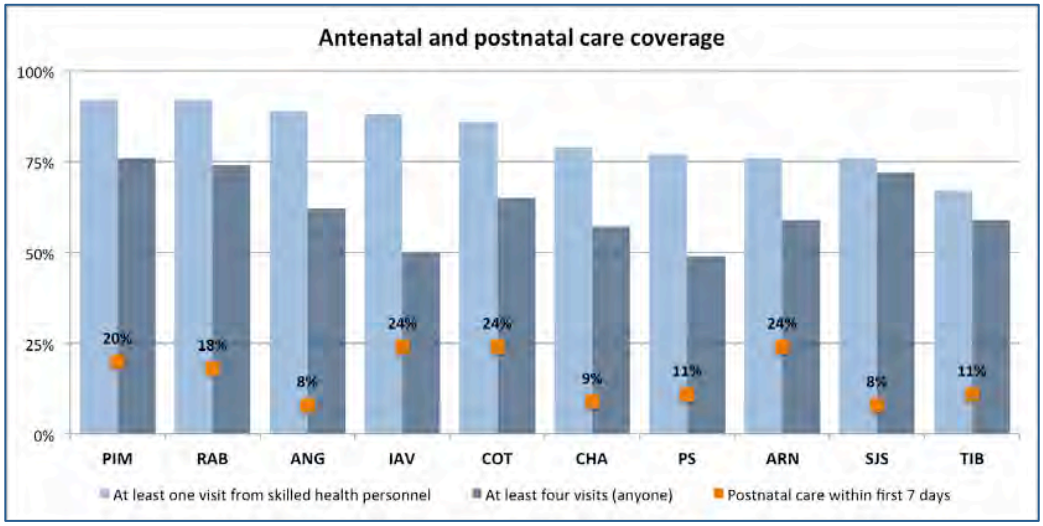


Figure 8 Antenatal and postnatal care coverage

In southwest Haiti, the contraceptive prevalence rate for all methods of contraception for surveyed women between the ages of 15-49 who are married or in a union is 31%; only 29% are using modern methods. Limitations of supplies, stock-outs in the supply chain, and absence of skilled health providers symbolize some of the impediments for larger family planning coverage. MDG 5.6 targets the unmet need for family planning, defined as pre-menopausal women that are sexually active and report not wanting to have children, but do not have access to modern contraceptive methods, is 41%. There is a strong need for family planning consultations and contraceptive methods in the region, particularly in the light of the population demographics

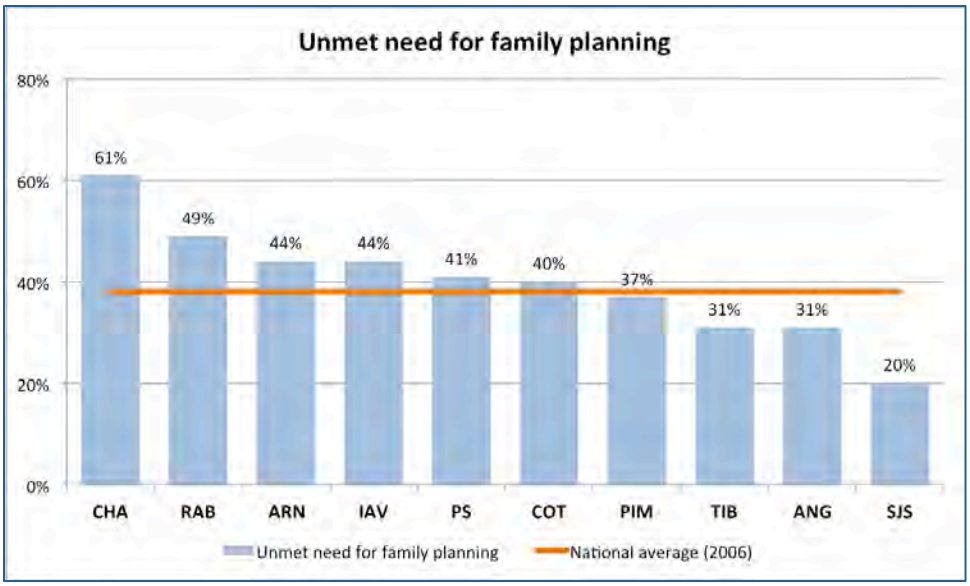


Figure 9 Unmet need for family planning.

with a high ratio of young women of child-bearing age and many more who are coming of age. The adolescent birth rate, MDG 5.4, which has been estimated in recent years to 50 births per 1,000 women aged 15-19, on average, in the ten communes in 2011.

MDG 5.5 measures antenatal coverage, which is important to ensure that there are few complications for the mother and the child leading up to pregnancy. Antenatal care is also important to reinforce positive practice for delivery itself. Antenatal care coverage among sampled women is 83% who had at least one visit by a skilled health worker and 63% completed at least four visits by any health provider during their last pregnancy.

GOAL 6: COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES

MDG 6 aims to halt and reverse the spread of HIV/AIDS, malaria and other diseases by 2015. The indicators of these targets measure detection rates, treatment rates, prevalence rates and death rates.

Beginning with HIV, this study measured the percentage of pregnant women tested for HIV during their pregnancy and proportion of children under-5 sleeping under insecticide-treated bed nets. Haiti has the highest reported HIV prevalence of any nation in the western hemisphere, estimated at 2.3% for women (15-49yrs) and 2% for men (15-59yrs).[3] The baseline survey in the ten communes indicates that only 8% of female respondents between 15 and 24 years old have a correct comprehensive knowledge of HIV/AIDS. Of women 15-49, approximately 24% have correct knowledge.

According to the survey, 54% of women between 15-49 years old have ever been tested for HIV/AIDS in the ten communes; 47% of women have ever received the test results, 16% of which were screened in the past twelve months.

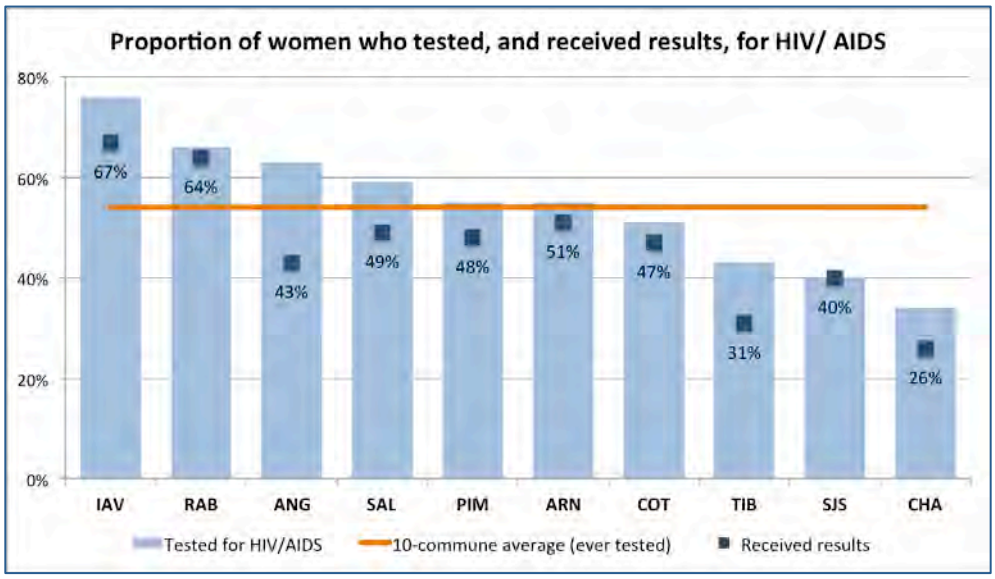


Figure 10 Proportion of women tested and received results for HIV/AIDS

[3] http://data.unaids.org/pub/Report/2009/JC1700_Epi_Update_2009_en.pdf

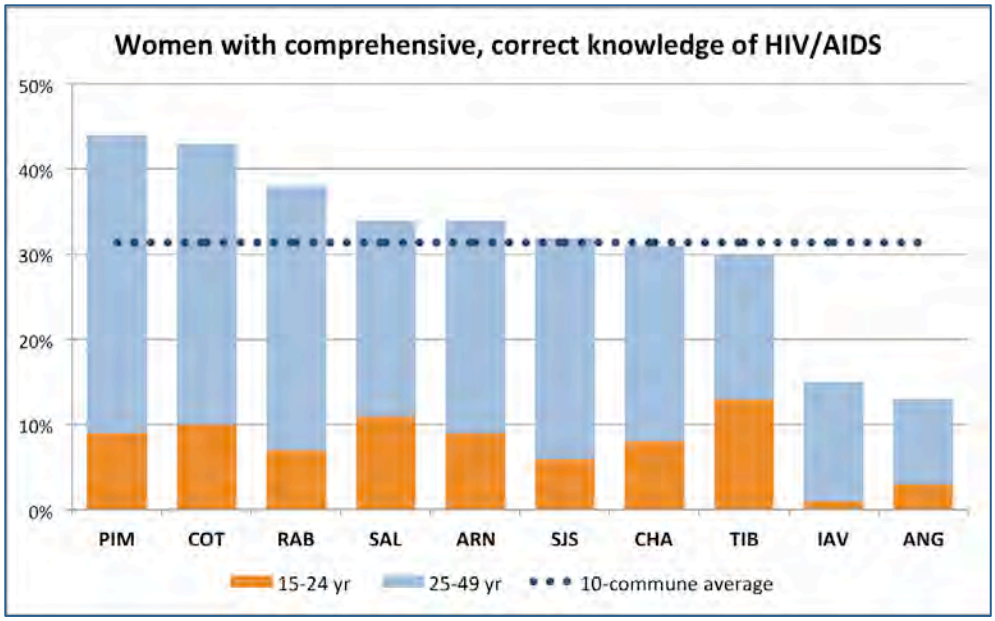


Figure 11 Women with comprehensive, correct knowledge of HIV/AIDS

With regard to preventing malaria, the efficacy of untreated bed nets is extremely low in preventing transmission. Only 1% of surveyed children under five years are sleeping under insecticide-treated bed nets in the ten communes surveyed. Approximately 7% of children under five years old slept under any type of bed net (treated or non-treated) the night before the survey took place. The World Health Organization standards recommends that bed nets to be treated with pyretheroid-based insecticide and hung over each sleeping site, particularly for children under five years of age.

MDG Indicators	South west average	TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
6.7 **Children under 5 who slept under a net previous night**	1%	1%	0%	1%	2%	1%	0%	0%	0%	0%	2%

Table 4. Children under five years who slept under a bed net the previous night.

GOAL 7: ENSURE ENVIRONMENTAL SUSTAINABILITY

MDG 7 focuses on the integration the principles of sustainable development into country policies and programs to reverse the loss of environmental resources, with an objective of halving the proportion of people without sustainable access to safe drinking water. Targets include increasing the percentage of land covered by forests, increasing the protected area to total surface area, increasing the square kilometers of protected area, ensuring sustainability of fish stocks, reducing overall erosion, and reaching sustainable levels of carbon dioxide emissions (CO^2) per capita, and reducing consumption of all ozone-depleting substances in oxygen depletion metric tons. Another target calls for an increase in the proportion of urban and rural populations using improved drinking sources and sanitation facilities.

Except for Ile à Vache, the study region is part of the larger Tiburon watershed, situated below the Pic Macaya National Park, one of the last areas in Haiti with original forest cover and a critical zone for conservation. The area is designated as a park but has not been clearly delineated or protected. The land use and land cover data collected show that the densely forested areas remain in the upper watershed areas near the park.

Almost 73% of the ten-commune area is under some form of agricultural production, including annual food cropping, agroforestry, and pasture. The percentage of parcels located on the sides of hills averages 44% across the ten communes. In the entire study area, 32% of farmers cultivate plots on the tops of hills and only 24% on flat lands on the bottoms of hills. Only 4% of the region is forested.[4]

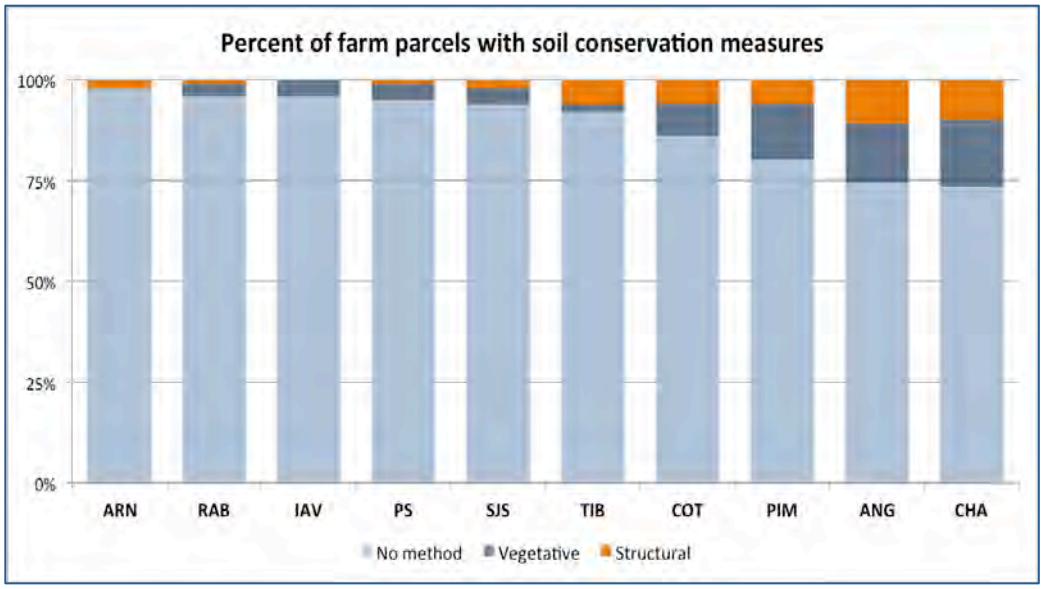


Figure 12 Percent of farm parcels with soil conservation measures

[4] Forests are categorized as both forests (vegetation structure more than 60% tree coverage) and open woodland (10-60% tree coverage), as measured in the 2011 Land Use Land Cover survey.

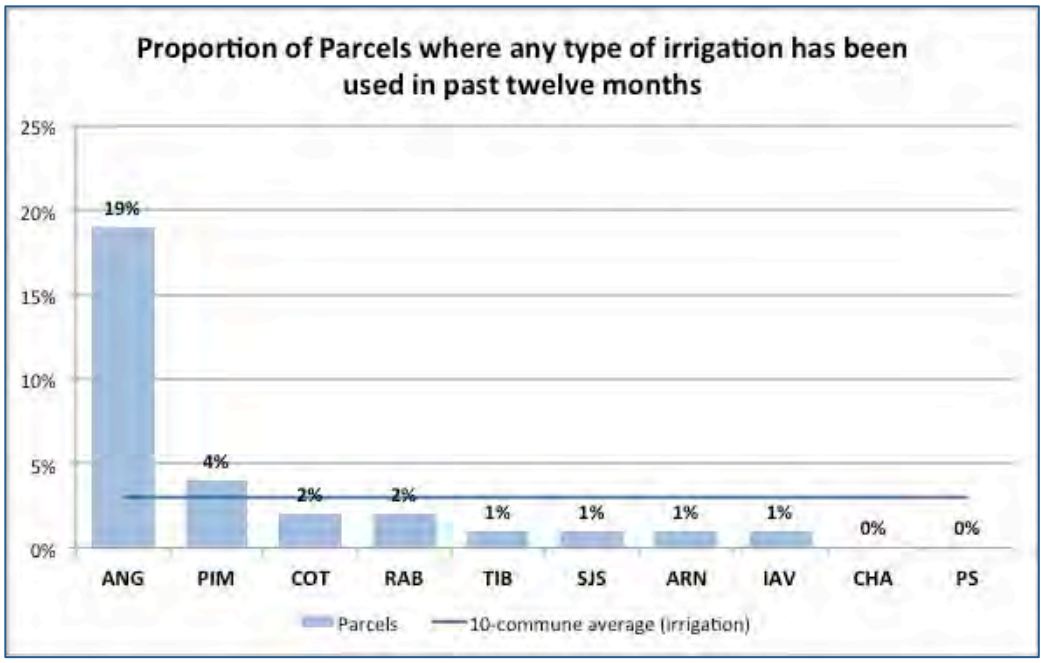


Figure 13 MDG 7 Proportions of parcels using irrigation in the past twelve months

Farming was widely reported on sloping lands that are highly prone to erosion; in the ten communes only 12% of land parcels had some form of soil conservation (including vegetative barriers or structures to impede erosion).

Across the zone, soil fertility is not seen as a principle environmental risk when compared to hurricanes, flooding, or earthquakes. The most common form of soil fertility management is the use of crop residues, at use in over a quarter of all parcels of land, but with existing low yields the amounts of residues available to be applied would be small and insufficient for maintaining soil fertility. Animal manure and natural fallow account respectively for fertilizers used on 10% of properties, though the majority of plots, at 64%, still have no method of soil fertility management.

In addition to the household survey, this report also includes findings from an additional set of indicators of soil and land degradation from the Port-à-Piment watershed. 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. The pH is generally within a range that will not limit most plant productivity, though soils at higher elevations have lower pH levels 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 life, and they are not likely limiting to crop production in most instances, however the majority of the soils in the watershed are likely deficient in phosphorus, potassium and zinc, which are important for the growth, seed production, and general health of plants. Selinium 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. For more information please see the full 2011 LSDF report by Smukler et al. on the Earth Institute's Haiti Research and Policy Program website.

Fishing is another source of livelihoods in the 10 commune region, primarily in Tiburon and St. Jean de Sud. Earlier reports by the Haitian NGO FoProBim and more recently by The Nature Conservancy (TNC) identify the large constraints to the fishing sector along the southern coast and around Ile à Vache. While only a small number of the overall population depend solely on fishing, as most report agriculture as the primary source of livelihood with fishing as a secondary income, the severe environmental degradation and overfishing pose serious constraints to any potential growth in this sector. The 2012 TNC report by Schill et al. provides detailed environmental monitoring priorities around Ile à Vache, while the 2009 FoProBim report contains further detailed analysis on the environmental conditions of the coastal areas along the other nine communes of the southwest coast.

Regarding water quality in the 10 communes, ten sites in the southwest were tested for enterococcus levels and were found to be contaminated. However, though only 45% of households use an improved water source, against a target for MDG 7.8 of more than 90%, there may be community perceptions of quality that keep households using some sources over others, including nearby improved sources that are known at the community level to be contaminated. Improved sanitation facilities are used by a very small portion of households, at only 22% versus the MDG 7.9 target of more than 75%.

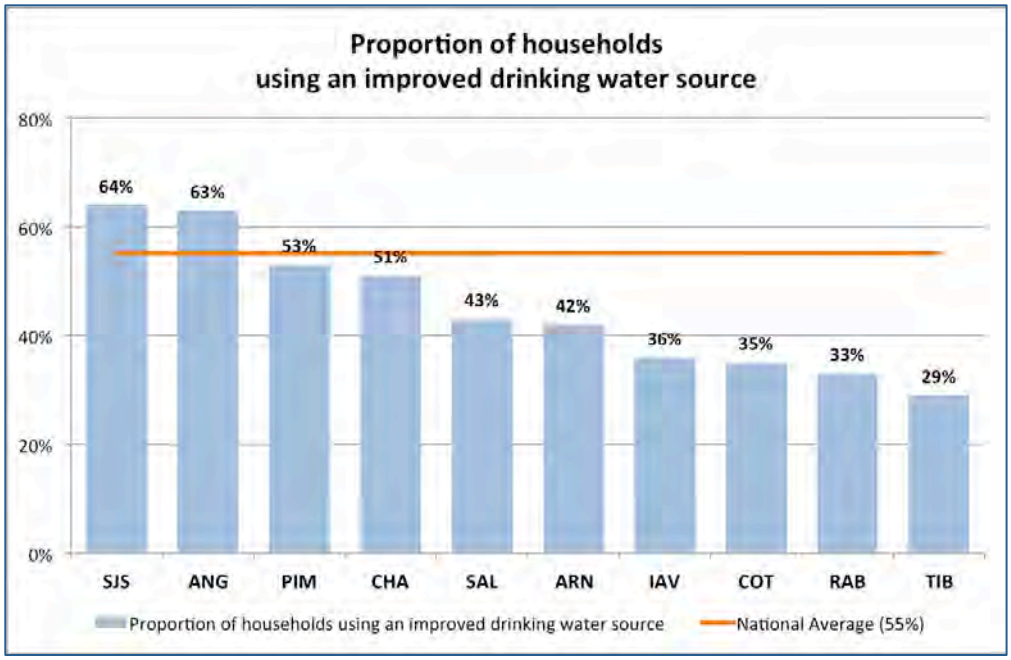


Figure 14 Proportion of households using an improved drinking water source

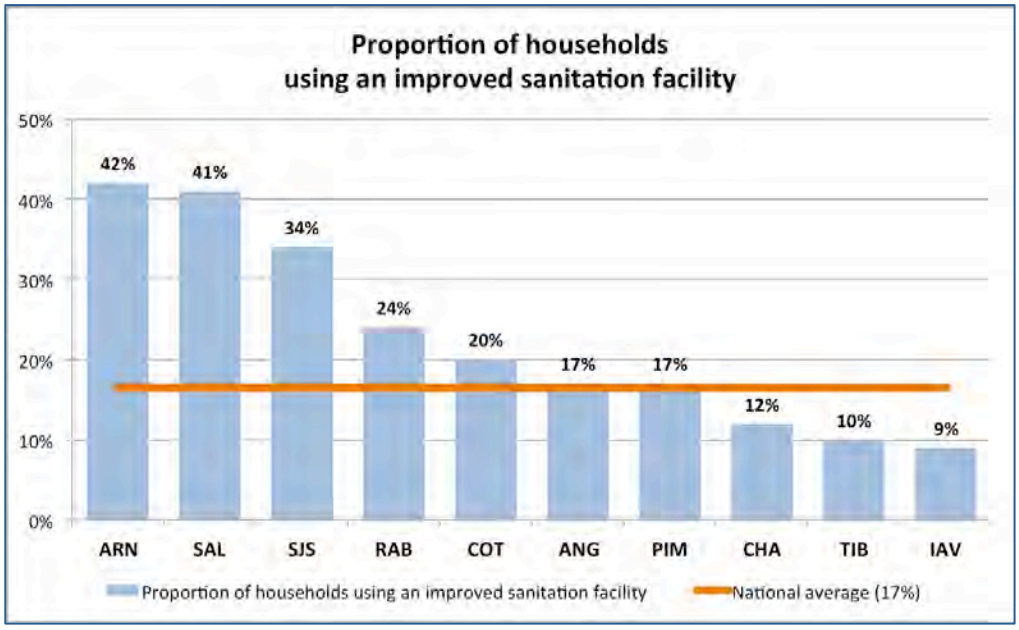


Figure 15 MDG 7 Water and sanitation: proportion of households using improved sanitation facilities

The incidence of diarrhea among children under five years of age is very high, indicating that the region is lacking both access to clean water as well as appropriate measures to inexpensively disinfect water at the household level. The large risk posed by insufficient water quality seems to be underestimated by respondents: 36.1% don't view inadequate sewage and sanitation as a threat at all, 23.1% are not worried about contaminated drinking water, and 21.6% do not feel threatened by dirty streams, rivers, or lakes.

GOAL 8: DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT

MDG 8 calls for a global partnership with a commitment to good governance towards development and poverty reduction. Targets under this MDG are designed to deal comprehensively with the debt problems of development countries through national and international measures in order to make debt sustainable, to develop strategies for decent and productive work for youth, and in cooperation with the private sector increase the availability of new technologies, especially information and communications technologies (ICT).

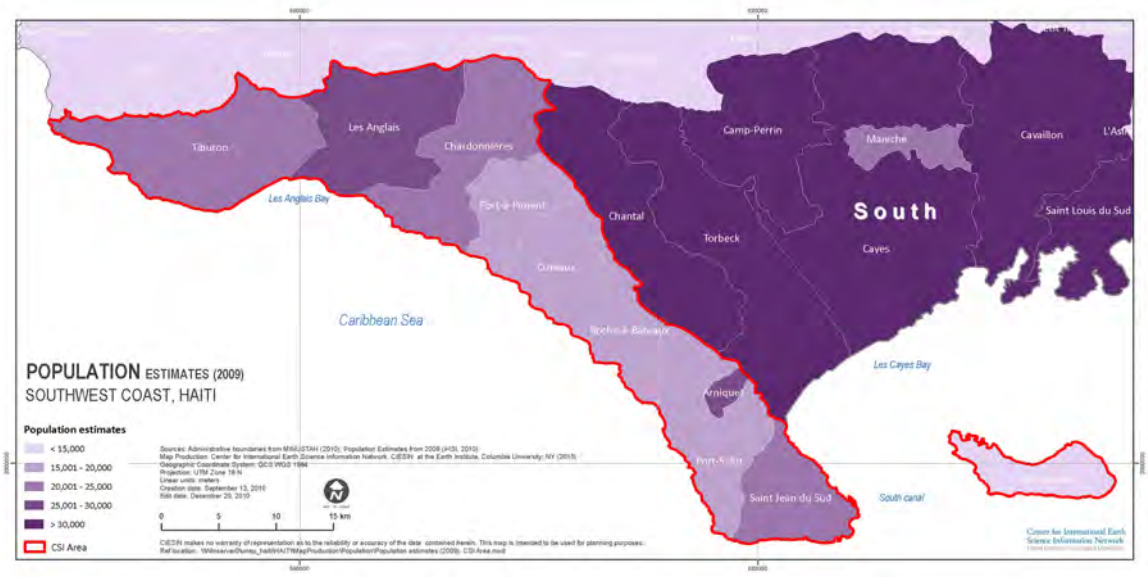
A specific target for MDG 8 is also to improve access to information and communication technology and penetration of the benefits that they can provide. Cell coverage in Haiti is very high in the urban centers and along the coasts of Haiti, with areas of low-to-no coverage in the rural regions in the north and south of Haiti.

Across the ten communes, the proportion of households that have at least one cell phone is 63%. 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 ten communes, only 1% of households reported internet usage within the past year, encompassing email, web browsing, or other non-telephone usage.

4. DEMOGRAPHIC PROFILE OF SOUTHWEST HAITI

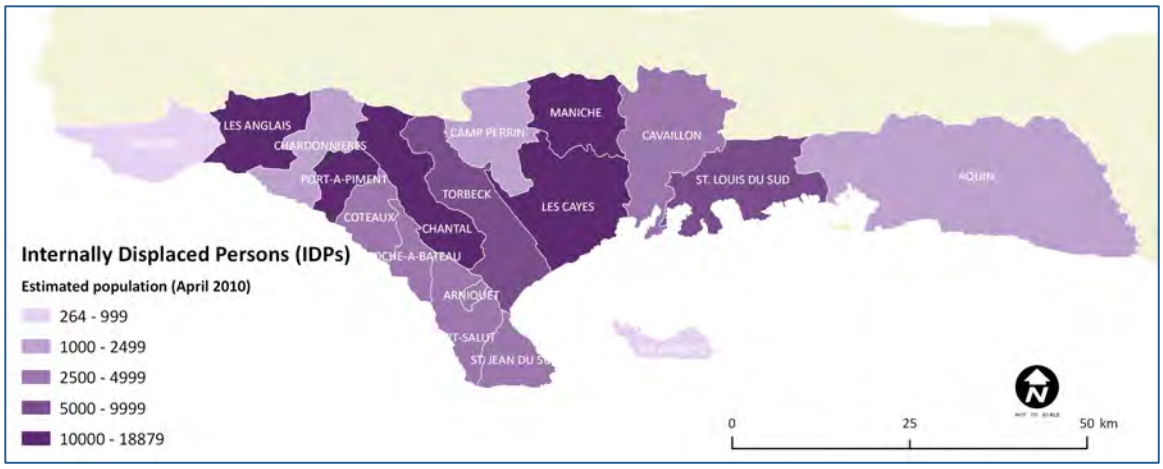
The most recent reported population figures from the IHSI's Direction des Statistiques Démographiques et Sociales estimate the total population of the ten commune region as 205,770 (IHSI, 2009). These ten communes represent roughly 30% of the total population in the South Department. As of 2012, a more recent complete population count per commune and by department is not available to reflect the reported internal migration changes in total town populations following the 2010 earthquake near Port-au-Prince.

Within the ten communes, Port Salut and Les Anglais have the largest shares of the population, with 16% and 13% respectively. The communes of Ile à Vache and Arniquet have the lowest percentage of the total population, with 7% and 5% respectively. Despite its small geographic area and relative share of the region's total population, Arniquet has the highest concentration of population per unit area (555 pop/ km^2). Tiburon is the least densely populated commune in the ten communes with 144 pop/km^2.



Map 3 Population estimates for the South Department

A population density map shows that the majority of the population is clustered along the coastal areas. The steep topography and lack of transportation routes partially explains this population pattern. While settlements are predominantly coastal, agricultural plots and family land parcels are frequently located on the steep mountain slopes and at higher elevations.



Map 4 Map of internally displaced populations after the 2010. Source MINUSTAH data. Produced by CIESIN 2010.

Based on recent estimates, the populations in Port Salut and Les Anglais have also experienced the highest net growth in population over the period of 2003 to 2009. Arniquet has the least population growth. There was a temporary population change due to the internal displacement and emigration as result of the 2010 earthquake. The estimates are shown in the map below.

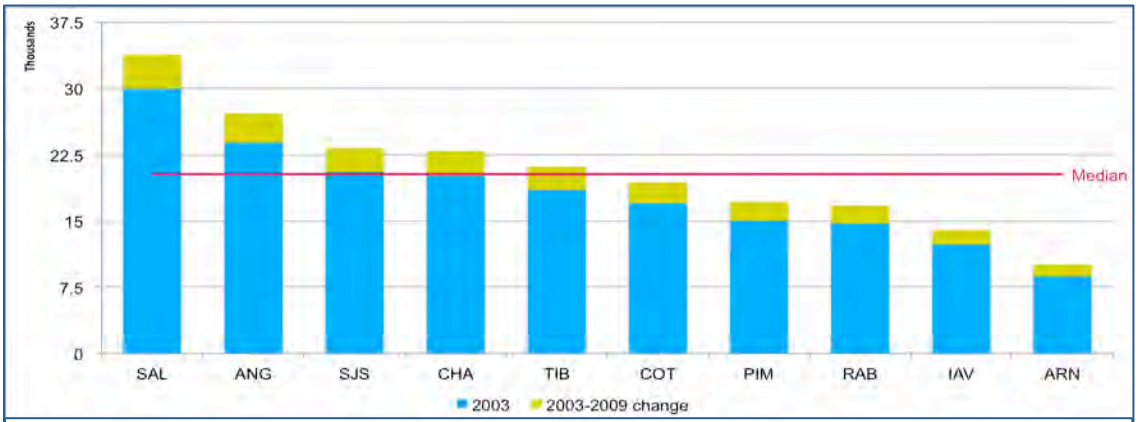


Figure 16. Population growth across the ten communes, from 2003 to 2009. Datasets: IHSI 2003, 2009. The Earth Institute at Columbia University

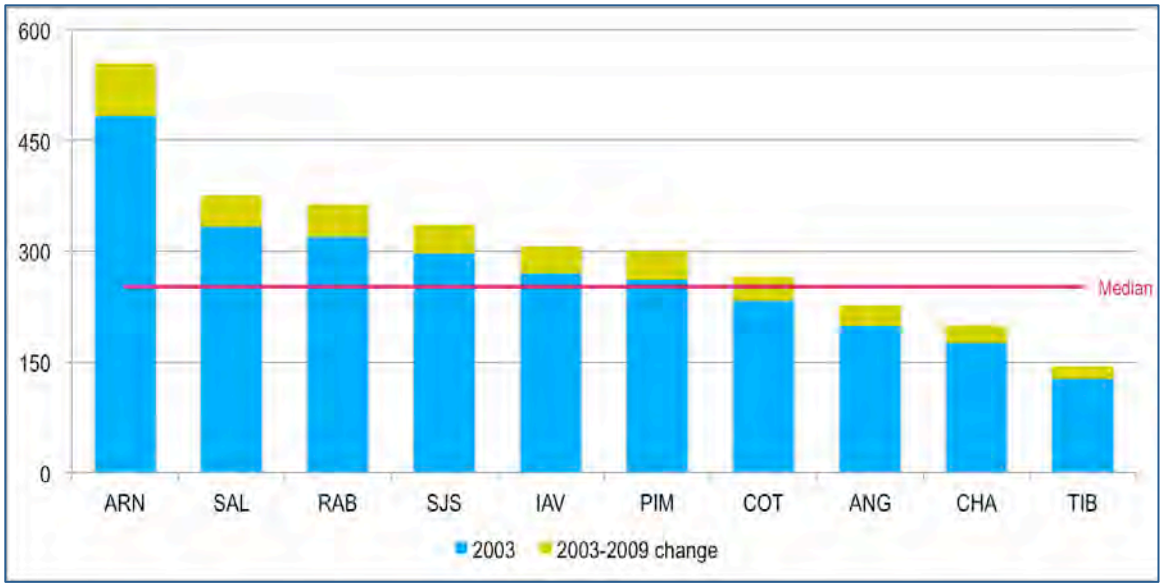


Figure 17. Population density in the ten communes, in pop/km^2. Source: The Earth Institute (EI) at Columbia University, 2012, using datasets from IHSI, 2003 and 2009; CNIGS, 2004.

In the western communes of the region, which are highly mountainous and close to the Pic Macaya National Park, particularly Tiburon, Les Anglais and Chardonnières, the population density figures are lowest. Communes to the east, generally flatter and closer to the urban center of Les Cayes, have the higher population densities. This includes Port Salut, the largest urban center in the zone.

CHARACTERISTICS OF SURVEYED HOUSEHOLDS

According to survey data from the 1,170 households, the average household size in is 5.1 members per household, which is higher compared to the average size of rural households nationally, which is 4.7 (Cayemittes et al, 2007). The average number of individuals per household in specific communes ranged from 5.6 in the commune of Chardonnières to 4.4 in Port Salut.

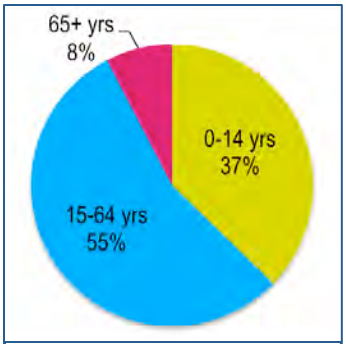


Figure 18: Household age distribution in the Côte Sud. Source: The Earth Institute at Columbia University, UNEP 2012.

Of the population surveyed, 5% were categorized as migrants, or individuals who had not lived in the region for all of the past twelve months. Port-à-Piment has the largest portion of migrants, at 27%, whereas St. Jean du Sud has only 3% of migrants. Reasons listed for migrating include family commitments, for work, or to seek professional health assistance. Estimates from the household survey suggest there are 112 men per 100 women in the region. Of households surveyed, 39% are headed by women. Among the portion of women heads of households, one third are widowed, 16% are divorced or single women, and the rest (51%) are either married or living as married.

POPULATION BREAKDOWN AND FERTILITY RATES

There is a large youth bulge, with 44% of the population under the age of 18. This population structure is often associated with large families and a decline in child mortality (Rowland 2011). The region's high fertility rate contributes to this bottom-heavy structure. Additionally, the national life expectancy is 60 years old for men and 63 for women. The lowest life expectancy in the Western hemisphere, this accounts for the distinct tapering at the top of the pyramid of the elderly population (WHO 2009).

In the figure below, 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 surveyed communes in 2011. Notably, the proportion of children under 10 years of age in the ten communes is lower than average of other rural areas in Haiti. In addition, the age group between 35 and 49 years of age presents the same difference in respect to other rural averages. However, the age group of 10-34 is much larger in the ten communes as compared to the 2009 rural averages.

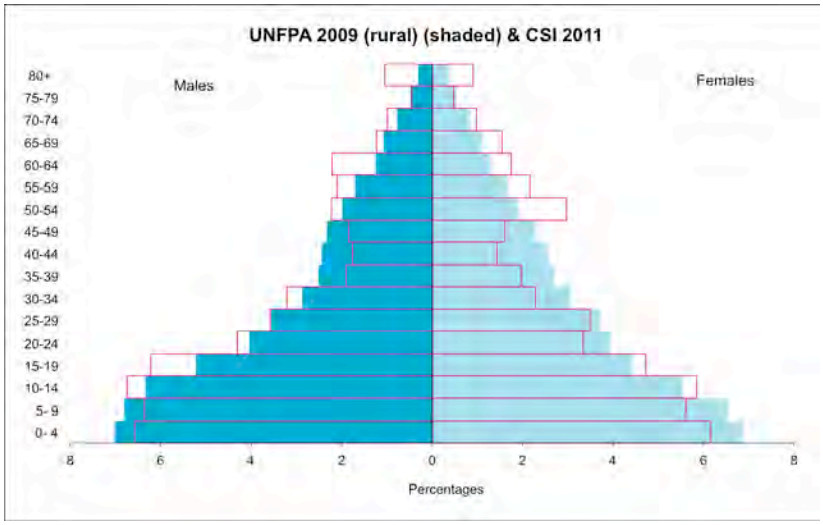


Figure 19. Population pyramid in the Côte Sud, compared to population projections from other rural areas in Haiti. Source: The Earth Institute at Columbia University, 2012. The rural population projections used are from IHSI, 2010.

The region reports a higher percentage of males to females in the region than the national averages. The data also showed high fertility rates compared to global averages but lower than the national average (The World Bank, 2011). The region also has high adolescent fertility rates. In the most recent available time period, from 2009-2011 the adolescent birth rate was estimated at 50 births per 1,000 women aged 15-19 per year, an increase from the rate of 32 births in 2007-2009.

The average total reported fertility rate for the region as of data from 2009-2011 is 4 children per woman. With the majority of women of childbearing age, the relatively high fertility rate contributes to sustained population growth as the majority young population continues to reach reproductive age. This increase in the total youth population and the increased fertility rates

and adolescent birth rates indicates growing pressure on already scarce natural resources and food security at the household level.

While the household survey shows that individuals of working age (15 to 64 years) represent more than half of the population (55%), children between 0 and 14 years old (37%) and people of 70 years or older (7%) constitute the remaining 44%. This total dependency ratio is 81 per 100 individuals at working age[5]. This high dependency ratio indicates that for every 10 individuals of working age, there are approximately 8 dependents, approaching a one-to-one ratio of dependents for those of working age. This represents a high pressure on consumption of economic income as compared to production. Based on estimations from respondents, the calculated child dependency ratio in the region is 68 for every 100 adults, and the aged dependency ratio is 13 for every 100 adults. The ratio of child dependents to adults is important in determining the poverty levels of the region, including indicators, such as child nutrition, demonstrating household access to food, but also the pressures that certain age groups represent over others. Examining the population pyramid to interpret the dependency ratio, the largest portions of the population are either students of primary school age (12% of the population is between 5-9 years old, and 13% of the population is between 10-14) or soon to be (13% are aged 0-4 years).

MAIN OCCUPATION

The main occupation of respondents within the households of working age (defined as between 15 and 64) in the ten communes fall under two main groups: young adult students and older adults in the agricultural and small business sectors. Whereas students are male and female in comparable proportions, men dominate the agricultural sector and women self-report more often as small business owners.

Within the working population, there is a clear divide among young adults aged 15-24 and adults 25 and over. Among young adults, 81% between 15-19 and 46% between 20-24 report their occupation as students. Among adults 15-19 who list their occupation of students, 62% are in primary and 38% are in secondary; for ages 20-24, 28% are in primary and 72% are in secondary school. The normal ages for primary school are between 5-12; accordingly, that nearly 25% of all primary school students are between the ages of 15-24 is consistent with the gross attendance ratio, which shows that there is a high proportion of students in school beyond the appropriate age for their level. For secondary school, there is an overlap with the working age, as appropriate school age is between the ages of 12-19; 83% of students fall between the young working age of 15-24.

The agriculture sector, which includes farming, animal husbandry and fishing, comprises 34% of the total labor force[6]. Among the working age population that self-identify as farmers, the

[5] The total dependency ratio is the sum of child dependency ratio and aged dependency ratio.
[6] For this study, the labor force is considered as the working age population between 15 and 64 years old.

majority are male (73%), are between the ages of 25-64 (91%) and are located in the dry agriculture and fishing agro-ecological zone (74%).[7] Nearly half (49%) of all farmers of working age in the southwest are defined by all of these attributes and are men between the ages of 25-64 who live in the dry agriculture and fishing agro-ecological zone. The 2012 TNC marine baseline report sampled people whose predominant occupation was fishing in the South Department and found that the predominant age group was between 19 and 45 years of age, with 47% between the ages of 31 and 45. The Nature Conservancy report also notes that while many rely solely on fishing for their livelihood (30%), 40% of people also participated in agriculture and animal husbandry and 23% participated in other livelihood-generating activities as well (Schill et al. 2012).

Whereas the majority of men self-identify their occupation as dry agriculture, animal husbandry and fishing, women of working age self-identify in greater numbers as self-employed in the household (77%). Self-employed women above age 25 account for 70% of all working age men and women who are self employed. Over one in ten of the working age population is a self-employed woman, most often located in the dry agriculture and fishing agro-ecological zone.

Notably, nearly 9% of the population surveyed within working age reported not having any occupation, of which 61% were female and 39% male. Only 3% of the population sampled has a full time salaried job. This demonstrates a lack of formal sector jobs and a concern for youth engagement and employment under conditions of increasing youthful populations. There are areas for growth in private sector, non-agricultural positions across the region. This should be a key component of an integrated program to address pressures in other sectors and future sustainability of programs with increased employment rates.

[7] More information on agro-ecological zones is found in Section 7.

5. SOCIOECONOMIC STATUS (MDG 1)

The first MDG is to reduce levels of extreme poverty and hunger by one half by 2015. Within this particular MDG there are a number of indicators specific to the elimination of poverty. MDG 1 seeks to halve the number of people living on less than US$1.00 per day, to ensure quality work for all, and to halve the amount of people who suffer from hunger. For the CSI baseline, household daily expenditures and income levels were not measured as part of the 2011-2012 household survey.

To evaluate relative wealth among surveyed households in the ten communes, a wealth index was calculated as a composite of variables of household assets and housing construction measured in the household survey. This index assigns comparative scores to households based on their relative status of wealth among the surveyed households. The wealth index provides a tool for comparative analysis of the region, including differences among communes and geographic areas. The goal of the comparative wealth index analysis is to demonstrate the variation in the region's comparative wealth as well as the disparities between households.

As of 2011-2012, there is a clear geographic distinction among communes, with eastern communes faring better relative to the region compared to western communes. Such distinctions also exist between urban and rural areas and based on elevation. A rise in relative household wealth can be expected as a result of positive changes at the household level in terms of food security, agricultural production, health and education.

Another critical MDG is to reduce malnutrition and reduce the proportion of people who suffer from hunger. To accurately measure food security in the ten communes, the 2011-2012 household survey collected responses from women on household food consumption, as well as anthropometric measurements of children under five years to measure for physical signs of malnutrition. Nationally, Haiti faces pressing hunger challenges: 19% are underweight for their age and 10% experience wasting, a measure of malnutrition indicating the children are severely underweight for their age, while 30% of children under five years in age are stunted, with a low height for age ratio that indicates they have experienced prolonged malnutrition that has stunted their growth. In rural regions that rely on agriculture for subsistence and the primary form of household income, both food shortages and natural weather events only add to the food insecurity felt by families.

The hunger component of MDG 1 is critical for achieving other targets and indicative of challenges in other systems, from agriculture to education, vulnerability to infectious disease, and maternal and child health. Accordingly, making progress towards eradicating hunger and poverty requires interventions that are integrated across sectors.

Finally, both connectivity and infrastructure are components associated with overall wealth. MDG 8 sets goals for increased access to mobile phones. Ownership of mobile phones is relatively high within households, at 64%. The proportion decreased slightly (at 57%) when adult females[8] were asked the same question. However, mobile coverage is limited except for coastal settlements within the ten commune area.

WEALTH INDEX

To visualize the main differences between the socioeconomic status of sampled households in the ten communes, specific variables from the 2011-2012 household survey were selected to construct a composite score, or index. This index makes it possible to observe and identify the significant differences in estimated wealth within the ten commune region. In the absence of household data on expenditures or consumption, the index ranked and categorized households in four classes based on quartiles. Each quartile represents the group of households that scored low, medium-low, medium-high or high in the wealth index.

