An assessment of child health and herbal home remedies in 16 batey communities of Sanchez Ramirez and Monte Plata, Dominican Republic

Picture posted with parental consent.

Meredith Camp
Peace Corps Volunteer, 2008-2010
Dominican Republic

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International Health, Global Disease Epidemiology and Control
Bloomberg School of Public Health
Johns Hopkins University

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INTRODUCTION

More than 4,400 Peace Corps Volunteers (PCVs) have served in the Dominican Republic since its inauguration in 1962 (1). Volunteers have contributed to technical skills transfer and institutional capacity-building in a wide range of fields, including agriculture, urban and rural community development, forestry, conservation, environmental education, community health and child survival, nursing, small business development, fisheries, water and sanitation, teacher education, university education, youth development, and information technology. Currently, there are approximately 150 volunteers working in 29 provinces of the country in five main technical sectors: Environment; Education; Community Economic Development; Health; and Youth, Family, and Community Development (2).

Within the Health technical sector, the Healthy Communities project targets low income, at-risk infant/maternal and youth populations living in small rural villages of the Dominican Republic in order to increase health education opportunities and access to resources that will result in healthier lives. The project has three broad goals:

1. Capacitate youth and young adults (18-24 years) as peer educators in the prevention of sexually transmitted infections and adolescent pregnancy
2. Capacitate mothers as child health promoters in the identification and prevention of dehydration, acute respiratory infections, and malnutrition in children
3. Capacitate mothers as reproductive health promoters in the identification and prevention of reproductive diseases and the importance of periodic papanicolau and self-breast exams

I was assigned to work directly in the three communities of El Jabonico, Las Arenas, and Doña María, three poor, rural communities with populations between 200 and 400 people in the Sanchez Ramirez region in the Southern Cibao Valley. I was also partnered with the national NGO Fundación de

Salud y Bienstar (FUSABI) and its community health promoters in 22 communities throughout the neighboring region of Monte Plata. In order to establish baseline knowledge of the general health condition of the communities as well as an understanding of the local beliefs and habits regarding current health practices so as to gain a foundation from which to design projects, I undertook a diagnostic study. Although the diagnostic household interview was designed to cover the large scope of health themes that are addressed in the Healthy Community project of Peace Corps Dominican Republic (PCDR), I took special interest in the issues related to child health as the infant mortality rate in the Dominican Republic is still one of the highest in Latin American and the Caribbean. It is this special interest that is the focus of this paper. Therefore, the following paper specifically addresses Goal 2 of the Healthy Communities project of Peace Corps Dominican Republic and focuses on the key contributors to high infant mortality: malnutrition, diarrhea, and respiratory infections. Additionally, as herbal remedies are very frequently used to treat common childhood respiratory illness and gastrointestinal disturbances, it is essential to address their role in order to fully assess the status of child health. Therefore, herbal home remedies for the treatment of respiratory infections, diarrhea, and parasites are a secondary focus of this paper.

BACKGROUND

FUSABI

The national NGO Fundación de Salud y Bienestar, Inc. was founded in 1989 by its director Guarionex Almonte Mora. The mission of the institution is to promote the sustainable development of local economies for the betterment of the quality of life, health, and environment in the poorest, most marginalized rural communities of the southeast, specifically the province of Monte Plata and the municipality of Jarabacoa (3).

Within FUSABI's three broad initiatives of gender equality, preventative health, and environmental protection, I specifically collaborate with FUSABI in the development of its health initiative. I was solicited to direct and train FUSABI's established network of 22 community health promoters, each from an impoverished rural community in the region of Monte Plata. The group consists of Dominican men and women between the ages of 20 and 55 years who are well-respected leaders in their individual communities. These community health promoters will be trained using Peace Corps' Healthy Homes model. Once a month I, along with a partner PCV Kenzie Kramer, will train the community health promoters on a specific topic related to a theme in preventative health: hygiene, sanitation, and potable water; child health; breastfeeding and infant nutrition; family nutrition; infectious diseases; female reproductive system; pregnancy; family planning; reproductive health diseases; sexually transmitted infections; HIV/AIDS; family violence; and first aid. Within the month before the next training meeting, the community health promoters will each visit 10 to 15 homes in his or her community to teach the health theme of the month. Using the FUSABI community health promoters and the Healthy Homes model, basic preventative health training will be widely multiplied throughout the region (4). This diagnostic study was the first step in their training.

Dominican Republic

The Dominican Republic lies on the eastern two-thirds of the island of Hispaniola. Its closest neighbor, Haiti, occupies the western one-third of the island. The Dominican people are a mulatto blend of Spanish, African, and indigenous Taino Indians and its culture therefore reflects all three heritages. From the Spanish, Dominicans inherited their language, cuisine, Roman Catholicism, and the patriarchal family structure. From the African and indigenous Indian cultures, they inherited their music (merengue), folklore, social activities, handicrafts, cuisine, and many of the names given to children. Spanish is the official language, although many indigenous words have been incorporated into Dominican Spanish. While Roman Catholicism is the predominant religion, Christian evangelical churches are becoming a more influential religious force in the country (1).

The climate is tropical with temperatures oscillating between 22 and 32 degrees centigrade and rainfall between 400 mm in the driest areas and 2,300 mm in the most humid areas (5). The environment allows for abundant agriculture, although the service sector has overtaken agriculture as the leading employer of Dominicans mainly as a result of growth in tourism and free-trade zones. More than one million tourists visit the DR every year, contributing close to US$1 billion to the economy. Remittances from the United States also help to support 30% of all Dominican families (1). However, the country has high levels of inequity in income distribution. In 2002, the wealthiest 20% obtained 53% of gross income whereas the poorest 40% only 14% (6). An average agricultural day laborer still earns approximately 150 pesos per day (less than $6 per day), and the unemployment rate is nearly 20 percent. The nation's $7 billion foreign public debt represents nearly half of its GDP, and less than 5% of GDP is spent on education, health and social welfare (6). Poverty incidence in the rural areas is three times higher than in urban areas, and it reaches extreme levels on the Haitian border and in the batey communities (work camps on the edge of sugar plantations in the east and along the border of the

Dominican Republic and Haiti) (1). In 2000, 54% of the population lived in poverty and 28% in extreme poverty; in 2003, these figures rose to 62% and 33%, respectively, after banking fraud caused losses of 20% of GDP, a fiscal deficit, and inflation of 42.7 percent (6). Severe energy shortages, with average daily blackouts of up to 12 hours, and a 60% increase in gas prices have had a domino effect on prices of general consumer goods and transportation. Additionally, the lack of access to potable water, inadequate access to basic preventive health services, and low pay in the service sector make it difficult for Dominicans to advance (1).

The country has a land area of 48,442 km^2 and an estimated population of 9.5 million, making the Dominican Republic one of the most population-dense countries in the western hemisphere (7; 8; 6; 9). Currently, 63.6% of the people are urban dwellers (6). This growth in the urban population along with falling mortality, birth, and fertility rates has placed the country in a stage of demographic transition. Almost one-third of the population is currently under the age of 15 years, but the population's age pyramid is shifting upward as the fertility rate has dropped from 7.5 births per woman in the 1970s to 2.8 births per women in 2008 (5; 7). In addition to the fertility rate, the education of the country has significantly improved; between 1996 and 2002, the percentage of people without elementary education fell from 20% to 10%, and the percentage of those with secondary education and university education rose from 25% to 30 percent. Nevertheless, among children who enter first grade, 50% complete just four years of primary school, 22% complete eight years, and 10% complete secondary school. Teenage pregnancies are a major contributing factor to school drop-out rates as 19% of teenage girls have children and 23% have been pregnant at some point (6).

Monte Plata and Sanchez Ramirez

This paper specifically addresses child health in the poor, rural regions of Sanchez Ramirez, in the Southern Cibao Valley (Region VIII), and Monte Plata, located north of Santo Domingo (Region 0)[1]. The vast majority of the people are subsistence agriculturists, growing yucca, sweet potato, and other root varieties to feed their families. The small communities of 50 to 100 houses scattered throughout the regions are connected by dirt roads and most are the remains of sugarcane settlements, or former bateys. As bateys historically consisted of a large Haitian workforce, many of the people in the area are Haitian or of Haitian descent. Consequently, language, dance, food, religion, and medicinal practices, among other cultural behaviors, are influenced by Kreol and Haitian voodoo. Additionally, as there is a strong and unrelenting prejudice against Haitians in the Dominican Republic, people of Haitian descent are denied most of the already limited public services in the area, such as medical care and access to community aqueducts.

After the sugarcane plantations were shut down at the end of the Trujillo dictatorship, the large pineapple company Dole was a source of prosperous employment for people in the area for twelve years. However, high taxes imposed by the government forced Dole to leave the country in 1996. Therefore, since there is no longer any employment in the area, the majority of the working-age class has moved to the cities and small towns, leaving grandparents to raise grandchildren with what they can produce from the land. Although the cities and small towns are familiar with many of the modern technological advancements, the poor, rural areas of the country are still overwhelmed by a lack of even basic infrastructure: unpaved roads, faulty bridges, expensive and unreliable transportation, inadequate schools, and few rural clinics or medical services of any kind. Imaginably, the health conditions of these regions are among the direst in the country.

[1] Maps of the country and area under study can be found in Appendix A.