Table 5 Wealth Index Variables

Variable	Weight	Mean	Std. Dev.
Housing characteristics			
Cement floors	0.38	0.54	0.50
Metal ceiling	0.36	0.78	0.41
Cement walls	0.32	0.20	0.40
Mud walls and floor	-0.24	0.12	0.32
Palm ceiling	-0.36	0.21	0.40
Household assets			
Owns at least one of the following: sofa, wardrobe, wall clock, computer, camera, TV, refrigerator, bicycle.	0.30	0.23	0.42
Owns mobile phone	0.27	0.63	0.48
Do not own any of the following: bed, chair, table	-0.24	0.15	0.35
Infrastructure & utilities			
Water source, piped into dwelling	0.17	0.08	0.27
Sanitation, no facilities	-0.30	0.57	0.50
Sanitation, flush toilet	0.10	0.01	0.10
Has access to electricity (grid, solar, generator)	0.16	0.02	0.15
Banking services			
Has access to a savings bank account	0.22	0.14	0.35
Livestock			
Owns at least: two cows or four goats or 15 chickens or two pigs	0.10	0.40	0.49
Land			
Has access to less than 0.5 kawo of land	-0.02	0.23	0.42

[8] Adult females of ages between 15 and 49.

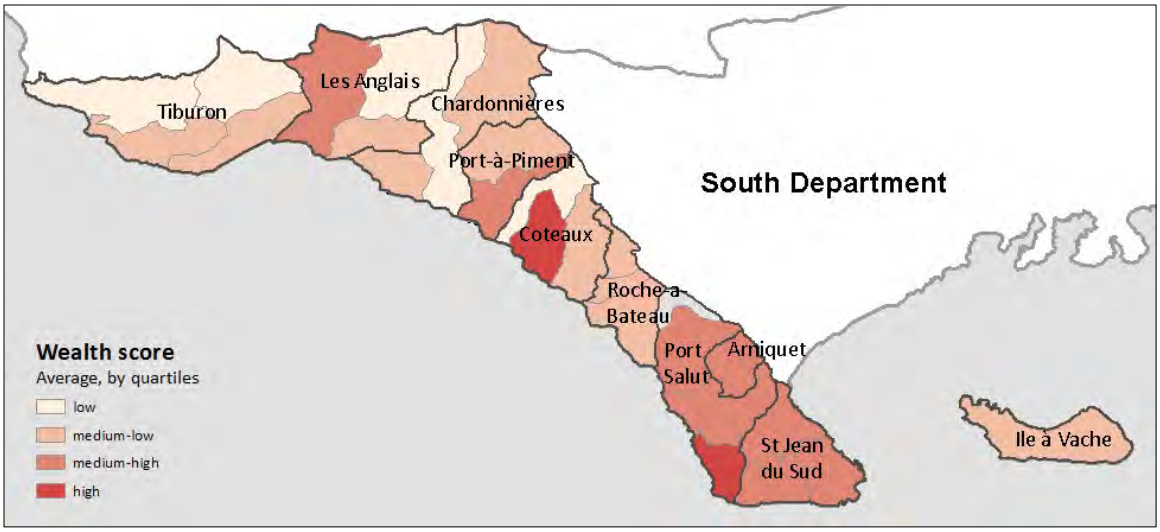
The wealth index was constructed using Principal Components Analysis (PCA), following the methodology proposed by the DHS Wealth Index and other similar studies[9]. Fifteen variables from the 2011-2012 household survey including sanitation facilities, housing construction, household assets (such as furniture, refrigerator and televisions); landholdings and number of livestock; mobile phone, electricity access and access to a savings account in a bank, were included. All the variables used were dichotomous (1=yes; 0=no) to facilitate the interpretation of results at the end. Using a computer algorithm for PCA, a weight for each variable was created, based on its overall contribution to the score (see column weight in indicator table below). Assigned weights were only summed up when households' responses equaled one. Each household's score was weighed based on the household size, and finally transformed to allow only for positive values[10]. The table below shows the summary values for each category of the wealth index.

Wealth index	Obs	Mean	Std. Dev.	Min	Max
Low	288	1.83	0.54	0.00	2.63
Medium_low	287	3.25	0.33	2.63	3.78
Medium_high	289	4.31	0.32	3.79	4.87
High	288	5.96	0.94	4.87	10.22

Within this score, positive effects (or high scores) of variables are associated with *wealth* and negative effects (or low scores) are associated with *poverty.* Housing construction and furniture was important in the creation of the index. Both sets of variables obtained the highest weights in the index, with either positive (as with cement floors at 0.38) or negative effects (or palm ceilings at -0.36). The lack of improved sanitation facilities has an important negative effect in the households score, at -0.30. Surprisingly, the lowest weight was assigned to land (-0.02). Although the score assumes that having access to land does not make a difference in the socioeconomic status of households, the research team believes that more research is needed to understand the nuances around the meaning of this value. The differences in wealth by communes, based on the wealth index categories, are shown in the map below.

[9] For a complete description of the methodology used in the construction of the wealth index, please refer to Annex 2 of this study.

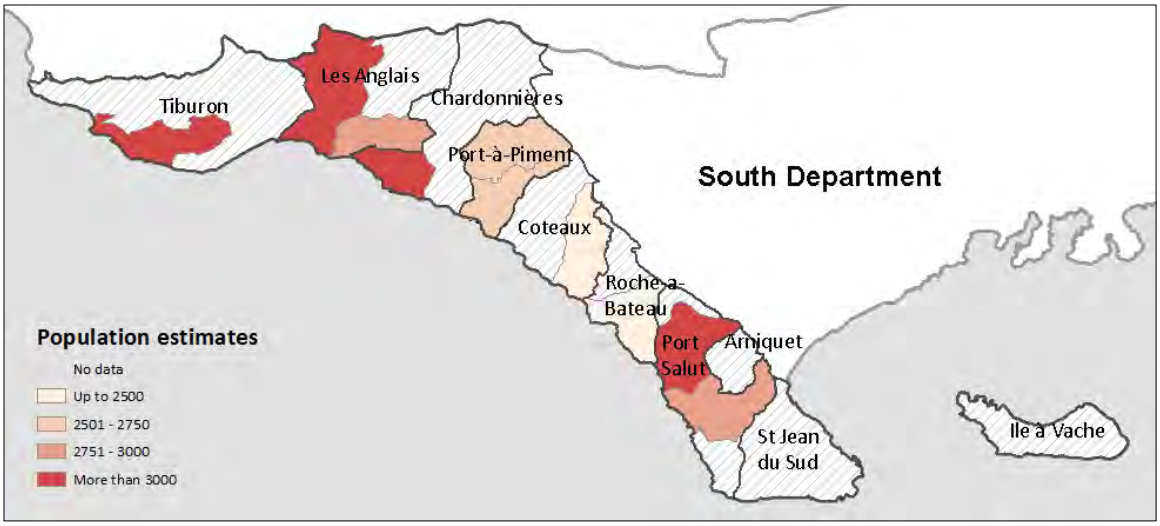
[10] The PCA model captured both positive and negative effects represented with a negative or positive sign for each variable (see weight column in table on wealth index variables). All scores from the wealth index were transformed at the end so that the minimum value was zero and the maximum value was 10.22



Map 5 Wealth index score by section communale

An estimated population count was calculated to establish the areas with the highest probability of getting low scores or areas showing greatest potential for poverty[11]. The map shows the top ten communal sections with the highest population counts within the index's lowest quartile. The probability of finding large clusters of less or least wealthy households is higher in the communal sections of Blacktote (Tiburon), Cosse and Verone (Les Anglais) and Bony (Chardonnières)—all of them clustered in the western zone of the study area. Interestingly, two communal sections in Port Salut (Anse à Drick and Barbois) were captured as high priority areas despite the fact that Port Salut appeared as one of the better-off communes in the previous maps. What this means is that the proportion of low scores from households in Port Salut paired with the large population therein has a negative effect in the count of the worse-off population living in poverty. Prior to implementing interventions in Port Salut, the results demonstrates that it is critical to conduct a careful beneficiary selection process to target those with the greatest needs.

[11] Population figures from the latest census in Haiti (IHSI, 2003).



Map 6 : Section communal with the that scored the lowest quartile and have the highest population counts.

Additional spatial analysis showed a wealth disparity between the eastern and western zones surveyed. The average scores of the four western communes (Tiburon, Les Anglais, Chardonnières and Port-à-Piment) had a statistically significant difference in means compared with the rest of the communes to the east[12]. Households who live in western communes are more likely to fall within the low or medium-low categories, as opposed to households living towards Les Cayes.[13]

The results of this study show that there is geographic variation between household wealth as measured by the wealth index. The results reaffirm previous assessments such as Sletten et al (2004) that show poverty in Haiti to have a geographic bias. The results for the ten communes showed similar patterns when the sample was divided into rural and semi-urban areas[14]. A low, yet significant correlation was found between the wealth score and the semi-urban divide suggesting that households are more likely to be better off if they live in a semi-urban area.[15] Moreover, knowing that semi-urban areas are mostly concentrated among low rather than high-elevated areas, elevation (in meters) was also correlated with the results from the wealth index. The Spearman rank correlation[16] was lower, yet still significant in the inverse association, suggesting that elevation might be associated with wealth scores, although the relationship is not quite strong as expected.

There may be several reasons associated with this geographic distribution of wealth. An immediate example of infrastructure may play an important role in access to services across

[12] An unpaired, two-sample test with unequal variances was calculated. The P value =0.0000 with a 5% (type I) error; CI 95%. The Central Limit Theorem (CLT) was assumed.
[13] Confidence interval at 95%; P value =0.0000
[14] The research team followed the same categorization of rural and semi-urban entities, as stipulated by the IHSI in 2003.
[15] (r=0.2916, P value=0.0000).
[16] (r=-0.1726, P value=0.0000)

multiple sectors. The paved road that links Les Cayes with the rest of the coastal towns ends at the town limit of Port-à-Piment. The lack of a secure transportation network impedes effective trade of goods and adequate provision of services to the local population.

Repeating this analysis in five years would show how wealth relationships have changed or intensified. The sharp rural to urban divide and east to west divide in scores suggests that the government and NGO's need a more geographically sensitive approach to provision of services and support programs. The research team recommends careful attention to how development funds and social services are distributed spatially, as many of the previous projects have only covered the immediately accessible coastal areas. Repeating this analysis in five years will demonstrate if this pattern has changed and the geographic locations where the changes are significant.

Limitations of the model

The index is meant as a tool of comparison only among the surveyed households in 2011-2012, and has relevant limitations. Specific poverty lines cannot be established without household expenditure and/or consumption data. The score ranks and classifies sampled households into four levels of estimated wealth, however the wealth index score cannot be compared to a dollar amount or benchmark for wealth outside of the sampled population, such as in comparison to national or international data. It is therefore not possible to estimate the proportion of the population within or above the margin of acceptable living conditions, and vice versa. A full methodology for the wealth index is included in Annex 2.

FOOD SECURITY AND NUTRITION

Food security is a problem across the ten communes: 93% of all households reported that they did not have enough food in at least one of the past twelve months, with an average 8.5 out of the twelve past months with inadequate food supply. Approximately 19% of all households reported using informal means of credit to buy food in the last twelve months.

In the study region, households consumed almost half (44%) of their annual harvests[17]. This demonstrates a high rate of subsistence farmers as households consume on average more than half of what they produce, as well as a vulnerability to crop loss due to weather and agricultural practices. Almost all (92% average across the ten communes) of households reported reduction in the size or number of meals in the seven days preceding the household survey, with highs of 96% in Tiburon and Chardonnieres. In Tiburon, 56% of households reported having gone a whole day without eating in the past seven days prior to the interview. Across the ten communes an average of 36% households reported one day without any meals. These numbers are highest in Chardonnieres (at 47% of households) and Port-à-Piment (at 46%).

Another perspective of nutrition focused on the number of households that consumed seeds that they had intended for the planting season. Sixty percent of households across the zone reported having consumed seeds intended for planting the following season. Eighty percent of households in Tiburon and 78% in Chardonnieres reported selling their livestock as a strategy to buy food. These two communes also had the highest rates of households who had sold or pledged land or their house as a food strategy, at 53% and 44% of households, respectively.

UNDER-NUTRITION OF CHILDREN UNDER FIVE

Biophysical measurements of children under five are useful in measuring both household access to food and the nutrition rate in children (0-5 years old). To measure acute malnutrition, surveyors measure for low weight for height, which is manifested as thinness and known as wasting. This measurement is an indicator of being properly nourished at the time of the survey.[18] Wasting is caused by acute malnutrition that results with rapid weight loss or the inability to gain weight at a normal rate; it is therefore an indicator of inadequate nutrition. Based on the 2011-2012 household survey data, in the ten commune area the rate of children who are categorized as wasted is 7%.[19]

[17] Values without comparable units were omitted in this calculation.
[18] Wasting is defined as a weight-for-height *z-score* of less than -2.
[19] Statistical error of 2%

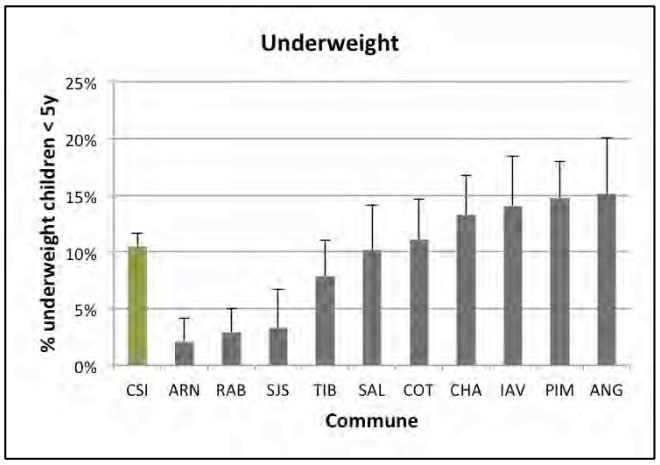


Figure 20 Percentage of children under age five who are underweight, by commune

When malnutrition—even if not categorized as acute—is prolonged, it becomes chronic malnutrition, defined as low height for age[20]; chronic wasting and low height appears as shortness, or stunting. Stunting occurs when children are unable to receive adequate nutrition over a long period of time, causing a failure to grow during crucial times in childhood. In the ten communes, household survey data indicates that 27% of children under five are stunted. This is slightly improved from 2009, when UNICEF reported that nationally 30% of children were stunted—placing Haiti as the 56th highest out of 136 countries (UNICEF, 2009).

Other factors that lead to wasting and stunting besides the lack of access to food are multidimensional, including access to adequate health care, access to clean water to avoid diarrhea, and maintaining a nutrient-rich diet. Based on the UNICEF framework (Table 8, below), the proximate determinants of child undernutrition include household food insecurity, childcare practices (including infant and young child feeding practices), and infectious disease control. The analysis emphasizes that multiple interacting factors affect child and maternal nutrition.

There is large variation between communes in the prevalence of underweight, stunting and wasting indicators among children. Communes with the highest levels of combined chronic (stunting) and acute malnutrition (wasting) include Les Anglais, Chardonnières and Coteaux. This compares to levels of wasting below 5% in Arniquet, Ile à Vache, Port Salut, Roche-a-Bateau, Saint Jean du Sud, and Tiburon. Levels of stunting vary from 13% in Ile à Vache to 34% in Port Salut.

[20] Stunting is defined as a height-for-age *z-score* of less than -2.

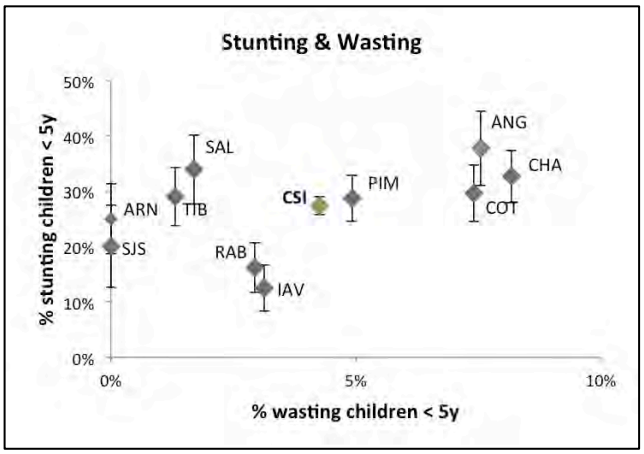


Figure 21 Stunting and wasting for children under five across the ten communes

Only 15% of children under two years, the crucial age range to prevent stunting, receive a minimum diversity of food and minimum meal frequency required to prevent malnutrition. Stunting is less prevalent for those infants exclusively breast-fed.[21] It is clear that in the ten surveyed communes region, early initiation of breastfeeding, or babies put to breast within an hour of birth, is also low at 23%. This number may be correlated to the high prevalence of home deliveries, which are more commonly associated with complications for the mother or the child in childbirth. Exclusive breastfeeding for infants under six months is low, at 22% of women interviewed. However, the rate of women who have *ever* breastfed their child, aged 0-23 months, is high at 97%.

[21] Regression analysis demonstrates that exclusive breastfeeding of infants is significantly positively related with height-for-age z-score.

DIETARY DIVERSITY AND RETENTION OF NUTRITION

Dietary diversity is an important indicator that correlates to micronutrient deficiencies that 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. 33% of children received foods from four or more groups during the previous day, and just 35% children who received food the minimum number of times or more each day. Arniquet and Tiburon had the lowest rates of dietary diversity, at 11% and 15% of children receiving four or more food groups the previous day. Vitamin A supplements, which are important for growing children, were only received by 67% of children under five in the six months prior to the survey. This is a high number and related to pointed specific efforts from MSPP and CRS in the region.

In regards to the adult population, the trends viewed across children continue among women aged 15-49. Women participants received an average score of 2.79 out of 7 for dietary diversity; only 27% of women in the surveyed communes consumed the minimum dietary diversity, including consuming food from four or more food groups the day before they responded to the survey. The rates of adult dietary diversity are mostly consistent across all of the ten communes, mirroring the consistency in number of months with inadequate food (average of 8.5).

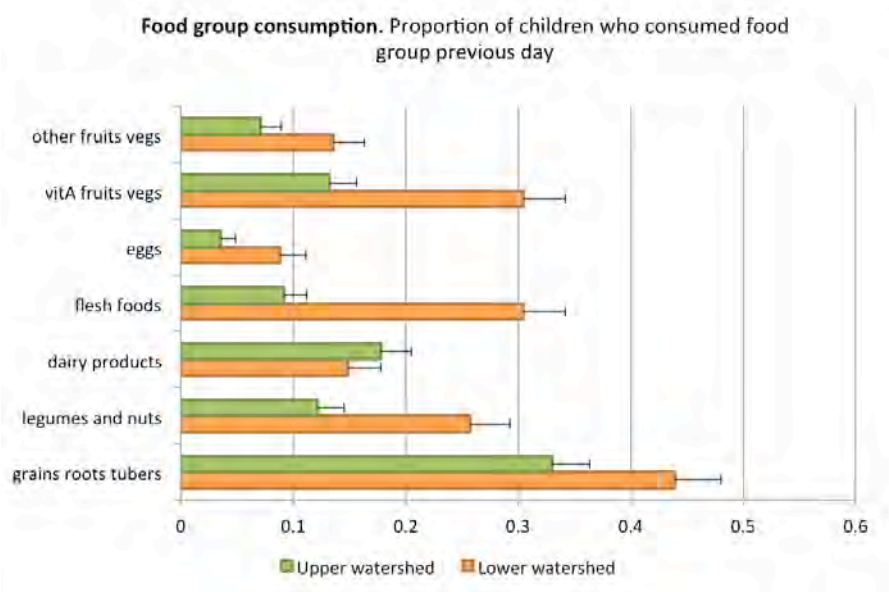


Figure 22 Proportion of children who consumed food the previous day by food group in Port-à-Piment watershed

HOUSEHOLD CONSUMPTION

Economic factors play a key role in the determination of household food consumption patterns, particularly the quantities and varieties of foods consumed. In qualitative focus groups in the Port-à-Piment watershed in 2012, participants displayed a good general knowledge of the importance of dietary diversity and high-nutritive foods but generally noted that they need more education on nutrition and that food consumption is dependent on household wealth. (Waller 2012). Many households faced with food insecurity employ alternate means to supplement both their feeding and their household income. On average, households consume roughly half of the all crops they produce, rather than making an economic profit from the sale of crops either locally or regionally. According to the household survey, the five most widely produced crops across the ten communes are pigeon peas, maize, sorghum, plantains and black beans.

Focus group participants in Port-à-Piment report that locally produced cereals are the most important food consumed daily: they are readily available and are perceived as filling. Maize and rice are particularly important, though rice's cost is prohibitive for daily consumption (Waller 2012). According to the household survey, 55% of the maize produced in the ten-commune region is consumed, second only to pigeon peas at 65% consumption and followed by sorghum (51% consumed) and black beans (41% consumed). Participants in the focus groups in Port-à-Piment readily acknowledged that fruits and vegetables are important to incorporate into household diets, as they contain nutrients not found in grains; however, the seasonality and availability of fruits and vegetables limits their consumption, as does the price to purchase them if not produced by the households themselves (Waller 2012). Consumption of fruits and vegetables among the households producing them across the ten communes is high, including plantains (54%), potatoes (63%), okra (75%), eggplants (55%), oranges (75%), mangoes (54%), green peppers (33%), tomatoes (40%) and avocados (42%).

Animal-based protein, including fish, poultry, goats and cows are available, though their prices are variable and cost-prohibitive for the majority of the population. Most of the qualitative interviews show that upon catch of the fish, they are sold to middlemen, particularly species ranked as first and second class fish, while other species including mussels, squids and sea turtles are consumed in local markets (Gardel 2006). The 2012 focus groups identified a deficiency in meat protein consumption in the region despite the fact that fish and meat are considered good for health. Households try to consume non-animal proteins when meat is too expensive (Waller, 2012). Additionally, focus groups acknowledge that animal milk consumption is not widespread, despite the presence of goats in the region and despite the fact that cows milk is considered the preferred form of milk to drink, and among household survey respondents, 28% own a cow.

A framework developed by UNICEF recognizes the basic and underlying causes of under-nutrition, including the environmental, economic, and sociopolitical contextual factors and the central role poverty plays in under-nutrition in a population. Because poverty is a complex state stemming from multiple variables, nutrition is a cross-cutting theme that is indicative of the progress of many different development goals at once. Accordingly, the optimal strategy to ensure rapid improvement of nutrition, and thereby the health of the population and its ability to engage in educational, social, and economic activities, 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.

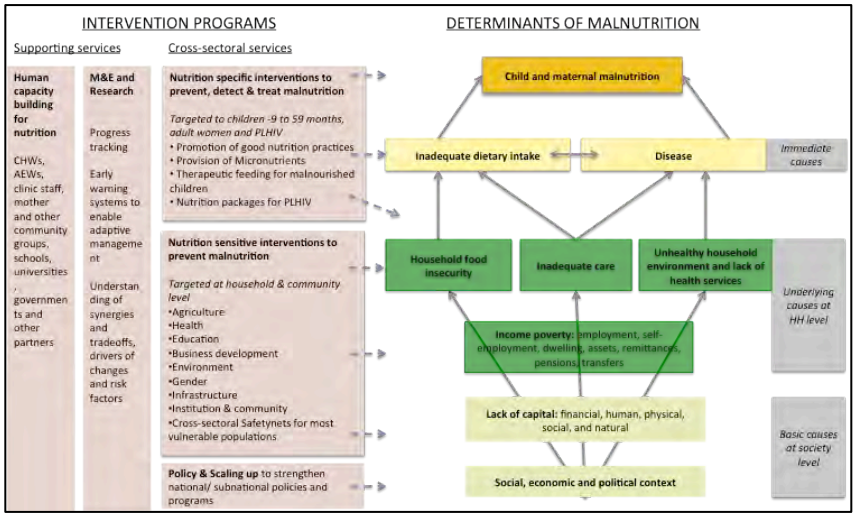
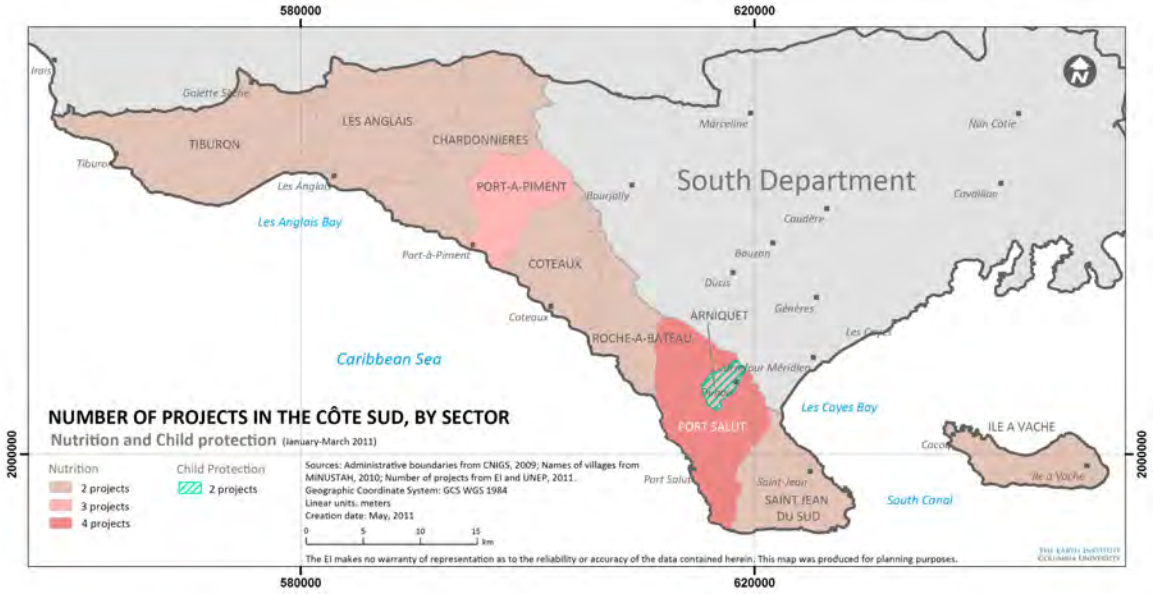


Table 6 Framework of the relations between poverty, food insecurity, and other underlying and immediate causes to maternal and child undernutrition and a cross-sectoral approach to address these multiple causes. Source: UNICEF.

Improving food security for a population is a function both of improving nutrition delivery programs as well as strengthening the existing agricultural system to better nourish the population. Nevertheless, nutrition-based projects are few in the ten surveyed communes. The majority of programs are run by CRS, who has built a strong presence along the southern coast. Also present in the region are the WFP and Terre des Hommes, which also operates child protection programs in Arniquet. Out of the ten communes, Les Anglais is the commune most lagging in food security, with high levels of both wasting and stunting. Les Anglais also has a below-average dietary diversity score for both children and adult women.



Map 7 Nutrition and child protection organization tracking in the ten communes, as of 2011.

REMITTANCES

While agriculture is the largest reported primary occupation for the majority of the working 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)[22] in 2010. The South Department has one of the highest proportions of remittances recipients in the country. IHSI estimated that more than half of households in the south receive remittances as part of annual incomes, representing 18% of annual income (IHSI 2001).

Remittances as supplemental income 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 credit or debit cards requires many customers in Haiti to physically go to a building housing a bank and stand in line for hours. In the ten communes surveyed in 2011-2012, only 15% of households have a bank account, with the highest in Port-à-Piment at 23% and as low as 8% in Port Salut and Tiburon. Instead of bank accounts, households use less formal means of credit. The proportion of households who receive any type of credit in surveyed communes is 36%, with as many as 44% of households in Roche-à-Bateau and Ile à Vache and as few as 24% of households in Tiburon. For households that report having received credit, there are varied sources used. Friends are the most relied upon to provide credit (44% of households who received credit), followed by relatives (21%) and vendors or sellers (17%). Local organizations, NGOs, and microfinance organizations each provide less than 5% of the credit received by households. When received, credit is most often used to buy food (32% of cases), followed by expenses to establish a

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

business (27%). Education expenses (17%) and health related expenses (9%) also account for household's reliance on credit. Purchasing of livestock, fertilizer or seeds, or agricultural equipment account for less than 3% of all use of credit. Home improvement and furniture account for 2.5% of credit uses.

ACCESS TO COMMUNICATION INFRASTRUCTURE

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. Across the ten communes, the proportion of households that own a cellular phone is 64%. The geographic distribution across communes of cell phone ownership is highest nearest the city of Les Cayes, the regional hub of the South Department. The pattern of distribution generally follows the availability of cell phone coverage, as displayed in the Digicel coverage map below.

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 ten communes, 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 Tiburon, Chardonnieres, Coteaux, Roche-à-Bateau, Port Salut and Ile à Vache contrasts with the 2% usage in Port-à-Piment and Arniquet. The middle school, College Stella Maris in Port-à-Piment town has a computer room with ICT education.

Map 8 Digicel phone coverage. Source: Digicel.

MOBILE BANKING IN THE SOUTH DEPARTMENT

Mobile banking in Haiti started in 2010. The January 2010 earthquake was a catalyst in kick-starting this sector, as many of the few previously 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, mobile banking options are operated by multinational organizations and centered with partnerships with specific banks. The availability of banking services in the South Department is expanding with new mobile banking options. This could 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.

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 the client to deposit money, withdraw money, conduct person-to-person transfers, and 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, there exist methods outside of the formal banking system for investment such as cash at home and livestock purchases. Certain crops such as vetiver are planted and harvested 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[23] or Fonkoze as credit receiving mechanisms. Only one seller reported to have heard of TchoTcho Mobile. There is a general lack of information regarding financing and savings options, irrespective of whether they are traditional banking mechanisms or branchless banking.

[23] Credit unions in Haiti

6. EDUCATION (MDGS 2 AND 3)

The second Millennium Development Goal (MDG 2) is to achieve universal primary education. The target is to ensure that all children, boys and girls, are able to complete a full course of primary schooling. The key indicators measuring progress towards MDG 2 are the primary school net attendance rate and gross attendance rate, the net intake rate, the adult literacy rate, and completion rates for each level of education. Indicators under several of the other MDGs, such as MDG 3 for gender equality, also have impacts on education interventions and projects.

The 2011-2012 household survey demonstrates that the ten communes are far from achieving MDG 2, with only 17% of children continuing their schooling through the final year of primary school. Significant challenges in meeting this goal include barriers such as affordability, adequate facilities access and quality of education.

Free and compulsory universal primary education is a hallmark of the 1987 Haitian constitution. Though President Martelly has re-affirmed free and compulsory universal primary education as a priority of his administration, private education accounts for over 80% of schools nationally (McNulty 2011). School fees are a large burden on households, with 10% of households in the ten communes reporting taking out informal credits to pay for education. A growing youth population creates further pressure and increased demands on the already insufficient system. The median age of the population of the region is estimated at 20; 37% of the population is estimated at age 15 or younger. This section details the core challenges identified within the education system in the ten communes and reports on findings on core education indicators from the 2011-2012 household survey and other national studies.

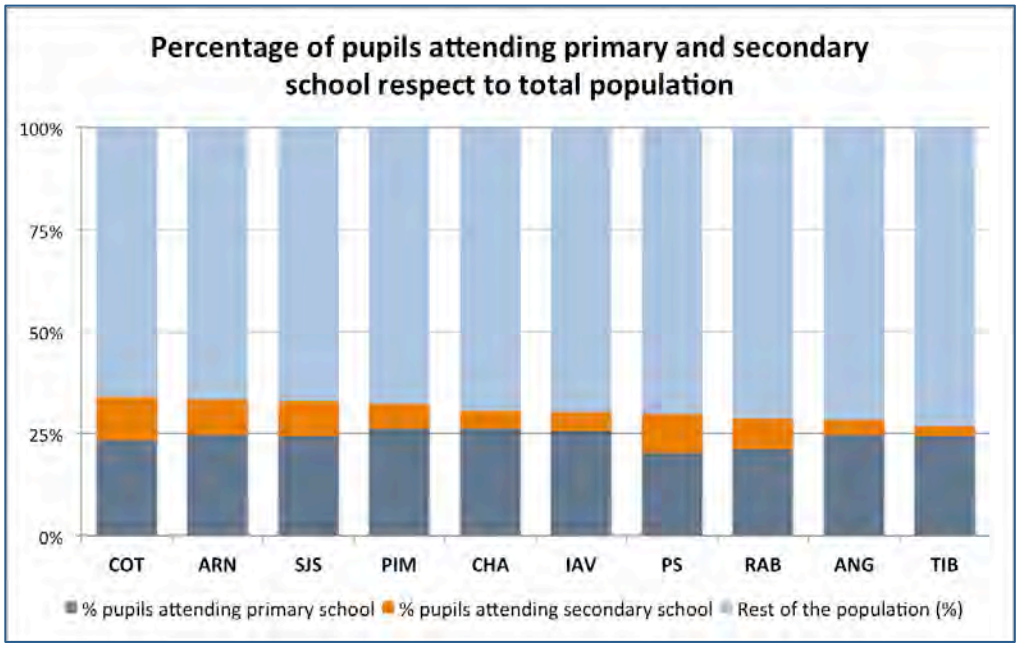


Figure 23 Estimated population attending primary and secondary school during the 2011-2012 academic year.

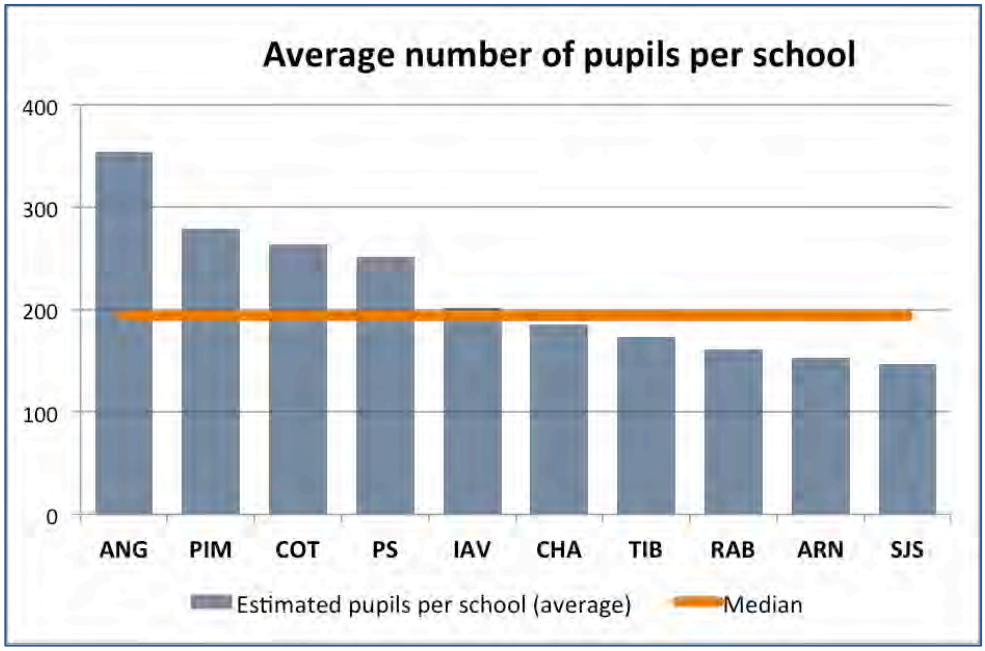


Figure 24 Estimated average number of pupils per school.

The population of students attending either primary or secondary school in the ten communes comprises on average nearly one third of the entire estimated population. This high percentage of the population depends on an existing network of public and private schools with inconsistent sources and amounts of funding. The state of the physical infrastructure of schools, including the number of students per classroom and per teacher, is inconsistent from institution to institution. Based on the estimated population attending primary or secondary school between the 2011-2012 academic year, paired with MENFP's 2011 list of schools in the ten commune region from the same time period, the average student population is estimated at a median of 200 students per school for all ten communes.[24] As seen in the figure above, among communes the estimates range from 147 children per school in Saint Jean du Sud to 354 students per school in Les Anglais.

[24] The calculation was made by extrapolating the proportion of children who attended school during the 2011-2012 academic year, with respect to the total estimated population per commune in 2009. This calculation excluded the proportion of children being reported as pre-schoolers, as well as schools tagged as "kindergarden", "préscolaire" or "fermée". The number of schools per commune was obtained from the MENFP, South Directorate. The proportion of children attending school during the academic year 2011-2012 was obtained through the 2011-2012 household survey. Data sources: IHSI (2009); MENFP (2011); UNEP, EI et al (2012).

CHALLENGES TOWARDS ACHIEVING MDG 2

Public and private school system structure

With inadequate state-supported public education, private schools are run by a variety of actors or organizations, including NGOs, churches, and individuals. Some are recognized and accredited by the government, but many more, especially those run by individuals with minimal education, are not. The resources and materials at private schools vary immensely, resulting in an unequal education experience for students. Inequality is furthered by the cost of private schools, as their fees tend to be higher than those of public schools. Private school fees are often paid monthly, and if a student cannot pay for a particular month, he or she must forgo school for that month.

MENFP endorses a curricular structure that 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 12).

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 25 Comparison of Haitian and United States school systems. Source Embassy of Haiti in the US, 2012.

Quality of Education

National studies conclude that the variability in quality of teachers and curriculum contributes to the overall lack of consistent quality of education throughout the country (McNulty 2011). On average, most private school teachers have completed nine years of schooling (i.e. fundamental education), and only 20% of teachers in private schools are graduates of teacher training colleges (Salmi 2000). Instructors and school principals do not require teaching degrees or certifications; there are no official or legal permits to be obtained, and there is no standard curriculum in most private schools (McNulty 2011). More support for teachers is necessary to improve the quality of education, as nearly 80% of primary school teachers have no formal teacher training (Wolff 2008), and in rural areas many have only some secondary education.

The quality of schools 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 oversight, curricular support, quality control and regulation directives.

Moreover, school instructors in general are poorly compensated, and the most educated among them often leave the system or go abroad for better opportunities and higher pay. Though public school teachers often receive higher compensation than private school teachers, these salaries remain inadequate; teacher absences are frequent. Increasing pay and oversight can lead to a stronger and more consistent base of primary instruction to ensure that the education children receive while in school will equip them with the critical skills needed to improve rates of literacy, both for current children and the future adult population.

Cost of Enrollment

The cost of schooling remains a major barrier for many families in the ten communes. Many families are unable to afford tuition, leaving students unable to attend school. Inconsistencies in national education 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 (McNulty 2011). Education experts in the south estimate costs range from USD $8-12 per month in coastal towns and urban centers in the south, such as Les Cayes. The cost of enrollment is also closely related to patterns of food insecurity and livelihoods production patterns, as families resort to supplemental income such as informal credit from friends, charcoal production or vetiver harvesting to pay for fees.

ADULT LITERACY RATE (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 and perform basic arithmetic. 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. Literacy was measured in the 2011-2012 household survey among adult women as a proxy for adults as a whole. The literacy rate for sampled women between the ages of 15 and 24 in the region is 61%. Since attendance rates in the southwest are higher than the national average, the low literacy rates may be due to poor quality in schools or a recent increase in enrollment that has not yet affected the literacy rate. At 56%, the youth literacy rate is much lower for sampled areas classified as rural, than those classified as urban, at 76%.

The adult literacy rate for women between 15 and 49 years old is 51%— ten percent lower than the young adult literacy rate. Likewise, the adult literacy rate is much lower for sampled areas classified as rural, at 46%, than those classified as urban, at 68%. These rates, in the predominantly rural southwest zone, are far below the national average as of 2006, which places literacy of women fifteen and older at 81% (Cayemittes et al, 2007).[25]

Within the ten communes, 74% of adults aged 25 and older have not completed primary school where fundamentals of reading and writing are usually taught. Almost one in four adults have completed primary school and only 3% have completed secondary or higher.

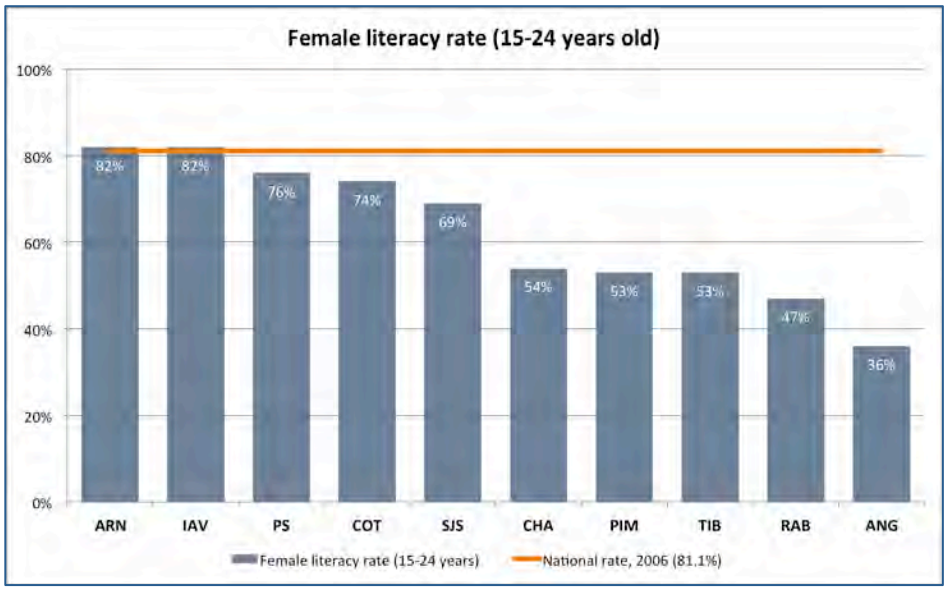


Figure 26. Female literacy rate for 15-24 year olds. National average data source: Cayemittes et al 2007.

[25] Unless otherwise noted, all national-scale education data in this section is from Cayemittes et al 2007.

NET AND GROSS ATTENDANCE RATES IN PRIMARY EDUCATION

Key indicators measuring progress towards achieving MDG 2 towards a target of universal primary education include the primary school net attendance rate and gross attendance rate. Net attendance rate (NAR) measures the percentage of currently attending pupils within the appropriate school-going age (ages 6-12 for primary and 12-19 for secondary). NAR therefore targets 100% net attendance to achieve universal primary education. Gross attendance rate (GAR) on the other hand is the number of attending pupils regardless of age attending school; GAR represents the total percentage of pupils, regardless of whether they are under or over the official age group for a given level of school. If GAR is higher than NAR, it means that many of the children in school are either above or below the appropriate age for their respective levels.

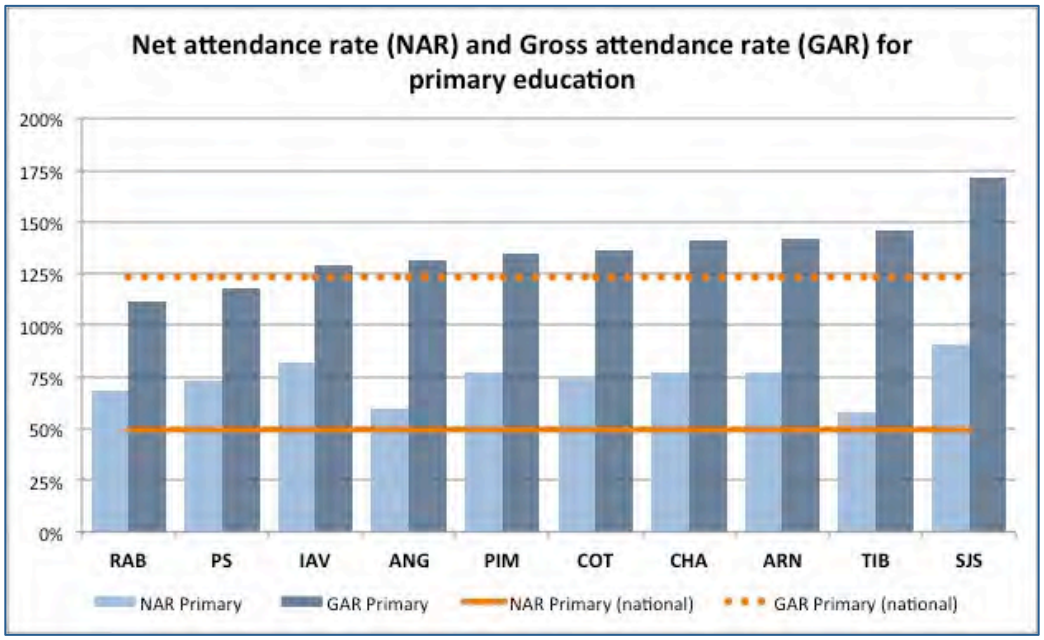


Figure 27 Net attendance rate and gross attendance rate for primary education.

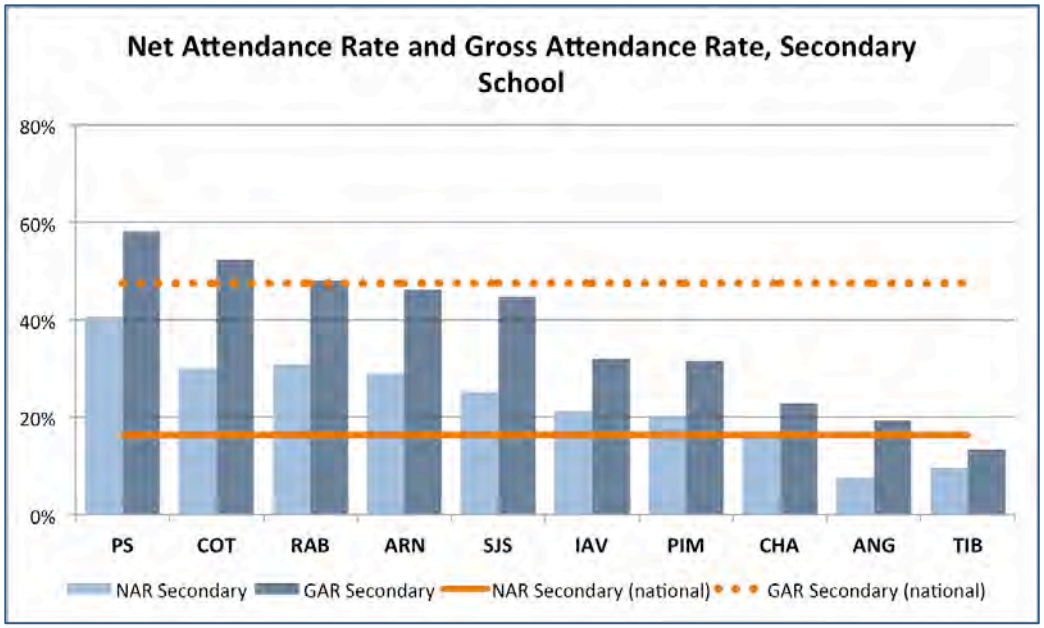


Figure 28 Net attendance rate and gross attendance rate for secondary school.

The figures above depict the net and gross attendance rates in each of the ten communes and the comparison with the national and regional average. Nationally, net attendance rates show that approximately half of the primary school age children are attending primary school (49.6%), and only 16.4% of secondary school age children are attending secondary school.[26] Gross attendance rates for both primary and secondary are much higher at national level, at 123.5% and 47.6% respectively, indicating that many of the children in primary and secondary school are not of the appropriate age.

[26] For the purpose of interpreting the indicators in this report, "primary" education refers to cycle 1 and 2 of fundamental education, which is equivalent of primary education in Haiti. The appropriate age of students in compulsory education, or primary education, is 6-12. Indicators in this report pertaining to "secondary" education are equivalent to the third cycle of fundamental education (grades 7-9, ages 12-15) and the subsequent four years of secondary schooling (grades 10-13, ages 15-19).

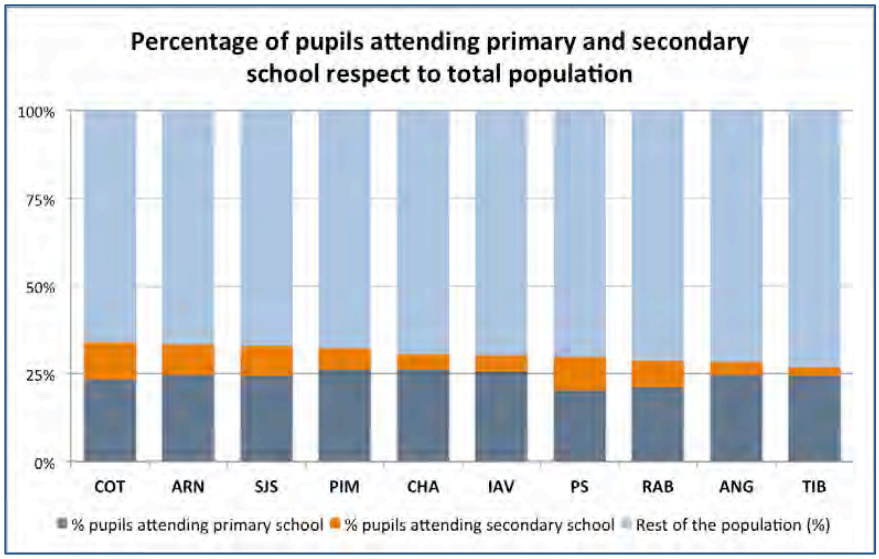


Figure 29 Percentage of pupils attending primary and secondary school, compared to total sampled student age population.

The average NAR at the primary school level in the ten communes is 74%, two thirds higher than the national average of 49.6%. The regional primary school GAR average is 135%, close to the national average, which signals that the area has similar problems with over-age students.

The NAR for secondary education estimated at 22% for the ten communes also shows in a higher proportion compared to 16.4% nationally. However, the GAR for the secondary school level falls below the national average (47%[27]) at 36%.

Analysis of household survey data by commune shows that net and gross attendance rates vary greatly among the communes. Primary school NAR rates vary from a low of 58% in Tiburon and 59% in Les Anglais to a high of 91% on Saint Jean du Sud. In secondary school, the NAR figures drop significantly as participation is much lower. Les Anglais again has the lowest score at 8%, relatively far below the regional average NAR of 22%. The highest secondary education NAR rates were reported in Port Salut at 41%.

While age-appropriate attendance in both primary and secondary school remains a challenge, over-age enrollment is a major issue across communes, particularly in primary school. The primary school GAR average in the ten commune region is 135%, with a low of 111% in Roche-à-Bateau to a high of 171% in Saint Jean du Sud. These figures indicate that specific programs with the MENFP and individual schools targeting the communes with the highest GARs are needed to support students in school at inappropriate ages and to encourage age-appropriate enrollment.

[27] Cayemittes et al 2007

NET INTAKE RATE AT FIRST GRADE OF PRIMARY SCHOOLING

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. Students who are over or under the appropriate age for their grade, as seen with high GARs throughout the region, are often more likely to fall behind or drop out. Thus, net intake rate and survival rates are two key indicators for measuring progress towards MDG 2.

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 first segment of primary school) is six years old. The 2011-2012 household survey shows that the net intake rates in the ten communes region varies, with a low of 18% in Les Anglais, and a high of 59% in Saint Jean du Sud[28]. The southwest average shows that only 36% of children start the first year of fundamental (grade 1) in that region. This indicator along with 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.

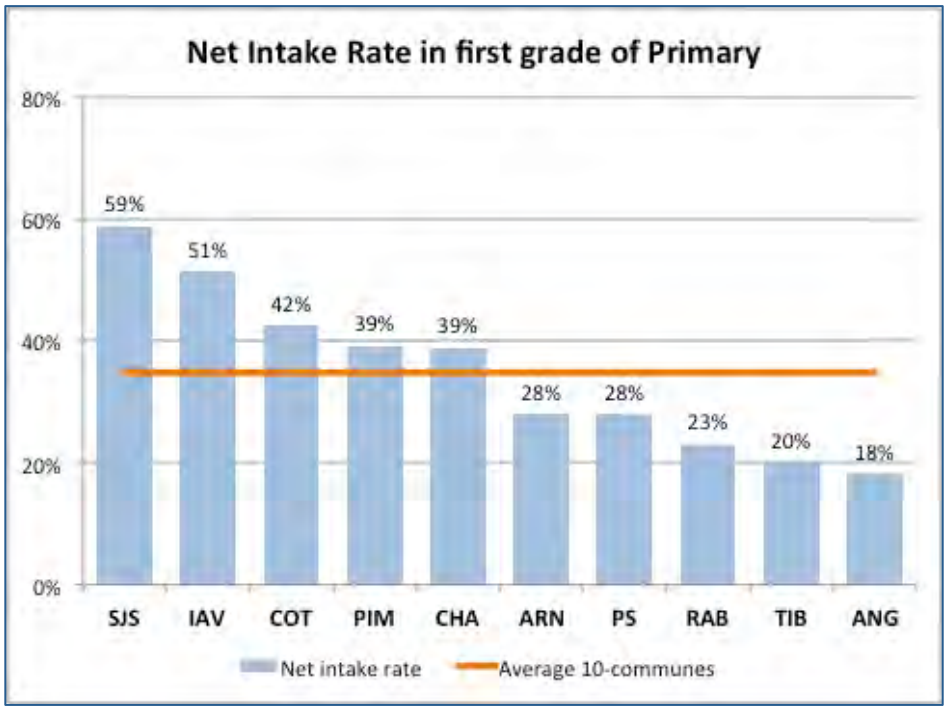


Figure 30 Net intake rate in first grade of primary education.

[28] In this report, the net intake rate at first grade of primary schooling was calculated as the percentage of children attending the first grade of primary, at ages 6 or 7 respect to the infant population of the same cohort. As initially mentioned, the 2011-2012 household survey was conducted between November 2011 and March 2012, which represents almost half a year after the commencement of the 2011-2012 academic year. It is possible that, by including only the population at age six, a significant portion of the relevant population is excluded.

PROPORTION OF PUPILS STARTING GRADE 1 WHO REACH GRADE 5

The proportion of pupils starting in grade 1 who reach last grade of primary education is known as the survival rate. 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 ten communes measured in the 2011-2012 household survey have a low survival rate. On average the probability of pupils who start grade 1 and reach grade 6 is 17%, compared to the national average of 38.4% (Cayemittes et al 2007), which is still well below the intended target of 100%.

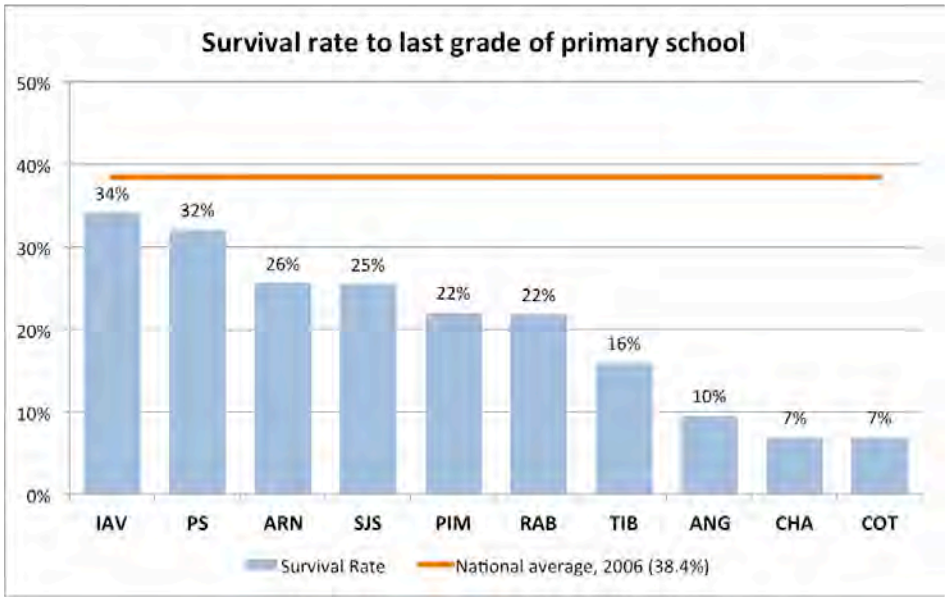


Figure 31 Survival rate to last grade of primary school.

The net survival rates are extremely low in Coteaux and Chardonnières, where only 7% of students are most likely to succeed in completing the final year of primary education. The probability of reaching grade five thus completing primary school level is the highest in Ile à Vache at 34%, followed by Port Salut at 32%. These figures draw attention to the fact that despite having high net attendance rates, students in the Southwest are highly likely to leave school prior to reaching grade 5.

These extremely low survival rates are corroborated by the overall low educational completion rates in the southwest region. On average, 74% of the adult population has not completed any level of education. These numbers are relatively higher in zones with low survival rates. For example in Les Anglais, where the level of non-completion is the highest (81%), the survival rate is among the lowest, at 10%. Interestingly, the same rationale might not hold for a positive outcome between completion and survival – the highest survival rates do not necessarily mean highest completion rates among adult population.

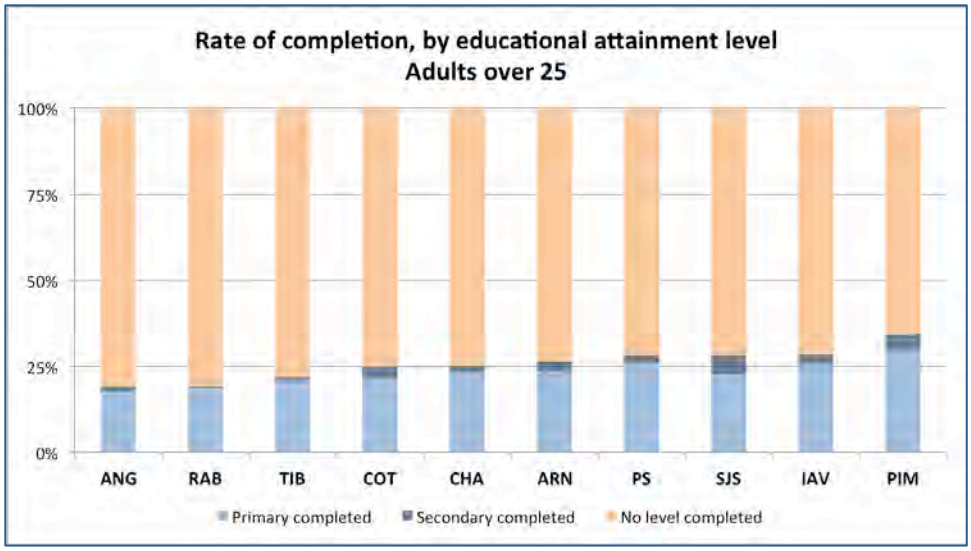


Figure 32 Rate of completion, by education attainment level of adults over 25.

As depicted in the figure above, Roche à Bateau and Les Anglais have the lowest completion rates of the ten communes. By contrast, Port-à-Piment has the highest rate of primary (at 30%) whereas Saint Jean du Sud has the highest rate for secondary (at 6%). The difference between the highest rate for primary compared to the highest rate for secondary are important to note. The latter suggest that, although primary schooling deserves full attention to comply with the national strategy and achieve MDG 2, secondary school (or a similar educational training, for example vocational studies) should also be targeted as part of an integrated approach.

Families reported in interviews that the inconsistency in attendance rates and late entry of students is linked with limitations to finance education. Public schools are not free, as families must pay annual fees and other costs for school 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). When families pay fees monthly, there is the possibility that if they fall short of a payment the student cannot attend for that month. There are some exceptions, including private school administrators in Port-à-Piment, who report to accept varying payments on the condition that they will arrive at the full sum by the end of the year.

School fees often represent a burden to households requiring a supplemental source of cash income or credit. In rural areas where household income depends on in large part on natural resources and the productivity of agricultural harvests school tuition issues have been referred as an important household economic consideration. Interviews with residents have linked increases in charcoal production with families' need to generate income to pay for school tuitions (Columbia University, 2011).

GENDER EQUALITY IN EDUCATION

One of the target indicators for MDG 3 includes the elimination of any gender disparity in primary, secondary and tertiary education. The ten communes are relatively close to the target for gender equality in education to attain MDG 3.

Complete gender parity is within reach of being achieved. At the national level, girls and boys are participating in primary school at equal rates, with the national ratio of girls to boys in primary school at 1.02 according to 2006 DHS data. This figure drops slightly in secondary school, indicating a disadvantage for girls' participation in secondary school nationally, with a ratio of 0.94.

In the ten communes, the total ratio of girls to boys in primary school (GAR) is 0.79 and in secondary schools (GAR) is at 0.74. The proportion of girls to boys increases for both school levels when referred to net attendance rates. The ratio of girls to boys attending primary and secondary school within their corresponding school age is almost one-to-one at 0.94 and at 0.91, respectively.

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 and the survival rate to achieve primary schooling, significant efforts must still be made to enroll more children in school, ensure they are learning and participating equally.

Among adult respondents to the 2011-2012 household survey over 25 years in age, the difference between men and women exists across all levels of educational completion— for primary school level the female to male ratio is estimated at 0.68, evidenced in the chart below.

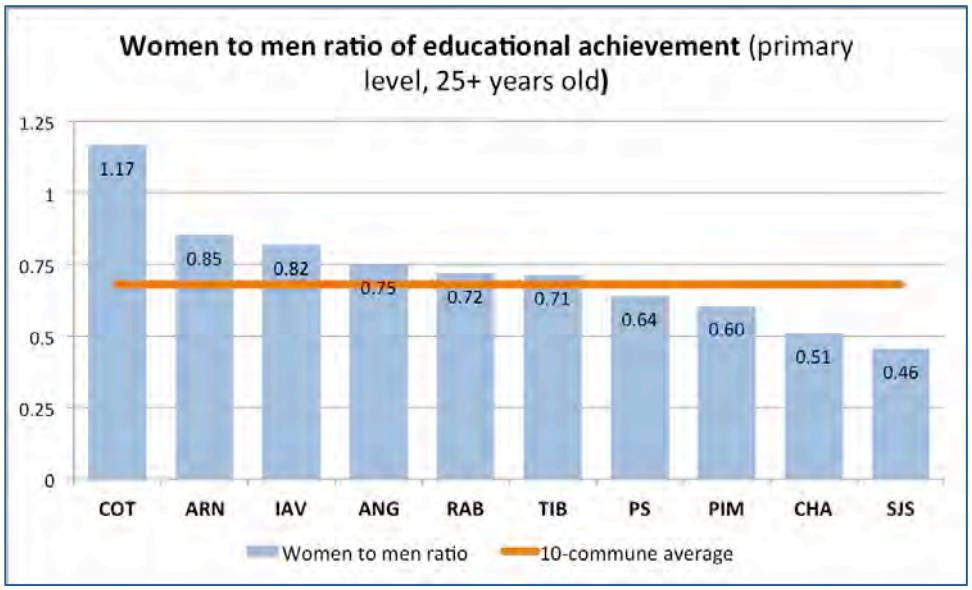
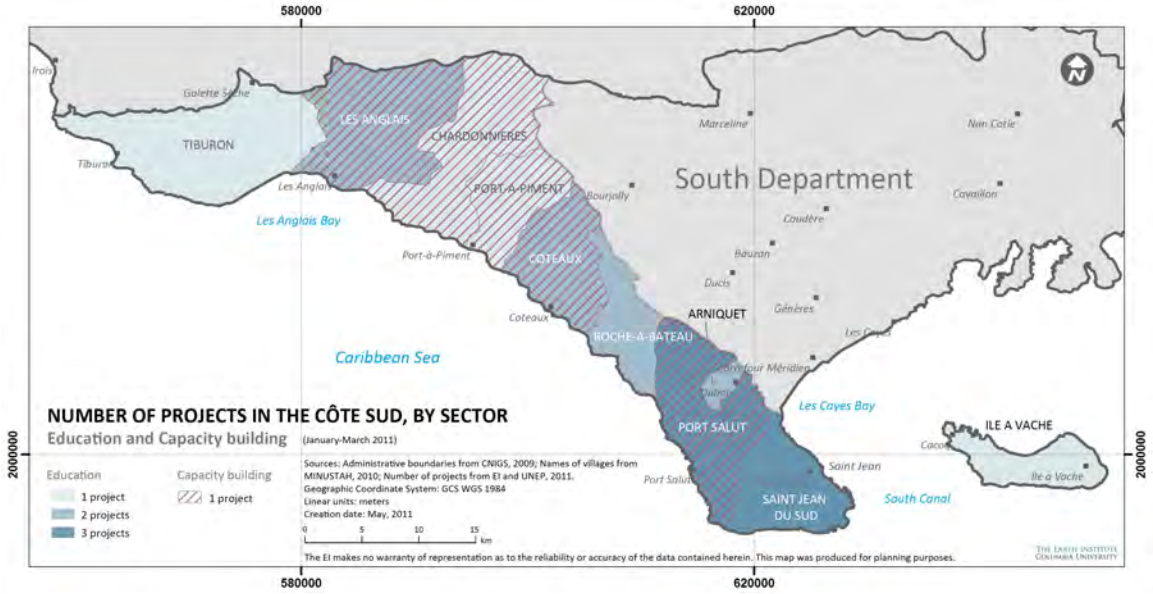


Figure 33 Women to men ratio of educational achievement of 25 years and older.

EDUCATION INTERVENTIONS IN SOUTHWEST HAITI

In the ten communes of southwest Haiti, the majority of education programs underway in early 2011 focus on school meals, school grants for internally displaced families, and agricultural extension programs. Most of these programs are implemented in the communes of Saint Jean du Sud and Port Salut. As of 2011, Ile à Vache, Chardonnières, Tiburon and Port-à-Piment had the least reported projects. In 2011-2012, CRS and the Port-à-Piment Millennium Village Project launched school meals and extensive training for parent teacher associations (PTAs) in the schools in the Port-à-Piment watershed zone. Along with CRS, the Danish Red Cross, Lutheran World Relief and SEED Ministries also provide extension education projects in the region. The Centre de Développement Sur la Côte Sud d'Haïti is a professional school in Port-à-Piment that offers a variety of carpentry, electrical, plumbing and construction skills.



Map 9 Number of education and capacity building projects per commune. Source CIESIN 2011.

Based on the findings above, a comparison of results between the ten communes in the southwest, and a rapidly increasing youth populations, it is clear that in order to achieve universal primary education there is a need for both increased access for students and quality of education. To help boost access and completion rates, the results suggest a focus on programs that enable early enrollment and larger annual matriculation. This can be done through incentive programs ranging from school meals to reduced tuition costs based on core government support. The increased role of PTAs also can reinforce the importance of children's education and create a community network of support. Based on a comprehensive facilities inventory, targeted capital investments should be made to improve the school buildings and ensure 100% access to water and sanitation. Private individuals and organizations can continue to provide scholarships for families unable to afford tuition, but through structured application processes.

The findings also show that quality of education is important to ensure outcomes, like high literacy rates. In a separate report, CRS conducted a teacher competency exam in 2012 that will reinforce priorities for the MENFP's training and school inspection system. MENFP and local school administrators should provide for adequate teacher salaries and requirements for improved capacity.

Overall, Les Anglais and Tiburon have the most consistent low performance on core indicators to achieve MDG 2. In the case of Les Anglais, the low NAR in primary and secondary school levels in addition to 10% survival rate for primary education poses significant challenges to achieve and sustain MDG 2. Challenges in Tiburon are similar in regards to low NAR in both primary and secondary school levels, paired with low intake rates during the first year of primary school. All this is indicative of a persistent problem that needs to be addressed with the current school-going population in order to avoid continued low rates of education attainment among adults into the future.

7. HEALTH (MDGS 4, 5, 6, AND 7)

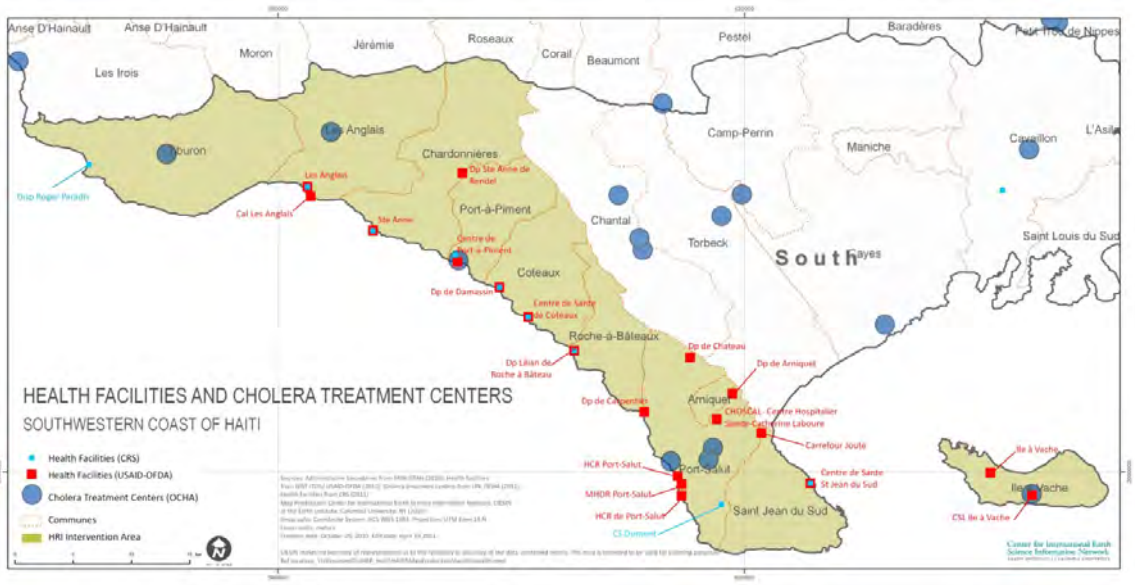
The health of the population underpins all efforts towards development and is paramount towards achieving any lasting progress: four of the eight MDGs directly relate to the population's health. MDG 4 is explicitly related to the rates of mortality among children under five years of age, with a focus 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.

Nationally, the government's expenditures on healthcare per capita are low, at $8.37 USD in 2003 (IHSI 2003). Clinics and hospitals in the South Department are run both publically and privately, creating an uneven landscape of access and affordability of health care. In the 2011-2012 household survey, respondents listed pursuit of healthcare as among the top reasons for internal migration. The problem of access to healthcare for women evidenced in the ten communes, in the context of births, is indicative of a larger national problem. The national 2005 EMMUS-IV survey found that even among the nation's wealthiest quintile, over 60% of women reported cost of treatment as a barrier to obtaining health care. In the household survey, of the 51% of households that report receiving some form of financial credit, 15% of those households report using it for health related expenses. Regardless of economic situation, 97% of women nationwide reported at least one hurdle when seeking care (EMMUS-IV). In southwest Haiti, the difficulty of transportation to health facilities, including distance, lack of infrastructure, and difficulty of terrain, is seen as among the most common problems when seeking health care.

The health sector is largely ill equipped to respond to these problems with simple and cost-effective interventions, due primarily to weak government coordination, fragmentation of health care facilities, and geographic and economic factors limiting access to existing facilities. The pervasive lack of primary health care has failed to address population health challenges due to poverty and chronic political turmoil that inhibit efforts to improve the system. Lack of access to quality health care has also led to an increase in the transmission of preventable communicable diseases, which can be devastating to one's health if contracted and not properly treated. Diseases set as targets by MDG 6, specifically HIV/AIDS, can be prevented through behavioral interventions but require intensive, though relatively expensive, treatment. Treatment and prevention of these diseases, with low incidences of preventative behavior demonstrated in the 2011-2012 report, are indicative not only of the general health of the population but also the penetration rate of prevention campaigns and appropriate interventions.

The MDGs set clear targets for children and mothers as they are vulnerable populations with compounding risk factors. Accordingly, any progress achieved towards the health MDGs must be the result of multiple interventions across different fields, including increasing food production and availability, promoting and enabling access to quality healthcare and preventative care, improving water and sanitation, and reducing exposure to natural disaster risks. The most common factors leading to maternal and child deaths are largely preventable and treatable. While progress in child mortality requires reduction in vulnerabilities in tandem with improved access to care, the easiest and most effective way to improve maternal health and to decrease maternal mortality is to increase the rate of births that take place within a medical facility with attendance by trained medical staff, referred to as institutional deliveries. While one of the most critical objectives, it is among the most difficult priorities to address in the ten communes, given the steep topography, which limits access to health facilities, particularly during delivery.

As of 2012, an inventory of health facilities in the ten communes identified 22 health centers, clinics or hospitals. Despite many offering delivery room services, the use of delivery services remains low. The clinic in Saint Jean du Sud, with two beds and one delivery room, also has 25 Traditional Birth Attendants (TBAs) in network. In Coteaux, the health clinic does not have running water or electricity, like that of Damassin, though both still offer a delivery room with medical attendants. Coteaux also has a maternal health clinic. The hospital in Port-à-Piment town and the clinic in Randel have limited facilities and staffing, and no capacity for emergency deliveries. To address this CRS and MSPP will partner to rehabilitate the clinic in Randel, in the mountains above Port-à-Piment in the Chardonnières commune, to include a birthing facility as of 2012. For any emergency situations, patients are referred to either the hospital in Port Salut or the hospital in Les Cayes. The hospital in Port Salut, operated by MSPP, has 17 beds, a number of physicians on staff, with an emergency room, gynecological services from an OB/GYN, and a surgery room, and inpatient and laboratory capabilities. However, it does not have Comprehensive Emergency Obstetric Care services (CEMOC), which can only be found at the hospital in Les Cayes.



Map 10 Health clinics in the ten communes, as of 2011.

Reduce Child Mortality

A sustained effort is needed to reduce mortality of children under five years of age in order to meet the targets established as a part of MDG 4, and to ensure that these gains are sustained beyond 2015. In Haiti the rates of child mortality are steadily decreasing at the national level, towards the MDG target for Haiti of 50 deaths per 1,000 live births. From the 2011-2012 household data, the level of child mortality from 2007-2011 is 65 in southwest Haiti, which represents progress from the stalled rates reported at 87 over the period of 2007-2002 and 90 from 1997-2002. Estimates from the Mortality, Morbidity and Utilization of Services Survey EMMUS-IV also report a decreasing trend nationally, from 130.8 in 1994-95 to 86.3 in 2005-06, demonstrated in the chart below.

MDG 4: Under-Five Mortality	Southwest average
2007-2011	65
2002-2007	87
1997-2002	90

Table 7 Mortality rate of children under five years in the ten commune area.

Because child mortality is an indicator associated with many factors, attributing the progress in child mortality to any particular intervention is a difficult process. Assessing the drivers of child mortality requires analysis of the multiple stressors across sectors, many of which were analyzed as a part of the baseline survey. What follows is a summary of a few of these key indicators, such as rate of immunizations against measles, treatment for diarrhea, and the frequency and coverage of Vitamin A distribution.

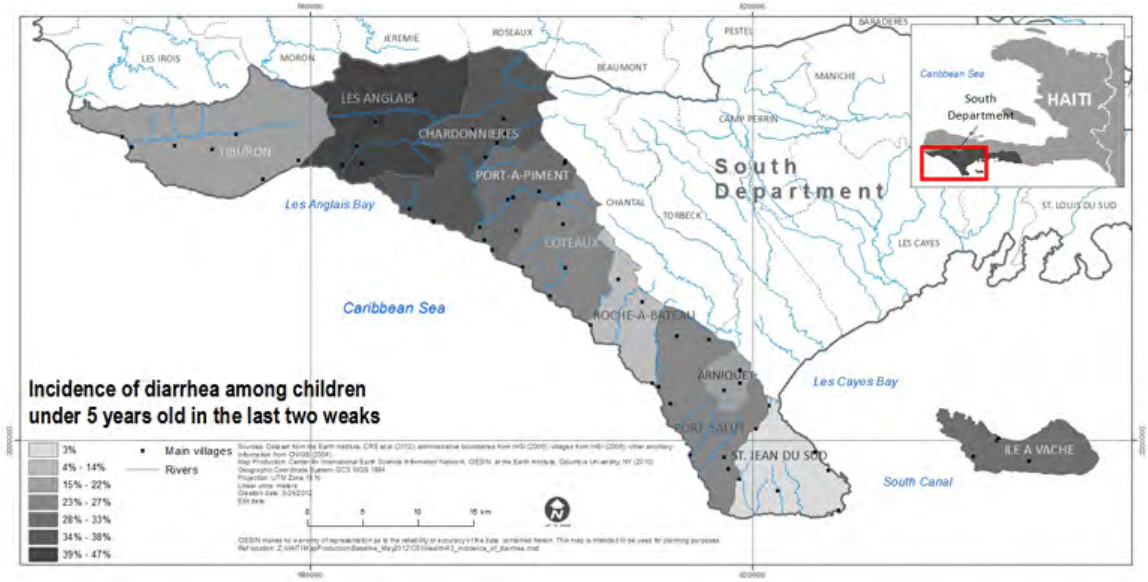
PROPORTION OF CHILDREN UNDER ONE IMMUNIZED AGAINST MEASLES

According to 2011-2012 survey data, 56% of children under one year of age in the ten communes have been immunized against measles. In 2005, 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, considered outside the critical age window, were included in the survey (Cayemittes et al 2007).

The greater percentage of improvement in immunization rate seen in the ten communes as evidenced in the 2011-2012 survey, as compared to the national data from EMMUS-IV in 2005, may be attributed to widespread immunization campaigns that have been conducted within recent years, many led by international organizations. This is also likely due to increased efforts of health outreach campaigns providing education for parents on the importance of steps to improve their child's health, including maintaining a vaccination schedule for their children.

PROPORTION OF CHILDREN WHO HAD DIARRHEA IN THE PAST TWO 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 ten communes surveyed, 27% of children under five were reported as having diarrhea in the two weeks prior to the 2011-2012 survey.[29] Of those children with reported cases of diarrhea, only 73% were treated with an oral rehydration solution (ORS) or another form of fluid prepared at home by a parent, guardian, or health worker.



Map 11 Incidence of diarrhea among children under five years old in the past two weeks.

[29] The 2011-2012 survey was conducted during the dry season between November 2011-February 2012, which has a lower prevalence of waterbourne diseases.

The highest rate of incidence of diarrhea reported in the 2011-2012 household survey is 48% in Les Anglais; the second highest is in Chardonnières at 37%. Both of these communes also have the highest percentages of reported sickness—not necessarily diarrhea—at 60% and 56%, and below average dietary diversity scores for children with less than 24 months of age (2.10 and 2.50, respectively). Across the ten communes surveyed, there is a urban/rural divide in likelihood of contracting diarrhea; children living in urban communal sections, generally those on the coast itself, downriver and with a higher population density, had a 30% reporting rate of diarrhea within the past two weeks, as opposed to 27% in communal sections classified as rural. While rural areas experienced less sickness from diarrhea, they did experience more overall sickness (43%) than areas that are urban, where only 39% of children experienced general sickness. Proximity to health centers, dispensaries or hospitals does not seem to be associated to a noticeable increase or decrease in incidence of diarrhea.

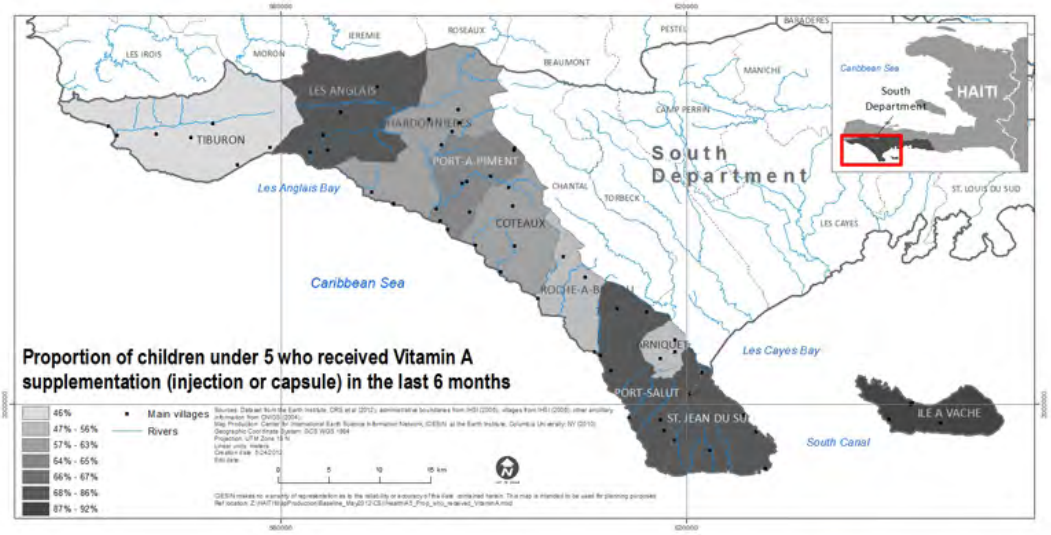
The frequency of sickness in children under five is very high across the southwest. Within the two weeks prior to the survey, 42% of children were reported as having been sick. Of those sick children, only 38% percent of them received treatment for their sickness, and within that category less than half (47%) were able to receive treatment in a health facility.

With the wide assortment of risks that threaten the vulnerable population evidenced in the frequency of sickness, such low rates of treatment and treatment by professional medical staff contribute directly to challenges in lowering the rate of child mortality. There are clinics that specialize in infants in Saint Jean du Sud, Damassin, Port-à-Piment, Port Salut, and Coteaux. Though Coteaux does have a clinic, it still has low rates of treatment, as are also seen in Chardonnières, Les Anglais and Tiburon.

Treatment for diarrhea can be prepared simply at home, negating a need to travel to a health clinic if parents are informed on the proper method. ORS packets as the recommended form of treatment are inexpensive solutions that can make a positive impact on the health of a population. ORS can be done easily at home, and is easily taught at the household level by community health workers as part of a strengthened primary health care system.

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

Factors of nutrition and rates of child wasting also contribute to under-five mortality. The high level of food insecurity in the southwest—particularly among the communes that have low levels of medical attention for child sickness (Tiburon, Les Anglais, and Chardonnières)—can contribute to, and be exacerbated by, the poor state of child health. Vitamin A supplementation is used as 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.[30]



Map 12 Proportion of children under five years old who received vitamin A supplements in the last six months

Prior to the 2011-2012 baseline survey, organizations such as CRS conducted 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 68% of children under five in the ten communes received vitamin A supplementation in the last 6 months. This is a positive 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. With the state of food insecurity and dietary diversity so low in the region, the relatively high rates of vitamin A distribution in the region are a positive sign. These numbers are particularly high in some communes (Port Salut, 80%; Saint-Jean du Sud, 86%; Arniquet, 92%; Ile-à-Vache, 92%) where campaigns have had a high penetration rate. Les Anglais, also high in food insecurity, has a similarly positive rate of vitamin A supplementation, at 84%.

The easiest way to increase levels of vitamin A supplementation throughout the region is to intensify vitamin A campaigns, and ensure that vitamin A is also an intervention provided by

[30] WHO recommendations on Vitamin A supplementation: http://www.who.int/vaccines/en/vitamina.shtml

community health workers 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 that track mid upper arm circumference (MUAC), and weight and height. Health workers can also use these cards, and a simple registration system, to track the distribution of other critical supplements and care, such as vitamin A supplementation.

IMPROVE MATERNAL HEALTH

MDG 5 calls for increased care for pregnant mothers and women of reproductive age as a way to ensure the health of the population as a whole. Increasing access to options for family planning and for quality healthcare during pregnancy, for deliveries, and after babies are born, are crucial to ensure that maternal health is met. The 2011-2012 household survey did not measure for maternal mortality, but rather the causes that contribute to it and the prevalence of interventions that can prevent maternal mortality.

PROPORTION OF BIRTHS ATTENDED BY SKILLED HEALTH PERSONNEL

Within the ten communes, only 15% of live births were attended by skilled health personnel in 2012, below the national average of 26% of live births, as found EMMUS-IV in 2005. The percentage of attended births varies widely, from 5% attended in Les Anglais to 32% in Arniquet and Ile à Vache. Across the region but predominantly in the communes with the lowest rate of attended births, births occur in individual homes, though more in rural communal sections (87%) than urban communal sections (77%). Les Anglais has the highest rate of home births at 95%, followed by Saint Jean du Sud at 94% and Tiburon and Chardonnières at 93%. The communes with the lowest rates of home births, by contrast, occurred where there was a higher rate of births in government hospitals. In Ile-à-Vache and Arniquet, 27% of births occurred in government hospitals and health centers; these two communes also had the highest rate of births attended by a skilled birth professional, at 32%. In general, the density of the population around existing health centers may mean exposure to services and ease of travel for services make the frequenting of health centers more popular among communities.

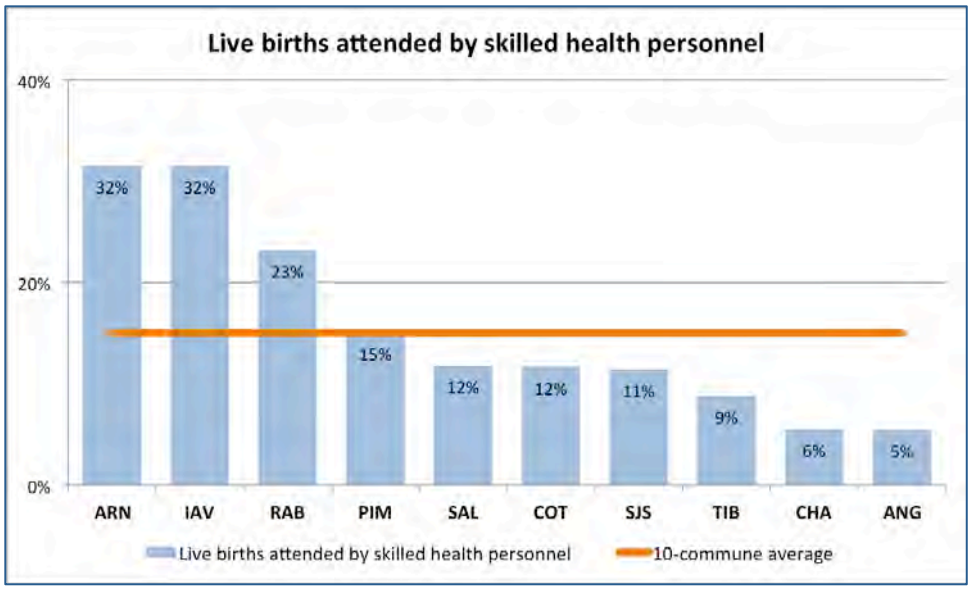


Figure 34 Live births attended by skilled health personnel.

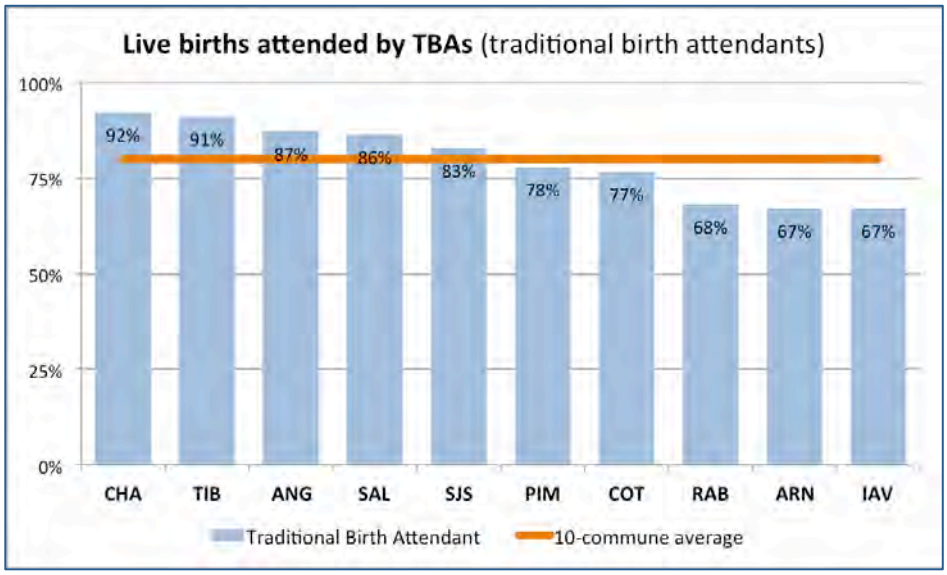


Figure 35 Live birth attended by traditional birth attendants

Across the ten communes, Traditional Birth Attendants (TBAs) play an important role in births, attending at a minimum of 67% of births in Ile à Vache and Arniquet and up to a high of 92% in Chardonnières. TBAs are present at home births and on the whole complete deliveries that are not performed by skilled health personnel.

Compared to the national average of 14.6%, the 2011-2012 survey found that only 13% of deliveries occurred in a government hospital or health center. The price differential between an institutional birth and that at home, attended or not by a TBA, is a wide margin that makes

safer, professionally-facilitated births beyond the economic abilities of most households. For example, the cost of a birth in the Port-à-Piment hospital as of 2012 is US$ 35, which encompasses drugs, lab tests and hospitalization fees and potential complications such as pre-eclampsia and eclampsia. This cost of a hospital birth is generally out of the reach of the majority of the population, corresponding to the finding that only 15% of births were attended by a physician, and only 80% by a skilled health professional such as a nurse or a midwife.

The remaining 87% of births occurred in private homes, where access to medical doctors and health services important in the case of complications is unavailable. TBAs, generally less expensive than a hospital birth, which in Port-à-Piment as of 2012 costs US $12.50, were present at 80% of the births in the region. No birth attendant, but rather family or others, attended at 5% of births. With the varied, often steep topography and low population density of the upper regions of southwest Haiti, most households are located far from health facilities. Besides the long distance, road access, knowledge, availability of trained personnel in the system, financial barriers and culture are major reasons for the 85% home deliveries in the ten communes.

The high presence of traditional birth attendants that deliver at the household scale is indicative of the important role that they currently play in maternal health in the southwest, a role that can be expanded by increasing their skills and ability to address complications in childbirth. Recent evidence from studies with traditional birth attendants has demonstrated that training in neonatal resuscitation reduces neonatal deaths by almost 50% and deaths by asphyxia by approximately 60% (Gill et al 2011). This has been addressed in the Port-à-Piment area of southwest Haiti by the introduction of the Helping Babies Breathe (HBB) campaign, where health workers have been trained in neonatal resuscitation.

Prevalence of antenatal and postnatal care

While the hospitals and clinics with maternal services offers antenatal care and institutional delivery, the rates of delivery in the hospital are extremely low. This is due in part to the fact that currently at the hospital women are required to pay for medications and supplies needed during the delivery, which can be prohibitive for many of the women throughout the region.