Child Health Statistics

Although child survival indicators in the Dominican Republic vary depending on the source of the estimate, the generally agreed upon country-wide infant mortality rate is 30 deaths per 1,000 live births, one of the highest in Latin America and the Caribbean. However, this estimate also ranges from 26 per 1,000 live births in urban areas to 37 per 1,000 live births in rural areas, a difference of 30%, due to obvious differences in maternal health and nutrition and conditions of health services (5). The country-wide neonatal mortality rate is 20 deaths per 1,000 live births, ranging from 18 per 1,000 live births to 25 per 1,000 live births in urban and rural areas, respectively (5). As the regions of Sanchez Ramirez and Monte Plata are among the most rural and poorest in the country and are therefore characterized by inadequate nutrition and sanitary conditions and lack of access to health care, 37 deaths per 1,000 live births and 25 deaths per 1,000 live births are the most accurate estimates of the infant mortality rate and neonatal mortality rate, respectively, in the area under study. In 2005, the leading causes of death in neonates were neonatal sepsis, respiratory distress syndrome, and prematurity, while the main causes of post-neonatal death were septicemia, diarrhea and gastroenteritis, and pneumonia (10). Although there are equally large discrepancies in rural versus urban neonatal mortality rates as in infant mortality rates, neonatal deaths are most often the result of congenital disorders and are therefore much more expensive and technical to address on the health provider level than the largely socio-economic factors that contribute to infant mortality that can be addressed through behavior change interventions. For this reason, to confront the health of children under five years of age, Goal 2 of the Healthy Communities project of Peace Corps Dominican Republic, and hence this paper, specifically addresses the socio-economic factors that contribute to high infant mortality: inadequate water and sanitation, undernutrition and poor breastfeeding practices, upper respiratory infections and indoor smoke pollution, diarrhea, low vaccination coverage, and lack of access to health care.

According to the 2007 Demographic and Health Survey (ENDESA), 51.3% of houses in rural areas are made of cement blocks, 37.1% are made of wood, and 1.5% are made of palm leaves. The vast majority of houses have electricity; 86.6% of households in Monte Plata and 94.1% of households in Sanchez Ramirez are connected to the public electric grid. As for the source of drinking water in Monte Plata, 1.7% is a private tap in the house, 13.1% is a public tap outside of the house, 27.3% is a well, 5.8% is river water, 19.2% is rainwater, 8% is carried in a truck, and 24.6% is bottled. In Sanchez Ramirez, 4.9% is a private tap in the house, 10.6% is a public tap outside of the house, 5.6% is a well, 3.1% is river water, 19.4% is rainwater, 3.5% is carried in a truck, and 52.0% is bottled. Despite the large proportion of drinking water that comes from well, river, and rainwater, only 13.3% of households in rural areas report that they boil or filter the drinking water for everyone in the household and 9.0% report that they boil or filter the drinking water only for the children. Seventy-seven percent report that they never boil or filter their drinking water (8).

Waste disposal is a significant concern. In rural areas throughout the country, 36.6% of the trash is collected by the regional government. Of the remaining, 45.7% is burned, 12.0% is thrown in the yard, and 2.7% is thrown in the streams (8). As for human waste disposal, 22.1% of households in the Monte Plata region have a private toilet, 54.9% have a private latrine, 13.7% share a latrine, and 9.8% do not have anything whereas 43.6% of households in the Sanchez Ramirez region have a private toilet, 45.4% have a private latrine, 5.1% share a latrine, and 5.0% do not have anything (8).

Gas propane is the principal source of cooking fuel, used by 81.1% of the households in Sanchez Ramirez and 67.5% of households in Monte Plata. Other sources include coal, used by 1.2% of the households in Sanchez Ramirez and 6.5% of households in Monte Plata, and wood, used by 11.4% of households in Sanchez Ramirez and 20.3% of households in Monte Plata (5). Furthermore, coal and wood are still frequently used as a secondary fuel source even by those who have a gas stove,

contributing to large amounts of indoor air pollution. As cooking is traditionally the job of woman, along with child-rearing, it is the mothers and children who are subjected to the large amounts of cooking smoke inhalation. Cigarette smoke in the home is another common source of indoor air pollution, although it is a less significant source than coal and wood- burning stoves. Of women 15 to 49 years of age, 5.9% in the Monte Plata region and 6.4% in the Sanchez Ramirez region report that they smoke cigarettes, both under the national average of 6.5%. Of men 15 to 49 years of age, 11.6% in the Monte Plata region and 9.0% in the Sanchez Ramirez region report that they smoke cigarettes; the national average for men is 11.5% (8).

Based on weight-for-age measurements, 3.2% of children are considered undernourished (2 standard deviations under the mean) and 0.4% severely undernourished (3 standard deviations under the mean) in the Sanchez Ramirez region, and 5.5% of children are considered undernourished and 0.7% severely undernourished in the Monte Plata region (5). A large portion can be blamed on poor breastfeeding practices. Between 0 and 3 months of age, only 10% of children in rural areas are breastfed exclusively, and only 39% of children between the ages of 6 and 9 months in rural areas receive breast milk along with complementary foods (5). Specifically in the regions under study, there is an average of 6.6 months of total breastfeeding, 0.4 months of exclusive breastfeeding, and 0.4 months of predominantly breastfeeding in the Sanchez Ramirez region, and there is an average of 6.9 months of total breastfeeding, 0.5 months of exclusive breastfeeding, and 0.6 months of predominantly breastfeeding in the Monte Plata region (8). Furthermore, the already infrequent practice of breastfeeding is becoming increasingly rarer. According to the 2007 ENDESA, 23% of children less than 6 months of age that live with their mothers are not breastfeeding (compared to 21% in 2002). Eight percent (compared to 10% in 2002) are exclusively breastfed, and 9% receive water in addition to breast milk (compared to 6% in 2002) or water and juice in addition to breast milk (compared to 3% in 2002). In addition, 42% are given other types of milk (compared to 48% in 2002) and 19% receive supplementary

foods (compared to 8% in 2002) (8). This represents a notable a decrease in breastfeeding and increase in supplementary feeding in just the last five years.

In 2002, acute respiratory infections were the leading cause of illness and reason for medical care in health establishments in children one to four years old (6). According to the 2007 ENDESA, 8.3% of children under five years of age in the Sanchez Ramirez region and 5.7% in the Monte Plata region suffered from an acute respiratory infection (ARI), defined by a cough accompanied by rapid or agitated breathing or difficulty breathing, in the two weeks prior to the survey. Although the percentage of children with ARI symptoms are similar in households with mothers who smoke and do not smoke tobacco, the percentage increases from 6.9% in households that use gas stoves to 8.5% in households that use wood-burning stoves and to 9.6% in households that use coal-burning stoves (8).

Diarrheal disease prevalence in children under 5 years of age is considerable; between 2,000 and 5,000 cases a week are reported each year (6). According to the 2007 ENDESA, 14.7% of children under five years suffered from diarrhea during the two weeks before the survey, with the hardest hit groups being children between 6 and 11 months old (23.6%) and children between 12 and 23 months old (21.8%). Although this overall percentage is higher than the estimate for Monte Plata (11.9%), the estimate for Sanchez Ramirez is even higher at 20.8% (8). In addition, the percentage varies by sanitation facility; 14.3% of children from households with a private toilet or private latrine with a lid suffered from diarrhea in the two weeks prior to the interview, compared to 15.9% of children from other households with shared facilities or nothing (8).

The treatment of diarrhea also varies between the regions of Monte Plata and Sanchez Ramirez. Whereas 60.3% of cases seek treatment from a health care establishment in Monte Plata, only 30.8% of cases seek medical care in Sanchez Ramirez. In Monte Plata, 73.2% of cases are treated with oral rehydration solution or a general increase in liquids, 9.2% with antibiotics, 4.1% with anti-diarrheal

agents, 50.8% with home remedies, and 9.7% go untreated. Conversely, in Sanchez Ramirez, 54.3% of cases are treated with oral rehydration solution or a general increase in liquids, 7.3% with antibiotics, 2.0% with anti-diarrheal agents, 17.2% with home remedies, and 31.7% go untreated.

According to the 2007 ENDESA, only 52.9% of children 18 to 29 months country-wide are fully vaccinated with one dose of BCG, 3 doses of OPV, 3 doses of PENTA, and one dose of MMR (8). The vaccination rates in Sanchez Ramirez and Monte Plata are comparable to the rest of the country; the average coverage for all vaccines in Sanchez Ramirez is 50.5% and 54.8% in Monte Plata (8). However, only 39% of children are completely vaccinated on schedule before the child is 18 months old (8). The highest coverage is with BCG, a birth dose before the infant leaves the hospital, at 92% (10). The three PENTA/DPT and OPV doses are given on the same schedule and therefore have similar vaccination rates. However, the coverage of the first and third doses varies considerably. The first dose has a high coverage at 93% for PENTA/DPT and 95% for OPV; the third dose is a meager 65% for PENTA/DPT and 69% for OPV (5). Additionally, only 68% of children 12 to 23 months of age have received their measles vaccine, scheduled at one year of age (5).

Herbal Home Remedies

Towards the late 1990's the Dominican Republic's health care system exhibited systematic problems typical of many countries in Latin America: inadequate financing, low coverage, inequitable distribution of services, and an emphasis on curative care, among many others. Attempts at reform lasted almost a decade until two laws were passed in 2001 which separated health service provision and financing from the Ministry of Health and Social Services called SESPAS (Secretaria de Salud Pública y Asistencia Social) and created the Dominican social security system for health insurance and pensions. These laws entitle a basic health care package to all regardless of ability to pay.

Although there is no doubt that the health care system in the Dominican Republic is improving, the transition is slow and turbulent. Many people in small, rural towns still do not have convenient access to health care facilities; long distances and poor road quality make transport prohibitively expensive and difficult. Additionally, for many that live near a village level health post known as a UNAP (Unidad de Atención Primaria), they are frequently poorly staffed with few supplies.

Therefore, traditional herbal medicine that has dominated medical care for centuries, dating back to the African traditions of imported slaves, is still widely utilized to treat common ailments, especially by people in poor, rural towns for whom modern medicine is less accessible. In the 2007 ENDESA, for example, only 54.5% of child diarrhea cases nation-wide sought medical care. However, this number is as low as 30.8% in Sanchez Ramirez. Instead, the majority (50.8% in Monte Plata) treated the diarrhea with a medicinal herb (8). As herbal remedies are very frequently used to treat common childhood respiratory infections and gastrointestinal disturbances, as previously mentioned, it is essential to address their role in order to fully assess the status of child health. Therefore, herbal remedies for the treatment of respiratory infections, diarrhea, and parasites are explored in this paper.