The 2011-2012 household survey specified that in the ten communes 42% of sampled women benefited an exam from a physician, 50% by a nurse or a midwife, 4% by a community health worker, and 4% from a traditional birth attendant during their last pregnancy. In sum, however, the total coverage is high for the region, at 91%. Antenatal care coverage among sampled women is 83% who had at least one visit by a skilled health worker and 63% completed at least four visits by any health provider during their last pregnancy. These numbers are much lower in certain communes, including Chardonnières and, interestingly, Arniquet and Ile-à-Vache, which are two communes with the highest in-hospital births. On the same note, only 16% of the sampled women in the south benefited from postnatal care in the first seven days with a doctor or a nurse, during the last pregnancy.

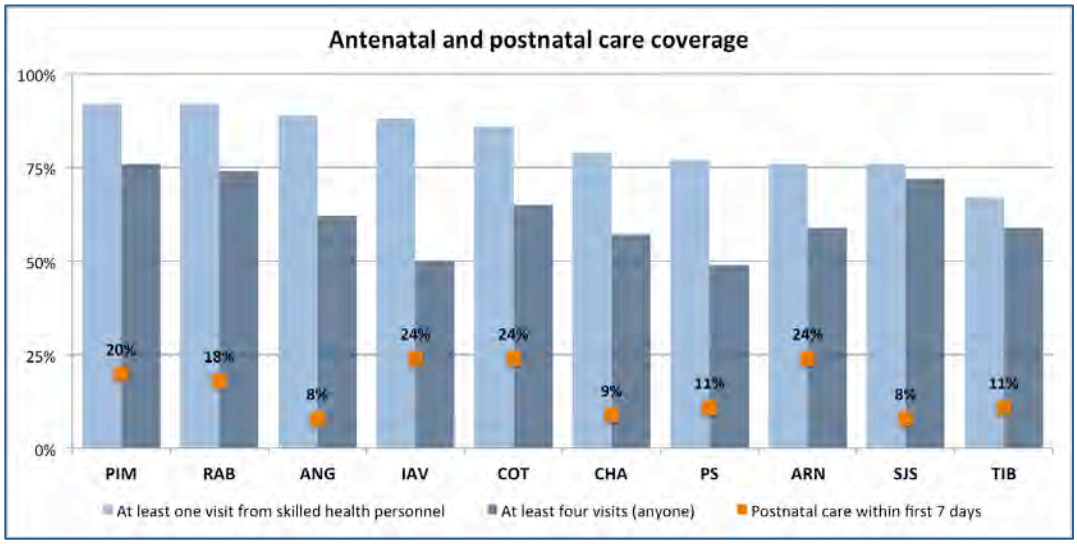


Figure 36 Antenatal and postnatal care coverage in the ten commune region.

Antenatal care, including services that cannot be offered by TBAs, is important to ensure infant health. Post-natal care may not be perceived as an apparent priority to economically-challenged households, particularly as in many cases both the mother and child appear in good health.

A key intervention to encourage mothers to deliver in health facilities is to provide women with free "Mama Kits" containing soap, a towel and blanket, and other supplies. Encouraging Traditional Birth Attendants to bring women to birthing facilities through a small payment that can be transacted at point of service has been found to be an effective and simple intervention to increase rates of institutional delivery in rural areas.

CONTRACEPTIVE PREVALENCE RATE

Family planning can be an important tool to reduce poverty and avoid health risks when women are informed about their options and have access to health clinics where such services are available. With the dependency ratio, or the ratio of dependents per working-age members of the population, very high in the region, there is a heavy burden placed on large households (averaging 5.1 people per household across the ten communes), particularly in impoverished and food insecure regions. Accordingly, access to contraceptive options is paramount to empower individuals to pace or limit pregnancies according to their needs.

Access to contraception is limited in across the ten communes surveyed; accordingly, there is a generally low rate of usage. In southwest Haiti, the contraceptive prevalence rate for all methods of contraception for sampled women of 15-49 years who are married or in a union is 31%; of those using contraception, only 29% are using modern methods. Limitations of supplies, stock-outs in the supply chain, and absence of skilled health providers are among the impediments for broader family planning coverage.

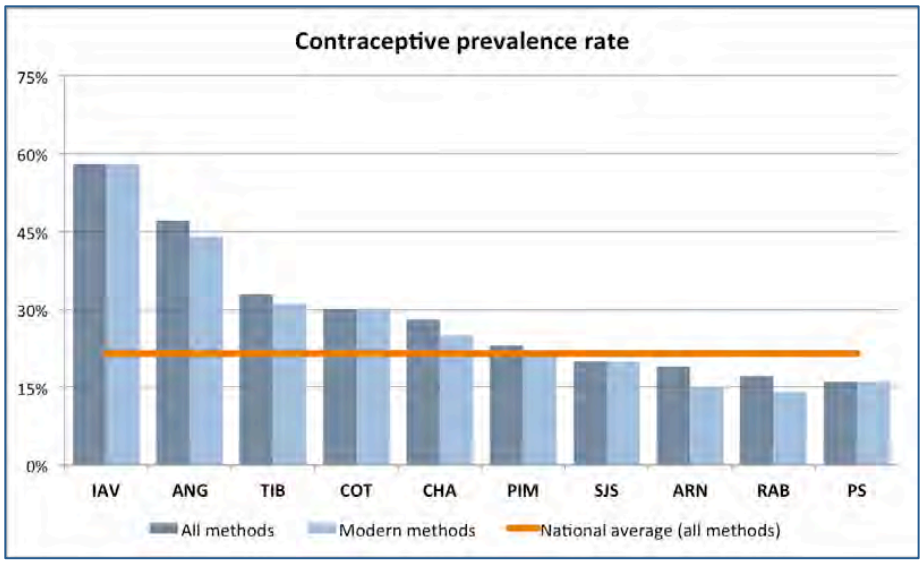


Table 8 MDG 5: Contraceptive prevalence rates

In Arniquet and Ile-à-Vache, where there is a high density and frequentation of clinics, 58% of the sampled population use modern methods of contraceptives. There are some noteworthy lapses in usage; Roche-à-Bateau and Port Salut have among the least usage, at 14% and 16% of the population sampled.

Nationally, according to EMMUS IV, 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 who were not pregnant during the survey in 2005, 23% were using at least one method, 18% a modern method and 5% a traditional one. Norplant (7%) and male condom (6%) were the most utilized modern methods.

FAMILY PLANNING

Unmet family planning—the proportion of women who wish to space or limit their children, but are not currently using a contraceptive method—is due in part to the lack of availability of family planning methods. Nationally, obtaining such devices for clinics is difficult, as is disseminating information about the options available.

The unmet need for family planning in the ten communes in 2011-2012 is 40%, higher than national average of 38% in 2006. There is a strong need for family planning consultations and contraceptive methods in the region, particularly in the light of the population distribution that has many young women of child-bearing age and many more who are coming of age. Chardonnières at 61% presents the highest figures in the Southwest, while Saint Jean du Sud represents the lowest.

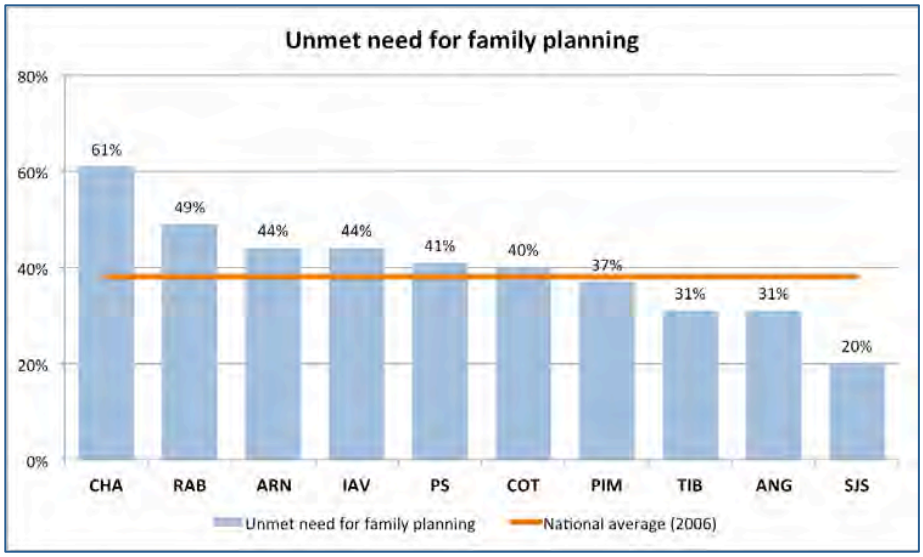


Table 9 MDG 5 Health unmet need for family planning

Family planning services are available in many clinics throughout southwest Haiti. As of 2012, family planning rooms exist in the clinics of Saint Jean du Sud, Coteaux, and Randel, as well as the hospitals of Port Salut and Port-à-Piment. The staff of the hospital in Port-à-Piment participated in a workshop for long-term family planning methods, including the insertion and removal of intrauterine devices and Jadelle Norplant implants. Some facilities coordinated or run by the Catholic Church do not promote modern or long-term methods for family planning, thereby further limiting the access to family planning throughout the region.

PREVALENCE OF HIV/AIDS (MDG 6)

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, WHO 2009). Data on the prevalence of HIV is not available at the level of specific communes or for the ten commune zone, due to the low hospital frequentation rates and the confidential nature of medical histories. However in the South Department positive blood tests for women are relatively elevated at 2.9%, and lower for men at 1.5% (Cayemittes et al 2007). Additionally, age and sexual activity are correlating factors to positive testing (known as seropositivity), as 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. 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, IHE, et al 2006). 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.

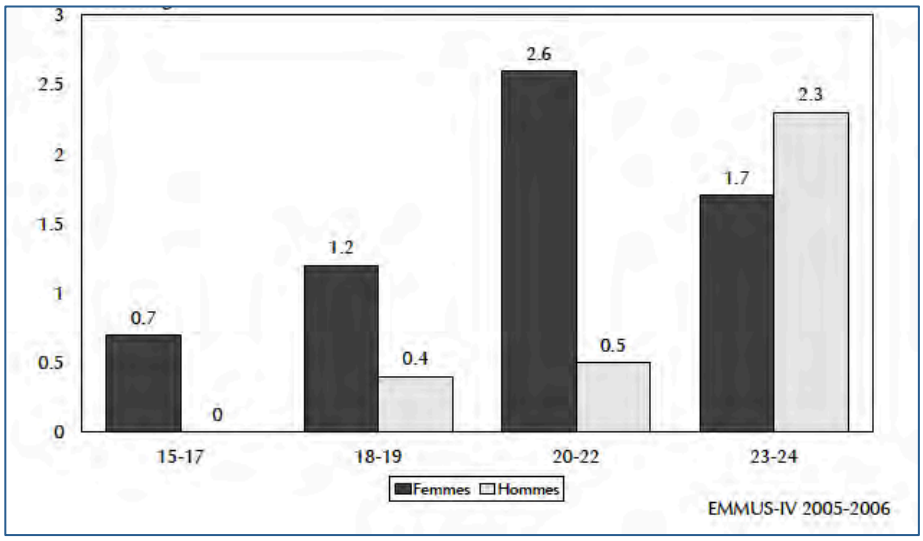


Figure 37: Prevalence of HIV (percentage) by age and gender

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

The proportion of adult women with comprehensive and correct knowledge of HIV/AIDS was measured in the 2011-2012 survey. As HIV/AIDS is preventable with correct knowledge and preventative sexual behavior practice, this knowledge proportion is indicative of the vulnerability of the population due to lack of disease and prevention. The baseline 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 24% 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, has a much higher rate of knowledge than the more vulnerable younger population of 15-24, which has nationally shown a higher rate of contracting the disease.

Community health workers are particularly important where access to contraceptive methods is low as a simple way to educate women on disease prevention and self-care at their houses or at community gathering points.

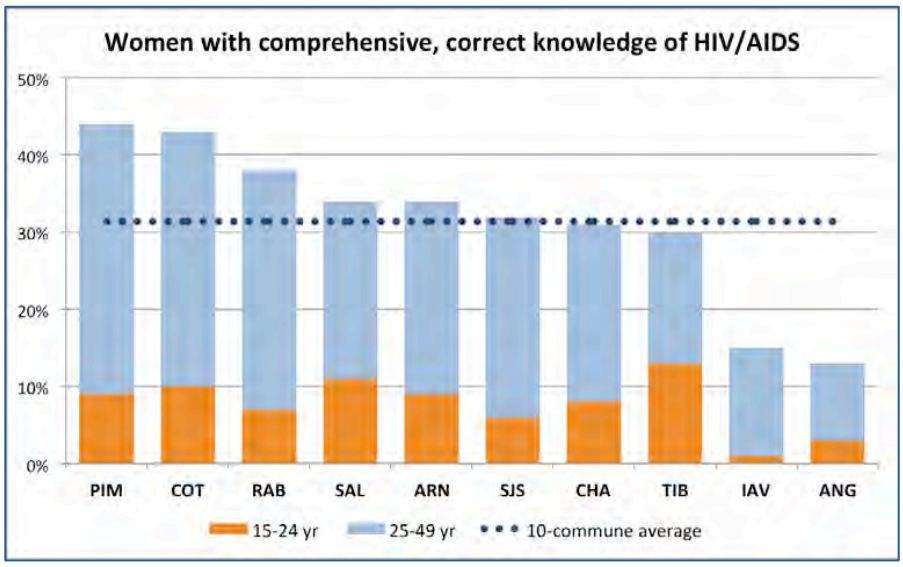


Table 10 MDG 6: Women with comprehensive knowledge of HIV/AIDS

PROPORTION OF WOMEN WHO HAVE BEEN TESTED FOR HIV/AIDS AND RECEIVED TESTS, IN THE PAST TWELVE MONTHS

As determined through the 2012 survey, 54% of female respondents between 15-49 years old have been tested for HIV/AIDS in the ten communes; 47% of female respondents have received the test results, 16% of which were screened in the past twelve months. Only 13% of respondents were tested in the past twelve months and received the results. In the ten communes, 61% of sampled women were tested for HIV during their last pregnancy. The frequency of testing is important, as contraction of the disease can occur with each new exposure to a potentially positive 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. Clinics and even some hospitals, such as that in Port-à-Piment, do not have facilities that diagnose or treat HIV; patients are referred to the hospital in Port Salut.

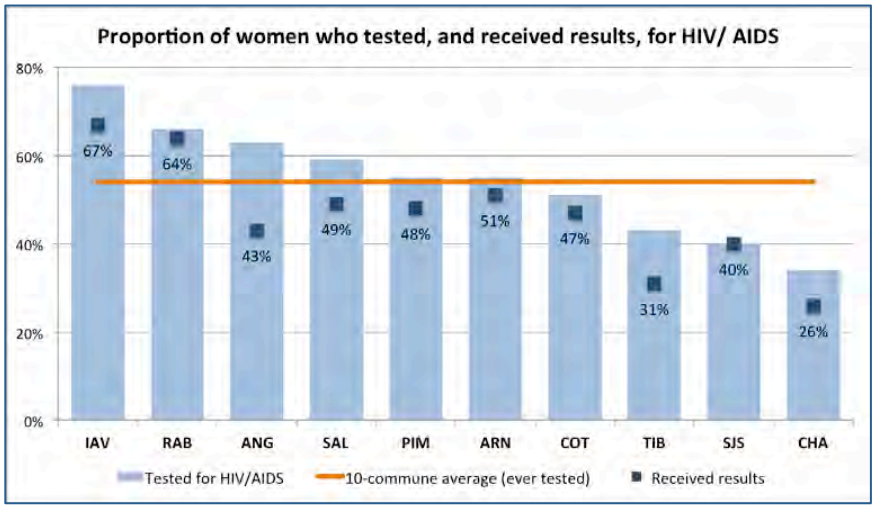


Table 11 MDG 6: Women tested for HIV/Aids, and of those, the women who received results.

MALARIA (MDG 6)

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 and concentrated almost entirely between October and December. *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 (Centers for Disease Control and Prevention 2010). Incidence of malaria was not measured as part of the 2011-2012 household survey, but indicators of preventative measures were determined. The hospital in Port-à-Piment treats malaria and tuberculosis. Diagnosis and treatment happen only at the clinic level, using microscopy and not the cheaper and more accurate rapid diagnostic tests (RDTs); there is therefore no capacity for diagnosis at a more localized level.

PROPORTION OF CHILDREN UNDER FIVE YEARS OF AGE WHO SLEPT UNDER A TREATED BED NET

With respect to MDG target 6.7, only 1% of children under five are sleeping under insecticide-treated bed nets in the ten communes surveyed in 2011-2012. However, approximately 7% of children under five years old slept under any type of bed net 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, the efficacy of bed nets is limited in preventing malaria transmission. Across the ten communes, only 2% of surveyed households possess at least one insecticide-treated net.

PROPER DIAGNOSIS AND TREATMENT OF MALARIA

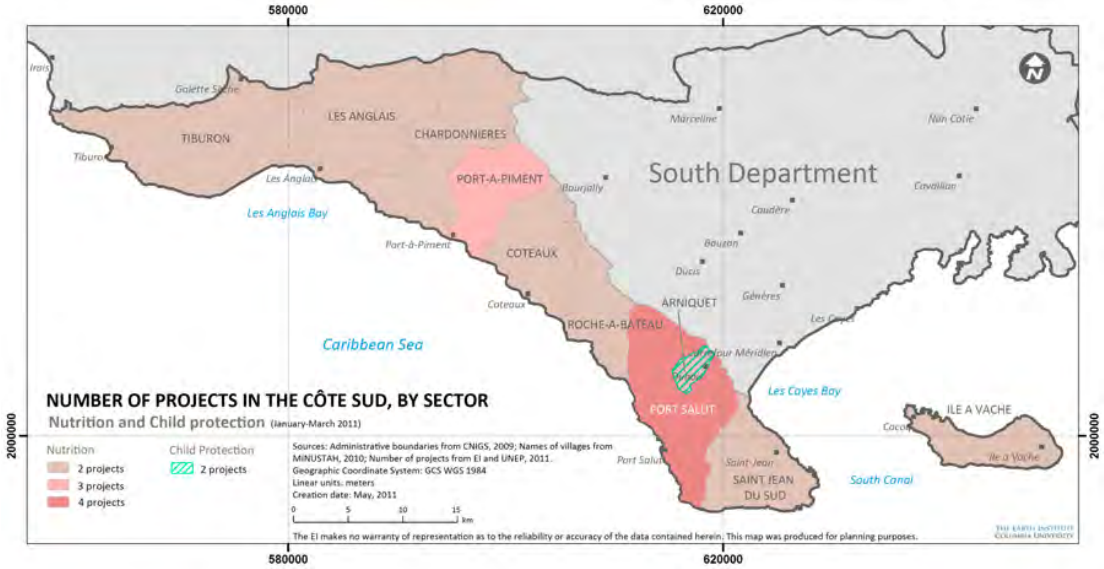
The 2011-2012 household survey measured the proportion of children under five with a fever who were treated with appropriate anti-malarial drugs and those who received treatment within two days. For vulnerable populations like children, this is critical to measure not only as an indicator of healthy practices, but also the effectiveness of reaching vulnerable populations at the symptoms of infectious disease. For children under five that reported symptoms of fever within the ten communes, only 6% were treated with appropriate anti-malarial drugs in 2011-2012. Of those who received treatment, the majority was treated for malaria after reporting fever within two days.

Table 12 MDG 6 Children under five treated with anti-malarial drugs

MDG 6.8 Indicator	Southwest average	TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
Children under five with fever treated appropriate anti-malarial drugs	6%	7%	7%	2%	5%	4%	29%	5%	10%	0%	4%

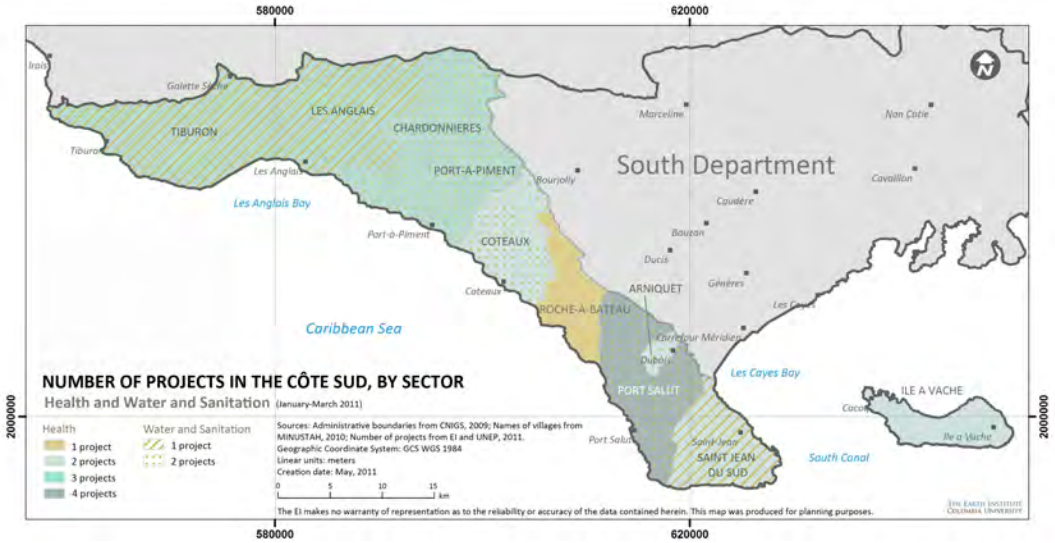
First-line treatment for uncomplicated malaria in Haiti is chloroquine. No evidence exists of clinical failure of chloroquine (CQ) treatment in persons with *P. falciparum* infection acquired in Hispaniola. However, given vector resistance to CQ throughout most of sub-Saharan Africa and East Asia, it 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.

HEALTH INTERVENTIONS IN SOUTHWEST HAITI



Map 13 Nutrition projects in the ten communes, as of 2011.

As of 2011, CRS, UNICEF, World Food Program, Terre des Hommes and other NGOs are active throughout the ten communes with nutrition and child protection projects, both of which can be attributed as aiding efforts to improve childhood nutrition in the southwest.



Map 14 Water, Sanitation and health projects in the ten communes, as of 2011.

In the health and WASH sectors, CRS, Lutheran World Relief, Voice of Haiti, Terre des Hommes and the Haitian Red Cross are currently active. DINEPA plays a strong and active role through OREPA, the regional arm of the National Directorate for Potable Water and Sanitation. In terms of health, basic services are limited and not universally accessible. In addition to the above organizations, MSPP and POZ are also involved in health projects.

8. WATER, SANITATION, AND HYGIENE (MDG 7)

Safe drinking water and improved sanitation facilities are critical social services that link environmental sustainability, health, hygiene and physical infrastructure. MDG 7 sets the target to decrease the proportion of the population without proper access to safe drinking water by half by 2015. In Haiti, this target should be more ambitious due to the low coverage rates, especially for improved sanitation. With only 45% of households using improved water sources and only 22% of the population using improved sanitation facilities, the ten communes are far from achieving MDG 7.

This remains a nationwide challenge to provide improved water and sanitation due to inadequate rural water systems and unprotected water sources. There are insufficient funds for investment in urban water delivery systems. Households lack access to improved sanitation facilities, with inconsistent knowledge and behavioral practice at the household level for clean water practices, sanitation, and proper hygiene.

The 2010 outbreak of cholera in the country highlighted the overall inadequacy of improved water sources and treatment technologies, sanitation, and hygiene across Haiti. The lack of safe water and improved sanitation systems impacts the health conditions and nutrition rates, and rates of diarrheal diseases. Water tests in 2011 in Port-à-Piment and Port Salut found high levels of fecal contamination in river water and some piped municipal water delivery systems, which indicates that water sources normally categorized as 'improved,' or less susceptible to contamination, may also be contaminated in the region.

The key indicators used to measure progress toward MDG 7 are access to improved water sources, sources of water currently being used, and the frequency of water treatment. Household-level data on the prevalence of sanitation and handwashing practices, and the incidence of diarrhea in children under five demonstrate that beyond the access and quality of the water itself, there are behavioral challenges that are influenced by many compounding factors. The data discussed below demonstrates this, with additional support from qualitative interviews with local stakeholders conducted in 2012.

CHALLENGES IN THE WATER, SANITATION, AND HYGIENE SECTOR

Surface water systems

The surface water hydrological system carries both sediment and runoff from the upper elevations. The lack of improved sanitation systems and presence of pit-latrines within flood zones, as well as a high prevalence of open defecation upstream help describe the high level of recorded contaminants of surface water in situ and downstream.

Lack of improved piped water infrastructure

When treated and maintained, piped water access points, either to households or to hand-pumped water points, are often of better quality compared to surface water. Surface water is frequently used as an alternative when piped water is not available. Across all elevations and in both rural and urban areas, households have a higher use of surface water than improved sources. This means that a majority of the population is using unprotected water sources. Water investments, including piped water infrastructure, can be improved at the municipal and at the site-specific level.[31] As of June 2010, Haiti remains one of four Latin American countries not to have achieved MDG 7 or made any progress (IDB 2010).

Access to improved sanitation infrastructure

As with the presence of piped water within the home, access to improved sanitation infrastructure is correlated with the comparative wealth of households in the region. Sanitation infrastructure is an investment that can be made at multiple levels, including municipalities and the household level, where low-cost latrines can be constructed. However, household or community level capital for investing in sanitation facilities is often an insurmountable cost barrier, as is subsequently maintaining them once built. Solid waste treatment is nonexistent throughout the region, and issues of solid waste clogging waterways and town streets during rains are widely acknowledged.

Access to hygiene products, including soap and water treatments

Cost and consistent access limit the use of products critical for hygiene such as soap for hand washing and Aquatabs (a commercially available tablet containing a chlorine derivative) or bleach. This limitation is based on either elevated initial cost for purchase, prohibitively high ongoing costs, or lack of availability in local markets. Though distribution campaigns of Aquatabs in high seasons for diarrheal disease are critical, it does mean that each person has access to the tablets, and most importantly do not imply continual use.

Perception of water quality

There is a disparity between the household perception of water quality and the actual level of contamination in the area among water sources, both improved and not improved. Very few people (only 3%) in the ten communes ranked water as among their highest environmental concerns. This is important in designing WASH and awareness campaigns, as there is a gap in understanding of the high level of contamination in the region and the risks that contaminated water pose to health, including sickness in children. Further qualitative interviews are needed to identify perceptions and causal links between water quality, health, and behavior.

[31] Several reports detail the national scale problem of water infrastructure including "The Denial of the Right to Water in Haiti" published by the New York University's Center for Human Rights and Global Justice and reports on drinking water, sanitation and the MDGs.

WATER QUALITY

In 2012, a qualitative study of community water sources and perception of water quality testing was conducted in the Port-à-Piment watershed and adjacent areas by EI and CRS. According to findings, the most common water sources used by households include rivers, which are locally known to be contaminated; wells, some of which are salinized; and natural springs, which are generally thought to be clean and are the reported primary collection points for water systems. While DINEPA was involved in the construction of piped potable water systems across the region, in Port-à-Piment and other communities in the zone the original system has sustained severe damages by past flooding and has fallen into disrepair. Except for the town of Les Anglais, where community members contribute funds to maintain a piped treated water system,[32] there is not currently a system in the vicinity with effective water treatment mechanisms to deliver safe water (Mielke 2012).

When the main water source is not treated, households often use Aquatabs to treat water in the home. The qualitative study indicates that residents tend to only treat their water with Aquatabs if it is perceived as contaminated. However, this is not a uniform solution to water quality management, as both the provision and quantity of Aquatabs used in the area is inadequate for needs. For instance, in the community of Les Anglais, treatment of already chlorinated water with Aquatabs has resulted in sickness in some households and a suspicion of additional at-home treatments (Mielke 2012). Additionally, stakeholder interviews indicate that members of the community believe that Aquatabs contribute to cancer or reduce an individual's ability to fight disease. Accordingly, community education campaigns are needed to ensure proper use and understanding about household-level treatments (Mielke, 2012).

While there are no global agreements on water quality standards, the United States Environmental Protection Agency defines safe levels of Enterococcus concentration, a common bacterium, in Most Probable Number (MPN) of bacteria colonies in a 100-milliliter sample. The US standard for acceptable levels is 104 MPN for saltwater and 61 MPN for freshwater[33]. The WHO sets indicators and water quality targets for chemical and biological water contaminants; according to these international targets, total coliform bacteria (which measures overall presence of coliform as some naturally occurs while other is fecal from human and animal sources) should not be detectible at any level in water leaving treated works.

Water quality tests measure the concentration of Enterococcus, commonly used as an indicator of fecal contamination in water for public health risk assessments. Such tests were conducted in 2011 with water samples collected from several sites in southwest Haiti, including rivers, piped

[32] The piped water system is fully operable in Les Anglais, maintained and treated by chlorine tablets by the town's Committee for Water Supply and Sanitation (CAEPA).

[33] http://water.epa.gov/type/rsl/monitoring/vms511.cfm

water systems, and coastal areas near the towns of Port-à-Piment, Randel, and Port Salut. All samples tested showed positive results for Enterococcus contamination, and indicate higher contamination in the lower portions of the watersheds with decreasing levels further upstream. The table below shows sites and results of the tests.

Table 13: Enterococcus values (MPN/100cc) from various sites across southwest Haiti.

Sample Date	Site	MPN (per 100ml)
10/25/11	Port Salut Bridge	>2419.6
10/25/11	Port-à-Piment Bridge	>2419.6
10/27/11	Port-à-Piment west tributary – Upstream	391
10/27/11	Port-à-Piment west tributary – Water Jug	1768
10/27/11	Port-à-Piment west tributary – Separate Spring	627
10/27/11	Port-à-Piment Town	8664
10/31/11	Port-à-Piment west tributary — Stage Site 1	278
10/31/11	Port-à-Piment west tributary — Stage Site 2	233
11/01/11	Port-à-Piment east tributary — Stage Site	<100

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 and providing an ongoing monitoring system. Qualitative interviews in 2012 with stakeholders in Port-à-Piment indicate that there is a perceived need for water quality testing among community leaders and health care providers, as there is awareness of a problem in relation to water quality that is currently not paired to action in the community (Mielke, 2012). Community education and sensitization through existing social networks will then be needed to convey this information to the local population in a useful way.

PROPORTION OF HOUSEHOLDS USING IMPROVED WATER SOURCES

An improved drinking water source is defined as a water source protected from external contamination, particularly fecal contamination. This includes household connections, public standpipes, boreholes, protected dug wells, protected springs, or rainwater collection. Unprotected sources include unprotected dug wells, springs, tanker-truck, and surface water. Many unprotected sources are about storage and transport of water more than actual source of water as a number of contaminants can be introduced during the transportation process. The table below presents the results of the 2011-2012 household survey. It shows that an average of 45% of the population in the study region use an improved water source, slightly below the national rural average of 50%. Only 29% of respondents in Tiburon report use of improved water sources, the lowest of the ten communes. This is followed by 33% of respondents in Roche a Bateau. In St. Jean du Sud, 64% of the respondents report using improved water sources, the highest percentage within the ten communes. Les Anglais, where the local CAEPA treats the functional piped water system in the town, has a much higher percentage than the national average, at 63%.

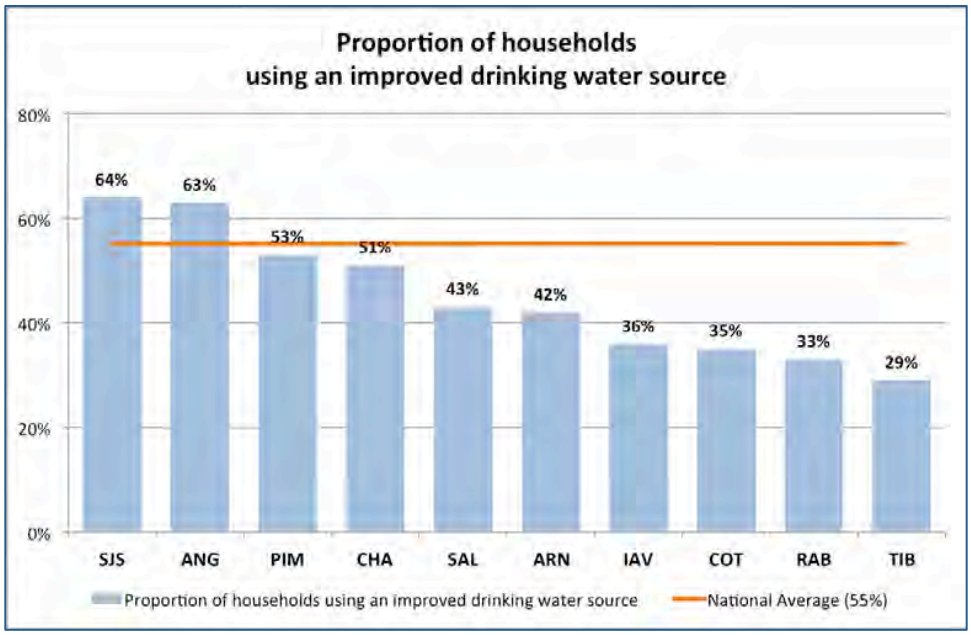


Table 14 MDG 7: Proportion of population using an improved water source

Use of an improved water source is an important step towards reducing diarrheal disease, along with hygiene and improved sanitation. The 2006 DHS survey noted that there was no significant difference between rates of diarrhea in children under five, whether or not they had access to improved water supplies, suggesting that there are a large number of causal pathways for contamination.

Safe water treatment using Aquatabs or other methods should be encouraged through community-based campaigns, even in areas where the water source is improved. Distribution and education on Aquatab use should come through community agents such as the CAEPAs or Community Health Workers who know the water system in their area and can both widely distribute Aquatabs as well as advise when and how households should use them. Locally preferred disinfection methods, including those not recorded in the 2011-2012 survey, should be examined for efficacy. Local knowledge-based methods for decontamination, which appears to reduce turbidity, may not however decrease the amount of disease-causing bacteria in the water. Any behavior change efforts must be sensitive to local beliefs and current practices.

PROPORTION OF HOUSEHOLDS THAT TREAT THEIR WATER

Results from the 2011-2012 survey show that the proportion of households who report treating their water is high at 93%. The overwhelming majority (95%) of reported treatment was with Aquatabs, likely as a result of distribution campaigns during the cholera outbreak that made Aquatabs available in small quantities. The next most common means of filtration is adding bleach or chlorine to the water, at 30%. Very few households used boiling (3%) 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 the reported method of treatment, as without regular use of disinfectant the water consumed may still have been of poor quality the majority of time. However, very few people in the ten communes ranked the lack of clean water as among their highest environmental risks, at only 3%. This is surprising due to the prevalence of cholera and other waterborne diseases but reflects community perceptions on their priority concerns.

Water quality testing results from local sources could serve as a basis to continue building greater community awareness in regions without adequate treatment mechanisms. 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.[34]

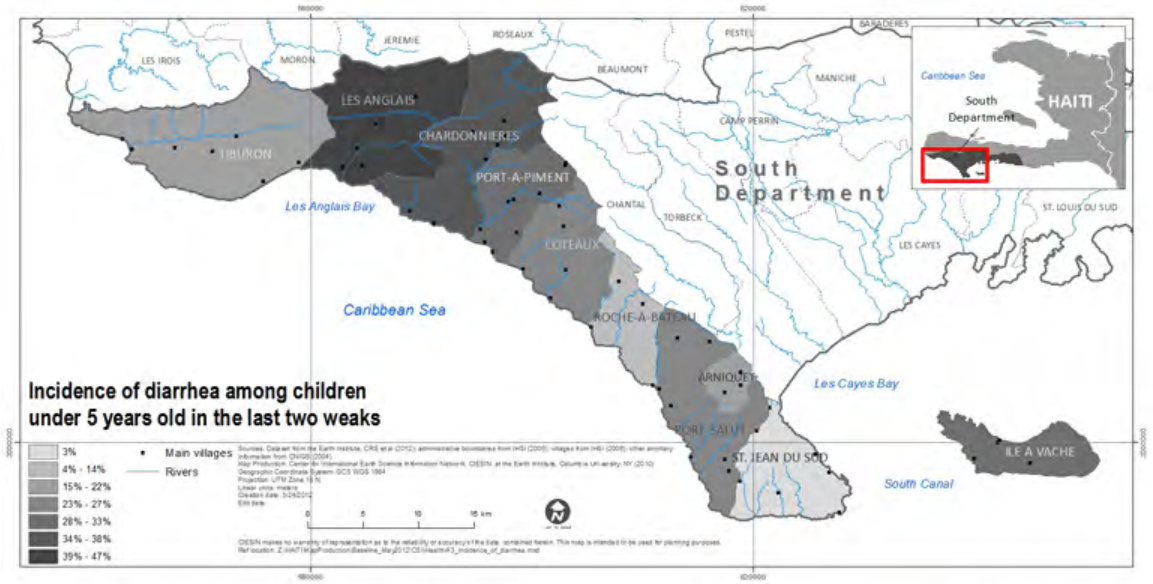
Gathering qualitative information on knowledge, attitudes and practices would help inform community sensitizations and local WASH committee activities to boost household water treatment. Countering local beliefs and misconceptions about what constitutes a safe source and adequate treatment could be critical to more consistent usage. The information collection should be linked with communication pathways and social networks, such as the example set by

[34] Examples include the Rapid Assessment of Drinking-Water Quality (RADWQ) conducted in various countries by the Joint Monitoring Programme for Water Supply and Sanitation (JMP). The RADWQ was piloted between 2002 and 2008 in Ethiopia, Jordan, Nicaragua, Nigeria and Tajikistan.

the CAEPA in Les Anglais that reports using a megaphone and motorcycle to transmit important water quality information when chlorination rates in their system are low and other action is necessary (Mielke, 2012). Additional possibilities include mobile text messaging with alerts of contamination, radio alerts, or the word of mouth such as churches or community leaders networks as a mechanism for information distribution.

INCIDENCE OF DIARRHEA

Diarrhea is one of the five most common causes of child mortality globally and an indicator of the lack of sanitation and clean water facilities. Caused by ingesting contaminated water or food products, diarrhea is preventable and treatable. In the ten communes surveyed, on average, 27% of children under five years experienced diarrhea in the two weeks prior to the household survey.



Map 15 Incidence of diarrhea among children under five years (two weeks prior to the 2011-2012 household survey).

Rural regions in the far mountainous communes, such as Les Anglais and Chardonnières showed higher incidences, at 47% and 38% of children. Other communes, such as Roche-à-Bateau and Saint Jean du Sud, had much lower rates, at 14% and 3% respectively. Across the region, only 73% of sick children under five with diarrhea received oral hydration salts or other homemade treatment. [The two communes with the highest rate of sickness, Les Anglais and Chardonnières, also had the highest rates of treatment, with 87% and 88% of children receiving a treatment. A comparatively low 39% of children in Ile à Vache received treatment of oral rehydration salts, though Ile à Vache generally has above-average rates of other health indicators such as vitamin A supplementation and treatment rates for an average number of children who fall sick. Notably 67% percent of the 44% of children who had fallen sick receive

treatment in Ile à Vache, of which 78% were in a health facility, as opposed to 38% of the 42% of children sick across southwest Haiti of which only 27% were in a health facility.

Children living in urban communal sections, generally those on the coast itself, downriver and with a higher population density, had a 30.3% reporting rate of diarrhea within the past two weeks, as opposed to 26.6% in communal sections classified as rural.

Diarrheal disease is caused by multiple pathways, as seen in the 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 hand washing with soap and proper food hygiene practices.

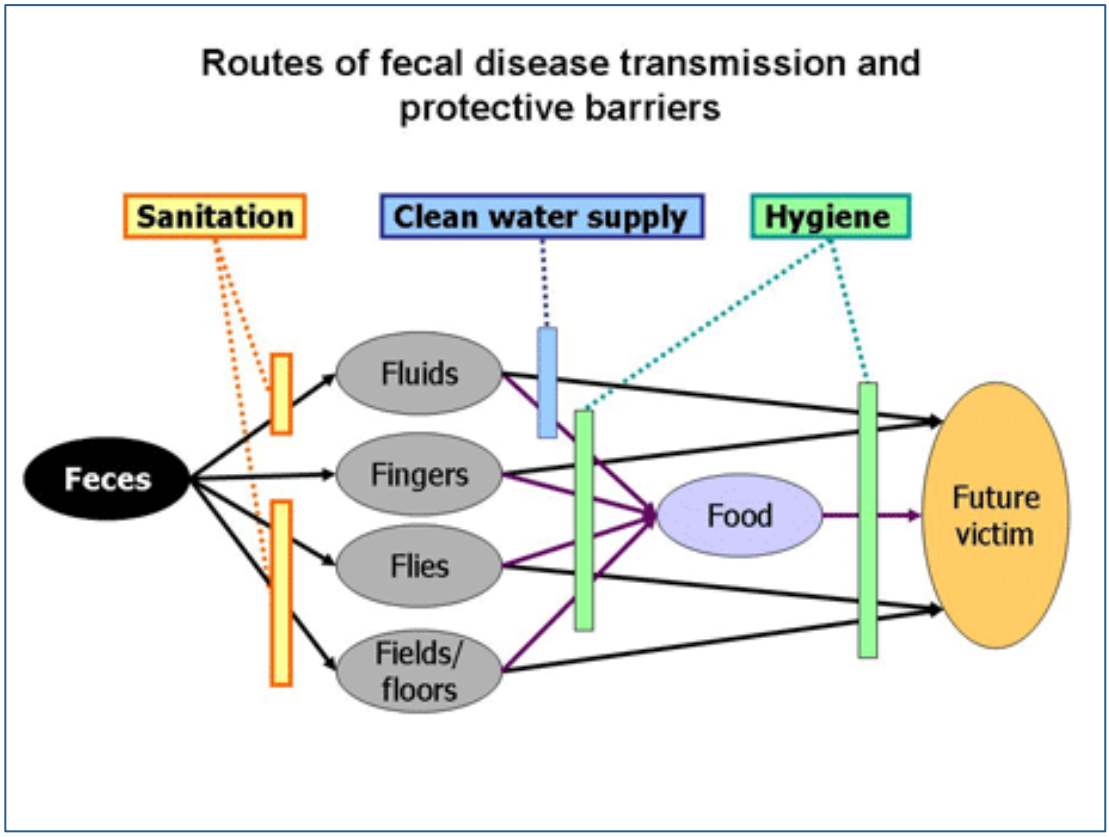


Figure 38 WASH Routes of fecal disease transmission. (World Bank)

As 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 ten communes, 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. For example, Chardonnières and Les Anglais, two communes with the highest rates of childhood diarrhea, have a below average proportion of the population using an improved sanitation facility, and an above average proportion of the population that does not use any sanitation facility. In these communities, there should be special emphasis on knowledge of and rapid treatment of children under five years of age with ORS and zinc. This can be reinforced by education campaigns in schools and with local CAEPAS or 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. Most importantly, the construction of improved sanitation facilities is key.

HOUSEHOLDS 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 likelihood to contaminate both the water supply and come into contact with food or people in a way that poses a risk to their health. Across the ten communes, the proportion of the population that uses improved sanitation is low at 22%. Many communes such as Tiburon, Ile à Vache and Chardonnières fall well below the rural average of 17%, according 2006 WHO numbers. Ile a Vache has the lowest proportion of the population using an improved sanitation facility at 9% and Tiburon at 10%.

Of the 22% on average among the communes who do use improved facilities, the most common forms of improved facilities are ventilated improved pit latrines (11%), pit latrines with slabs (17%) and pit latrines without a slab, or open pit latrines (13%). In the communes of Port-à-Piment, Saint Jean du Sud, and Ile à Vache, 1% of respondents used a composting toilet.

Most households in the ten-commune area (56%) do not use any facilities at all. Appropriate infrastructure at the household level is integral to ensuring a safe water supply, and ultimately in reducing diarrheal disease. The high contraction of diarrhea in children across the ten communes is in part a function of a lack of access to proper materials to build pit latrines and other low-technology solutions. The low rate of use is indicative of a high rate of open defecation, a harmful practice that requires serious interventions in community education alongside any improved infrastructure campaigns. Without safe sanitation facilities that can survive the regular rains and flooding, local water sources will continue to be contaminated with human fecal matter.