METHODS

Developed and refined using the foundation of successful interviews used previously by Peace Corps Volunteers in the Dominican Republic, the diagnostic interview consisted of five to ten quantitative and qualitative questions in each of ten sections[2]: principal data (name, age, sex, education, and documentation for everyone over the age of five years; name, age, sex, documentation, arm circumference, flu and diarrhea prevalence, and vaccination history for children under five years of age); living conditions (type of house, water source, trash disposal, cooking source, tobacco smoke); opinions (community resources, necessities, and health problems); child health (diagnosis and treatment of upper respiratory infections and diarrhea, oral rehydration solution knowledge, and breastfeeding and vaccination practices); family nutrition (balanced meal knowledge, food diary, household production of food and animals for consumption); mothers' health (age of first pregnancy, number of pregnancies, miscarriages, prenatal check-ups birthing problems); family planning (knowledge and use of family planning methods); knowledge and frequency of pap smear and self breast exams; knowledge of transmission and prevention of sexually transmitted infections; and additional medical information (high blood pressure, respiratory issues, diabetes, frequent medications, and oral hygiene knowledge).

In addition to the extensive piloting and revision of the core interview done by previous DR PCVs over the years, the wording and content of the interview was reviewed by two leaders of the community and then piloted in five households. The final version of the interview was administered through home visits using two approaches: via the Peace Corps Volunteer and via the FUSABI community health promoters.

[2] The diagnostic interview (in Spanish) can be found in Appendix B.

With the support and guidance of several members in each community (including the FUSABI community health promoter) acting as hosts[3], the Peace Corps Volunteer administered 30 household interviews in Doña María, Las Arenas, and El Jabonico in November and December of 2008. In each community, the PCV first visited all of the households with children under five years, followed by households with older children, then households with adolescents, and finally households with adults and elderly persons. Due to the nature of the questions (especially reproductive and women's health questions) and the females' central role in the health and nutrition of the household, the interview was conducted with the head woman of each household.

In a meeting of the FUSABI community health promoters in January of 2009, the PCV introduced the purpose and format of the diagnostic interview and then trained the community health promoters on how to administer the interview to members of their communities. The community health promoters were taught how to read and clarify the questions without insinuating the desired responses and how to avoid the opinions of neighbors and family members from skewing the responses of the woman being interviewed. Between January and March of 2009, 13 community health promoters[4] each interviewed 10 to 15 households through house visits in their communities following the same sequence as the PCV: households with children under five years, households with older children, households with adolescents, and finally households with adults and elderly persons.

Due to limited resources in the field, arm circumference-for-age was used as an alternative indicator of nutritional status. The PCV and each community health promoter were equipped with a measuring tape. For each child under five years of age encountered, the mid upper arm circumference was measured and recorded. The Simplified Field Tables of the WHO Child Health Standards developed

[3] Doña María: Julia Serberino Guzmán, Alexander (Ali) Sánchez (FUSABI)
Las Arenas: Liliana Teres Enriques, Asencio (Kiko) Leonara (FUSABI), Juanita de Metría Martínez, Meri Aquino
El Jabonico: María Magdalena (Ayalivi) Pantaleón, Luki Félix (FUSABI), Eduvilge (Edú) Luci Félix

[4] The names and communities of the FUSABI health promoters can be found in Appendix C.

in the WHO Multicenter Growth Reference Study Group between 1997 and 2003 were used to determine the nutritional status of each child[5]. Children with an upper arm circumference measurement of two standard deviations under the mean for his or her age were classified as undernourished, and children with an upper arm circumference measurement of three standard deviations under the mean for his or her age were classified as severely undernourished. According to the WHO report published in 2007, the WHO Child Health Standards provide a technically robust set of tools that represent the best description of physiological growth for children under five years of age. The standards depict normal early childhood growth under optimal environmental conditions and can be used to assess children everywhere, regardless of ethnicity, socioeconomic status and type of feeding (11). Therefore, arm circumference-for-age is assumed to be an adequate indicator of nutritional status.

In addition to the mid upper arm circumference measurement, for each child under five years of age encountered, the PCV and the community health promoters attempted to verify the vaccination history of each child by examining the child's SESPAS vaccination card[6]. If the mother or caretaker of the child could produce the card, the existence of the card was noted and either the self-reported vaccination status of the child was confirmed or it was changed to reflect the information on the card.

Again, the objective of the diagnostic interview was to establish baseline knowledge of the general health condition of the communities in the region as well as an understanding of the local beliefs and habits regarding current health practices. The diagnostic was designed to include health statistics for the large scope of health themes that are addressed in the Healthy Community project of Peace Corps Dominican Republic. A rudimentary analysis of the data for the communities of Dona Maria, Las Arenas, and El Jabonico was performed and presented to leaders of the communities and Peace Corps Dominican Republic staff to begin the phase of project planning. In addition, a rudimentary

[5] The Simplified Field Tables of the WHO Child Health Standards can be found in Appendix D.
[6] The SESPAS vaccination card can be found in Appendix E.

analysis of all of the data was performed and presented to the FUSABI community health promoters and staff to identify priority health topics to be addressed in the training of the community health promoters. However, the focus of the data was too broad to analyze in detail in a single paper; therefore, this paper specifically addresses Goal 2 of the Healthy Communities project of Peace Corps Dominican Republic by focusing exclusively on the health of children under five years of age. This paper addresses nutritional deficiencies and undernutrition, upper respiratory infections, diarrhea, breastfeeding practices, vaccination coverage, and the influence of herbal home remedies on the health of children under five years.

This more thorough analysis of the under-five health indicators was carried out using Microsoft Office Excel 2007 and StataIC 10 statistical software (StataCorp LP**,** College Station, Texas). The quantitative data were entered into the program with each child serving as an observation; interviews of households without children were omitted, and households with multiple children were included once for every child. The total sample size was 279 observations. Two primary outcomes were investigated: respiratory infection prevalence and diarrhea prevalence in the 15 days prior to the interview. For both primary outcomes, predictors included current age of the respondent, material of the house, presence of electricity in the house, source of water, water purification habit, method of trash disposal, type of stove, type of sanitation facility, cigarette smoke in the house, current age of the child, gender of the child, nutritional classification of the child based on his or her upper arm circumference measurement, breastfeeding history, adjusted time of exclusive breastfeeding[7], and current vaccination status. Descriptive information on each variable and other logical checks were run to identify irregularities and appropriate corrections were made. Summary statistics of each predictor were also analyzed in addition to the qualitative data pertaining to reasons for not breastfeeding or vaccinating and herbal home remedy usage.

[7] Reported time of exclusive breastfeeding was adjusted to match the earliest reported month that a bottle, water, tea, juice, or solid food was introduced to the child.

Lowess nonparametric regression was performed on the three continuous variables: current age of respondent in years, current age of child in months, and time of exclusive breastfeeding adjusted by time of introduction of other liquids and foods. The relationship between current age of respondent and respiratory and diarrhea prevalence during the 15 days prior to the interview appeared to be non-linear with a knot at 25 years. There also appeared to be a non-linear relationship between current age of child in months, with two knots at 5 and 45 months, and between adjusted time of exclusive breastfeeding, with a knot at 2 months. However, Wald tests rejected all of these categories, so no departure from a linear trend was demonstrated.

Collinearity for the logistic regression was checked by performing a multiple regression analysis in place of the logistic regression analysis to calculate the variance inflation factors (VIF). The four categories of housing material were dropped due to high collinearity. Nutritional classification of the child based on his or her upper arm circumference measurement was also dropped because it predicted success perfectly and was collinear in the multiple logistic regression models. The resulting mean VIF was 1.69, signifying little collinearity among the remaining predictors.

For each primary outcome variable, simple logistic regression analyses were performed with each of the thirteen remaining predictors to find their crude odds ratios. A multiple logistic regression was then fit using all thirteen predictors. Those predictors that were significantly influenced by the adjustment with the other predictors were chosen for the final model along with those predictors that are heavily supported in the literature, such as type of stove and cigarette smoke in the house for the prevalence of respiratory infection and water purification habit and type of sanitation facility for the prevalence of diarrhea.

As there are a large number of unique covariate patterns in the data, the Hosmer-Lemeshow goodness-of-fit test with ten groups was used to check the fit of the models. Both the respiratory infection prevalence model ($p=0.075$) and the diarrhea prevalence model are adequate fits ($p=0.055$).

RESULTS AND ANALYSIS

Summary statistics

The mean age of the women interviewed is 31.36 years (SD 12.67). Sixty-one percent of the homes are made of wood, 26% of block, 11% of block and wood, and 2% of sheet metal (Pie Chart 1). Sixty-two percent of the households reported having electricity (Pie Chart 2). As summarized visually in Pie Chart 3, 45% of households use water from a private tap, 26% use water from a public tap, 22% use river or rainwater, and 7% use well water. Of the 47% of households that reported purifying their drinking water, 73% use chlorine, 11% boil the water, 8% use a combination of chlorination and boiling, 6% filter the water, and 2% drink bottled water (Pie Charts 4 and 5). As seen in Pie Chart 6, 59% of the interviewed households burn their trash, 32% toss it somewhere near the house, and 9% have it collected by trucks. Thirty-five percent of households reported using both a wood stove and gas stove for cooking, 35% reported using only a wood stove, and 22% reported using only a gas stove (Pie Chart 7). As for sanitation facilities, 61% use a private latrine, 18% no not have any type of sanitation facility, 12% use a shared latrine and 9% use a toilet (Pie Chart 8). In 28% of the households, someone who lives in the house smokes (Pie Chart 9). The mean age of the children in the study is 36 months (SD 17.49). Fifty-two percent of the children represented in the study are female (Pie Chart 10).

Based on the mid upper arm circumference measurement, 1% of the children are considered severely undernourished (3 SD under the mean) and 1% of the children are considered undernourished (2 SD under the mean); the remaining 98% of children are considered normally nourished (Pie Chart 11). Ninety percent of the children covered in the study are breastfeeding or were breastfed (Pie Chart 12). Even though 99.64% of the women interviewed agreed that breastfeeding is both more convenient and better for the baby than bottle-feeding, the middle 50% only exclusively breastfed for 1.5 months. As previously mentioned, reported time of exclusive breastfeeding was adjusted to match the earliest reported month that a bottle, water, tea, juice, or solid food was introduced to the child. For example, if

a woman reported exclusively breastfeeding for 8 months but also reported introducing bean broth to the child at 4 months of age, the adjusted time of exclusive breastfeeding was recorded as 4 months. The median is a better estimate of the average time of exclusive breastfeeding than the mean (mean 5.55, SD 8.14) as the data are skewed to the far right by the extreme outliers who reported twelve months or more of exclusive breastfeeding and did not report the months that a bottle, water, tea, juice, or solid food was introduced to the child. It can be assumed that these women did not fully understand the question. On average, a bottle was introduced at 2.33 months (3.50 SD), water at 1.21 months (1.52 SD), tea at 2.29 months (3.69 SD), juice at 3.67 months (2.82 SD), and solid food at 4.98 months (3.30 SD).

Commonly reported reasons for not breastfeeding are displayed in Bar Graph 1. These data were collected as a general, open-ended question (Why do you think some parents choose not to breastfeed their children?) and responses were grouped into common categories for analysis. By far, the most common reason reported was cosmetic; women think that other women do not breastfeed because they fear that breastfeeding will cause their breasts to sag or cause them to lose their figure or youthful appearance.

As seen in Pie Chart 13, 46% of children are not completely vaccinated for their age, and 54% are either in the process of vaccination or are completely vaccinated. A child in the process of vaccination is under 18 months of age and has received some vaccines but not all. Of these reported vaccination histories, 67% were verified by the SESPAS vaccination card (Pie Charts 14). However, the number of children not completely vaccinated is an underestimate of the number of children who are behind in their vaccinations. A better metric would have been whether the child is up to date for his or her age, a metric which the diagnostic interview was designed to collect. Unfortunately, however, the health promoters were not able to reliably collect information on what vaccines the children were

missing for their age due to a lack of adequate understanding of the vaccine schedule and an inability to properly read the vaccination card.

Commonly reported reasons for not vaccinating are displayed in Bar Graph 2. As with reasons for not breastfeeding, the data were collected as a general, open-ended question (Why do you think some children are not vaccinated completely for their age?) and responses were grouped into common categories for analysis. The overwhelming response was lack of parental care, meaning women interviewed believe that parents do not vaccinate their children because they are irresponsible parents who do not care enough about their child's health.

Finally, respiratory infection prevalence in the 15 days prior to the interview is estimated at 82% (Pie Chart 15). Diarrhea prevalence in the 15 days prior to the interview is estimated at 30% (Pie Chart 16).

Simple Logistic Regression Analyses

Baseline characteristics of the children stratified by respiratory infection prevalence in the 15 days prior to the interview are shown in Table 1. Baseline characteristics of the children stratified by diarrhea prevalence in the 15 days prior to the interview are shown in Table 2. Most variables are fairly balanced, although there is a higher respiratory infection prevalence and diarrhea prevalence in homes without electricity and in homes that burn their trash. In addition, children who had diarrhea in the 15 days prior to the interview are younger, on average, than the kids who did not have diarrhea in the 15 days prior to the interview.

The results of the adjusted multiple logistic analyses are shown in Tables 3 and 4. Unfortunately, none of the predictors are statistically significant. However, there are a few weak associations ($p<0.03$) that point to general trends that may be valuable to interpret.

The odds of respiratory infection in children may increase by 4% for every one year increase in current age of the respondent (95% CI 1.00 – 1.09, p=0.064). The odds of respiratory infection may also differ by method of trash disposal. Compared to the reference group of those who throw the trash in the yard, kids who live in households that burn the trash may be 42% less likely to have a respiratory infection (95% CI 0.22 – 1.53, p= 0.115), and kids who live in households in which the trash is collected by a truck may be 88% less likely to have a respiratory infection (95% CI 0.05 – 0.92, p= 0.115). Children who live in households in which someone smokes cigarettes may be 52% less likely to have a respiratory infection than children who live in households in which no one smokes cigarettes (95% CI 0.18 – 1.31, p= 0.151). Relative to those children who were never breastfed, those children who were breastfed or are breastfeeding may be 60% less likely to have a respiratory infection (95% CI 0.08 – 1.93, p= 0.252). Conversely, the analysis found that the odds of respiratory infection may increase by 3% for every month increase in adjusted time of exclusive breastfeeding (95% CI 0.97 – 1.10, p= 0.279).

Relative to those households who do not have electricity, children who live in households that do have electricity may be 39% less likely to have diarrhea (95% CI 0.29 – 1.27, p=0.190). Furthermore, the odds of diarrhea may increase by 62% for children who live in households that purify their water compared to children who live in households that do not purify their water (95% CI 0.78 – 3.40, p=.198). Finally, those children who are in the process of being vaccinated or are completely vaccinated may be 30% less likely to have diarrhea than those kids who are not completely vaccinated for their age (95% CI 0.49 – 1.01, p= 0.059).

Herbal Home Remedies

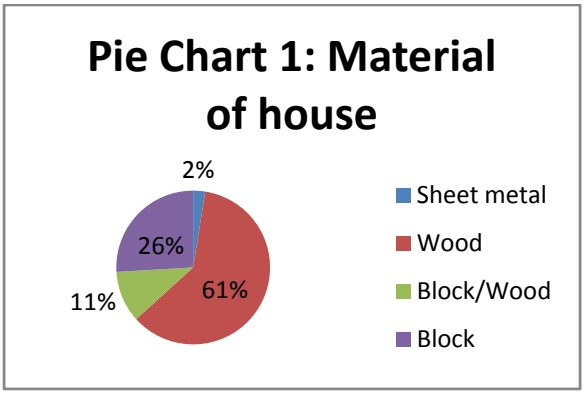
Of those who reported the use of an herbal home remedy for the treatment of respiratory ailments, the most commonly reported were citrus lemon and onion, each comprising 16% of the responses. The next most common responses were chinola or passionflower at 15%, black cherry and

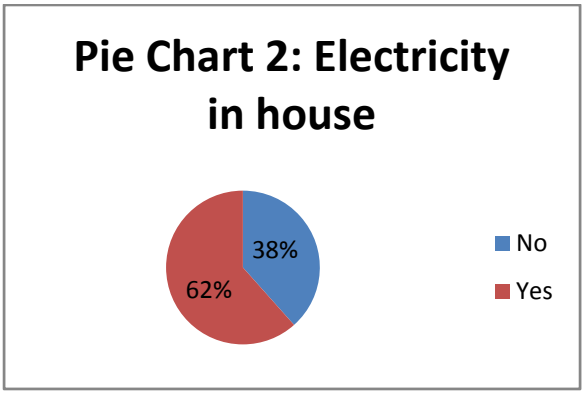
bitter orange each at 12%, and sabila or aloe vera at 8% of the responses. The remaining 21% of the responses included bacalao fish oil, lemon grass, custard apple, avocado, boneset, unripe plantain, and anise seeds. The frequency of the most commonly reported herbal home remedies for the treatment of respiratory ailments can be found in Pie Chart 17.

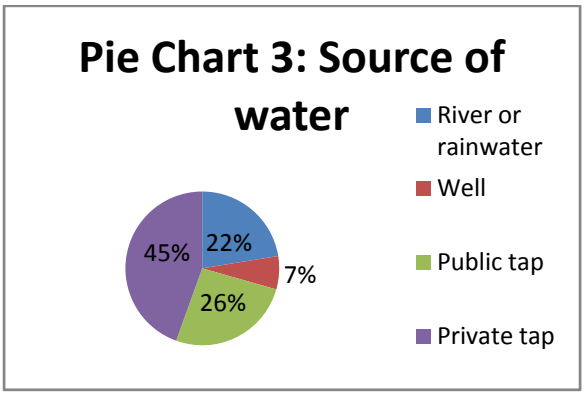
As for the treatment of diarrhea, oregano was the most common response; thirty-three percent reported its use, both the eating and the cooking varieties. In addition, 27% use guayaba, 16% use bitter orange, 12% use citrus lemon, 12% use coffee, and 2% use lemon grass. The frequency of the most commonly reported home remedies for the treatment of diarrhea can be found in Pie Chart 18.

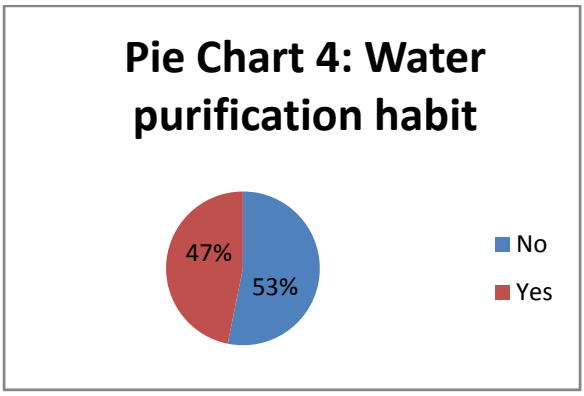
Of those who reported the use of an herbal home remedy for the treatment of parasites, the most common response was garlic, making up 24% of the responses. Next were pumpkin seed at 17%, aposate or wormseed at 16%, coffee at 12%, and guayaba at 10%. The remaining 21% of the responses included cucumber, carrot, senna, and neem or margosa tree. The frequency of the most common herbal home remedies for the treatment of parasites can be found in Pie Chart 19.