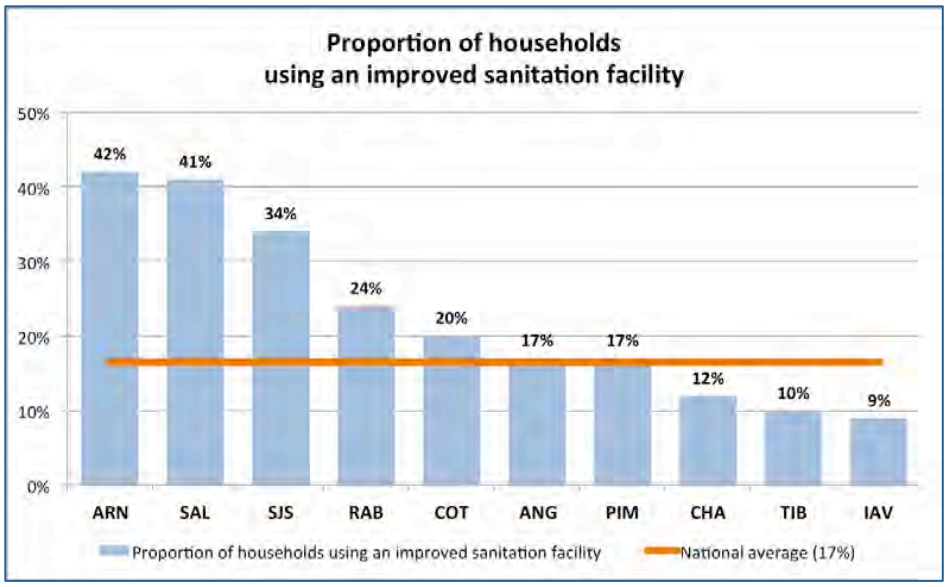


Table 15 MDG 7 Proportion of population using improved sanitation facility

When cholera is present in the region during a time of heavy rains and flooding, the disease travels all the more rapidly without use of improved sanitation facilities. Community sensitizations, building of deep latrines and improved school sanitation, are all ways to increase demand by starting with younger members of the family whose habits are not already ingrained by practice. There are a variety of new hygienic lavatory technologies that are being developed and used across Haiti and globally, including dry pit latrines, ventilated improved pit (VIP) latrines, pour flush latrines, composting latrines for rural areas or piped municipal sewage systems for areas with higher population densities. (WaterAid, 2010) Anecdotal evidence shows a predominantly dry pit and VIP latrines usage throughout the rural areas. Sensitization efforts and system maintenance is required along with the infrastructure. In the 10 communes, one technique to address this is the creation and strengthening of local CAEPAs or WASH committees from within the community to act as a continual leader, management entity and point of communication around education principles regarding positive behaviors. NGOs and the government should reinforce the capacity of these committees with knowledge, educational tools, supplies, and techniques on building appropriate sanitation infrastructure.

PROPORTION OF HOUSEHOLDS WITH SOAP OR WATER AVAILABLE AT HANDWASHING STATIONS

While not included in MDGs, hand washing is an important behavior contributing to reducing diarrheal disease, as it interrupts fecal-oral transmission of pathogens. Without regular handwashing 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. Across the ten communes surveyed, approximately 24% of households had water at the washing 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. 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 surprising 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 at the time of the household survey, the data suggests the need for more education around handwashing behavior and the need for both soap and water in proper hygiene.

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 hand washing can also promote improved practices at the household level.

Time spent gathering water and returning to households

On average across the ten communes, the time spent to go and collect water and return is at an average of 22 minutes, and within a range from 15 to 37 minutes. Compared to the time spent on other necessary daily activities, such as collecting fuel wood (43 minutes) and arriving at parcels for agricultural work (58 minutes), the access to water in the region is less of a distance. Though this measurement is indicative of access to water and the burden of water collection on households, it does not reveal the quality of the water that is collected. Much of the watershed is crossed by small streams and rivers and is 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 time traveling to collect water from improved or safe sources.

This suggests that 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.

Management of water and sanitation in Southwest Haiti

The Government of Haiti and UNICEF launched SIS-KLOR, a collaborative crowdsourcing initiative to test water quality in November 2010 (OCHA Haiti, 2011); it is currently being piloted in all but two departments in Haiti (Claude, 2012). Currently, DINEPA runs the system and uses technicians to test water daily for chlorine levels and send results to an online database, SIS-

KLOR. The project only measures chlorine levels, although DINEPA does E. coli testing using laboratory services in major cities. Presently, there is no lab for testing bacterial contamination levels in the Sud department. As of August 2012, the DINEPA office in Les Cayes is seeking funding to implement SISKLOR and construct a lab in Les Cayes (Claude, 2012).

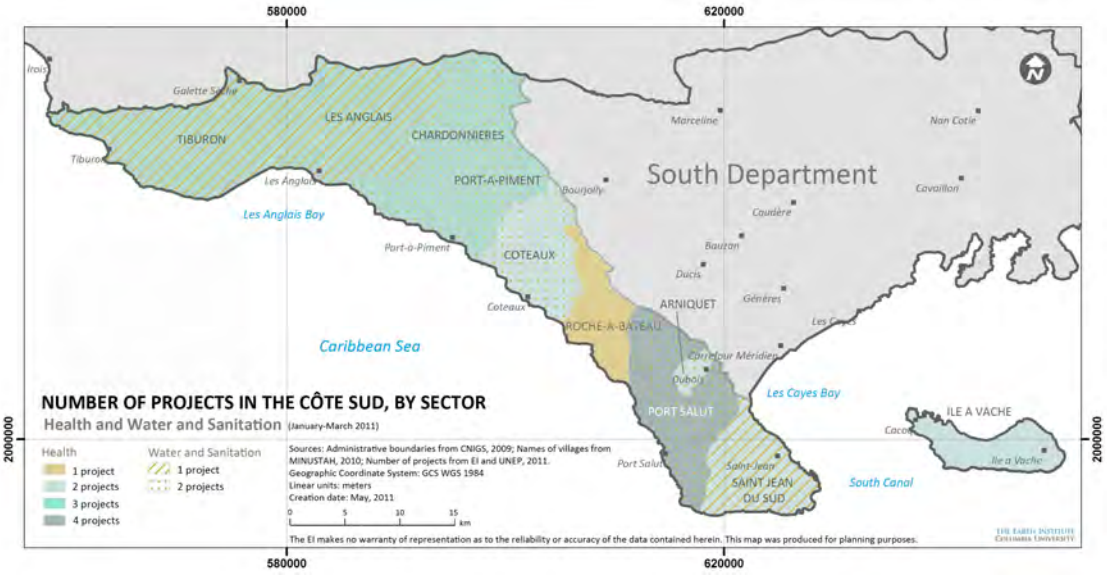
There are many actors working in water and sanitation in the southwest of Haiti. The government actors DINEPA, OREPA and CAEPA are the organizations that serve as the institutional basis for future water system development and management. They are currently working to further restructure water system construction, management and delivery in rural Haiti. DINEPA is involved in the construction of new systems and their eventual chlorination, which has been a priority since the onset of cholera. They manage tools such as SIS KLOR and work to improve the capacity of regional OREPA offices and CAEPAs.

Figure 39: WASH actors in the South Department, including local actors in the Port-à-Piment watershed. Source: Mielke, 2012.

DINEPA is very active in the region, specifically through its regional office, OREPA-Sud. There are a variety of local organizations that work directly with the regional office of OREPA. In the ten commune region, the several regional actors working in WASH as of 2011 including CRS, Lutheran World Relief, Voice of Haiti, Terre Des Hommes, and the Red Cross.

CRS has since increased WASH projects across the ten communes as well. Most of the current interventions are associated with infrastructure changes, though some interventions specifically incorporate capacity building, community awareness, and committee trainings. Collaboration

through the Government's regional WASH coordinating committee (table sectoriel) has been beneficial, as for example with efforts from CRS to work with OREPA in 2012 to address a cholera outbreak in several communes of the ten commune area. 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.



Map 16 WASH projects in the ten communes, as of 2011.

Numbers for the cases of cholera have been underreported since the departure of the British Red Cross and the closure of multiple Cholera Treatment Centers in late 2011. Prior to that, indicators held that cholera cases were decreasing and public awareness was increasing. However, isolated outbreaks do occur, both in conjunction with rainfall events and flooding that exacerbate the spread of contaminated water, as seen in October 2011, and as recently as the Cavalier/Port-à-Piment area in May 2012.

CAEPAS are present across the ten commune region, though they differ in the degrees to which they are engaged in their communities' water quality situations. Where present, they are a likely collaborator for community-level engagement. Likewise WASH committees, such as those in Port-à-Piment, consist of community members who have participated in trainings on public health and WASH basics, are a valuable population-driven tool for sensitization and community-level change. These community-based actors can serve to test water quality, either for effective chlorination in treated systems such as that in Les Anglais and those planned by DINEPA across the South, or in testing Enterococcus levels in untreated water sources in the interim.

9. AGRICULTURE (MDGS 1 AND 7)

This section provides measurements of agricultural productivity, agriculture related activities at the household level and overviews of environmental conditions. Ensuring environmental sustainability, the aim of MDG 7, is of crucial importance in the ten communes and across the country, where the high levels of environmental degradation exacerbate the drivers of poverty. Sustainability of the agricultural system is paramount, as it ensures overall environmental security and contributes to the economic viability, overall public health and food security of the population in the region.

MDG 1 also sets the target to reduce levels of extreme poverty and hunger by one half by 2015. With low yield rates and high household rates of agricultural occupations, the agriculture sector is linked directly with the success of reducing hunger and malnutrition in the region.

The most widely reported occupation among surveyed adults between 15 and 64 years is agriculture, including farming, livestock rearing, animal husbandry and fishing. In total, 34% of respondents name dry agriculture or fishing as their primary occupation; among this cohort, men constitute the majority (73%), while only 27% of women list dry agriculture or fishing as their primary occupation.

There is significant evidence that demonstrates the importance of agriculture in contributing, both directly and indirectly, towards achieving the MDGs. With 34% of the working-age population of the ten communes reporting agriculture as a primary occupation, and with high levels of food insecurity undermining health and nutrition within the region, there is a great need to increase the productivity of agriculture in the region. The continued low yield rates of subsistence crops, which are the most widely cultivated in the region, imply that any positive increase in yields will have a large impact on household food supply and economic assets.

MAIN CHALLENGES FOR THE AGRICULTURE SECTOR

Smallholder plots and insecure land tenure and access

Haiti's land tenure system is based largely on a system of informal markets and inheritance, whereby plots are subdivided equally among each successive generation. This has led to a patchwork system of small plots, which present a challenge to achieve geographically significant area for watershed management and land use planning.

The 2011-2012 survey indicates that 98% of respondents have access to land in general, an average of 1.3 hectares, or Ha, however only 85% of them used it for agricultural purposes in the past twelve months. As shown in the figure above, the largest landholdings are in Chardonnières and Tiburon, with 1.7 Ha and 1.5 Ha respectively, whereas the smallest ones are located in the smallest, most densely populated commune, Arniquet, with an average of 0.9 Ha per household.

Households reported using an average of one hectare of land for agricultural purposes, ranging from less than 0.003 Ha up to 6.25 Ha. The largest and smallest average landholdings for agricultural purposes were again located in Chardonnières (1.27 Ha) Arniquet (0.67 Ha). Interesting to note is that households in Port-à-Piment (0.92 Ha), Saint Jean du Sud (0.77 Ha), Port Salut (0.76 Ha) and Arniquet (0.67 Ha) consistently reported average land sizes of less than 1 Ha.

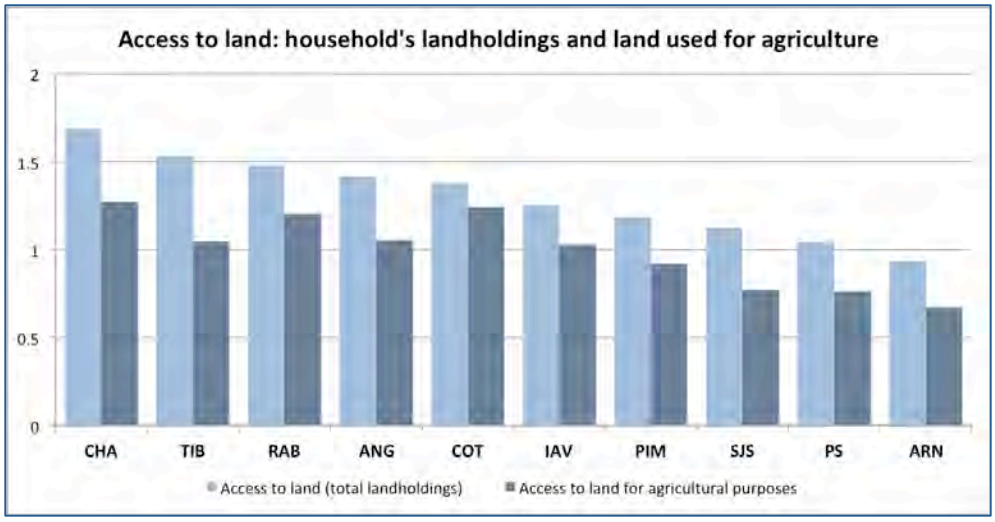


Figure 40 Access to land, average landholdings for households and land used for agriculture in the past twelve months.

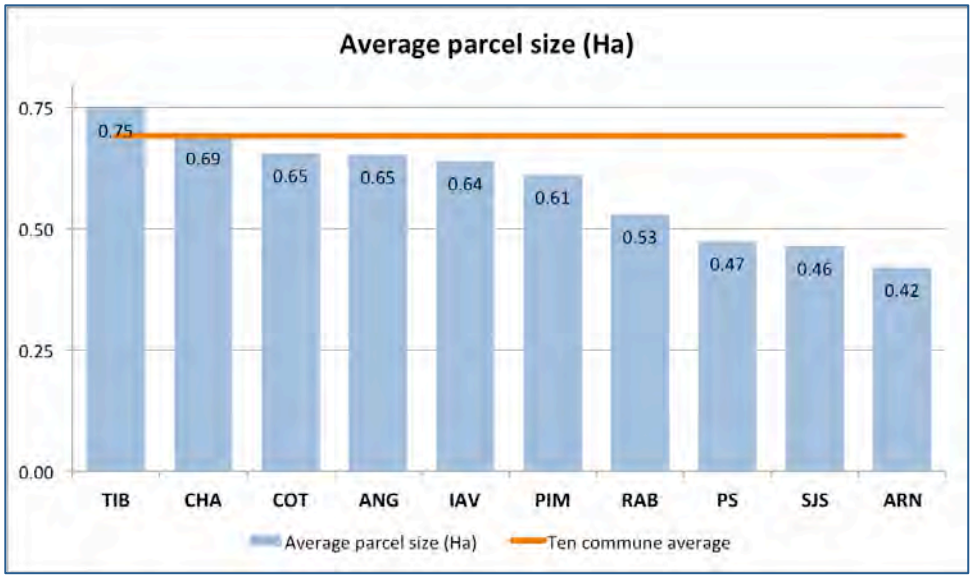


Figure 41 Average parcel size (ha) used for agricultural purposes in the past twelve months, as reported by households.

The total area of land is comprised of an average of 1.77 parcels per household. Across the ten communes, the self-reported size per parcel was 0.7 Ha, on average. Household agricultural plots are often far from households themselves, on average 58 minutes walk by foot.

The multiple, small sized parcels, often far from the households, contribute to a landscape of fragmented parcels that is challenging for larger-scale watershed planning. The lack of land management practices and the over-exploitation of small parcels, often located on hillsides, contributes to both low yield rates and susceptibility to erosion.

Low yield rates

Most crop production does not utilize modern methods in Haiti to include the utilization of fertilizers or improved seeds—inputs that elsewhere around the world are associated with increased food production and reduction in food insecurity for the rural poor. According to the 2011-2012 household survey, almost all surveyed households (99%) reported having used local seeds during the last planting season (from November 2010 to October 2011). Only 1% reported having used improved seeds during the same period. The use of either organic or chemical fertilizers is negligible in the area.

Higher yield potentials for crops have been demonstrated in the southwest region with improved agricultural practices, however non-irrigated hillside agriculture, lack of land use management, and lack of access to fertilizer and improved seeds have kept yields lower than is possible to achieve at the scale of small-holder farms in the region. Access to improved inputs such as fertilizers and improved seeds is limited by local availability, by the initial investment cost it poses for farmers, and also by a lack of knowledge of available techniques and their potential benefits for yields and household income through increased production.

Unreliable markets

Unreliable markets, from the local to the regional, national and international levels, have created an unequal demand for products. Production is also unreliable, as crops are highly susceptible to environmental elements such as heavy precipitation and drought. Similar environmental challenges exist for those reliant on fishing for household income. There is little capacity for processing and preservation of sensitive products, including some crops and fish species that require special care in order to be viable beyond local markets. Infrastructure is inadequate between rural regions in the further communes of the southwest peninsula. Likewise, coastal towns to settlements in the steep mountains are isolated by lack of roads. Smallholder farmers are reliant on intermediaries to move products beyond local markets, where their neighbors may have similar economic household constraints that limit their purchasing power, to regional or national markets. Reliance on intermediaries lowers the amount that farmers, fishers and cooperatives receive for their products.

No access to credit

Most farmers do not have any access to credit or savings facilities, including traditional banks or grain storage facilities. As a result, assets are incredibly liquid and savings for larger investments, including infrastructure to reduce household vulnerability are limited. This study found 36% of households used some form of formal or informal to credit as supplemental income in the past twelve months. From those, only 4.5% used that credit to buy seeds or fertilizers, or to invest in agricultural equipment (motorized and non-motorized); a few others invested in livestock.

As part of the post-earthquake recovery plan in 2010, MARNDR stated “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 situation and the constraints that need to be overcome to first of all increase agricultural production. In this report, the baseline information on household agricultural production practices in the ten communes is presented as a foundation for planning an agricultural green revolution in the region.

AGRO-ECOLOGICAL ZONES

USAID has identified three main agro-ecological zones in the southwest study area: 1) humid mountain agricultural zone, 2) agro-pastoral zone, and 3) dry-agriculture and fishing zone (FEWS NET, USAID et al 2005). The agro-ecological zones summarize both the type of livelihood that prevails within that region and the biophysical parameters of the corresponding area. Within the ten-commune region 59% of the area is catalogued as dry-agriculture and fishing, 28% as humid-mountain and only 13% and agro-pastoral.

According to the 2011 LULC study, most of the land catalogued as dry-agriculture and fishing is used for agro-forestry (43%) followed by pastureland (21%) and cropland (15%). The biophysical and socioeconomic conditions of this zone are such that forests are under continued pressure from the population, due to the potential income associated with charcoal production, and therefore less likely to succeed (only 3%[35] this agro-ecological classification). Low-elevation areas, where the vast majority of the population within the ten-commune region lives, are also classified as dry-agriculture and fishing. However, within the ten communes it is possible to find areas with enough humidity and elevation to plant high value crops such as cocoa and coffee, and forested areas with relative high coverage. Within the humid mountain area, agroforestry and forests are the two predominant uses at 40% and 30%, respectively. Cropland (at 5% coverage) is among the lowest uses in this agro-ecological zone.

Dry and semi-humid areas, such as agro-pastoral zones, allow livestock raising and planting of staple crops (beans, maize) as well as fruit trees. Based on the 2011 LULC, almost half of the land within this agro-ecological classification is used for agro-forestry, 17% for pasture and only 11% is used as cropland.

[35] The 3% includes land cover classified as forests and open woodland, as well as woodlots.

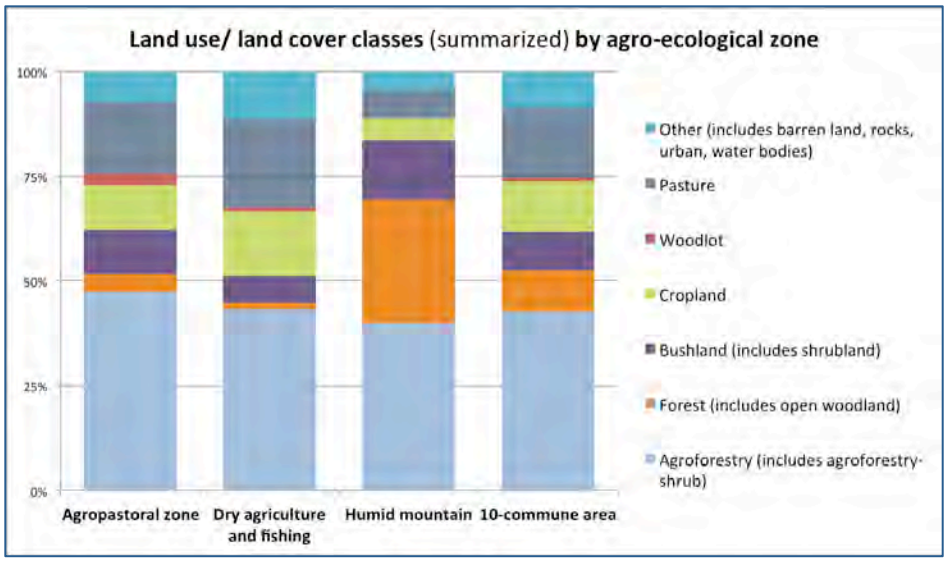
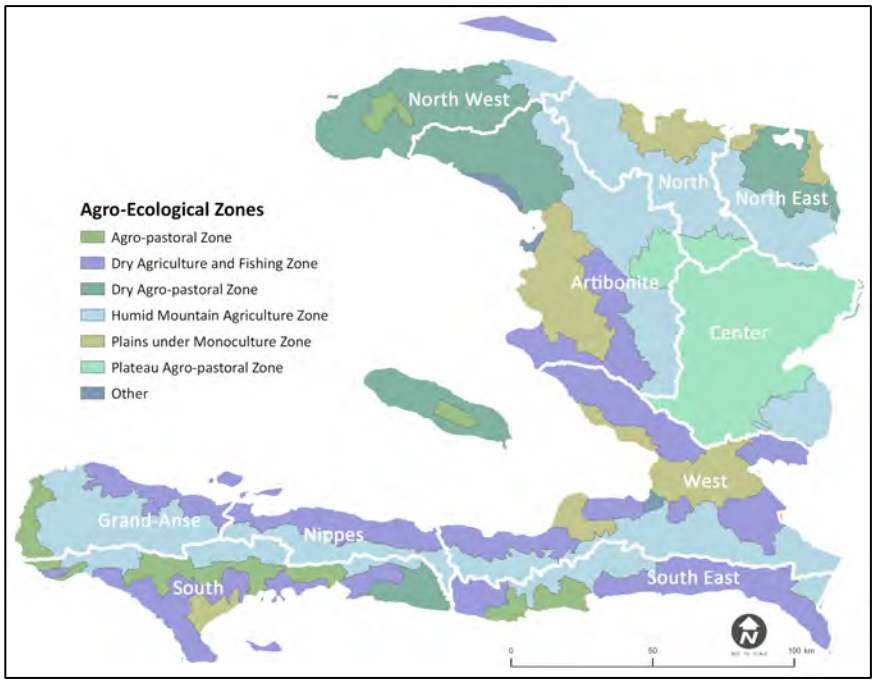


Figure 42 Land use and land cover summarized by agro-ecological zone.



Map 17 Agro-ecological zones. Source USAID, 2008

Although the majority of agricultural production is undertaken by small landholders in largely coastal areas of the ten communes, larger agricultural production does occur, especially in the Les Cayes plain and increasingly in the flood plains of Les Anglais in the South Department. These larger plain areas, with less steep slopes and greater soil fertility, are more conducive to larger scale, predominantly monoculture crop production.

Major food crops (average 2000-2007)	Tonnes produced per year	Total area under cultivation (ha)	Average yield (Tonnes/ha)
Maize	202,175	268,125	0.83
Sugar cane	909,763	119,750	52.37
Cassava	364,968	75,740	4.86
Yams	205,838	58,450	6.05
Rice, paddy	112,313	54,025	2.33
Beans, dry	39,694	52,413	0.72
Bananas	300,688	45,813	7.30
Cow peas, dry	31,875	45,625	0.77
Plantains	276,000	43,563	7.19
Mangoes, guavas	260,000	33,438	8.42
Groundnuts	22,700	25,375	0.92
Sorghum	96,700	22,256	0.87
Sweet potatoes	188,000	17,050	3.33
Pigeon peas	2,594	6,475	0.44

Figure 43 Agricultural production per year, national. Source FAOSTAT, 2009

These zones are the coarse environmental units that can be used for zonal agricultural strategies and targeted funding packages. Within agro-ecological zones, the breakdown of current land use, soil potential, access to transportation and markets and current cropping patterns are the components needed for running crop models and agricultural economic models as a basis for future production scenarios and options. These models could be used to suggest pathways to future production targets and food security and help develop optimization models that government policies can support through investment and incentive programs.

LAND USE AND LAND COVER

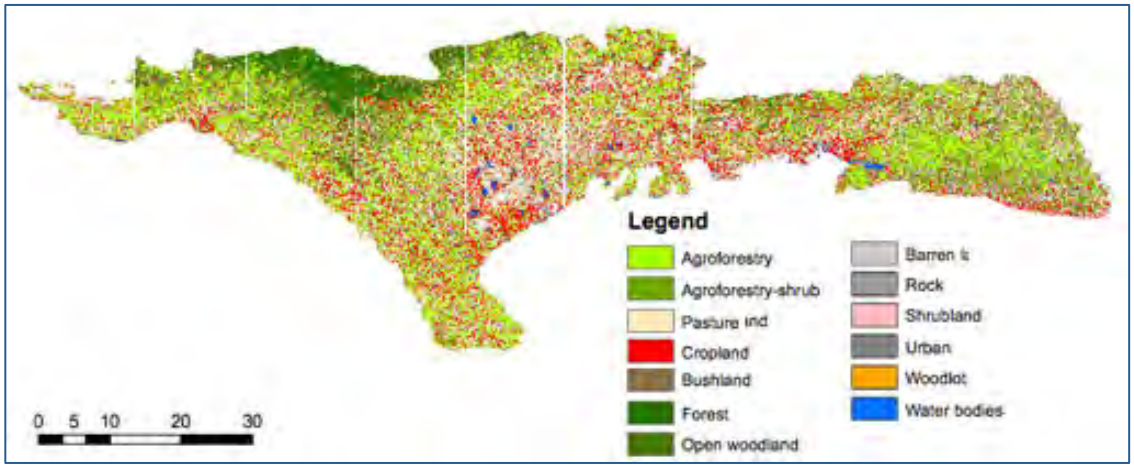
According to the 2011 LULC survey, almost three quarters (73%) of the ten commune region is under some form of agricultural production including annual food cropping, agroforestry and pasture. Around half of the land area is cultivated with inter-cropping, including agro-forestry. The land use mapping shows that close to 50% of the region has some form of agro-forestry. The 2011-2012 household survey shows that 88% of households report inter-cropping during the last harvest.[36] Imagery shows that a large total number of parcels have vegetative cover and a predominance of cultivated land. These large areas under some form of agricultural production leaves only unmanaged bushland/shrubland, barren land, forest, rock, urban and water bodies as categories not under some form of economic production, totaling roughly 27% of land that is not under cultivation.

Land use/ land cover classification,	Agropastoral	Dry_ag_	Humid_area	Total Côte Sud

[36] While this percentage was reported by the household survey, satellite imagery cannot detect this in the land use land cover.

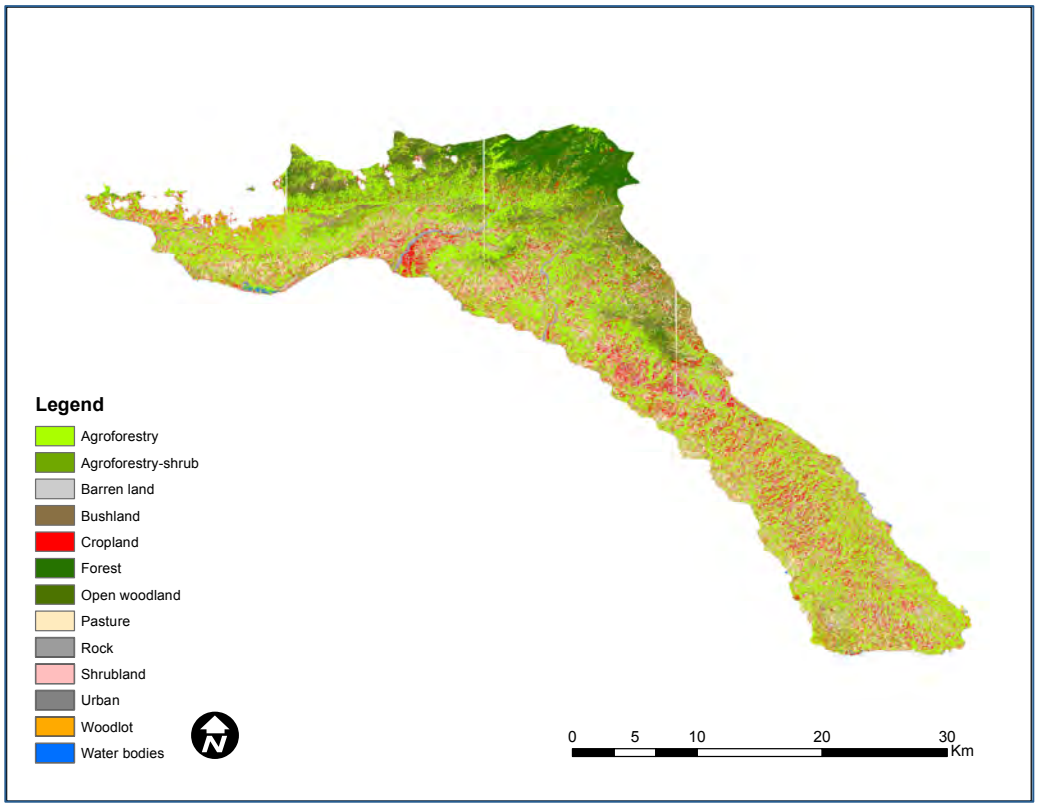
condensed.	_ Area (%)	area (%)	(%)	area (%)
Agroforestry (includes agroforestry-shrub)	47%	43%	40%	43%
Bushland (includes shrubland)	11%	6%	14%	9%
Forest (includes open woodland)	4%	2%	30%	10%
Cropland	11%	15%	5%	12%
Woodlot	3%	1%	0%	1%
Pasture	17%	21%	7%	17%
Other (includes barren land, rocks, urban, water bodies)	7%	11%	4%	9%
Total	**100%**	**100%**	**100%**	100%

Table 16 Land use and land cover by agro-ecological zone



Map 18 Land use/ land cover map for the South Department. Source CIESIN, 2012.

Reversing the trend of forest cover loss will be a key target for the region, as only 4% of the land area has dense forest cover. The target will be to increase productive and sustainable forms of land use on slopes greater than 15%. These include primarily forest cover, agro-forestry, woodlots, or open woodland. This transition to forest cover on steep slope, instead of steep slope agriculture which prevails in the region as of 2012, would help to ensure environmental security and reduce the risks associated with flooding and severe erosion.



Map 19 Land use /land cover map for the nine southwest coast communes. Source: CIESIN, 2012.

PRIMARY CROPS HARVESTED BETWEEN 2011 AND 2012

The top five crops grown, in the order of the number of households reporting harvests in the past year, are: pigeon pea, maize, sorghum, plantain, and black bean. The ranking of these crops varies within the ten communes, as potatoes, yam, manioc and peanut are also ranked in the top five in some communes. The table below shows spatial variation of crop rankings. Crops like black beans are ranked higher in the more western communes than in the eastern ones, though the importance of both pigeon peas and maize is seen across the region.

MDG Indicator		South west average	TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
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	1	2	2	2	1	1	1	2	2	1	4
	Maize	2	1	1	1	2	2	3	3	3	2	1
	Sorghum	3	9	9	6	6	4	2	1	1	3	6
	Plantain	4	4	4	7	7	7	4	4	4	4	2
	Black bean	5	3	3	3	3	8	8	6	8	5	NA
	Yam	6	6	6	5	5	6	5	5	7	7	8
	Manioc	7	7	7	4	4	5	9	10	6	9	3
	Potato	8	8	10	9	8	9	7	7	5	6	5
	Peanut	9	5	5	8	9	3	6	NA	NA	NA	9
	Lima bean	10	NA	NA	10	NA	10	NA	9	9	NA	7
	Malanga	NA	10	NA	NA	10	NA	10	8	NA	9	NA
	Rice	NA	NA	8	NA	NA	NA	NA	NA	10	NA	NA
	Breadfruit	NA	NA	NA	NA	NA	NA	NA	NA	NA	10	NA
	Coconut	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10

Table 17 Top ten crops harvested from November 2010 to October 2011.

Across the ten communes there are multiple planting seasons and rotations every year, which vary according to elevation and agro-ecological zone. Accordingly, addressing interventions towards specific crops or regions requires a sequenced distribution of inputs and outreach from agricultural extension agents. The distribution of inputs should be timed with the crop calendar detailed below, and specific climate and environmental conditions of the agro-ecological zones, weather forecasts and growing constraints of the priority crops identified in the household survey and listed above. The goal remains to dramatically increase the yields of these top crops.

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 44 Seasonal crop calendar by agro-ecological zone

The seasonal calendar identifies the variation of growing seasons between agro-ecological zones. The humid mountains region has an earlier planting season for corn and an earlier summer planting for green beans.

CROP CONSUMPTION AND FOOD SECURITY

Despite the predominance of food crop agriculture in the southwest, food insecurity is extremely high in southern Haiti with 93% of households reporting not having adequate food supply at times over the course of last year. This is another indicator of low crop productivity and stems from multiple factors. Low crop yields due to poor soil conditions and inefficient crop management practices, as well as inconsistent markets, leads to variations in the buying and selling of food for household consumption. The 2011-2012 household survey analyzed the percentage of yields by crop consumed by the family. This analysis, although not time sensitive to fluctuations in market prices and storage capacity of the household, shows the variation between communes of family consumption of goods produced from their own land.

Tubers such as potatoes and yams were among the top crops harvested by surveyed households between 2011 and 2012. Both were on average the highest consumed at home – not sold at market places. The average consumption rate at home for both crops was reported at 61% each (selling rate at markets was 39%). It is possible that the low selling rate responds to the relative low prices at markets,[37] in addition to usually being considered as emergency food security crops (FAO and CFC 2010).

Peanuts have the lowest rate of household consumption, at 25%, and the highest selling rate at 65%, between 2011 and 2012,[38] though peanuts are not considered a cash crop in the region. The annual price per marmite of peanuts fluctuated between 60 to 80 HTG in the Port-à-Piment market between 2011 and 2012.[39] Due to price inaccessibility of animal-based proteins, households should consider peanuts' high nutritional and caloric value, at 567 kcal per 100 gr,[40] as part of their daily food intake.

Beans, on the other hand, seems to be the cash crop of the region. According to KPP, the market price for beans between 2011 and 2012[41] ranged between 130 and 225 HTG per marmite. Beans were reported as consumed by households at 40%, and sold at markets at 52%. Although labor intensive during harvest and processing, it is assumed that significant differences in prices between beans and other staple crops is a high enough economic incentive for households to continue planting beans.

Comparable to beans in caloric value,[42] maize and pigeon peas can cost half the price in local markets in the same time period.[43] The relatively low cost of maize and pigeon peas compared

[37] According to local experts a person can obtain the equivalent of 4 kg of potatoes from a lot valued at 50 HTG. Likewise, a person can obtain the equivalent of 2.7 kg of yam from a lot valued at 50 HTG.
[38] All differences between the percentage of crops consumed at home versus the percentage of crops sold at markets are assumed to be used as seeds for the next planting season.
[39] Data obtained from the Konbit for Port-à-Piment website between March 2011 and February 2012.
[40] http://www.ers.usda.gov/data-products/food-consumption-and-nutrient-intakes.aspx#26671
[41] Data obtained from the Konbit for Port-à-Piment website between March 2011 and February 2012.
[42] According to USDA, 100 gr of beans have 341 kcal, compared to 365 kcal for maize and 343 kcal for pigeon peas.

to other staple crops in the region such as beans makes them an affordable food item for the average household in the region. According to the 2011-2012 household survey, the consumption rate at home for both maize and pigeon peas was reported at 54%; only 41% was reported to be sold at markets for both cases.

Other important crops reported to be equally consumed at home and sold at markets were plantains, with 54% consumed at home, and manioc, with 49% consumed at home. Both crops are part of the daily dietary intake in the region.

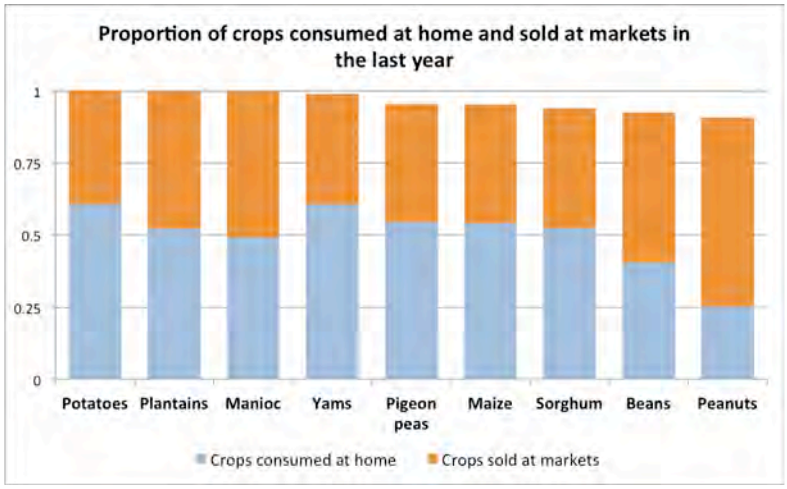


Figure 45 Proportion of crops consumed at home compared to the proportion of crops sold at markets.

[43] Data obtained from the Konbit for Port-à-Piment website between March 2011 and February 2012.

FISHERIES

Fishing is directly related to nutrition (MDG1) and environmental sustainability (MDG 7). Fishing accounts for a minimal portion of the income levels in rural areas, acting mostly as a secondary occupation and supplemental source of income. Along the extensive coastline of the South Department, fishing operates in much of the same fashion as agriculture; fishermen generally do not own the boats or equipment they use but rather rent them in the same way sharecroppers till land. The fishermen of the South Department make up 18% of the total fishermen in Haiti (Gardel 2006). Qualitative interviews have showed that few people (with the exception of St. Jean de Sud and Tiburon) consider fishing their primary occupation. Tiburon is considered the largest fishing community. Yet qualitative interviews show that transport and refrigeration remain one of the largest problems for increased production and accessing larger markets. Ability to pay for gasoline for motor boats for further off coast fishing was also a limiting factor.

The types of fishing vessels employed by the fishermen in the South Department are generally artisanal, non-industrial crafts. The majority of the vessels employed in the department are wooden pirogues, measuring between 12 and 14 feet long and two and four feet in diameter. Fishermen use fine mesh nets, poles, and harpoons to collect their catch, methods which are traditional but also limit the capacity of each expedition (Gardel 2006). The research teams observed Food for the Poor boats that had been donated to fishing cooperatives in Tiburon and Ile à Vache; as of 2011, some boats had been converted to operate as ferries instead of fishing vessels.

The types of catch harvested off the southern coastline are generally categorized into 1st class fish (pink fish, high quality white fish), 2nd class fish (white fish and grey fish), small langoustes, large langoustes, shrimp, crabs, mussels, squids, and sea turtles. Respondents of the 2012 TNC focus groups reported a predominance of second and third class fish, including grunts, ocean surgeon and blue tang. Species of high value, including lobsters, finfish, and conch, are heavily exploited, resulting in reduced fish and catch size in the South Department (Schill et al. 2012).

Fish and other catch are most often sold to middlemen agencies at the seafront or along the riverfront. Of the middlemen agencies, seven are based in Les Cayes; two of these agencies represent hotel and restaurant consumers in Les Cayes, while the other two represent consumers in Port-au-Prince, which comprise 70% of the market for seafood products. In Port-au-Prince, restaurants and hotels act as the primary consumers for 1st class fish and shrimp. The majority of the 2nd class fish, and both large and small langoustes, are immediately refrigerated for export to the USA, Canada, and Curaçao, where they are sold to medium-level merchants and restaurants. The majority of other species of catch, including mussels, squids, and sea turtles, are consumed in local markets (Gardel 2006).

More detailed information on the state of fisheries in the South Department can be found in the 2012 Marine Baseline Report by Schill et al.

CROP AND SOIL MANAGEMENT

Data from FAO indicates yields for several of the major crops to be only 30% to 50% that of the average yields attained in other countries in the Caribbean region (FAOSTATS 2009). This is both due to a lack of improved inputs, such as seeds and fertilizers, as well as continued cultivation of poorly suited land on steep slopes without improved farming practices such as anti-erosion hedgerows or irrigation systems. The low crop yields reported for most of the food crops in the ten communes are reflected in the land use practices and crop and soil management.

The Earth Institute LDSF study also showed that agricultural production in the Port-à-Piment watershed is significantly constrained by the steep slopes and hilly terrain of the area, with as much as 50% of the area is classified as steep slopes (>30%), and 75% of the area is covered by moderate (16-30%) to 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 (Smukler et al., 2012). A very small portion of land (25%) has zero to slight slopes, defined as up to 15%. Thus there should be a major focus on perennial agriculture on these slopes or planting techniques that mix agro-forestry and annual crops for harvest. Extension agents using mixed planting techniques could be further guided by land use management plans that detail spatial zones and related objectives for those areas, which could then be combined with local community land use management planning.

The percentage of parcels located on the sides of hills averages 44% across the ten communes, though the practice is most pronounced in the communes of Roche-à-Bateau (58%), Coteaux (53%) and Port-à-Piment (51%). In the entire study area, 32% of farmers cultivate plots on the tops of hills and only 24% on flat lands on the bottoms of hills. In Ile à Vache, 50% of plots are located in flat lands, though the average across the study area is much lower at 24% and as low as 15% in Roche-à-Bateau. Hillside agriculture, when not practiced in conjunction with positive erosion prevention mechanisms, augments the already severe rates of erosion and soil loss, contributing to lessened productivity of the agriculture itself.

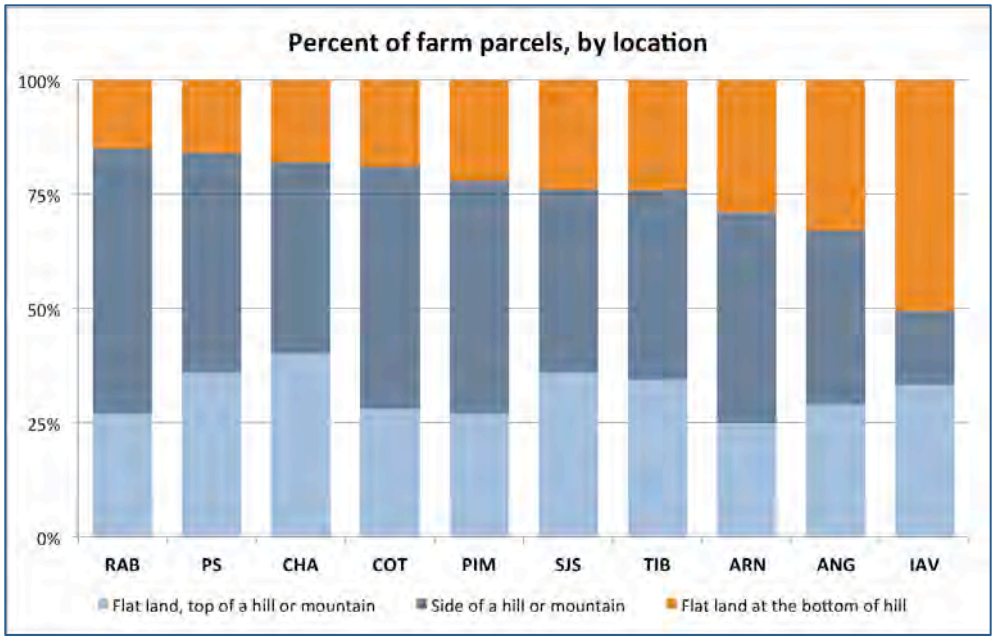


Figure 46 Percent of farm parcels located on the top of hills, on slopes or bottom lands.

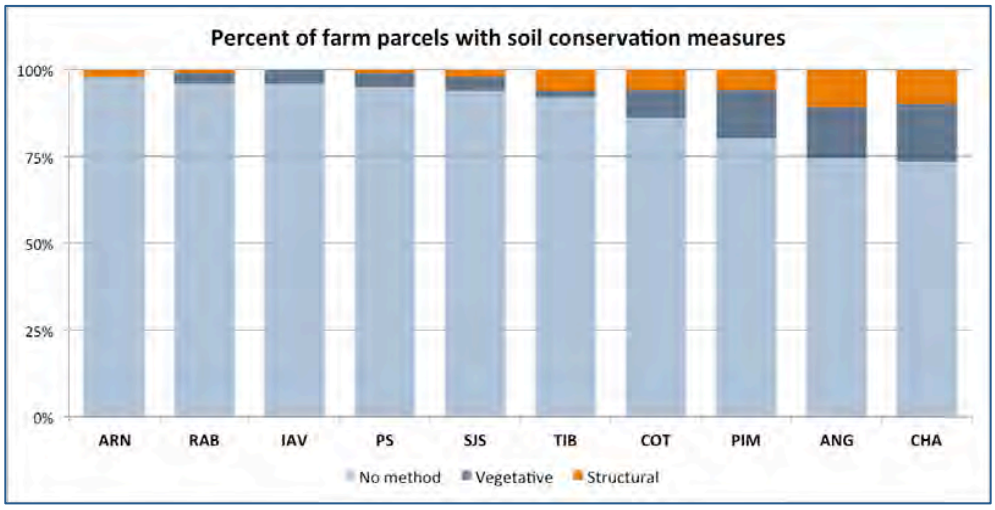


Figure 47 Percent of farm parcels with soil conservation measures.