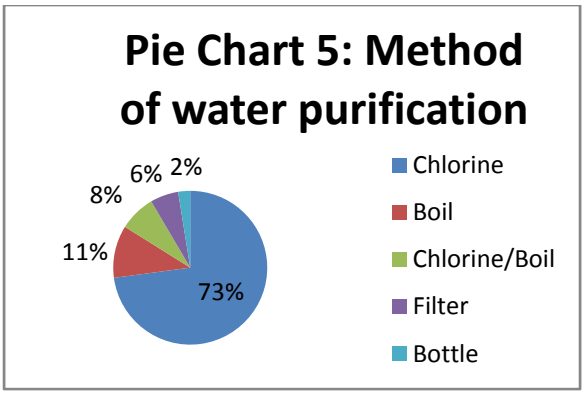
FIGURES AND TABLES

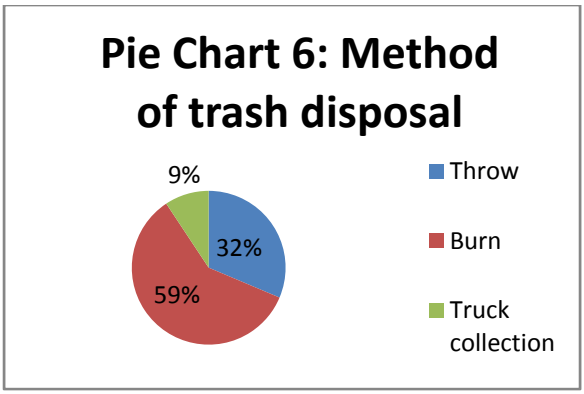


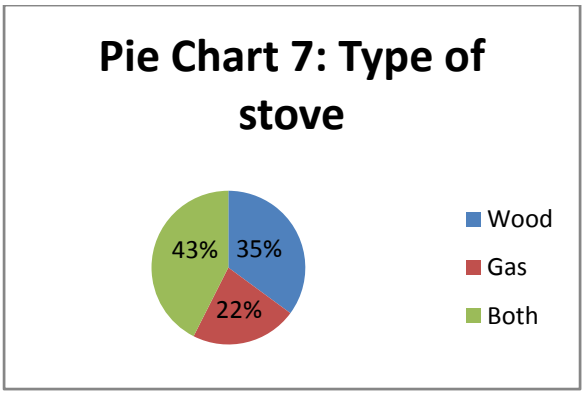


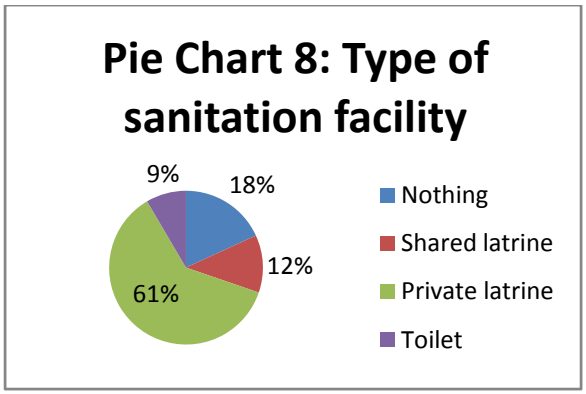


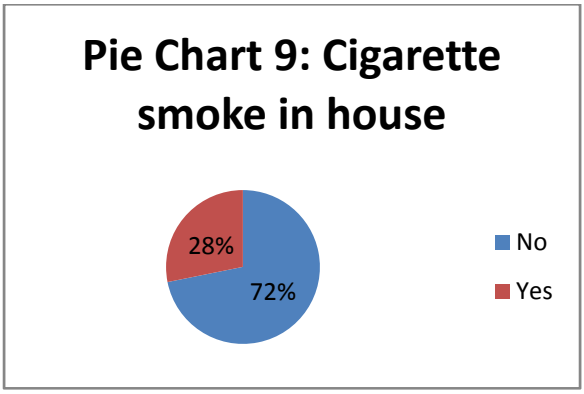


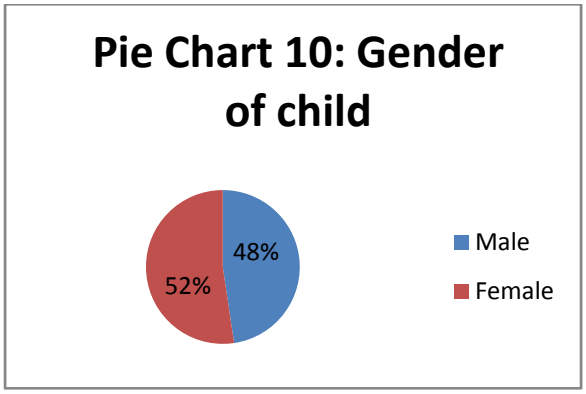


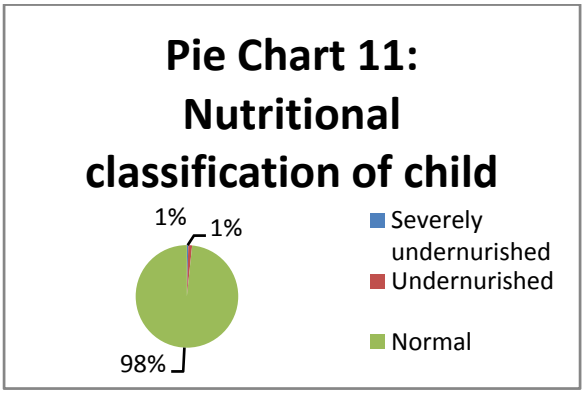


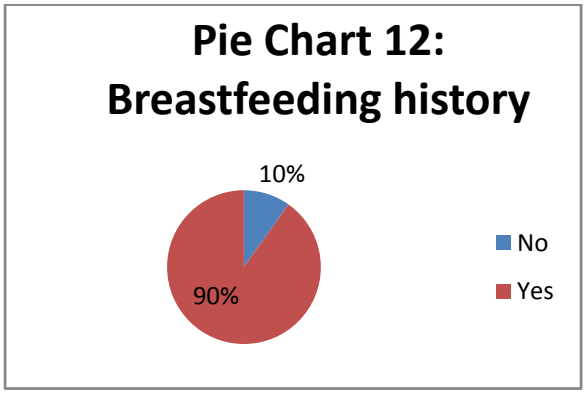

Pie Chart 7: Type of stove
43%
35%
22%
Wood
Gas
Both

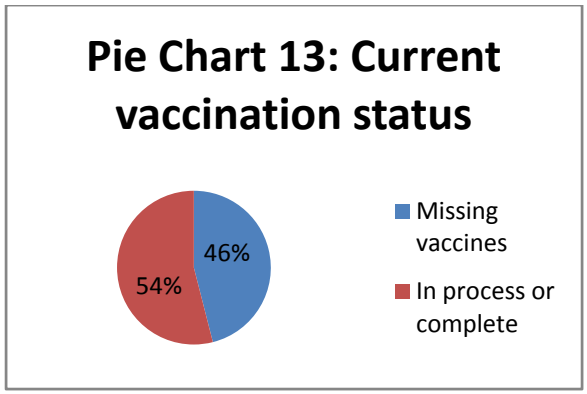

Pie Chart 8: Type of sanitation facility
9%
18%
12%
61%
Nothing
Shared latrine
Private latrine
Toilet

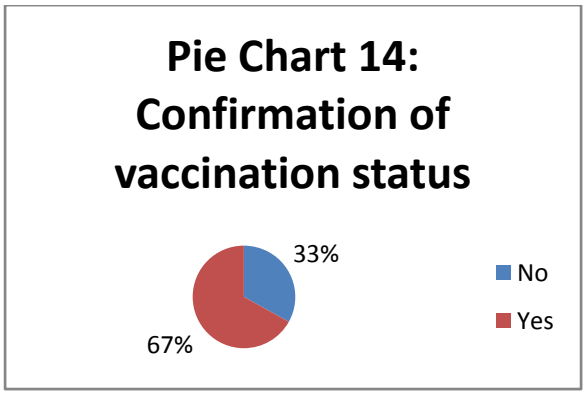

Pie Chart 9: Cigarette smoke in house
28%
72%
No
Yes

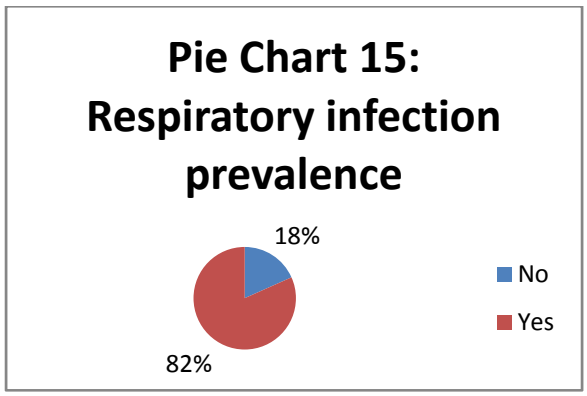

Pie Chart 10: Gender of child
48%
52%
Male
Female


Pie Chart 11: Nutritional classification of child
1%
1%
98%
Severely undernurished
Undernurished
Normal


Pie Chart 12: Breastfeeding history
10%
90%
No
Yes


Pie Chart 13: Current vaccination status
46%
54%
Missing vaccines
In process or complete


Pie Chart 14: Confirmation of vaccination status
33%
67%
No
Yes


Pie Chart 15: Respiratory infection prevalence
18%
82%
No
Yes

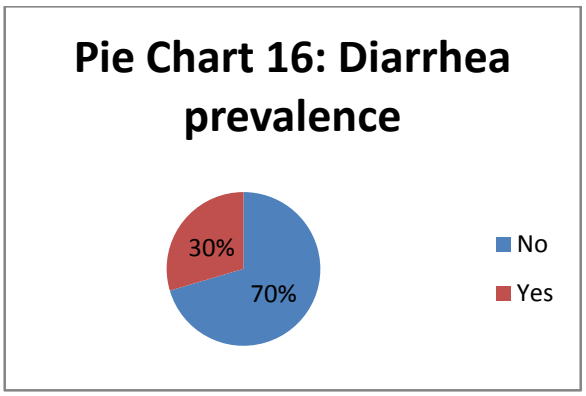

Pie Chart 16: Diarrhea prevalence
30%
70%
No
Yes

Table 1. Baseline characteristics stratified by respiratory infection prevalence

	No Respiratory Infection (n=48)	Respiratory Infection (n=218)	Total (n=272)	P value
Age of respondent - years				0.034*
Mean	28.02	32.20	31.37	
SD	8.79	13.37	12.66	
Age of child - months				0.022*
Mean	28.78	32.09	31.60	
SD	17.08	17.31	17.49	
Sex of child - %				0.755**
Male	50.00	47.09	47.62	
Female	50.00	52.91	52.38	
Electricity in the home - %				0.053**
No	26.00	41.82	38.89	
Yes	74.00	58.18	61.11	
Source of water - %				0.142**
River or rainwater	27.08	21.92	22.85	
Well	0.00	8.68	7.12	
Public tap	27.08	26.48	26.59	
Private tap	45.83	42.92	43.45	
Method of trash disposal - %				<0.001**
Burn	20.45	33.49	31.30	
Throw	54.55	60.09	59.16	
Truck collection	25.00	6.42	9.54	

*Calculated using two-sided t-test
**Calculated using Fisher's exact test

Table 2. Baseline characteristics stratified by diarrhea prevalence

	No Diarrhea (n=48)	Diarrhea (n=218)	Total (n=272)	P value
Age of respondent - years				0.074*
Mean	32.27	29.24	31.36	
SD	13.59	10.19	12.66	
Age of child - months				<0.001*
Mean	34.36	24.10	31.60	
SD	16.59	17.313	17.49	
Sex of child - %				0.355**
Male	49.74	43.21	47.81	
Female	50.26	56.79	52.19	
Electricity in the home - %				0.028**
No	34.03	48.75	38.38	
Yes	65.97	51.25	61.62	
Source of water - %				0.220**
River or rainwater	24.87	17.50	22.65	
Well	8.47	3.75	7.06	
Public tap	25.93	27.50	26.39	
Private tap	40.75	51.25	43.87	
Method of trash disposal - %				0.086**
Burn	27.32	41.25	31.56	
Throw	62.30	51.25	58.94	
Truck collection	10.38	7.50	9.51	

*Calculated using two-sided t-test
**Calculated using Fisher's exact test

Table 3. Crude and adjusted odds ratios of respiratory infection prevalence

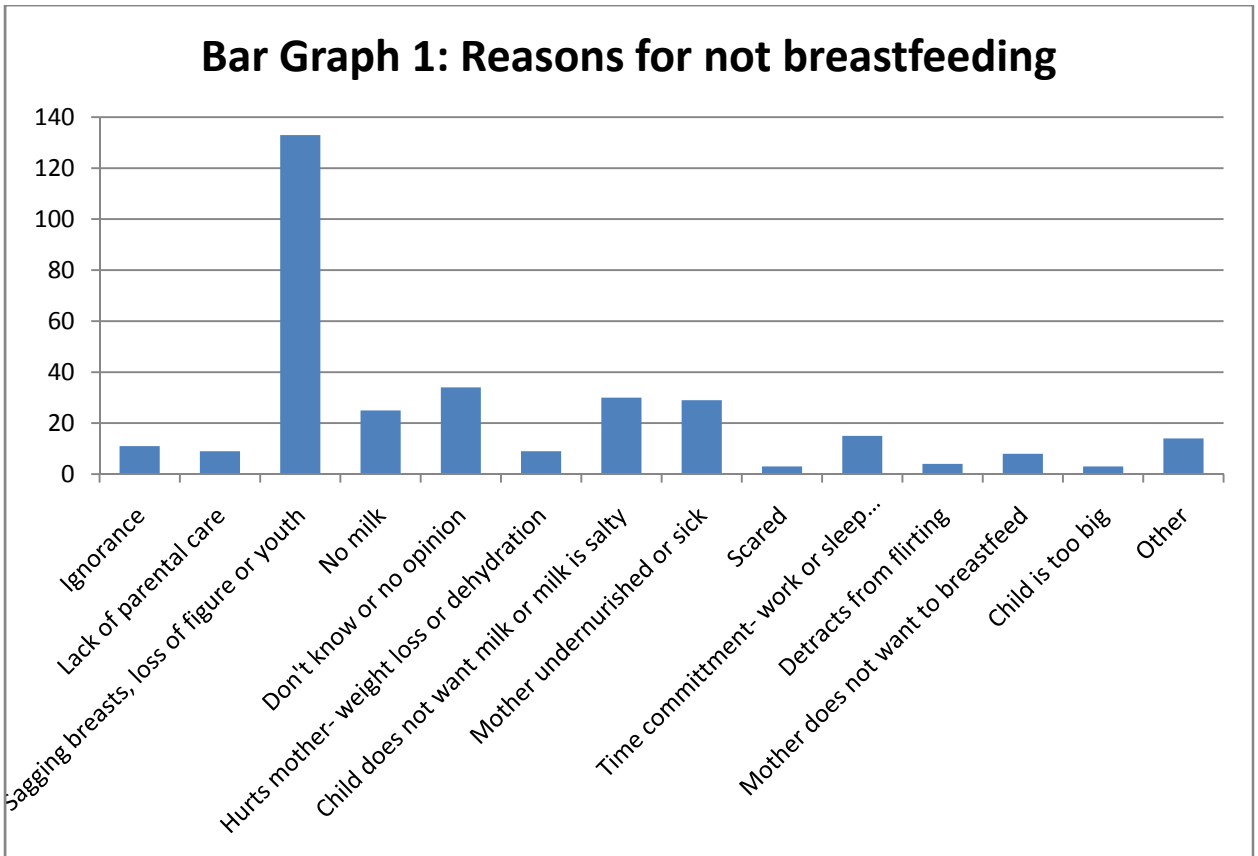
	Crude			Adjusted*		
	OR	**95% CI**	**P value**	**OR**	**95% CI**	**P value**
Current age of respondent (per year)	1.03	(1.00 – 1.06)	0.029	1.04	(1.00 - 1.09)	0.064
Electricity in house (no vs. yes)	0.49	(0.25 – 0.97)	0.034	0.73	(0.29 - 1.82)	0.495
Water purification habit (no vs. yes)	1.80	(0.93 – 3.47)	0.075	1.34	(0.58 - 3.13)	0.495
Method of trash disposal			0.002			0.115
Throw (reference)	1.00			1.00		
Burn	0.67	(0.30 - 1.52)		0.58	(0.22 - 1.53)	
Truck collection	0.16	(0.05 - 0.45)		0.22	(0.05 - 0.92)	
Type of stove			0.650			0.790
Wood (reference)	1.00			1.00		
Gas	0.82	(0.36 - 1.88)		1.50	(0.47 - 4.70)	
Both	1.24	(0.57 - 2.54)		1.25	(0.44 - 3.57)	
Cigarette smoke in the house (no vs. yes)	0.71	(0.36 – 1.40)	0.334	0.48	(0.18 - 1.31)	0.151
Breastfeeding history (no vs. yes)	0.33	(0.07 – 1.42)	0.0849	0.40	(0.08 - 1.93)	0.252
Adjusted time of exclusive breastfeeding (per month)	0.99	(0.96 – 1.04)	0.966	1.03	(0.97 - 1.10)	0.279
Current vaccination status (missing vs. in process/complete)	0.96	(0.70 – 1.30)	0.780	0.99	(0.44 - 2.25)	0.982

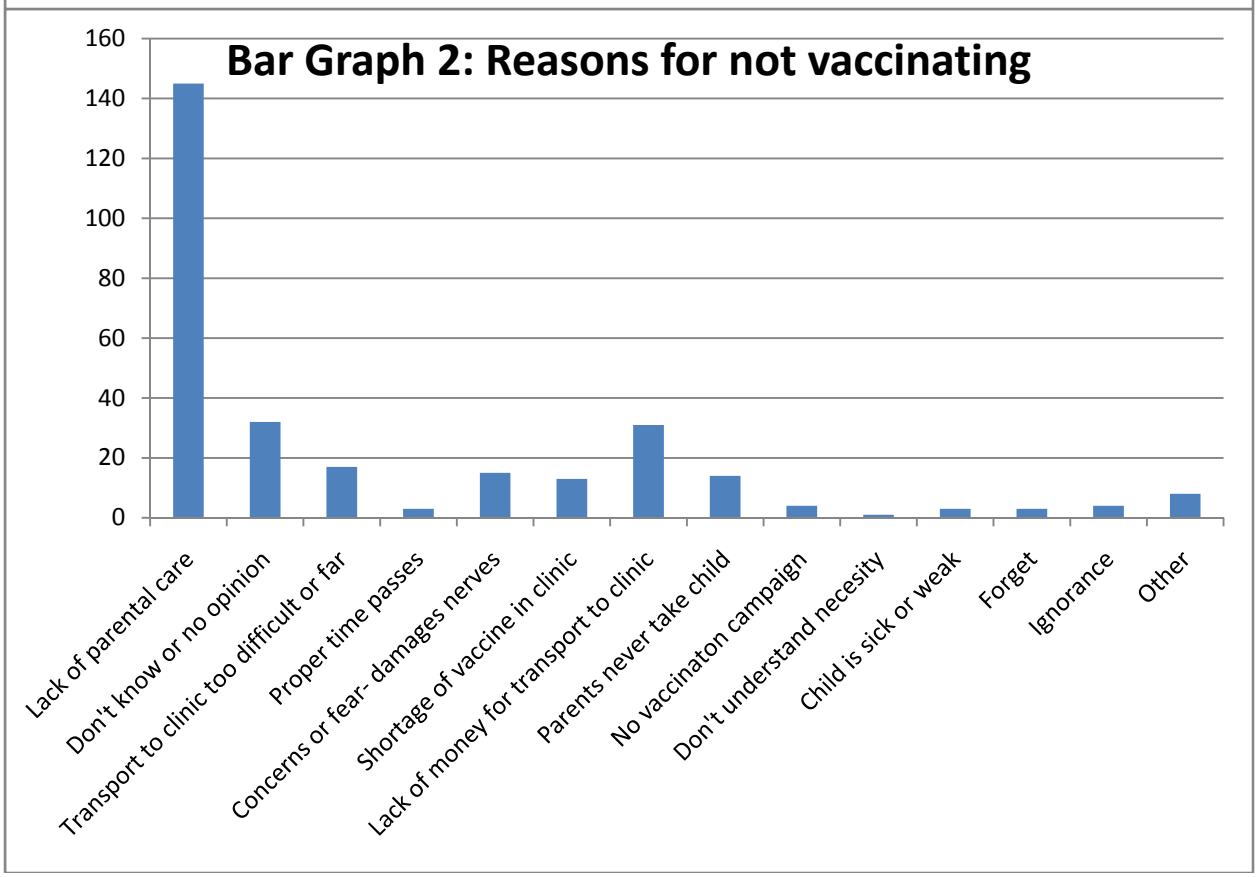
*Adjusted model includes current age of the respondent, presence of electricity in the house, water purification habit, method of trash disposal, type of stove, cigarette smoke in the house, breastfeeding history, adjusted time of exclusive breastfeeding, and current vaccination status.