In spite of farming on overwhelmingly sloping lands that are highly prone to erosion, in the ten communes only 12% of land parcels had some form of soil conservation, including vegetative barriers or structures to impede erosion. Les Anglais, Chardonnières and Port-à-Piment do have conservation mechanisms in place at over 20% of plots, though in most other areas the coverage was less than 10%. While flooding, which is highly related to past and future erosion rates, was listed as the primary environmental concern for 20% of the population, both infertile/poor soil quality and soil erosion were listed as the paramount concern in less than 1% of households across the study area.

However, the 2011 LDSF in the Port-à-Piment watershed indicates that much of the land, particularly the steep slopes found throughout much of the mountainous area, is prone to erosion. Soil nutrients are washed away every time excess surface runoff flows over land. Therefore, in community education campaigns the relationship between erosion risk and poor soil quality should be paired with the measured high perception of risk and high rates of damage reported as a result of flooding. Contextualizing risk and communicating the benefits of adopting soil conservation practices as a preventive measure against soil erosion should be emphasized at all times. Watershed management systems in the highly mountainous landscape of the region should include erosion control methods as a way to retain and enhance soil nutrients.

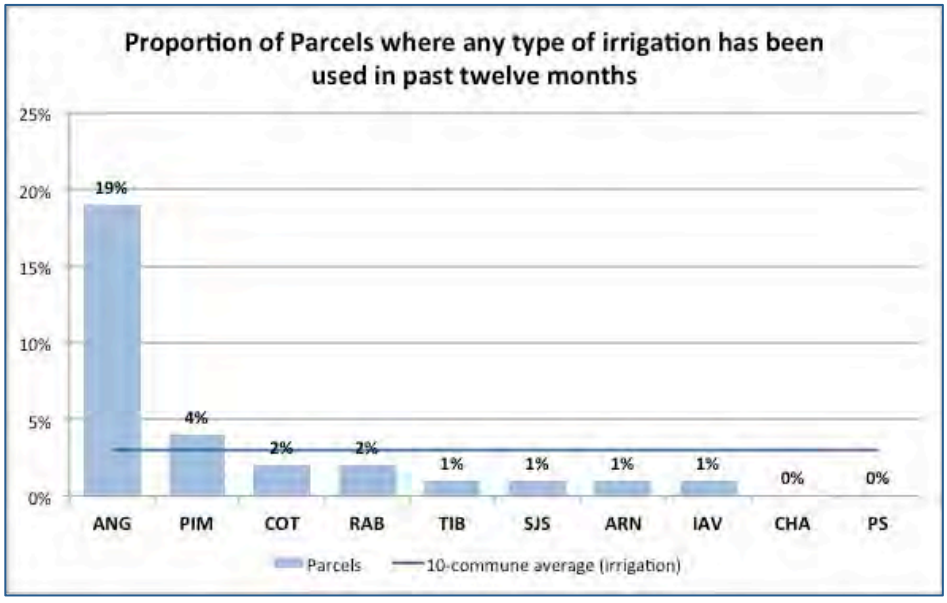


Figure 48 Percent of farm parcels with access to irrigation systems.

In addition to poor soil erosion control management practices, few farmers are employing modern practices in agriculture on their plots, including tillage methods, use of fertilizer, and irrigation. Most farmers rely on human labor through hand tilling of their plots, at more than 87% of plots. Only 4% of parcels in southwest Haiti are plowed with oxen or horses. Ile à Vache, where 50% of plots are located on flat land, has a much higher rate of plots plowed by livestock, at 43%. In 13% of plots, no form of tillage is used. Irrigation is employed in only 3% of plots across the ten communes, though notably 19% of plots in Les Anglais have some form of irrigation as well as the highest proportion of structural anti-erosion methods. Households from Roche-à-Bateau and Chardonnières reported not employing any irrigation systems for their plots.

For the few households that do employ irrigation, three quarters use furrow irrigation, 10% use flood irrigation, and 14% use bucket irrigation. Most of the water used in irrigation originates from a pond, river or canal (79%), with water storage, wells, and boreholes also used in smaller numbers. The ways water is delivered to these parcels are traditional, either gravity-fed (65%) or

manual (35%). Handle or treadle pump or mechanized distribution is not used as a method for water distribution.

As such low numbers of households use improved irrigation systems, it can be assumed that the majority of plots across the ten communes are reliant exclusively on the highly variable precipitation to water crops under cultivation. Unreliable and non-ideal precipitation patterns have a direct impact on agricultural yields. Inadequate rainfall and drought, however, are only viewed as a primary environmental risk by 3% of the households. Even among communes where more than 5% of households consider inadequate rainfall a risk, including Port Salut, Arniquet, Saint Jean du Sud, Roche-à-Bateau and Saint Jean du Sud, very few households employed irrigation systems on their plots.

Soil fertility in itself is not seen as a principal environmental risk, compared to hurricanes, flooding, or earthquakes. Across the region, less than half of plots are being actively managed for soil fertility; the most common form of soil fertility management is the use of crop residues, at over a quarter of all parcels. With low yields, the amounts of residues available to be applied are small and insufficient for maintaining soil fertility. Animal manure and natural fallow account for fertilizers used on 10% of properties, though the majority of plots, at 64%, still have no method of soil fertility management. The results show that crop residues are the second most frequent method. Though yield data for the different crops being produced across the ten communes are not available yet, a study was conducted in the Port-à-Piment watershed to compare 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 seed variety and no fertilizer.

There is an extremely low reporting of fertilizer use in the ten communes. Les Anglais has the highest, which corresponds to priority given by MARNDR and agricultural groups for the cultivation of larger plains. This may also be linked to the higher rates of structural soil conservation methods and irrigation systems, mostly still gravity-fed from surface water sources, found in that commune. Based on the results of preliminary trial plots, the potential for major changes in yield rates should be a priority for agriculture sector growth and for food security in the region.

MDG Indicator		South west average	10 Communes									
			TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
Proportion of parcels where the following soil fertility methods have been used in the past 12 months	No method	64%	78%	65%	64%	69%	68%	47%	57 %	79%	62%	49 %
	Crop residues	27%	20%	13%	27%	20%	24%	34%	38 %	16%	34%	50 %
	Animal manure	10%	12%	8%	8%	10%	11%	3%	16 %	11%	10%	9%
	Fertilizer	1%	0%	10%	0%	1%	0%	0%	2%	1%	0%	0%
	Natural fallow	10%	3%	10%	10%	10%	7%	20%	11 %	4%	8%	15 %
	Improved fallow	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
	Legume cover crop	1%	0%	2%	2%	1%	1%	2%	0%	0%	0%	0%
	Biomass transfer	1%	1%	1%	0%	0%	1%	0%	1%	4%	2%	0%
	Compost	0%	0%	0%	0%	0%	2%	1%	0%	0%	2%	0%

Figure 49 Percent of farm parcels where soil fertility methods have been used in the past 12 months.

The 2011 Earth Institute and ORE study on the effectiveness of fertilizer and plant densities on yields for four different bean varieties in the Port-à-Piment watershed evaluated the effectiveness of fertilizer on yields. 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. The complete Bean Yield Report is available separately (ORE et EI, 2010).

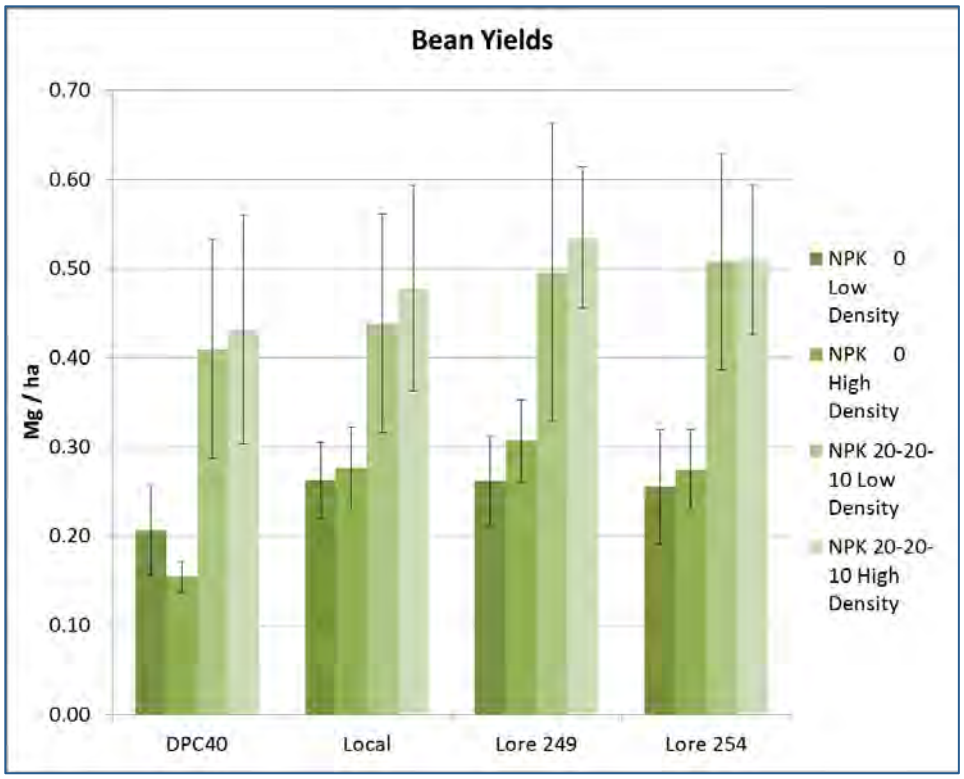


Figure 50 Bean yields recorded in Port-à-Piment watershed in 2011. Source: ORE and Earth Institute

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 need to apply nitrogen-containing fertilizers, which 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. Organizations in the South Department, such as SEED Ministries based in Les Cayes, have positive initiatives to build systems for soil fertility improvements and crop rotations, including low-cost and high efficacy solutions with chicken coops as the source of fertilizer.

LAND HOLDINGS AND LAND TENURE

Land tenure and land scarcity are both relevant issues in Haiti. Insecure 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% of agricultural plots were acquired through purchase, 38% were acquired through inheritance, 10% were accessed through cash rents, 10% accessed through sharecropping, and the remainder was freely accessed through informal arrangements (2003).

Interviews revealed that while conflicts over land in southwestern Haiti are prevalent, particularly regarding issues of inheritance, they are rarely violent. Yet ongoing disputes of ownership versus current users can hinder investment and management strategies. Determining who is a qualified recipient of agricultural subsidies can undermine government and NGO programs. Disputes also reportedly decrease incentives for long-term management strategies, instead increasing the short-term over cultivation if current land managers fear losing control of their land in a dispute claim, or fear being kicked off the plots. See the Earth Institute and SIPA Land Tenure report for more information.

Farmers in the region report on average that they have access to about one hectare of land for agriculture, though the land itself most often exists in multiple fragmented plots, often not large in size. This fragmentation of land, and the use of land, is important in understanding the level of investment households put into managing and investing in their plots. The size of arable land available per household ranges from a high of 1.27 Ha in Chardonnières to a low of 0.67 Ha in Arniquet. Across the ten communes, the self-reported size of parcels was 0.7 Ha, on average. Likewise, households reported the use of 1.77 parcels for cultivation, on average. In Chardonnières, households have access to the highest number of parcels, at 1.9 per household, and on average the size of parcels is larger than in any other commune. In contrast, households in Arniquet reported having access to the lowest number of parcels in the region at 1.2 parcels per household.

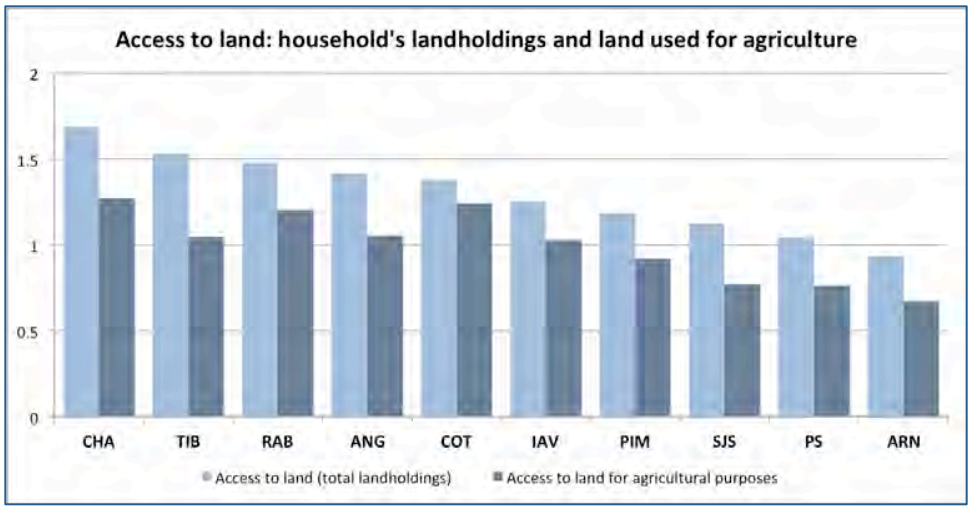


Figure 51 Average landholdings, total and for agriculture use, in the ten commune area.

On average, the parcels are located almost one hour away from the household, ranging from 27 minutes in Ile à Vache, the flattest of the ten communes, presumably with the shortest of distances, to 74 minutes in Chardonnières, which is defined by a steep topography.

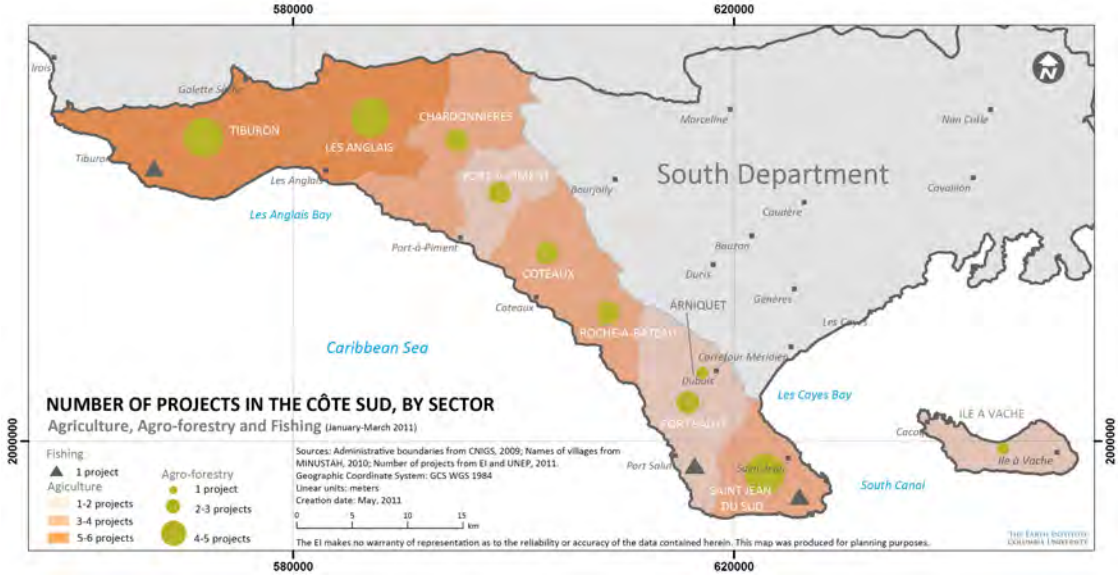
Having multiple small parcels available for farming have two main implications. The limited availability of productive arable land creates an incentive for farmers to cultivate as much land as they can in order to maximize productivity, despite the fact that the majority of plots across the south (76%) are located at the top or on the side of hills. This return maximization strategy also discourages farmers from using improved farming practices, such as rotation or diversification of crops, that can reverse soil erosion and nutrient depletion. Long distances between plots also increases the amount of energy exerted to arrive, which may limit investments in labor or added-value inputs, such as irrigation, fertilizers, and erosion protection mechanisms. Small-holder parcels also limit the potential for larger-scale land-use planning. 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 or larger scale erosion and flood risk reduction (Mickerlange 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 2012). 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 charcoal). 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 2012). 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 working to minimize the effects of the above-mentioned problems. In Randel, in the commune of Chardonnieres, *Fondation Macaya* works with farmers to increase agricultural yields while protecting the park's biodiversity (Vanel et al, 2012). 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, 2012). 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, 2012). These institutions show how even small local land-use planning interventions can have significant positive impacts on the environment and on the way land is collectively managed. Such organizations are valuable assets for the region and should be empowered to enable future rural planning and development initiatives.

Below is a map showing the number of agriculture, agro-forestry, and fishing projects identified throughout the ten commune region as of 2011. There are a large number of projects located in Les Anglais and Tiburon versus a smaller amount in Port Salut and Ile à Vache.



Map 20 Agriculture, agro-forestry and fishing projects in the ten southwest communes. CIESIN, 2011.

10. PHYSICAL ENVIRONMENT, DISASTER VULNERABILITY, AND ENERGY (MDG 7)

The interdependent relationship between the physical environment and the population results in self-perpetuating cycles of environmental degradation and increased economic and social vulnerabilities. MDG 7 aims to integrate the principles of sustainable development into country policies and programs to reverse the loss of environmental resources. It therefore targets increases in the percentage of land covered by forests, in the protected area to total surface area, and in the square kilometers of protected area. It also measures progress towards increasing the proportion of urban and rural populations that use improved drinking sources and sanitation facilities as discussed in the health section in this report. Though not explored at length in this report, MDG 7 also has targets for reaching sustainable levels of carbon dioxide emissions (CO2) per capita and reducing consumption of all Ozone-depleting substances in ODP metric tons. An overarching goal identified for the region is to increase tree cover and perennial planting on the steep slopes to above 15%. Haiti also faces severe vulnerability to natural disasters, exacerbated by topographical, climate and land degradation factors.

Excepting Ile à Vache, the southwest study area is part of the larger Tiburon watershed, located below the Pic Macaya National Park. The park is one of the last areas in Haiti with original forest cover and a critical zone for conservation as it contains most of Hispaniola's remaining biodiversity flora and fauna. The area is designated as a park, but has not been clearly delineated and there are not sufficient mechanisms in place to protect the remaining ecological fragile areas. The densely forested areas, as seen on the land use and land cover map in the section above and in the separate report, are almost exclusively in the upper watershed areas near the Pic Macaya National Park.

The following section presents a biophysical profile of the ten communes. In addition to data from the 2011-2012 household survey, the profile is supplemented with data from the three climate monitoring stations and historic climate data, results from LULC study, and the LDSF analysis and qualitative research on charcoal production, both focused on the Port-à-Piment watershed. This section also includes research on the human drivers and decision-making models related to environmental perceptions, including a mental model analysis of qualitative 2010 data and the quantitative 2011-2012 household data.

The lack of real-time, continuous hydro-meteorological observations compromises robust management and planning of flood hazards and risks, agriculture, health, and energy in southwest Haiti and the country as a whole. While the data below summarizes data collected between April 2010 and May 2012 for the Port-à-Piment station, and October 2011-May 2012 in the Randel station, a consistent dataset over a longer timer period is required to conduct the comprehensive desired watershed modeling.

BIOPHYSICAL AND HYDROLOGICAL PROFILE

The section below describes the bio-physical and hydrologic conditions in ten communes of the South Department of Haiti. The study area of the ten communes is the base of the Pic Macaya National Park. The upper watershed boundaries within the forested park area make the zone one of special consideration for environmental planning and disaster risk mitigation due to its dense forest cover and influence on run off and water dynamics in the watershed below.

TOPOGRAPHY

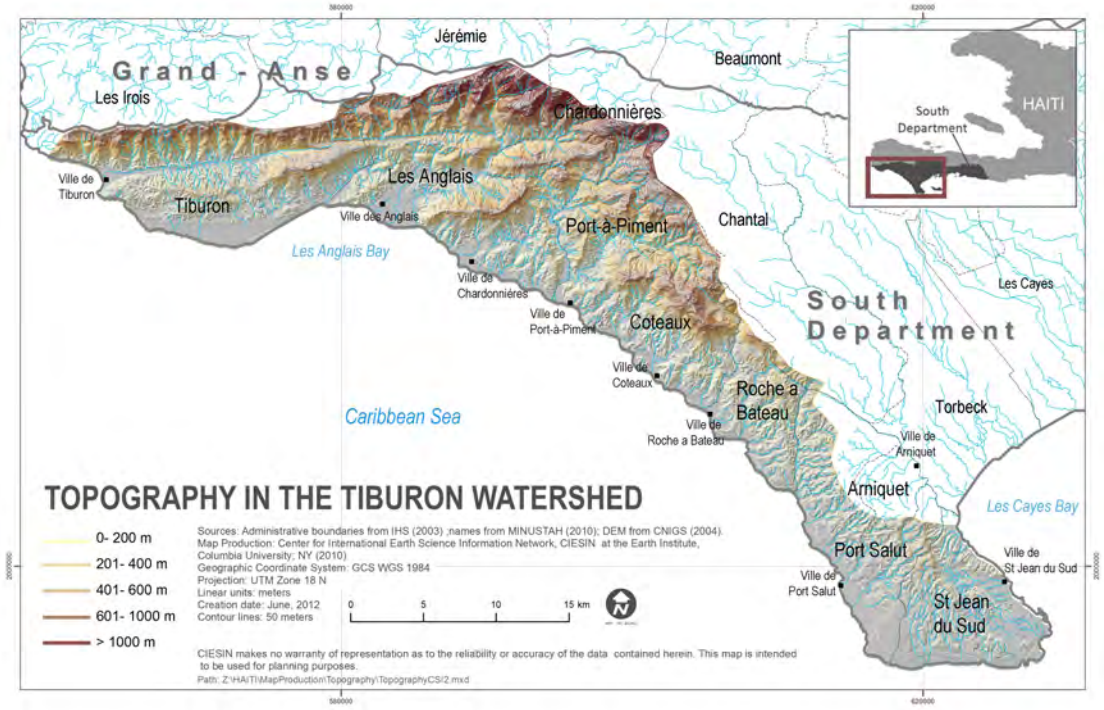
With the exception of Ile à Vache, the ten communes of the study area are within the greater hydrologic unit of the Tiburon watershed. Flowing from the Pic Macaya (2,347m) in the Massif de la Hotte mountain chain, the Tiburon watershed is listed as a priority watershed zone in USAID's 2007 environmental vulnerability report (Smucker, Bannister et al 2007). The Tiburon river basin is subdivided into sub-watersheds of varying topography and environmental vulnerability.

The elevation of the region is varied, with steep slopes in the western communes of Tiburon, Les Anglais, Chardonnieres, Port-à-Piment and Coteaux. Flat plain lands comprise only one fifth of the zone's terrain, whereas elsewhere in the zone slopes increase to over 300%.[44] The combination of steep slopes and a mountainous morphology gives Tiburon watershed a natural predisposition to geological and hydrological hazards, such as erosion and floods. These steep mountain slopes present difficulties for access to services and income-generating activities for the region's inhabitants.

Total area **(km^2)**	Elevation **(meters)**		Slope **(percentage)**		
	Min	Max	Plain (0%)	Hilly (<30%)	Steep (30% +)
782	0	2300	20%	17%	63%

Table 18 Topography overview. Data sources: IHSI 2003, NGIA 1960, CNIGS (2004, 2008).

[44] Calculations made using Tiburon's Digital Elevation Model DEM (CNIGS, 2004). Tiburon's DEM covers approximately 70% of the entire study area. It is assumed that the physical characterization of the Tiburon Watershed applies to the 10-commune area-- except for Ile à Vache.



Map 21 Topography in the Tiburon Watershed. Source: Center for International Earth Science Information Network (CIESIN), the Earth Institute at Columbia University, 2012. Datasets used: CNIGS, 2004; MINUSTAH, 2010; IHSI, 2003.

Ile à Vache is the one commune that is geographically distinct from the other nine communes, as it is an island located in the bay across from Les Cayes. The island is primarily at sea level and renowned for its pristine beaches and fishing communities.

MARINE RESOURCES

The surveyed area is situated on the southwestern most part of the country. This area has significant history and potential for the marine area, for tourism, fisheries, biodiversity, mangroves, and historical ports. Yet, as mentioned in earlier sections, fishing is not reported as the main occupation for a large portion of the population.

Earlier studies, commissioned by the United Nations Environment Programme and undertaken by the Haitian NGO, FoProBim, identified the extreme erosion and overfishing as the main challenges to the fish stock and marine resources.

The water clarity along the southern coastline is reported as poor (low, visibility or high turbidity). Previous studies have linked this with the heavy waves of the southeast current as well as discharge river systems with levels of soil runoff; visible heavy sediment in the ocean is partly responsible for the generally poor condition of sea-grasses in the area and deterioration of the coral reefs, which act as a important habitat for marine life. While significant coral reefs are not present along the majority of the southwest coastline, the status of coral reefs in the bay of Les Cayes of the South Department, including Ile à Vache, was studied in the 2012 TNC Marine Baseline. The reefs studied, particularly those around Ile à Vache, are observed as heavily depleted and affected by the area's sedimentation (Schill et al. 2012). Preservation of reefs and the species that rely on them for habitats are integral to achieving targets to improve environmental sustainability, including MDG 7.4 to increase the proportion of fish stocks within safe biological limits and MDG 7.6 to increase the proportion of protected terrestrial and marine areas.

The 2012 TNC Marine Baseline report indicates that among focus groups in the South Department, 92% of fishers indicate that fish resources have worsened over the past ten years. Particularly threatened species include lobster, conch, turtles, snappers, sharks and angelfish (Schill et al. 2012).

Overexploitation of mangroves for charcoal purposes has led to a lack of mangrove forests to act as estuaries for fish species (Weiner 2009). Along the southern peninsula, the only remaining significant mangrove forest is located at the westernmost tip, at Plaine Kawan. This mangrove forest too is under severe threat due to the destructive livelihood necessities associated with charcoal production. In the 2012 TNC Marine Baseline Report, 86% of focus group respondents indicated that the condition of mangroves has degraded in the past ten years, while 53% reported the conditions of coral reefs have declined (Schill et al. 2012).

Climate Overview

The ten communes are situated on Haiti's southwest coast of the southern peninsula, an area with a high frequency of hurricanes and destructive storm systems. There are four distinct seasons in southwest Haiti: two rainy seasons (April to May, September to November) and two dry seasons (December-March and June-August). This oscillation is seen in temperature as well as precipitation. Climate and rainfall data collected in the Port-à-Piment watershed pilot site reflected this overall trend. The climate data specifically demonstrates the variation of rainfall and temperature between the upper watershed, higher elevations regions and the lower coastal zones. This data is from two stations in the Port-à-Piment watershed, but is believed to be similar to other micro-watersheds throughout the larger Tiburon watershed. More information is available in the 2012 Hydrology Report.

Temperature

Temperature plays an important role in agriculture and ecosystems, as it regulates all the chemical and physical processes of plant metabolism (Singh and Dillon 2004). Ideal temperature conditions for plant growing are between 18.3°C and 23.9°C, though the optimum temperature for crop productivity varies from crop to crop. In the watershed of Port-à-Piment, localized temperature has been recorded at two elevations, in the town of Port-à-Piment since 2010, and Randel since November 2011. As the majority of the active population in the ten communes relies upon agriculture for their livelihood, including 34% of the labor force[45] who reported it as their primary occupation, any temperature has direct impact on livelihoods and is a core factor for planning models, as it determines the length of growing seasons and the types of crops able to thrive.

[45] The labor force in this report is considered as the adult population at working age (between 15 and 64 years).

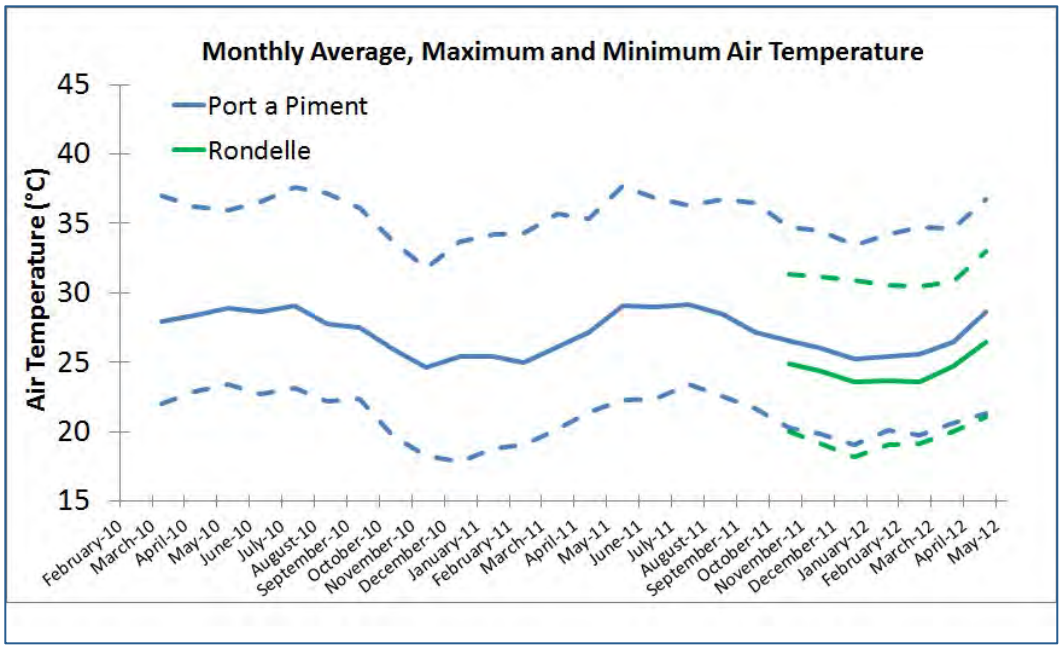


Figure 52 Monthly average of the maximum and minimum air temperature at Port-à-Piment and Randel stations for 2010-2012.

The variation in temperatures and duration of temperature extremes (cold or hot) directly impacts plant productivity and therefore agricultural production. There is a clear and recognizable seasonal pattern associated with air temperature in the Port-à-Piment watershed. The minimum temperatures are similar for both upper and lower watershed measurement sites. The lower temperature in Randel is likely due to the difference in elevation and reflects the agro-ecological zones described in Section 8.

The climate stations recorded temperatures that regularly exceed the optimal average growing temperatures for some crops. Certain crops growing within the watershed, such as the widely-grown pigeon peas, are able to withstand large and high variations in temperature, up to 40°C. However, studies on other important crops in the area such as maize and beans suggest that an increase in air temperature might affect the growth, development and photosynthesis of plants (Kim, Gitz et al 2007; Lira, Lima et al 2005). It is possible that recorded increases in temperature in the ten-commune will have a negative effect on crops, jeopardizing potential higher yields. Farmers should be continually informed about temperature variations at specific times of the year so that they can make informed decisions.

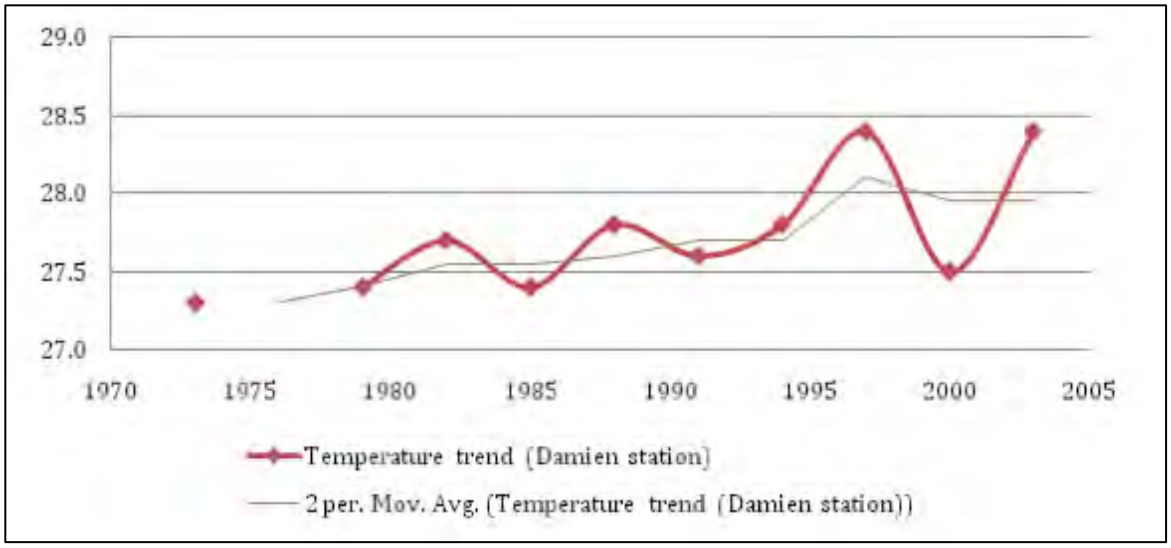


Figure 53 Average annual temperature trend from the Damien station, Port-au-Prince. Data source: National Meteorological Service, Ministry of the Environment and National Adaptation Programmes of Action (NAPA).

During the past 30 years, studies have demonstrated that temperature in the Caribbean region have increased by an estimated average of 1°C. The annual average temperature, recorded at the Damien station in Port-au-Prince at three-year intervals from 1973 to 2003, shows an increase of almost 1°C. This rise in temperature may be a source for more frequent droughts and an increase of the sea-surface temperatures that will create more frequent and stronger hurricanes and precipitation events in the Caribbean region.

On the local and regional scale, this change in temperature can have a direct impact on the length of seasons and the maximum temperatures, with a direct impact on agricultural production, including the agricultural methods, the need for irrigation systems, and the types of crops cultivated. As the implications of climate change for Haiti are better understood, public campaigns to educate farmers on alternative crops and planting techniques better adapted to temperature and growing season changes will be imperative, as 2011-2012 Household Survey data suggests that climate change currently ranks very low in a list of environmental risks perceived by residents of the ten commune region.

RAINFALL

As with temperature, rainfall is critical in shaping growing seasons and determining the crop productivity. Rainfall patterns, similar to temperature, vary significantly based on elevation. Heavy precipitation in the mountainous regions has severe flooding implications, especially in areas hillside agriculture and deforestation has increased the soil instability.

Accurate precipitation data is required to accurately quantify and predict the water flow and hydrologic conditions in southwest Haiti for agricultural planning, flood modeling and infrastructure investment, and business development. To achieve higher-resolution monitoring, a pilot system of hydrological and climate stations for continuous monitoring has been developed, deployed and maintained by the Earth Institute, UNEP, and CRS. The first station is located near the hydrological dam in Saut Mathurine in Camp Perrin, while the second is in the town of Randel in the upper area of the Port-à-Piment watershed, and the third in the town in the lower watershed of Port-à-Piment.

These stations report via satellite continuous data to measure site-specific precipitation. The preliminary results showed significant heterogeneity in rainfall across the region and by elevation. Comparison between the three sites enable analysis of the spatial and temporal dynamics of the hydrological system in each watershed. Additional stations are recommended to complete the hydrological monitoring system across the South Department.

While complete models are not yet available, current data is matched with historic data and models will be possible once enough continuous data is collected from these new stations. Initial readings over the first years confirm that high precipitation trends at elevated locations can result in significant river discharge and flooding in the coastal regions.

HISTORIC RAINFALL AVERAGES

The 2010-2012 two year monthly composite rainfall trends demonstrate the year-to-year variability in the Port-à-Piment data, though overall the precipitation trends follow seasonal oscillation. Comparing recently measured yearly data from 2010-2012 and the historical averages for Port-à-Piment[46] demonstrate the high variability of annual precipitation.

[46] The historical rainfall unavailable for Port-à-Piment was correlated with the station at Camp Perrin to produce estimates for the missing monthly precipitation rates in order to create a historical average for Port-à-Piment. More information on the historical rainfall averages, see the Hydrology Report.

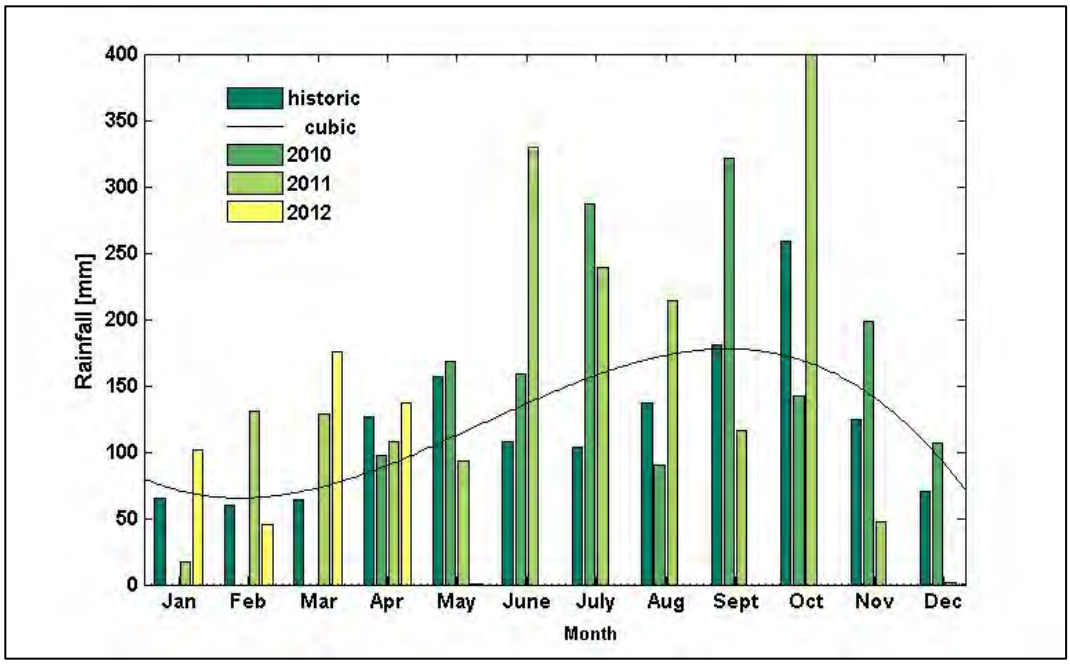


Figure 54: Real-time monthly totals of precipitation in the town of Port-à-Piment

Climate Station Monitoring Results

The stations at Randel and Saut Mathurine have received similar amounts of precipitation during large rain events, likely because they are situated at similar elevations. However, rain events are often localized. Over a three-month study period, the Randel station recorded approximately 650 mm of total rainfall, the most of precipitation of the 3 stations. In contrast, Port-à-Piment, which sits in the low-lying portion of the watershed, received about 300 mm.

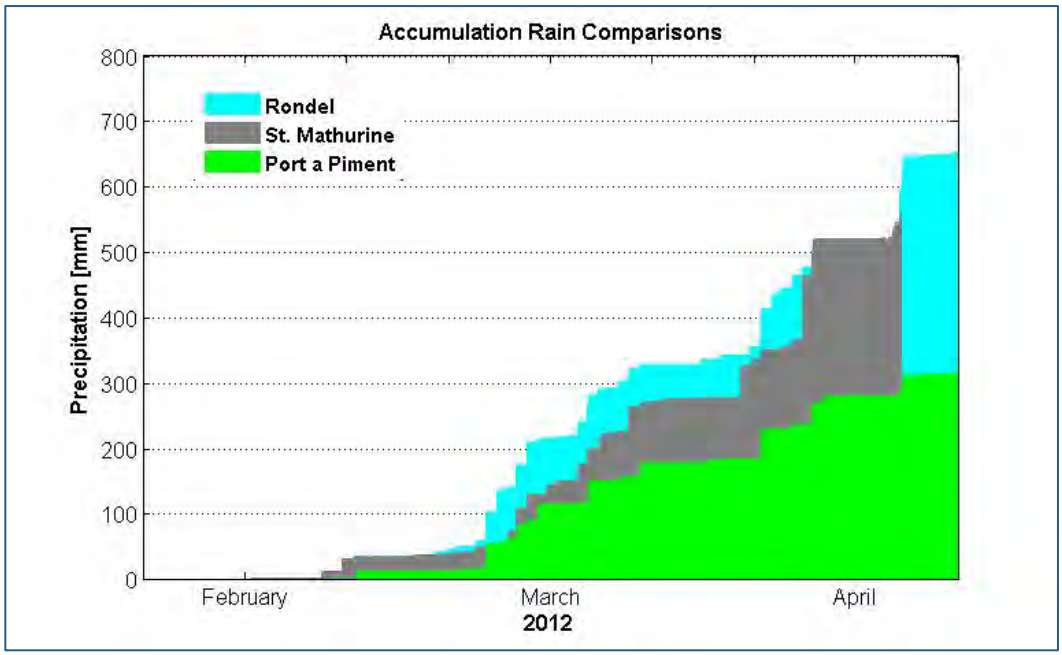


Figure 55: Cumulative rainfall for the three stations, February-April 2012

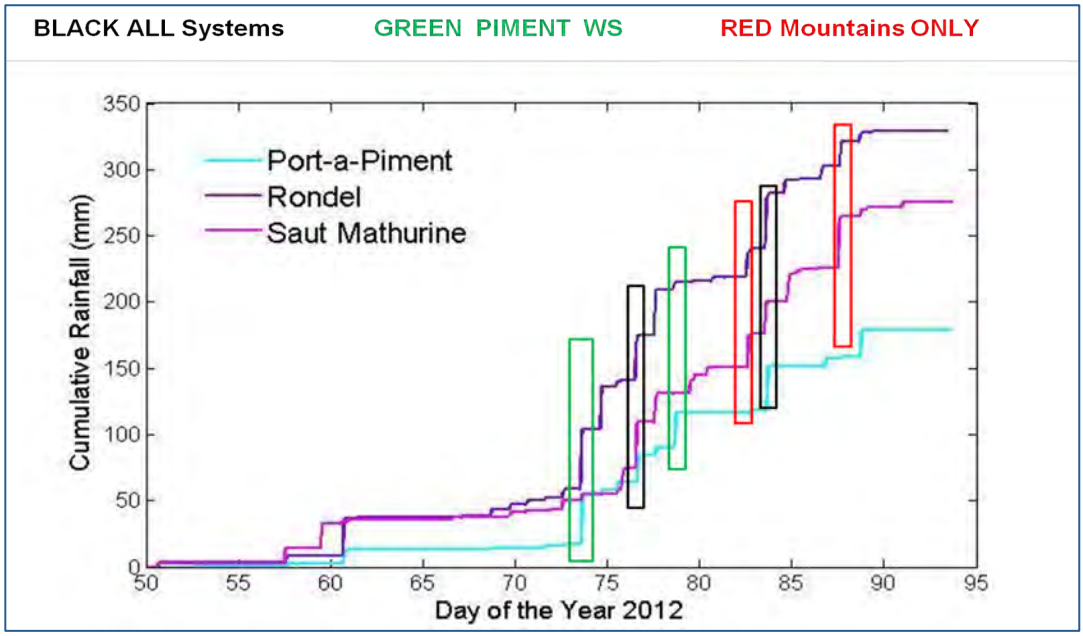


Figure 56 Cumulative Rainfall (mm) for three rainfall stations

Rainfall data also shows three trends in spatial rainfall patterns. The first are isolated large spikes in accumulated precipitation due to heavy storm events, which occur across the region. These are largely singular short duration rainfall events rather than sustained precipitation, requiring different water capture, irrigation and flood management infrastructure than the slow sustained rainfall. The second shows a larger total rainfall in higher elevations of Randel and Saut Mathurine. This influences flood early warning requirements and agricultural irrigation plans. The third is that the smaller rain systems are frequently isolated to specific geographic local zone as seen with visible sharp increases in Port-à-Piment and Randel, but not Saut Mathurine.

Continued monitoring across the watersheds is required to develop a clearer understanding of the precipitation relationships and patterns at play between the mountainous and the low-lying regions. Pic Macaya, which forms the upper boundary of the Port-à-Piment pilot watershed, is also the highest elevation point of the greater Tiburon watershed. Accordingly, information on the rainfall dynamics in the upper Port-à-Piment watershed is indicative of the rainfall at the source point of many of the major rivers forming the regional hydrological basin. While each riverbed is distinct in elevation, width, and vulnerability to flooding, the flooding dynamics studied in the Port-à-Piment river may provide information valuable for risk management for many of the similarly vulnerable watersheds across southwest Haiti.

RAIN AND SOIL MOISTURE DYNAMICS IN THE PORT-À-PIMENT WATERSHED

In addition to precipitation data, soil moisture is a secondary parameter used in generating predictive flood models. Soil moisture indicates the existing moisture present in the soil from previous intense rain events; defining soil's infiltration capacity at saturation may be useful when combined with rainfall intensity to predict flood risk, as it allows for predictability of surface runoff due to soil saturation. Monitoring soil moisture and rainfall intensity rather than each parameter alone has the advantage of taking preexisting moisture saturation in the ground when creating flood models.