Table 4. Crude and adjusted odds ratios of diarrhea prevalence

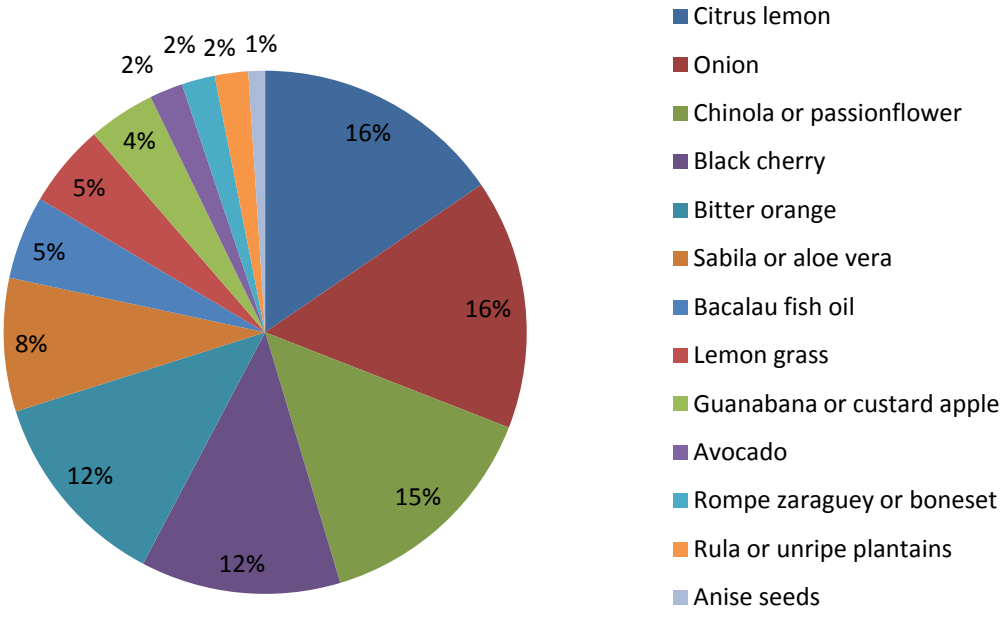
	Crude			Adjusted*		
	OR	**95% CI**	**P value**	**OR**	**95% CI**	**P value**
Current age of respondent (per year)	0.98	(0.96 – 1.00)	0.065	1.00	(0.97 - 1.03)	0.853
Electricity in house (no vs. yes)	0.54	(0.32 – 0.92)	0.024	0.61	(0.29 - 1.27)	0.190
Water purification habit (no vs. yes)	1.38	(0.80 – 2.40)	0.251	1.62	(0.78 - 3.40)	0.198
Method of trash disposal			0.084			0.492
Throw (reference)	1.00			1.00		
Burn	0.54	(0.31 - 0.96)		0.69	(0.32 - 1.50)	
Truck collection	0.48	(0.17 - 1.32)		0.43	(0.31 - 2.30)	
Type of stove			0.036			0.707
Wood (reference)	1.00			1.00		
Gas	0.76	(0.38 - 1.52)		1.05	(0.37 – 2.98)	
Both	0.45	(0.25 - 0.84)		0.75	(0.31 - 1.81)	
Type of sanitization facility			0.142			0.542
Nothing (reference)	1.00			1.00		
Shared latrine	1.35	(0.51 - 3.61)		1.53	(0.46 - 5.12)	
Private latrine	0.90	(0.44 - 1.85)		0.99	(0.36 - 2.74)	
Toilet	0.25	(0.05 - 1.21)		0.41	(0.07 - 2.42)	
Breastfeeding history (no vs. yes)	1.01	(0.42 – 2.42)	0.975	0.90	(0.32 - 2.51)	0.840
Adjusted time of exclusive breastfeeding (per month)	0.98	(0.94 – 1.02)	0.241	0.98	(0.92 - 1.03)	0.387
Current vaccination status (missing vs. in process/complete)	0.93	(0.71 – 1.22)	0.620	0.70	(0.49 - 1.01)	0.059

*Adjusted model includes current age of the respondent, presence of electricity in the house, water purification habit, method of trash disposal, type of stove, type of sanitation facility, breastfeeding history, adjusted time of exclusive breastfeeding, and current vaccination status.

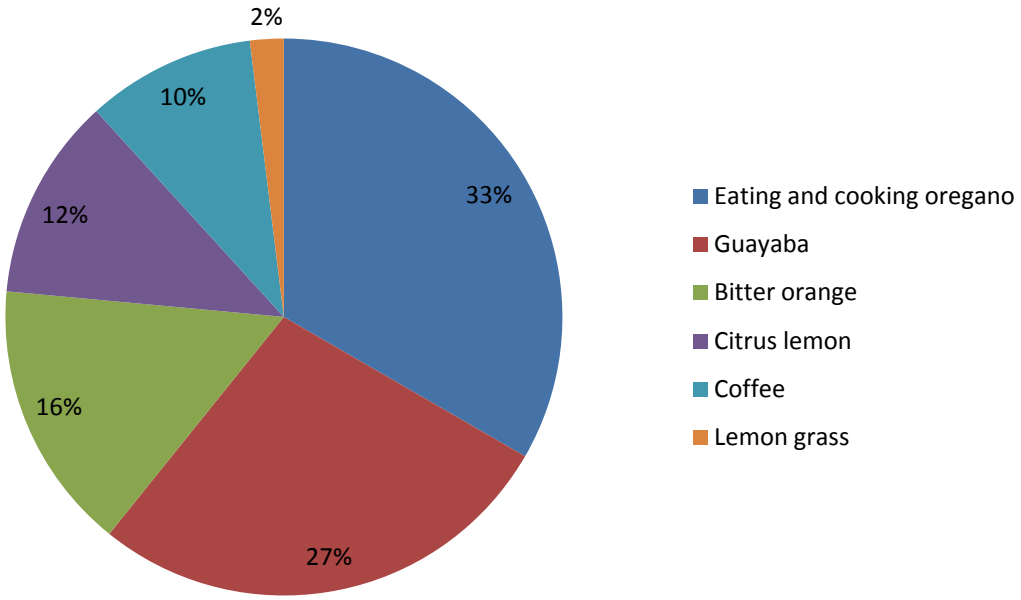

Bar Graph 1: Reasons for not breastfeeding
140
120
100
80
60
40
20
0
Ignorance
Lack of parental care
Sagging breasts, loss of figure or youth
No milk
Don't know or no opinion
Hurts mother- weight loss or dehydration
Child does not want milk or milk is salty
Mother undernurished or sick
Scared
Time committment- work or sleep...
Detracts from flirting
Mother does not want to breastfeed
Child is too big
Other