Soil infiltration rates varied greatly across the landscape based on a field data collection in the Port-à-Piment watershed. Based on the 2011 LDSF report by Smukler et al, the mean infiltration rate across the Port-à-Piment watershed was estimated at 169 mm hr^{-1} with a median value of 151 mm hr^{-1}. While the likelihood of rainfall intensity exceeding these average infiltration rates is still uncertain, flooding is a known problem in the lower watershed. Most of the infiltration rates observed are not likely to be a problem but the 20% of the plots sampled had rates below 50 mm hr^{-1} and may be an important for addressing the flooding issue. Although there was no significant effect of land cover class, there was a significant positive linear relationship between infiltration rate and tree density (r^2 = 0.24; $p < 0.05$), which means that infiltration rates increased with increases in tree density. Both of these results indicate that greater tree cover can promote soil properties that enhance infiltration rates. See the 2011 LDSF report for more information.

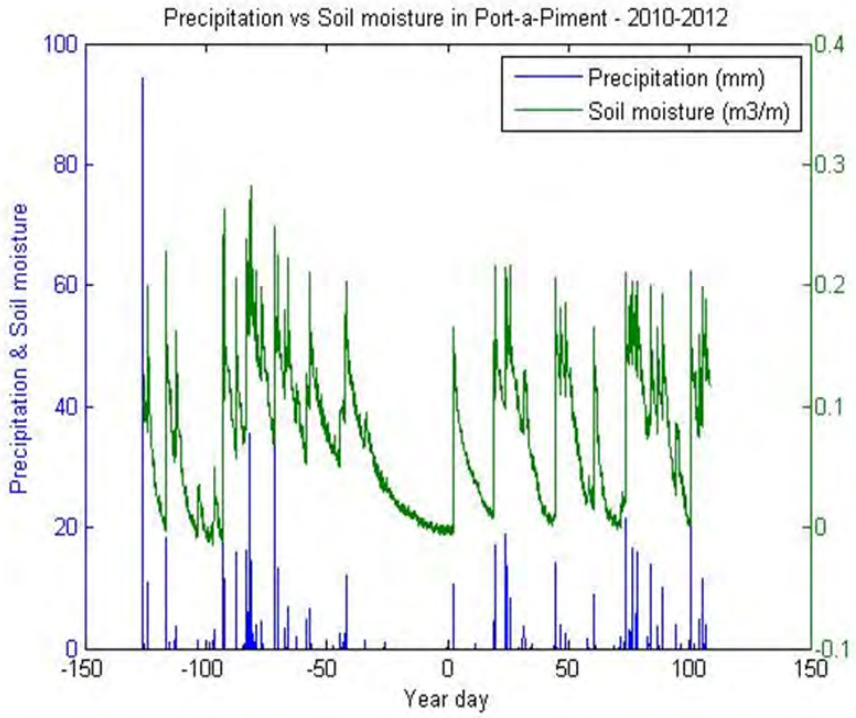


Figure 57 Precipitation versus soil moisture in Port-à-Piment 2010-2012.

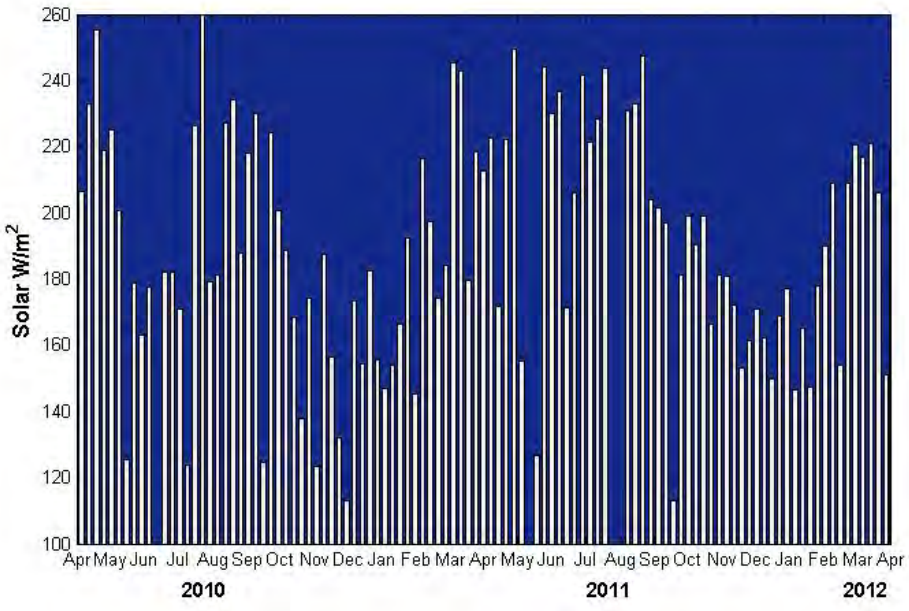


Figure 58: Weekly average solar radiation in Port-à-Piment

The climate station in Port-à-Piment also measures solar radiation. Preliminary results show that the months of October through February receive significantly less weekly solar radiation, also affected by year-round cloud cover and participation. Solar radiation is also an important component for convection of air moisture and soil moisture rates.

DISASTER RISK AND VULNERABILITY

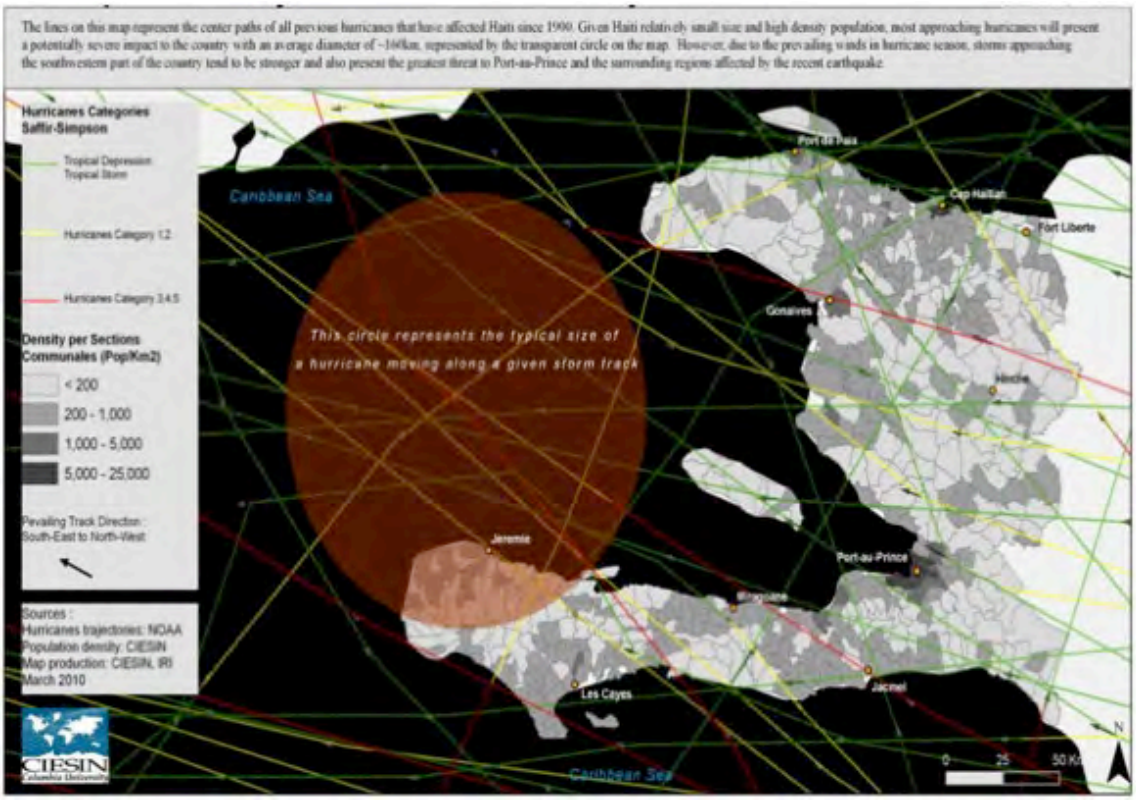
The geographic placement of the ten communes on the southwest coast of Haiti has a historic trend of high vulnerability to hurricanes and large rain events. This geographic vulnerability is combined with high levels of poverty and environmental degradation. Reduction of disaster risk is crucial to ensure that the efforts at social, economic and environmental development are able to take root without threat of catastrophic events upturning progress. The section below details the multi-hazard risk and vulnerability of the region; they types of environmental risks to consider for disaster risk planning and vulnerability assessments are summed in the table below.

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 59 Summary of Socio-economic impacts due to climate hazards. Source: Parry, Canziani et al 2007; Ministry of Environment 2006.

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 September 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 2008). On average, a hurricane or tropical depression directly hits Haiti every two years. 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 22 The hurricane pathways from 1908 to 2008. CIESIN 2009. The lines show the hurricane pathways and trajectories across Haiti. The 150km circle in red represents the average size of wind strength for each hurricane pathway.

Generally speaking, scientific studies demonstrate that hurricanes have increased in intensity and frequency over recent decades (Parry, Canziani et al 2007). Observations from Haitian farmers, fishermen, local village leaders, and the government confirm the same observation. Hurricane damages are particularly destructive in the South Department due to the fact that most of the towns 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.

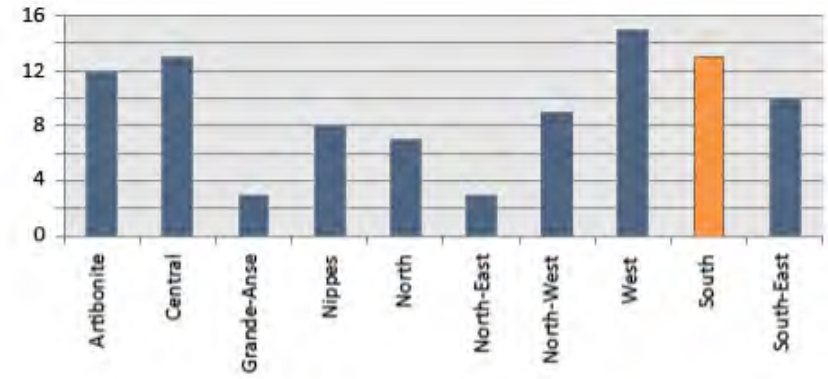


Figure 60: Frequency of hurricanes by department (1909-2008). Data source: NOAA.

FLOODING

Most of the settlements in the ten communes surveyed in 2011-2012 are along the coastline or densely concentrated along river systems. While each river in the study region has a different morphology based on its elevation, slope, and land cover, the Port-à-Piment River has been extensively monitored and serves as an example for the flood risk behavior of the region. With both a major and a minor riverbed, the Port-à-Piment riverbed has been widening and its alluvium channel expanding. There is not sufficient high-resolution areal or satellite imagery to estimate how much the riverbed has widened in the last years, but field observations suggested that the alluvium channel has been expanding northwards at an approximate rate of 5-10 feet/year, at an increasing rate after the 1990's storms. 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, and can quickly overrun the riverbanks and run through urban streets. Strong rainfall events, even for short periods of time, can saturate the terrain impeding its infiltration to other soil sub-layers.

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 was substantial. Monitoring the response time of between rainfall and changes in river levels is crucial for ensuring the safety of the residents who live downstream. Once a pattern is established, automated warnings can be established to prevent deaths of residents in high-risk zones.

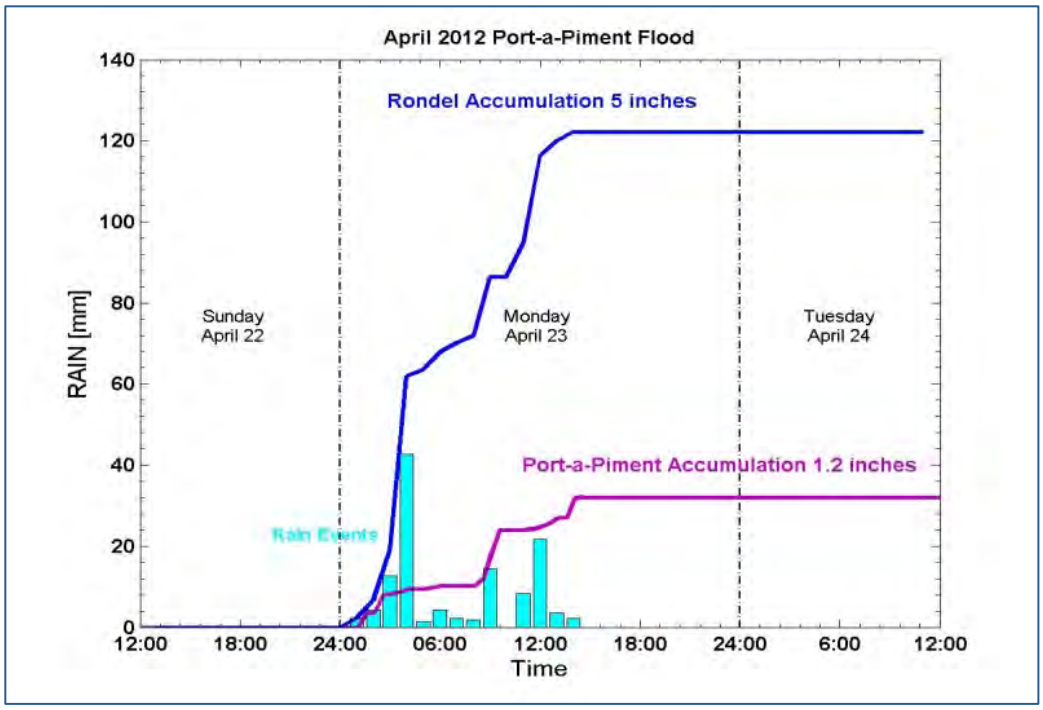


Figure 61 Rainfall data from April 2012 rain event in Port-à-Piment and Randel climate stations

Often the areas that are at the highest risk for flooding are those that are densely populated. Flood plains are the most cultivated areas due to the highest relative soil fertility and most densely settled. 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.

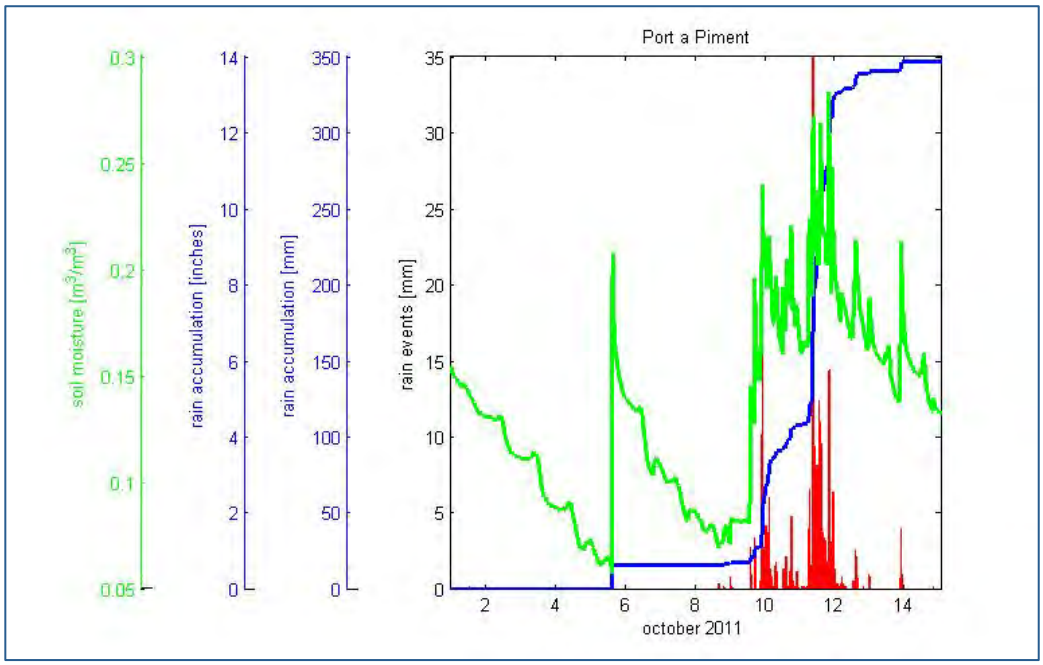


Figure 62 Rainfall data from October 2011 heavy rain event in Port-à-Piment.

EARTHQUAKES

The Caribbean region is an active seismic zone; 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 a ten second span time. The movement disrupted 40km of fault segment from Petit Goave to Gressier. These eruptions triggered seismic waves that propagated along the faults.

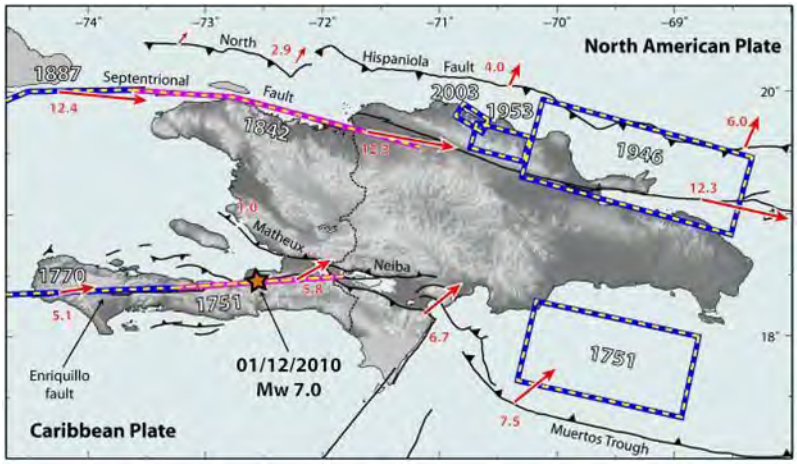


Figure 63 Four major fault lines run across Hispaniola. Source: Mora et. al 2010.

The figure above displays the four major geological faults that touch Haiti: 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.

ENVIRONMENTAL RISK PERCEPTIONS

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 of each of the ten communes of southwest Haiti. This following section is based on the 2012 household survey and 2010 qualitative data collection using the mental model methodology[47] with residents in the region, help to contextualize the biophysical and environmental vulnerability data with the risks perceived by the local population to enhance understanding of the priorities and behaviors.

MAIN ENVIRONMENTAL PROBLEMS EXPERIENCED BY HOUSEHOLDS

Survey participants were prompted to list the top 3 environmental problems faced in the past three years. The population of the zone overwhelmingly viewed hurricanes/cyclones (56%) and flooding (20%) as the greatest challenges. Certain communes in particularly fragile watersheds, such as Les Anglais (65%), Port–à-Piment (59%) and Chardonnières (59%) were above the average. Hurricanes in 2008, as well as a severe storm in October of 2011 caused significant damage in the area perhaps influencing these ratings. In certain communes, such as Tiburon, Port-à-Piment and Coteaux, the proportions are much higher, at 30%, 27% and 31%, most likely due to the high frequency and damaging nature of the fast and strong flooding. As recently as October 2011, strong and damaging flooding was experienced in the towns of Port-à-Piment and Coteaux where their rivers meet the sea, even though the storm system was not associated with a hurricane.

Few people identify earthquakes (11%) as major distress, despite the presence of the Enquirillo fault line in the region and the devastating aftermath of the 7.0 earthquake in January of 2010 that occurred in Port-au-Prince.

Smaller groups listed contaminated drinking water (3%) and wind (4%) as primary concerns. Those who list contaminated drinking water as a problem are primarily the furthest west communes (Tiburon, Port-à-Piment and Coteaux at 3% and Les Anglais at 5%) and Ile à Vache, where 10% listed it as a problem. A very small minority (at or less than 1%) thinks of each 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 three years.

[47] A mental model represents a person's thought process for how something works (i.e. a person's understanding of the surrounding world). A person's mental model influences their environmental expectations and use of forecasts or early warning systems. Morgan, Fischhoff, et al. 2002

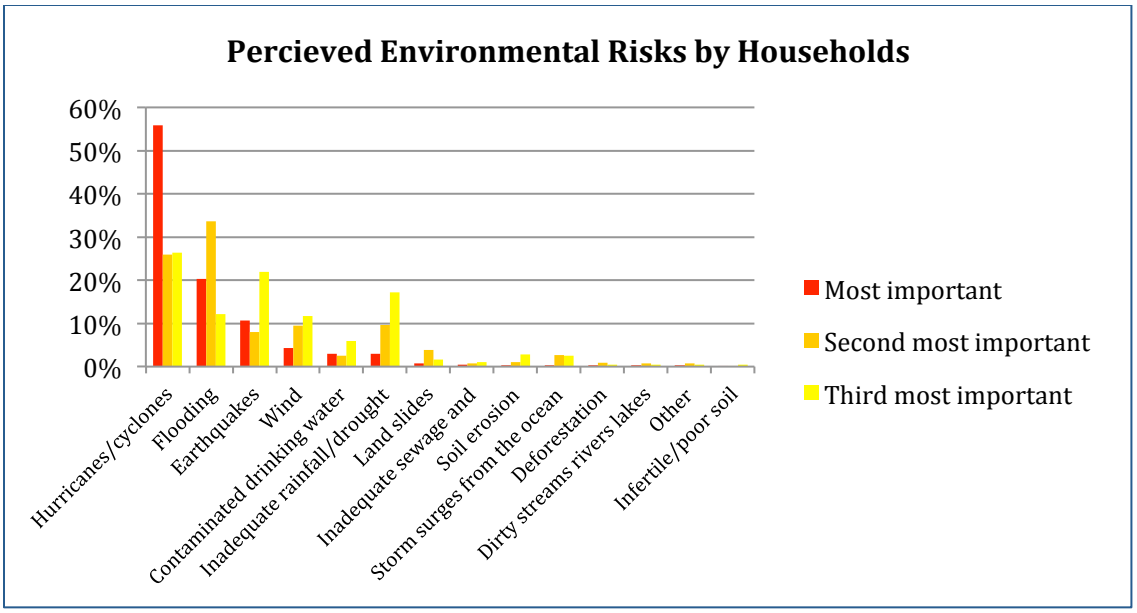
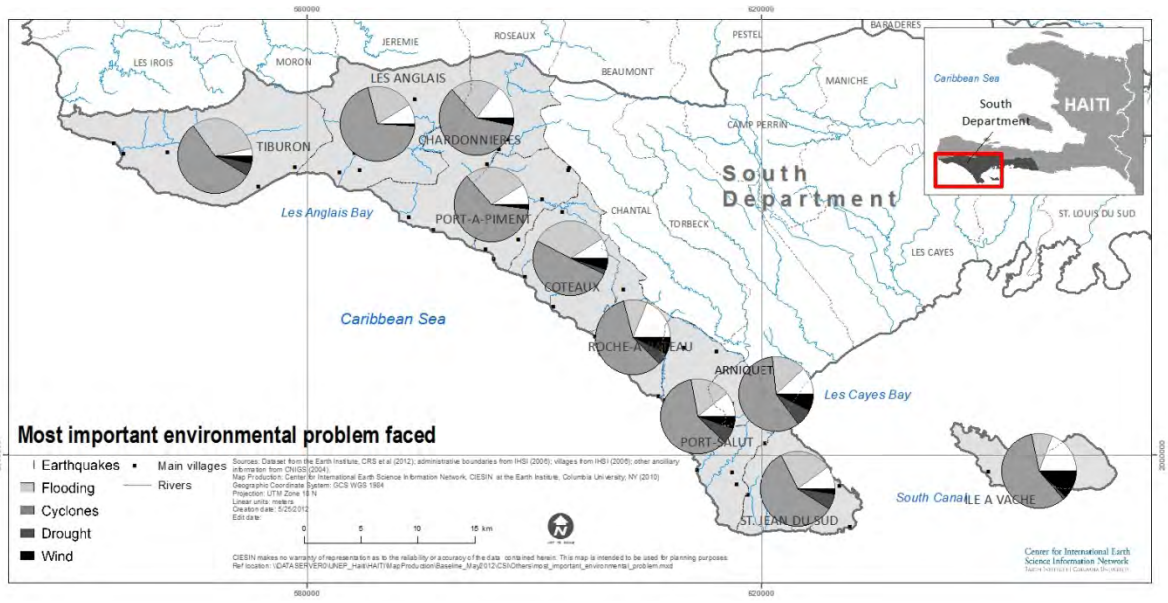


Figure 64: Environmental problems perceived as important.

When considering additional important problems, household survey participants responded in greater numbers about concerns related to inadequate rainfall and drought, drinking water, wind, and landslides. Not all participants listed three main concerns, though those that do demonstrate an increased relevance about earthquakes, with 15% mentioning it as the second biggest environmental problem and 16% percent listing it as the third most important environmental problem in the past three years.

Survey respondents were asked to identify all of the potential risks to their household. Given the multiple hazards in this part of Haiti, surprisingly less than half of the inhabitants (48%) identified more than two environmental risks. The reason may be that most people have very recently experienced two specific types of events, namely hurricanes and flooding. These occurrences and their consequences may have been perceived as more severe than other events, therefore possibly overshadowing all other environmental hazards. In fact, those who can point to a particular year when they last experienced loss or damage from hurricanes will refer to very recent incidents: 2011 (62.6%), 2010 (13.3%), or 2008 (9.8%).

While flooding is perceived as a serious problem across the ten communes, it is of greatest concern to the residents of three communes in the northwestern part of the department. 31% of people in Tiburon cite flooding as the most important problem, followed by 30% in Coteaux, and 27% in Port-à-Piment.



Map 23 Map of environmental risks ranked as most problematic by households. Data is shown by commune and broken down by issue.

When interviewees were presented with a list of hazards common to the region and asked to rate the seriousness of the threat of each, the top four items remain mostly the same as in the free-listing task. Hurricanes were rated as very serious by 88% of respondents. Flooding is seen as very serious by 77% of respondents, followed by wind (68% say is very serious), and inadequate rainfall/drought (67% say is very serious).

Close to 50% of the resident of the ten communes surveyed in 2011-2012 rate each of the following as a serious threat when asked to identify environmental problems directly: Infertile/poor soils, deforestation, contaminated drinking water, dirty streams/rivers/lakes, and soil erosion. Roughly a third list landslides, storm surges, inadequate sewage and sanitation pose a serious risk. Earthquakes and climate change get the lowest rating and are seen as severe threat by only 19.4% and 16.9%, respectively, and as a somewhat serious threat by 23.9% and 37.3%, respectively.

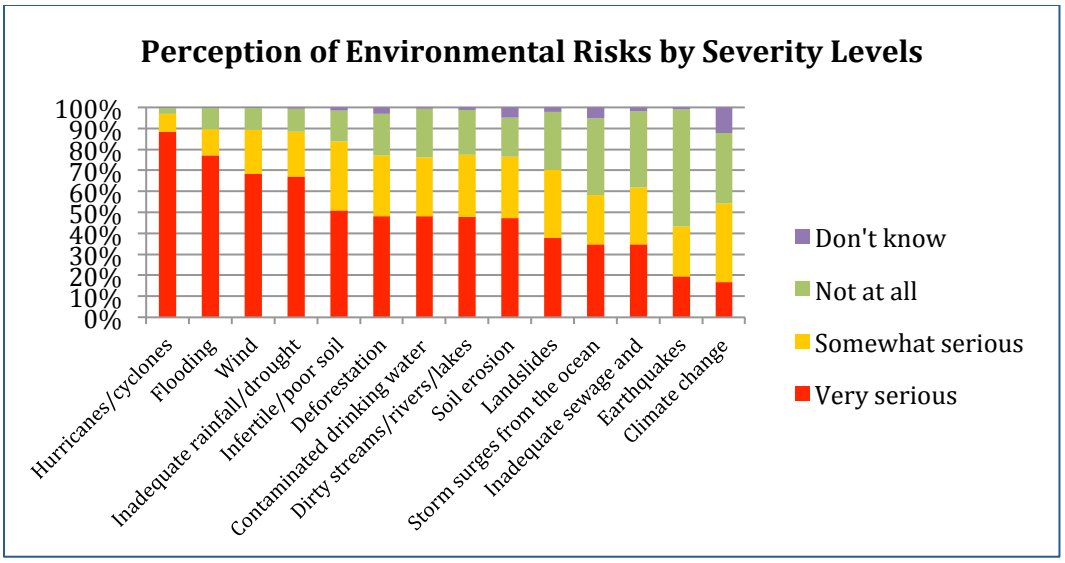


Figure 65: Perception of seriousness of environmental risk (prompted)

In order for conservation interventions or planning mechanisms to be effective, it is equally important to note what the population does not perceive as a threat as it is to note what is perceived as threatening. More than half the population is not worried about earthquakes, which could be explained by the fact that the ten communes were only indirectly affected by the 2010 earthquake, primarily through emigration from Port-au-Prince and other affected cities, loss of income due to death of supporting family members in Port-au-Prince, among others. The table below describes environmentally related factors that were not perceived as serious by heads of households. Insufficient water quality appears to be underestimated by residents: 36.1% of households don't view inadequate sewage and sanitation as a threat at all, 23.1% are not worried about contaminated drinking water, and 21.6% don't feel threatened by dirty streams, rivers, or lakes.

Environmental issue ranked as "not serious"	% of Respondents
Earthquakes	55 %
Storm surges from the ocean	36%
Inadequate sewage and sanitation	36%
Climate change	33 %
Landslides	27%
Contaminated drinking water	23%
Dirty streams/rivers/lakes	21%
Deforestation	19%
Soil erosion	18%
Infertile/poor soil	14%
Inadequate rainfall/drought	11%
Wind	10%
Flooding	9 %
Hurricanes/cyclones	2.80%

Table 19: 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 all respondents have experienced loss or damage related to an extreme event. When asked about the most recent such event, the majority of interviewees (70%) attribute these damages to a hurricane or cyclone. People experienced losses also as a result of flooding (20%), which may or may not be related to hurricane activity. Only a small portion of damages and losses are linked to contaminated drinking water, inadequate rainfall, earthquakes, and wind (between 1.7 and 1.9%). Storm surges, landslides, dirty streams, soil erosion, inadequate sewage and sanitation, infertile soil, and deforestation were not mentioned as damage-causing events.

Type of extreme event that most recently caused damage/loss	Percentage of respondents
Wind	1.6%
Earthquakes	1.8%
Inadequate rainfall/drought	1.9%
Contaminated drinking water	2.0%
Flooding	19.8%
Hurricanes/cyclones	69.9%

Table 20: Experiences with damage/loss causing events.

Hurricane Warnings

Close to half of the households surveyed in the 2011-2012 survey (44.1%) had no warning at all before the last hurricane they experienced. Only a little more than half of the population (55.6%) had some type of advanced warning. The reported lead-time of warnings ranged from one day in advance to thirty days. Among the households who responded to the question about warning lead times, roughly 40% had 2 to 3 days warning, almost 20% had heard roughly a week in advance, and very few had more than nine days of warning. Three percent of respondents stated that they were alerted only within hours, ranging from 1-12 hours.

Reported amount of time (days) of first warning prior to hurricane/cyclone	Percentage of Respondents
1	5.9%
2	18.4%
3	19.9%
4	9.9%
5	12.0%
6	2.8%
7	9.5%
8	11.0%
9	0.2%
10	2.2%
15	3.2%
30	0.5%
don't know	4.5%

Table 21: Lead times for those respondents who had any warning.

The majority (57.5%) of warnings are communicated via radio. In-person discussion and SMS/text messages are the second and third most frequent methods of sharing information about approaching hurricanes (15.1% and 11.2%, respectively). Other means, mentioned by 12.9% of respondents, include megaphones and local members of the civil protection council (pwoteksyon sivil).

Apart from radio, most of these means of communication are very localized and dependent on already existing social networks, either among friends and family members or within specific communities. It is important to note both the strength of this model—that through these existing means, more than half of the population is able to gain awareness of impending weather events—but also the shortcomings of the model, as just under half of the population still had no warning. Where lack of access to radio for economic reasons and remoteness adding to social isolation can pose as impediments to some existing communication, there may be ways to increase warning by spreading and advancing both the formalized means of information dissemination, such as radio announcements, as well as helping to reinforce existing social networks to spread the formalized messages into the most vulnerable communities.

Means of communication	% of Respondents
Radio	57.5%
In-person discussion	15.1%
Other	12.9%
SMS/text message	11.2%
Phone call	3.3%
Internet	0.0%

Table 22 Means by which warnings were received.

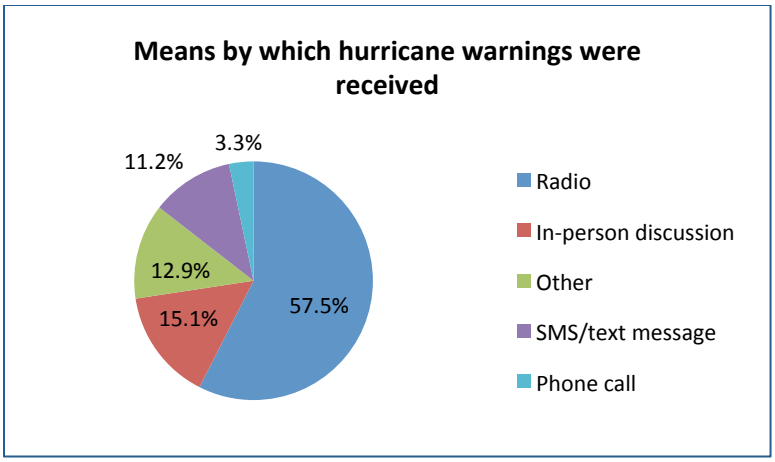


Figure 66 Communication mechanisms used to receive warnings about hurricanes.

Local community members play a large role as messengers of hurricane warnings: Among the households who received any in-person warning or phone call, it was either a family member or friend living in the community (28%), or local community organizers and leaders (19.6%) who first alerted them. Automated machines for phone or SMS/text messages also play role in the distributing warnings (27.6%). Only a small portion of households report that they were informed by government or NGO workers (8.4%) and family members or friends living outside the community (6.3%).

Type of message	% of Respondents
Family member or friend living in the community	28.0%
Automated machines for phone or SMS/text messages	27.6%
Local community organizers and leaders	19.6%
Government or NGO workers	8.4%
Family members or friends living Outside the community	6.3%
Other	4.9%
Don't know	0.3%

Table 23: Type of messengers spreading hurricane/cyclone warnings.

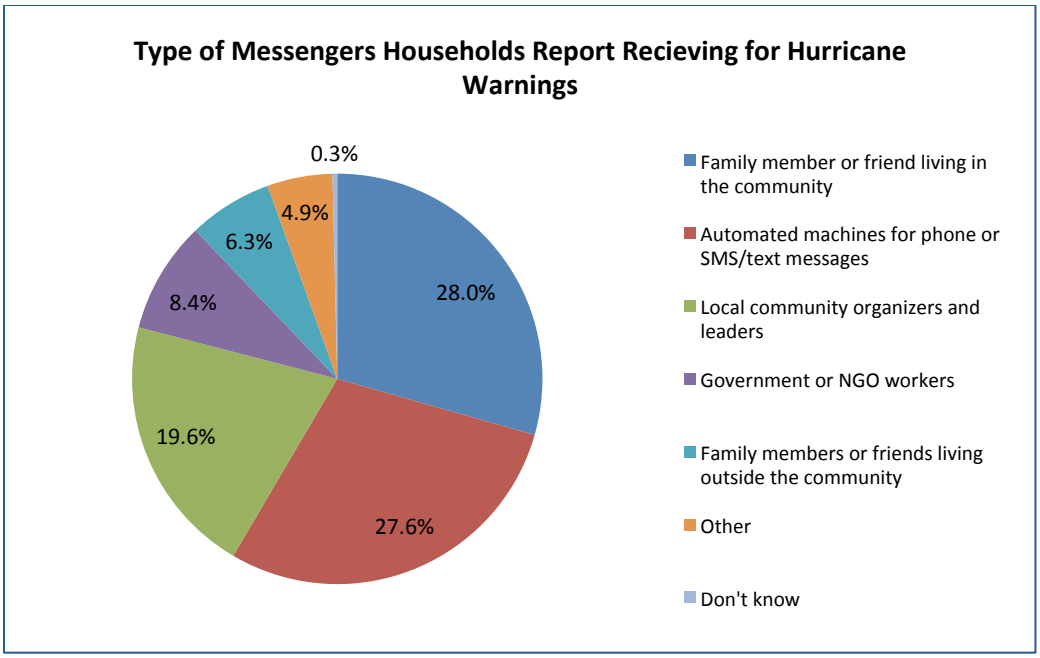


Figure 67 Type of alert and warning message reported prior to hurricane/cyclone.

ENERGY

Though Haiti has among the lowest per capita energy consumption in the world, the current energy demand is being met through unsustainable collection and harvesting of biomass. The national demand for energy is directly linked to the pressures driving environmental degradation in southwest Haiti. Improving energy sources, reliability of service, efficiency of energy production and transmission and rural access to sustainable energy sources are critical interventions to reduce natural resource pressures and improve community well-being and long-term pathways to increased household wealth.

The household sector represents 70% of the energy consumption in Haiti (Angelier 2005). The majority of this comes from biomass (wood and charcoal) to fulfill household energy need. This has a specific and disproportionately high impact on the southwest region. Urban demand for charcoal, particularly in Port-au-Prince, comprises the majority of national consumption and drives the majority of rural production of charcoal in the south, due to its relative abundance of woody biomass. Charcoal production in the Port-à-Piment watershed acts as a household income safety net and large source of cash income (Earth Institute, 2011). This dependency is estimated to have increased right before school fees each year, in the aftermath f major floods, droughts or other strong weather events, and following the internal migration of displaced family members after the earthquake in 2010.

Roughly 75% of total energy sources in the country come from biomass, and formal energy structures rarely extend beyond large urban areas (International Crisis Group 2009). As access to electricity is limited in both urban and rural zones, the remaining forests of the South Department and elsewhere serve local energy and economic needs through wood collection and charcoal production. The charcoal trade increases soil degradation, links to the drivers of increased run off and contributes to long-term reduction of agricultural productivity through watershed. The lack of alternative energy sources contributes to the dependence of wood at the household level, which is contributing to the deterioration of the Haitian ecosystems (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 electricity grid remains insufficient. As of 2011, the National Electricity Company (Electricité d'Haïti, EDH) only connected three out of the ten communes in the study area. Mini-grids of mixed diesel and solar panels exist in the major costal towns and large upper watershed town of Randel.

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, gaining more income for the producer with less wood.

Costs of wood and charcoal do not accurately transfer the true value of the wood to the consumer, with urban charcoal costs fall well below kerosene and gas, making it the only affordable option for the majority of urban-dwellers. In 2011, one charcoal bag costed 400 HTG in Port-au-Prince and would last an average household almost two weeks, though most households purchase charcoal in smaller units for anywhere from 0.5 to 2.5 Haitian gourdes. Rural households rely on collected wood to reduce the price of energy as much as possible. 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.

COOKING FUEL

The 2011-2012 household survey indicates that the overwhelming majority of households in the ten communes cooks meals at home (97%) and rely on traditional fuel as the primary source of energy. Fuelwood is the main source of energy used, with 85% of the households reporting it as the primary source; 91% of households responded that it is either their primary or secondary source. This high rate of fuelwood usage is higher than the value of 78% found in DHS data for rural Haiti generally in 2006 (Cayemittes et al 2007). Charcoal is another traditional fuel used for cooking in the ten communes, though mainly as a secondary source, by 52% of the households. While secondary to fuelwood, charcoal usage is still prevalent throughout southwest Haiti.

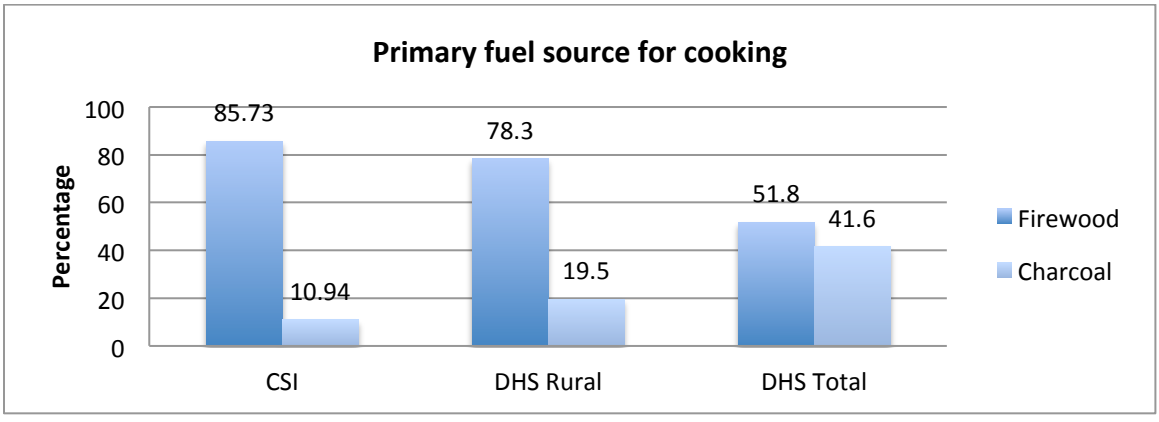


Figure 68 Primary fuel source for cooking. Average of ten communes and DHS rural versus total.

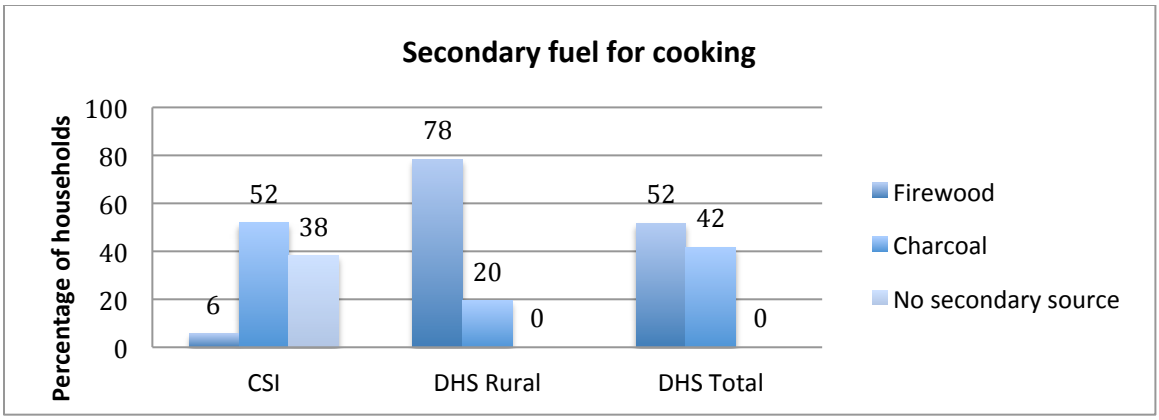


Figure 69 Secondary fuel source for cooking in ten communes and for DHS Rural versus total.

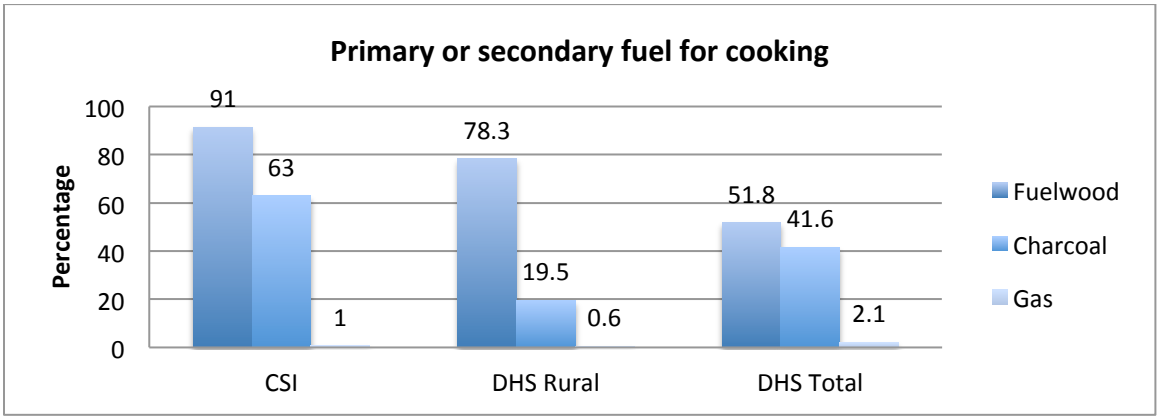


Figure 70 Primary and secondary fuel for cooking.

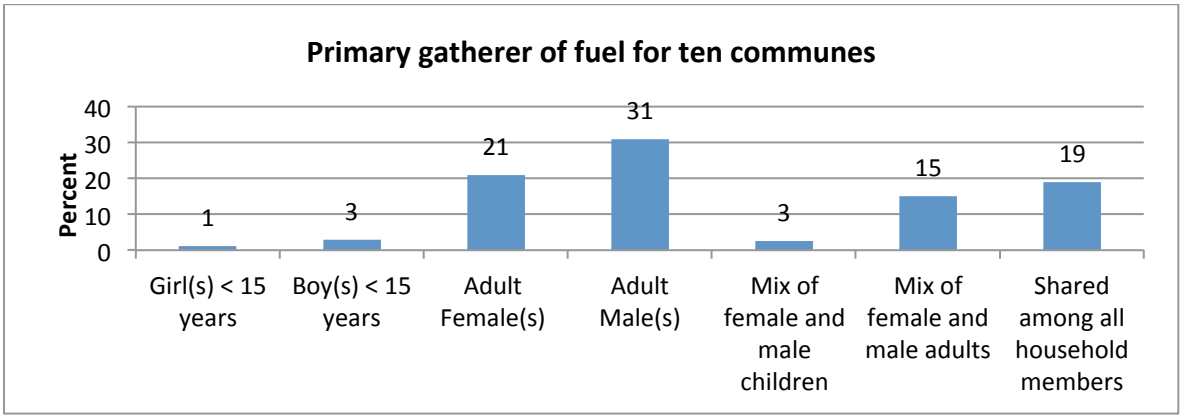


Figure 71 Percent of respondents identifying as the primary gather of fuel

The household survey indicates that fuelwood gathering is primarily undertaken by adults in households across the ten communes (67%) with the majority being either adult males (31%) or a mix of adult women and men. Only 4% children under 15 gather fuelwood. A challenging landscape and difficulty in finding fuelwood, which in the ten communes may require purchasing or cutting fuelwood (rather than simply collecting from the ground) may help explain

why adults (and particularly men) bear a large fraction of the fuelwood collection work in the ten communes. The average time to fetch wood and return is 43 minutes, though half of the respondents reported half an hour or less.

ENERGY FOR HOUSEHOLD LIGHTING

Kerosene is reported by the overwhelming majority of households of the 2011-2012 household survey (89%) as the primary energy type used for lighting. Approximately 70% of the households report no secondary source. Candles are an insignificant percentage of primary lighting; however, candles are the most important secondary source of lighting, used by about 12% of respondents. The use of batteries, whether dry cell or rechargeable, is extremely low both as primary and secondary sources, with under 1% of the total.

Electricity currently plays a much smaller but still significant role in household lighting, with a total of about 10% of respondents reporting primary use of either “electricity: grid or wire” (7%) or one of various other electricity sources (batteries, fuel-powered generator or solar system, at 3%) as their primary lighting energy source.

The household survey results do not distinguish clearly between power by wire from the national EDH grid versus power by wire from a local “mini-grid”. These mini-grids represent an important, but underutilized potential energy resource for residents of the ten communes. They exist in most major towns west along the coast beyond Port Salut, but they are plagued by technical and cost-recovery problems. If functional, they are typically operated by local community groups with some initial installation and set-up oversight by EDH.

The household survey reports of access to electricity are highest in communes of St. Jean du Sud, Arniquet, and Port Salut – all communes where grid is present in at least some settlements. In communes further west, reports of electricity access from “grid/wire” falls to around 10% of respondents (for Port-à-Piment and Roche-a-Bateau communes) and below 2% for the others (Chardonnières, Tiburon, and Coteaux). While household surveys may be revised in the future to better probe this distinction, they may not be the ideal instrument. The operational status, access rate, and reliability of these mini-grids is likely to be better characterized by individual assessments of each mini-grid as a local business. Initial stages of this work are underway, including analysis and metering. In any case, the rate of households using mini-grid power is expected to be well below 5% throughout the area.

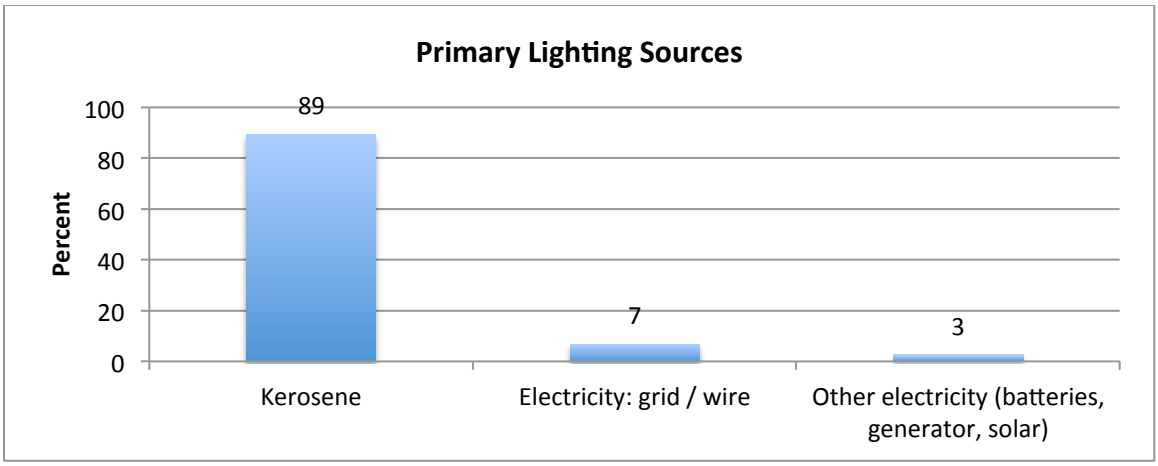


Figure 72 Primary lighting sources.

Households receive on average 23 hours of light per week from all the available sources, with 18 hours (81%) coming from kerosene 1. 9 hours (8%) from the second source, grid or mini-grid electricity, and 1.2 hours (5%) from candles.

Those households who have electricity by "grid/wire," or lighting by dry cell batteries report the most hours of light per week, at 29 and 23 hours, respectively. However, the household use rate is much lower for these lighting types, at 68 and 3 households, versus over 1,000 households reporting kerosene as the dominant lighting source.

	Average lighting hours per week (from primary and secondary sources) for all HH	% of total lighting hours
Kerosene	18.5	81%
Electricity/grid	1.9	8%
Candles	1.2	5%
Rechargeable batteries	0.2	1%
Dry cell batteries	0.3	1%
Generator	0.0	0%
Solar	0.5	2%
Total	22.7	100%

Figure 73 Average lighting hours per week in households.

	Kerosene	Electricity: grid / wire	Candles	Rechargeable batteries	Dry cell batteries	Generator	Solar
Average hours per week (# respondents)	20 (1002)	29 (68)	13 (4)	18 (6)	23 (3)	8 (4)	22 (14)

Figure 74 Average hours of energy per energy source reported by households

Choices made for energy expenditures are directly linked to the purchasing power of households, in consideration of other household expenditures. The weekly spending on primary and secondary lighting energy sources is on average 60 HTG (~US$1.40), primarily for kerosene. Kerosene is sold in small amounts, often daily small expenditures. For household food preparation, average weekly spending on primary and secondary cooking fuels is 80 HTG (~US$1.90). Note that households using charcoal generally pay more than double the amount per week vs. households using fuelwood. To recharge batteries, primarily mobile phone recharging, averaged 20 HTG a week (~US$0.47/ week).

These three categories of expenditure total ~160 HTG per week (~US$3.30/ week), Overall, the expenditure translates into ~$US170 / year or ~50 US cents per day. One important type of energy expenditure that was not present in the survey was dry cell battery purchases for non-lighting uses (radio being one important use). Dry cell battery costs were only captured to the extent that they constitute a primary or secondary lighting expenditure, though this was reported very infrequently.

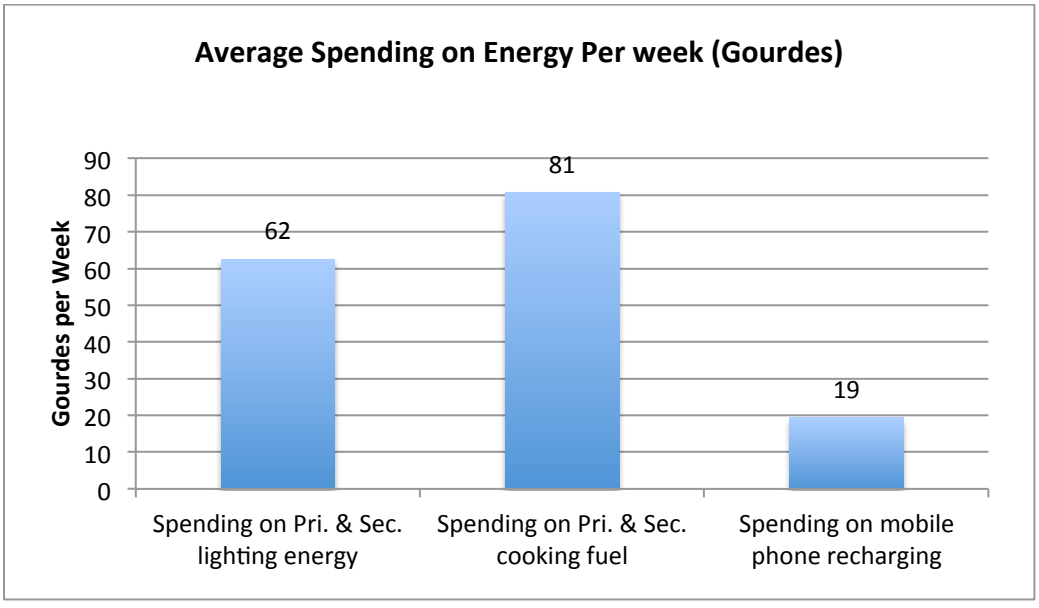


Figure 75 Average household energy expenditures per week.

ENERGY ASSETS

Household energy consuming assets within the ten communes region generally indicate higher ownership of small electrical or battery-operated appliances (such as radio, at nearly 30%) and much lower ownership of major electricity consuming (refrigerator) or producing (generators and solar home systems, owned by 2% and 4%, respectively). One noteworthy point regarding household appliances in the ten communes is the prevalence of "improved" cookstoves, which nearly 20% of households reported owning. However, ownership of cookstoves does not mean correct or continued usage within a household.

AGROFORESTRY AND TREE PLANTING

Environmental degradation continues to be one of most critical challenges in Haiti. Trees, both from native and imported species, are an important part of the Haitian agricultural and environmental system. While providing incentives for planting such as fruit, fuel and shade for households, they are also a vital part of stabilizing soils, particularly on steep slopes. Tree planting is quite common in the ten communes; 39% of households have planted trees in the last twelve months. The most frequently planted species are listed in the table below. In the ten communes, a variety of timber species constitute the majority of household tree planting. The average number of seedlings planted by primary use or purpose is listed in the table below. Contrary to what was expected, timber and pole trees were the most common primary use, reported by 86% of tree-planting respondents. Fruit, nut and edible leaf trees (species usually found within agro-forestry systems) are the second primary use, reported by 53% of tree-planters. Medicinal trees, fodder trees and hedge trees or bushes are the least common purpose reported by tree planters, at 1% each.

While these numbers demonstrate the importance that trees already play in the agricultural and environmental systems, the totals are still low at the household level, especially given the large numbers of trees that would need to be planted across the landscape to protect exposed soils on steep land (Smukler et al 2012).

	Southwest average	TIB	ANG	CHA	PIM	COT	RAB	SAL	SJS	ARN	IAV
Proportion of households who planted trees in the past 12 months	39%	23%	43%	54%	36%	35%	36%	45%	31%	34%	44%

Figure 76 Proportion of Households who planted trees in the past 12 months

Household harvesting and use of wood products is also high, with 37% of households specifically reporting that they harvested wood-based products in the last twelve months. This percentage is consistent with the proportion of tree-planting households who reported harvesting trees from those planted in the last twelve months (35%). Only 6% of households who reported having planted trees last year kept them.

	Kreyol	Subspecies	Uses
1	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.
2	mango	*Mangifera indica*	Most important tree in Haiti, lengthy fruiting season of the tree, important asset harvested for wood, charcoal, and lumber.
3	fwenn	*Simarouba berteroana*	fast, straight growth and wide adaptability on shallow soils
4	chenn	*Catalpa longissima*	High wood quality and local demand, used for building boats
5	acacia	*Acacia spp.*	Considered a weed, this usually shows up as a volunteer in fallows or degraded land, used for fodder and charcoal

Figure 77 Tree species planted by households. Source Timyan 1996

11. PLANNING, GOVERNANCE, AND INSTITUTIONS

The complex and well-established networks of local associations, producer cooperatives, municipal government and local development associations are important social system building blocks for long-term sustainable development. This section provides an analysis of the various mechanisms for governance and planning relating to these building blocks. It looks into development planning stakeholders and their overlapping thematic work or interests. The general purpose of this section is to identify and examine the existing social mechanisms that address challenges within the ten communes of southwest Haiti. It also aims 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 of Port-à-Piment and the larger ten commune regional area of the Southwest. It also serves as a snapshot of agents working in the region at the time of the household survey. Future studies may look at changes over this time period.

MECHANISMS FOR GOVERNANCE AND PLANNING IN THE SOUTHWEST OF HAITI

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 government planning processes 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 at the commune and communal section.

Each of Haiti's ten departments is divided into administrative communes, which maintain management responsibilities over local development. There are 18 communes in the South Department. Each commune is headed by a municipal council, made of a mayor and two deputy mayors, assisted by the CASEC municipal assembly. Communes are grouped into arrondissements, or district units. The South Department contains five arrondissements, four of which fall within the ten commune study area. Ile à Vache is within the Cayes arrondissement, whereas the other nine communes form three arrondissements: Port Salut (communes of Port Salut, Saint Jean du Sud, and Arniquet), Les Coteaux (communes of Coteaux, Port-à-Piment, and Roche-à-Bateau), Chardonnières (communes of Chardonnières, Les Anglais, and Tiburon). Within each commune are smaller units called communal sections; in total, there are 24 communal sections in the ten communes-study region. Regional planning projects often focus on different geographic units, varying between commune level, arrondissements (like health systems) and departmental programs. Some projects follow environmental and topographic features, like watershed programs.

Arrondissements	Communes	Main Towns	Communal Sections
Les Cayes	Île-à-Vache	---------	Ile-à-Vache (1)
Port-Salut	Port-Salut	Port-Salut	Lazarre, Anse-à-Drick, Darbois, Dumont (4)
	St-Jean du Sud	St-Jean du Sud	Tapion, Débouchette, Trichet (3)
	Arniquet	Arniquet	Arniquet (1)
Coteaux	Coteaux	Coteaux	Condé, Despas, Quantin (3)
	Port-à-Piment	Port-à-Piment	Paricot, Balais (2)
	Roche-à-Bateau	Roche-à-Bateau	Beaulieu, Renandin, Beauclos (3)
Chardonnières	Chardonnières	Chardonnières	Rendel, Déjoie, Bony (3)
	Les Anglais	Les Anglais	Verone, Edelin, Cosse (3)
	Tiburon	Tiburon	Bloctote, Sèvre, Loby, Dalmette (4)

Figure 78 List of administrative and governance units in the South Department of Haiti.

Commune-level state institutions include the mayor's office or municipal council made up of the mayor and two deputy mayors and local representatives, the CASEC (Conseil d'Administration de la Section Communale) formed by the communal section council representatives, and the ASEC, which are comprised of the communal section assembly representatives, and the civil delegate, appointed by the executive branch of national government. Each of these positions, except for the delegate, is an elected position that represents a distinct geographic area. Other elected local officials and state institutions often use the mayor's office facilities which are usually located in the largest town or cluster; it also hosts two deputy-mayors who help with decision-making and municipal project or program implementation.

Planning begins, in theory, with assessments of community needs at the lowest political jurisdiction, the communal section, by the members of the CASECs and the ASECs. Information from the needs assessment and their budgets move up the chain of governmental units until it eventually reaches the Presidential office through the Minister of Interior. The latter has the responsibility to funnel needs assessment and budgets to Ministry of Planning, Ministry of Finance and Prime Minister's office where the budget would then be developed in accordance with local needs and appropriate funds would flow back down to the commune level. However, the highly decentralized system of government in Haiti, which is meant to play an important planning role, is neither fully implemented nor is funding formally required by law, which creates disincentives to planning at a local level.

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 MPCE and the 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, many of which are frequently changing. 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 visions, self-identified needs and priorities for future community development. Accordingly, to push forward local-level planning initiatives, it is necessary to secure national support for local programs through alignment with particular government or ministerial actors, or to align projects specifically with nationally-stated funding priorities.

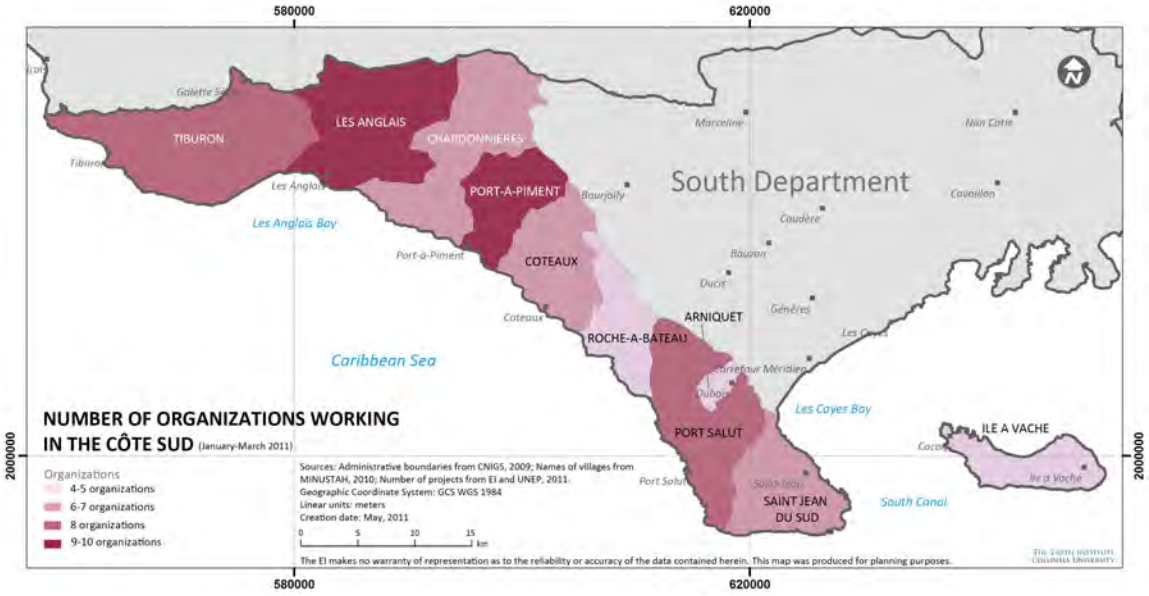
Six different national-level ministries are involved in planning activities at the regional and local levels. These ministries include the Ministry of Interior and National Defense; Ministry of Planning and External Cooperation; Ministry of Public Works, Transportation and Communications; Ministry of Finance; and the Ministry of Tourism. The Ministry of Agriculture runs extension programs and supports one full-time technician for the region, in addition to hosting occasional training seminars on soil preservation and erosion. Departmental senators and deputies oversee governance in their elected regions as well. And although officially (according to the constitution), the Delegates and Vice-delegates, appointed by the executive branch, are officially responsible for 'development' of their departments and arrondissements respectively, they often disconnected from the changes in national priorities relating to their districts. They also often do not have financial resources to implement projects.

FOREIGN AID AND INTERVENTIONS

Foreign entities such as NGOs and multi-lateral institutions often act in disconnected ways, which contributes to fragmentation at the local level and often circumvent local and regional bottom-up approaches to participatory planning practice. According to independent donor evaluations from the Center for Global Development, during the period of this study, only 3% of donor aid money went to support Government budgets (Ramachandra, 2012 p3). In the context of post-earthquake relief, the volatility of donor funding for programs has caused inability for the government to create long-term budgets and plans. In FY2010 the Haitian Government budget support increased from the previous $93.6million USD to $225million USD. As of July 2011 the Government FY2011 budget support had only received $48.8million. (Ramachandra, 2012). Small donor grants for short-term projects further undermine a longer term integrated planning approach. Ongoing efforts to rectify this institutional dilemma include USAID's LOKAL program and FAES's "Plan de Development Communautaire" program, two attempts to institutionalize systematic, local government-based planning processes.

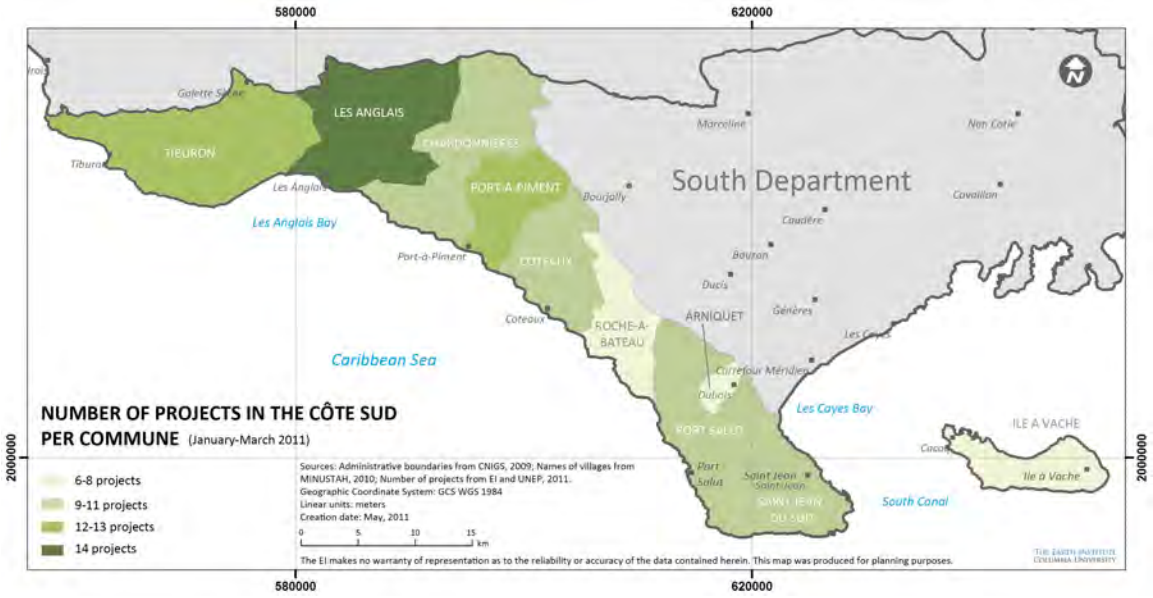
The research team identified and catalogued multiple organizations operating in the ten communes. A total of 51 organizations were identified across the ten communes, of which further information was obtained about 31 organizations. CRS is the largest NGO and provider in the southwest region, supporting projects in all ten communes and maintaining the largest

budgets. For more information, consult the Organizational and Projects Mapping Report (EI and UNEP 2011).



Map 24 Number of organizations working in the ten southwest communes. CIESIN 2010

There is an inconsistent pattern of projects and thematic sector-based distribution across the ten communes, with Ile à Vache having projects in five sectors whereas Port-à-Piment has projects in fourteen sectors. All communes have agriculture and agroforestry as well as health and education projects. Across the ten communes, the median of projects per commune is eleven, with a maximum of fourteen projects in Les Anglais and a minimum of six projects in Ile à Vache and Arniquet. Sectors such as agriculture, agroforestry and watershed management are present in most of the projects and across most of the ten communes. As these are challenges heavily prevalent throughout the region and the majority of the population is engaged in agricultural activities, they are of high concern for organizations. Nonetheless, they remain disparate efforts.



Map 25 Number of projects by commune in ten southwest communes. CIESIN 2010

	Agriculture	Agro-forestry	Government	Fisheries	Risk Reduction	Health	Education	Tourism	Water Sanitation	Development- Business	Infrastructure	Energy	Watershed	Nutrition	Housing	Communication	Capacity_ Building	Cash for work	Childhood	Biodiversity	Cash_grant
Ile à Vache	1	1				3	1				1										
Port-Salut	2	2		1	1	4	3		2	1	2		1		1		1	3			
Saint Jean du Sud	4	4	1	1	2	2	3		1	1	2		2					1			
Arniquet	1	1			1	2	2		2	1	3								2		1
Coteaux	3	2			1	2	2		2	1	3		3				1	1			1
Port-à-Piment	2	2			4	3	1		2	1	4		4				1	3		2	1
Roche-à-Bâteau	3	3			1	1	2				1		1					1			
Chardonnières	3	3	1		3	3	1		2	3	3		4				1	1			1
Les Anglais	5	5			3	3	2		1	4	2	1	5				1	1			1
Tiburon	5	4		1	3	3	1		1	3	3		4					1			

Figure 79 Projects per sector, by commune of southwest Haiti. CIESIN, 2011

REGIONAL AND LOCAL ACTORS IN GOVERNANCE, PLANNING AND PRACTICE

At 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. The mayor is the elected head of the commune level of local government.

The CASEC and the ASEC are the elected heads of the communal section level of local government. The CASEC is made up of three members, with one being the head and two assistants, and all serve for four 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" or the ASEC. The ASEC is part of the elected committee or assembly responsible for approving budgets and state transactions in regards to decisions concerning state property. It is made up of elected members 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, as many do not have physical offices or resources. The delineation of the responsibilities of the CASECs and ASECs is still undefined institutionally. Thus, their roles in decision-making vary throughout the region and country, based on the local context and political dynamics. Overall, this institutional situation leads to a fragmented planning approach.

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 current formalized system. CASECs have essentially replaced the roles that 'chef de section' used to play under the Duvalier era, as mediators for conflict resolution, for example property conflicts including animals.

Many interviewees described the regional and local government planning bodies as largely information sharing and/or coordination conduits rather than strategic planning entities. Most do not have the political power or 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 improved planning processes. For more information please see the report on local planning mechanisms.

Regional Coordination Committees

The 'table system' includes three types of consultative meetings, called tables, at 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 (Table de Concertation). The Consultation Table serves as a communication resource between key stakeholders (governmental units, NGOs and the private sector) across sectoral line ministries to enable coordination of services and avoid duplication. Stakeholders are invited by the respective departmental ministerial heads to monthly meetings to learn about what other institutions are doing within the department across the various sectors. However, Consultation Table does not make joint planning decisions and this works against an integrated development planning approach.

Developed by the donor community and promoted by the United Nations Development Programme, Sectoral Tables are administered by Regional Directors of thematic ministries. People and institutions operating within a particular sector and relevant to the ongoing problems of a sector are invited to discuss pertinent issues related to say agriculture. At times, Sectoral Tables serve as an effective platform for priority alignment for immediate response. They do not often serve as an effective platform for planning and decision-making. An example of such collaboration at the Table Sectorial 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 division of work and responsibility, within 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 or a coordinating body setup to manage a given project in a municipality. It is temporary by design, thus the presence and number of steering committees fluctuates dependent upon the projects in the region.

Local Development Councils (Conseil Developpement Kominal/Seksyon Kominal)

The local development councils were initiated by FAES in some of their target communes. In the Southwest area, this includes the commune with development plans implemented by FAES: Coteaux and in the Southeast in Aquin. A FAES representative noted that where the two councils -- Communal Development Council and the Communal Section -- are present, they essentially

replaced the Commune Table. These councils tend to exist based on the willingness of the local mayor especially so as to be transparent.

PARTICIPATION OF WOMEN IN ORGANIZATIONS AND EXTENSION TRAINING

Haiti is advancing towards achieving MDG 3 for gender equality and women's empowerment. Gender equality reaches beyond the rate of enrollment in primary and secondary schools to equal participation of women in community organizations and post-secondary professional development. Experience has shown that the scale of women's participation in community-based organizations is indicative of the level of social engagement in a particular community, and that women's participation has a strong impact on the sustainability of development interventions.

PARTICIPATION IN LOCAL ORGANIZATIONS

In the ten communes, on average, just under a quarter (24%) of the population of women surveyed participate in local organizations. Among the Southwest communes, Ile à Vache (42%), Les Anglais (31%) and Chardonnieres (29%) have the highest participation levels of women; communes with the lowest participation include Roche-à-Bateau at 16% and Port Salut at 19%.

In 2010, MARNDR developed an inventory of community-based organizations working in Port-à-Piment commune. This database of 26 organizations provided details on each organization's purpose and 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 integrated 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 fifteen organizations that had over 30% of female members, all but one engaged in farming activities such as agricultural extension and outreach, raising livestock, 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.

Though these figures highlight the crucial role women play 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. (Kim Blanco, 2011)

PROPORTION OF WOMEN PARTICIPATING IN EXTENSION TRAININGS

Post-primary and secondary extension trainings, which include agricultural trainings, are available in the ten communes. The proportion of women who have received some form of extension training within the past twelve months since the time of survey is 15% in the region. This number varies among the communes, with a high participation in Les Anglais (30%) double than the average and much higher than communes with the least participation in Port Salut (5%) and Tiburon (8%).

The participation numbers, both for trainings and in organizations, are partially a function of the organizations present in the ten communes and the training services that are offered. Across the surveyed area, the majority of women who participated in extension training participated in health-oriented trainings (40%), followed by water (22%) and agriculture (16%). As of 2011, across the ten communes, there were fewer health and water and sanitation projects (seven and four, respectively) underway compared to environment-oriented projects, such as in agriculture (ten), agroforestry (nine) and watershed management (eight). The prevalence of environment-oriented projects is indicative of the importance given to these sectors by the organizations at work and the cross-cutting role of the environment.

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ANNEX 2

Wealth Index Methodology

The research team constructed a composite score, or index, to visualize the main differences between the socioeconomic status among the sampled population in the household survey. The index makes it is possible to observe and identify the significant differences in estimated wealth. In the absence of expenditure or consumption data, the team found significant relationships between quartiles and endemic conditions such as location and elevation with the wealth index.

The wealth index assigned composite scores by households based on 15 variables and responses in the household survey. The results are calculated through a statistical algorithm to create a numeric score for each household. The scores obtained do not represent a specific unit of measurement. Instead, the coefficients derived for each independent variable (or score composites) are usually considered to represent relative weights, depending on the distribution and frequency of all responses combined. Individual frequencies and average values of each variable are depicted in table 1 below.

Table 1 List of variables included in the PCA for the wealth index. Coefficients, means and standard deviation by variable and category. The eigenvalue for the first component is 3.5236; the eigenvalue for the second component is 1.5815. The percentage of covariance explained by the first component is 23%

Variable	Weight	Mean	Std. Dev.
Housing characteristics			
Cement floors	0.38	0.54	0.50
Metal ceiling	0.36	0.78	0.41
Cement walls	0.32	0.20	0.40
Mud walls and floor	-0.24	0.12	0.32
Palm ceiling	-0.36	0.21	0.40
Household assets			
Owns at least one of the following: sofa, wardrobe, wall clock, computer, camera, TV, refrigerator, bicycle.	0.30	0.23	0.42
Owns mobile phone	0.27	0.63	0.48
Do not own any of the following: bed, chair, table	-0.24	0.15	0.35
Infrastructure & utilities			
Water source, piped into dwelling	0.17	0.08	0.27
Sanitation, no facilities	-0.30	0.57	0.50
Sanitation, flush toilet	0.10	0.01	0.10
Has access to electricity (grid, solar, generator)	0.16	0.02	0.15
Banking services			
Has access to a savings bank account	0.22	0.14	0.35
Livestock			
Owns at least: 2 cows or 4 goats or 15 chickens or 2 pigs	0.10	0.40	0.49
Land			
Has access to less than 0.5 kawo of land	-0.02	0.23	0.42

The development of composite scores or indices to rank households respect to their relative wealth or socioeconomic status has been the preferred method of various researchers when income values are not available (Filmer et al 2001; McKenzie 2005; Wietzke 2008). Following the methodology proposed by Rutstein et al (2004) from the Demographic and Health Surveys (DHS), the research team selected a list of variables that are more likely to be associated with differences in socioeconomic status in the 10-commune area. The list incorporates the possession of durable assets, access to services and infrastructure, quality of the house, access to credit and land (see table 1).

In order to obtain a score built up with the best possible linear combination of variables containing most of the variance, the research team chose to use Principal Components Analysis (PCA)[1]. Using PCA, each household was assigned a score based on the predicted value of the first component and then assigned a weight based on a newly calculated household size[2]. A final step in the calculation consisted on a score transformation, where negative values were transformed into positive values allowing for value "zero" as the lowest possible score[3].

Table 2 Summary of wealth index score, by quartiles

Wealth index	Obs	Mean	Std. Dev.	Min	Max
low	288	1.83	0.54	0.00	2.63
medium_low	287	3.25	0.33	2.63	3.78
medium_high	289	4.31	0.32	3.79	4.87
high	288	5.96	0.94	4.87	10.22

[1] The general equation to calculate a score using the first component of the PCA is:

$$score = b_{11}(X_1) + b_{12}(X_{12}) + \cdots . b_{1p}(X_{1p})$$

where:
b_{1p}= the regression coefficient (or weight) for observed variable p, as used in creating the first component of the PCA.
X_p= each household score on observed variable p.

[2] The weighed score counted each adult member of the household (ages 15 or above) as one, and each child dependent (ages 0 to 14) as half. Following these new parameters, a new household size (HH $_{size\ new}$) was created. The weight (w) value was then calculated by subtracting HH $_{size\ new}$ from the maximum value of the new household size (HH $_{size\ new\ max}$), and dividing it by the range of values from HH $_{size\ new;}$ mainly:

$$w = \frac{HH_{size\ new\ max} - HH_{size\ new}}{HH_{size\ new\ max} - HH_{size\ new\ min}}$$

By subtracting the new household size from the maximum value, the proposed weight normalized large households scoring high values in the index versus small households obtaining a similar score. At the end, the former will obtain a lower relative score than the latter.

[3] The weighed score with the transformation to positive values was calculated following the equation below:

$$score = [(PC_i - PC_{min}) + 1] * w$$

where:
PC_i =is the predicted score from PCA for each individual household
PC =min is the minimum predicted score from PCA from all households in the sample
w =is the weighed value obtained before, based on household size and age composition

Four categories were created (low, medium-low, medium-high or high) based on quartiles (see table 2). Each surveyed household was assigned into its corresponding category, based on its final weighed score. The distribution of the average score by quartiles per communal sections can be depicted in figure 1. There seems to be a geographic divide among communal sections in the southwest. Except for Cosse (3rd section in Les Anglais) and Paricot (1st section in Port-à-Piment) all communal sections situated to the left side from Des Pas (5th section in Coteaux) are more likely to fall within low to medium-low average scores. Contrastingly, sections in Saint Jean du Sud, Arniquet and Port Salut are more likely to score between medium-high to high, on average.

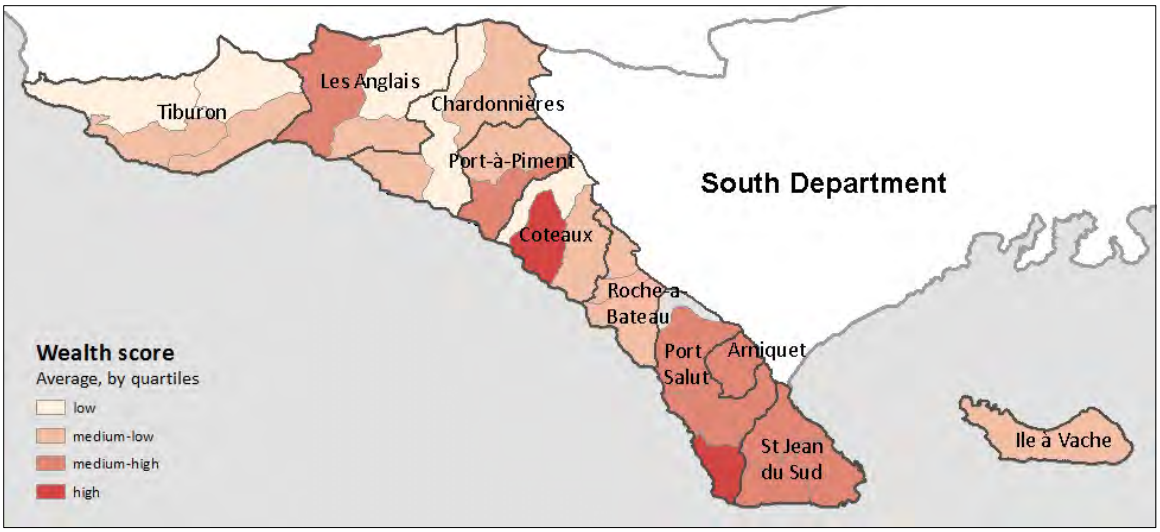

Figure 1 Distribution of wealth index across the 10-commune area, by quartiles.

Data validation process

The results from the weighed score were validated against other variables and models, as proposed by Filmer et al (2001), McKenzie (2005), Vyas (2006). As part of the initial validation, the signs of each coefficient were inspected as to have the expected effect (positive or negative) for each variable. Cross tabulation between selected variables and the score categories were plotted to confirm the expected trend of values. For instance, high frequency of positive variables was expected within the highest quartile. Inversely, high frequency of variables with a negative sign was expected within the lowest quartile. Finally, significant correlations were found between the weighed score and a sub-composite containing only durable assets (0.7941, P value=0.0000), as well as with the

same group of variables, but using factor analysis as an alternative index-formation method (0.7796, P value=0.0000).

However, the index has also relevant limitations that are important to note. Without expenditure and/or consumption data, poverty lines cannot be established. Even if the score intends to rank and therefore classify sampled households throughout the different levels of estimated wealth, it is not possible to compare those scores with a dollar amount or benchmark for relative wealth. It is, therefore, not possible to estimate the proportion of the population within or above the margin of acceptable living conditions, and vice versa.

Geographic analysis of results

The preliminary analysis showed that when the average scores of the four western communes (Tiburon, Les Anglais, Chardonnières and Port-à-Piment) were compared with the rest of the communes to the east, the differences in means were statistically significant [4]. The confidence interval (at 95%) for western communes showed significantly lower levels than the confidence interval for eastern communes. In other words, households who live in western communes are more likely to fall within the low or medium-low categories, as opposed to households living towards Les Cayes.

A population count was calculated to establish the areas with the highest probability of getting low scores, and to identify priority areas for targeted interventions. Given the differences in the distribution of the population across the 10-communes, it was possible that some areas were kept unnoticed if only percentages or proportions were considered. Similar to what was implemented during the sample design, a two-step selection of both research segments and households at the communal section level was conducted.

Figure 2 shows the top ten communal sections with the highest population counts within the index's lowest quartile. The probability of finding important clusters of worse-off households is higher in the communal sections of Blacktote (Tiburon), Cosse and Verone (Les Anglais) and Bony (Chardonnières)—all of them clustered to the west of the study area. Interestingly, two communal sections in Port Salut (Anse a Drick and Barbois) were captured as high priority areas. What this means is that the proportion of low scores from households in Port Salut paired with the large population therein has a

[4] An unpaired, two-sample test with unequal variances was calculated. The P value =0.0000 with a 5% (type I) error. The Central Limit Theorem was assumed.

negative effect in the count of the worse-off population. Interventions at Port Salut need careful beneficiary selection process to target those with the greatest needs.

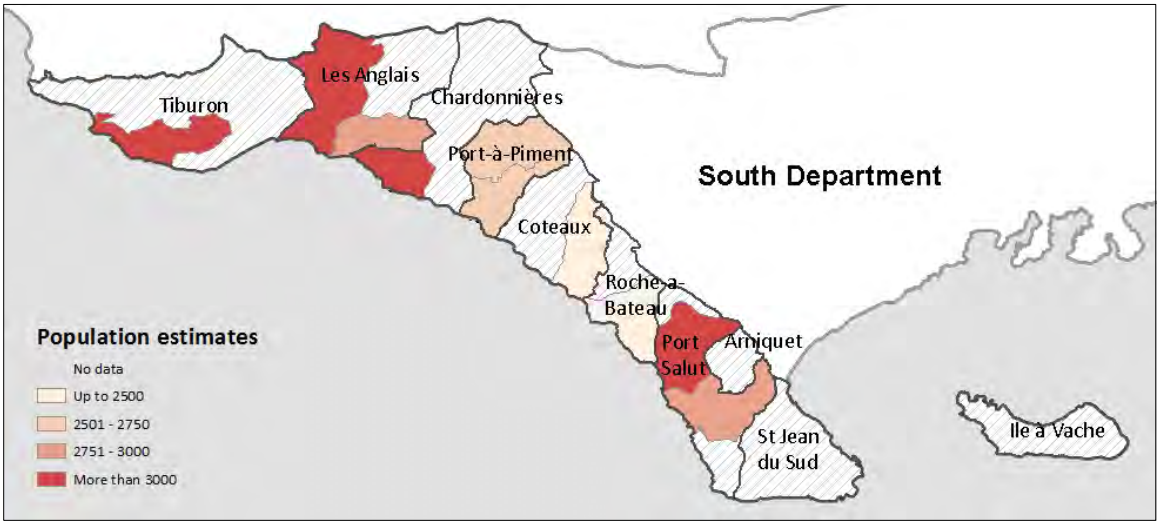

Figure 2 Population estimates based on the proportion of the population with the lowest score, by section communale.

The results of this study show geographic variation in wealth index. The results were averaged at each research segment and than extrapolated to spatial representation as seen in figure 1. The results reaffirm previous assessments such as the paper by Sletten et al (2004) that show poverty in Haiti to have a geographic bias. The results for the ten commune area showed similar patterns when the sample was divided into rural and semi-urban areas[5]. A significant correlation was found between the wealth score and the semi-urban divide suggesting that households are more likely to be better-off if they live in a semi-urban area (0.2916, P value=0.0000). Moreover, knowing that semi-urban areas are mostly concentrated among low rather than high-elevated areas, elevation (in meters) was also considered in the correlation model. The Spearman rank correlation (-0.1726, P value=0.0000) was equally significant although inversely associated, suggesting that households that live in high elevated areas tend to be worse-off than those living in the low elevation areas.

[5] The research team followed the same categorization of rural and semi-urban entities, as stipulated by the IHSI in 2003.

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" → (continue)

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:	___	___	___	

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: |_____| |_____| 90 = Don't Know Month YEAR: |_____| |_____| |_____| |_____| 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: |_____| |_____| 90 = Don't Know Month YEAR: |_____| |_____| |_____| |_____| 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:			

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 Lawa	
		6	14 Nyerere Avenue	Y	1	Harrison Cuatibalo	
					2	Paul Liande	
					3	Henry 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 Tendz	
		13	Mupundue Road	N			Mosque
		14	4 Mupundue Road	N			Vacant
		15	6 Mupundue Road	Y	1	Suzanne Henga	
		16	8 Mupundue Road	Y	1	David Chouta	
					2	Joseph Lupiya	
		17	10 Mupundue Road	Y	1	Eleni Fahmi	
		18	10A Mupundue Road	Y	1	Doctor Tadesse	Home upstairs, clinic downstairs

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

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.

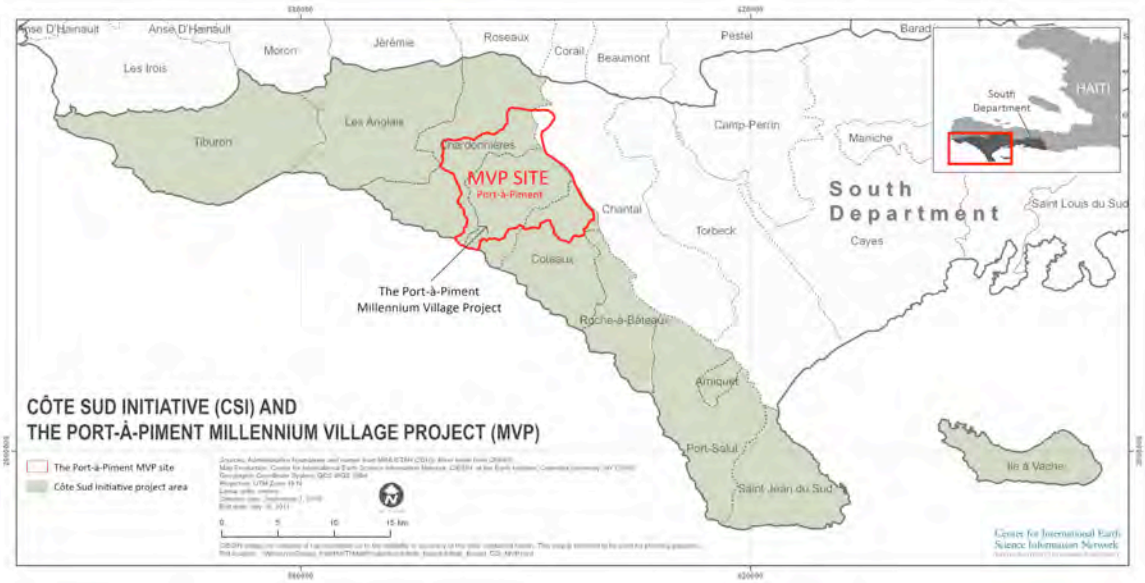

Figure 1. The map depicts the geographic coverage of the Côte Sud Initiative's Integrated Baseline Study. The red outline represents the Port-à-Piment Millennium Village. The shaded area represents 10 communes in the southwestern region, in Haiti. Source: the Earth Institute at Columbia University, 2011.

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

					Thematic Coverage									
No	**Survey tool**	**Unit of analysis**	**Study subjects**	**Geographic coverage** (number of communes)	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.

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.

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.

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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).

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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.

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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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