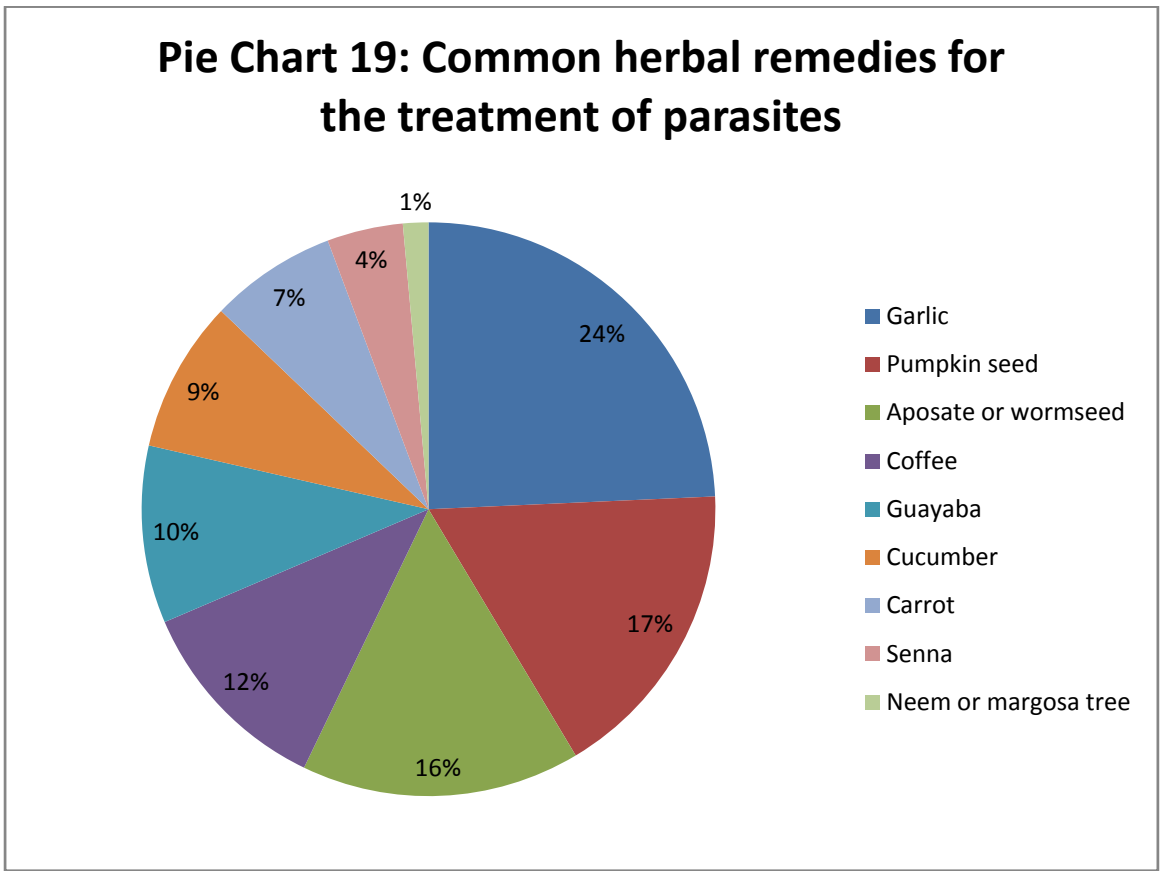

Bar Graph 2: Reasons for not vaccinating
160
140
120
100
80
60
40
20
0
Lack of parental care
Don't know or no opinion
Transport to clinic too difficult or far
Proper time passes
Concerns or fear- damages nerves
Shortage of vaccine in clinic
Lack of money for transport to clinic
Parents never take child
No vaccinaton campaign
Don't understand necesity
Child is sick or weak
Forget
Ignorance
Other

Pie Chart 17: Common herbal home remedies for the treatment of respiratory ailments



Pie Chart 18: Common herbal home remedies for the treatment of diarrhea




Pie Chart 19: Common herbal remedies for the treatment of parasites
24%
17%
16%
12%
10%
9%
7%
4%
1%
Garlic
Pumpkin seed
Aposate or wormseed
Coffee
Guayaba
Cucumber
Carrot
Senna
Neem or margosa tree

DISCUSSION

Summary Statistics

Compared to regional statistics reported in the 2006 ENHOGAR and the 2007 ENDESA reports, the living condition indicators of the communities under study are below average. As previously mentioned, the 2007 ENDESA reports that 51.3% of houses in rural areas are made of cement block and 37.1% are made of wood. However, in the 16 communities interviewed in the Sanchez Ramirez and Monte Plata regions, only 26% of houses are made of block and 61% are made of wood. As block is a costly material compared to free wood that can be cut from surrounding forest, this may be an indicator of a higher poverty level. In addition, the 2007 ENDESA reports that 86.6% of households in Monte Plata and 94.1% of households in Sanchez Ramirez have electricity, whereas this study found that only 62% of households have electricity. This below average access to the public electric grid may be an indicator of increased geographical isolation and decreased access to public services.

Water and sanitation statistics for the communities under study are also weaker. The 2007 ENDESA reports that 24.6% of households in Monte Plata and 52.0% of households in Sanchez Ramirez use bottled water as their source of water. This is not an option for the batey communities under study. Virtually all water is derived from a river, either carried manually or delivered by a gravity aqueduct to private taps (45%) or public taps (26%). However, more households do report that they purify the water in the communities under study (47%) than in the national report on the region (13.3%). As for waste disposal, the 2007 ENDESA reports that 36.6% of trash in rural areas is collected in trucks by the regional governments. However, households in this study reported that only 9% of trash is collected by trucks. There is also a discrepancy in human waste disposal. Regional statistics indicate that 22.1% of households in Monte Plata and 43.6% of households in Sanchez Ramirez have a toilet, whereas 9.8% in Monte Plata and 5.0% in Sanchez Ramirez do not have anything. However, this study found the

opposite; only 9% of households have a toilet and 18% of households have no type of sanitation facility at all.

Increased usage of wood-burning stoves and cigarette smoking in the house contributes to more indoor air pollution in the communities under study compared to the reported regional averages. The 2007 ENDESA reports that 81.1% of the households in Sanchez Ramirez and 67.5% of households in Monte Plata use gas propane as the principal source of fuel. However, this study found the percentage to be much lower at 22%. In addition, of women 15 to 49 years of age, 5.9% in the Monte Plata region and 6.4% in the Sanchez Ramirez region report that they smoke cigarettes, and of men 15 to 49 years of age, 11.6% in the Monte Plata region and 9.0% in the Sanchez Ramirez region report that they smoke cigarettes. Even these combined percentages are much lower than the 28% found in the communities under study.

Comparable percentages of undernourished and severely undernourished children were found between this study and the regional averages. As this study found that the middle 50% of women interviewed exclusively breastfed for 1.5 months and the regional average of exclusive breastfeeding is only 0.4 months in the Sanchez Ramirez region and 0.5 months in the Monte Plata region, it appears at first glance that breastfeeding statistics in the communities under study are better than the regional statistics. However, as previously mentioned, there was obvious confusion surrounding the term "exclusive breastfeeding" in the interview as many women reported exclusively breastfeeding for 12 months or more, for example, but later reported introducing tea at 2 months and rice water at 3 months. Although reported time of exclusive breastfeeding was adjusted to match the earliest reported month that a bottle, water, tea, juice, or solid food was introduced to the child when the information was available, the statistic more than likely remains inflated. However, it follows that poorer, more

geographically isolated women who do not have the means to feed their children formula would breastfeed more exclusively.

Superficially, the vaccination rates found in this study appear to be comparable to the regional vaccination rates in Sanchez Ramirez and Monte Plata reported in the 2007 ENDESA. The average coverage for all vaccines in Sanchez Ramirez is 50.5% and the average coverage in Monte Plata is 54.8%; this study found that 54% of children are fully vaccinated for their age, which includes both children who are in the process of vaccination if they are under 18 months of age and children who are completely vaccinated if they are 18 months of age or older. However, as previously mentioned, this is an overestimate because a number of the children who are categorized as "in process" may still be behind in their vaccinations. Therefore, there is reason to believe that the communities under study has a lower overall vaccination rate than the region.

It is interesting to note the general differences between the common reasons given for not breastfeeding and the common reasons given for not vaccinating. The majority of the reasons given for not breastfeeding are cultural: the mother is concerned that her breasts will sag or she will lose her youthful figure; that somehow breastfeeding hurts her health by making her too thin or dehydrated; or that she cannot breastfeed if she wants to continue normal working, sleeping, and flirting habits. These beliefs are created and influenced by family and peers. Conversely, aside from general lack of parental care which was the primary response, the majority of the reasons given for not vaccinating are logistical: the transportation is too difficult and expensive, there are no vaccines in the clinic, or parents are expecting vaccination campaigns to bring the vaccine to the kids. These reasons are largely problems at the infrastructure and healthcare level. These differences are important to understand in order to design adequate solutions.

According to the 2007 ENDESA, 8.3% of children under five years of age in the Sanchez Ramirez region and 5.7% in the Monte Plata region suffered from an acute respiratory infection in the two weeks prior to the survey. This study found the respiratory infection prevalence in the 15 days prior to the interview to be 82%. Although initially unsettling, much of the difference can be explained by the fact that a respiratory infection in the ENDESA report was defined as a cough accompanied by rapid or agitated breathing or difficulty breathing, which are symptoms of pneumonia; this study defined a respiratory infection as congestion, runny nose, cough, or wheezing, more moderate symptoms that also include the common viral cold. Furthermore, one study estimated that normal, healthy toddlers and preschoolers in US daycare experience, on average, four to five respiratory infections per year, whereas some healthy children experience as many as 12 per year (12). Given that many respiratory infections can last as long as two weeks, the prevalence found in this study may not be all that surprising. Nonetheless, it is most likely still higher than the prevalence of the region. Factors that could potentially contributed to a higher prevalence, such as greater use of wood-burning stoves and cigarette smoking in the house, are explored in the following section.

As for diarrhea prevalence, according to the 2007 ENDESA, 11.9% of children in the Monte Plata region and 20.8% of children in the Sanchez Ramirez region under five years suffered from diarrhea during the two weeks before the survey. Although not nearly as shocking as the respiratory infection prevalence, the diarrhea prevalence in the communities under study in the 15 days prior to the interview was found to be 30%. Again, factors that could have potentially contributed to this higher prevalence, such as water purification habit and type of sanitation facility, are explored in the following section.

Simple Logistic Regression Analyses

A few of the associations within the simple logistic regression models are counterintuitive but may be explained by factors that were not taken into consideration in this study. Contrary to well-established findings in the literature, children who live in households in which someone smokes cigarettes may be 52% less likely to have a respiratory infection than children who live in households in which no one smokes cigarettes (95% CI 0.18 – 1.31, p= 0.151). However, this may be due to the fact that people with a higher socio-economic status (SES) can afford to buy cigarettes. Similarly, the odds of respiratory infection may increase by 3% for every month increase in adjusted time of exclusive breastfeeding (95% CI 0.97 – 1.10, p= 0.279). However, it is also well-established in the literature that lower income mothers and mothers with less education tend to breastfeed more. As no SES predictors were included in the model, SES may be confounding the relationship between both cigarette smoke in the house and exclusive breastfeeding and the prevalence of respiratory infections. Finally, the odds of diarrhea may increase by 62% for children who live in households that purify their water compared to children who live in households that do not purify their water (95% CI 0.78 – 3.40, p=.198). However, people who do not purify their water may be drinking clean, uncontaminated well or rain water whereas people who do purify their water may not do so every day or may not add sufficient chlorine or boil for sufficient time.

On the other hand, several weak associations may be beneficial in prioritizing and planning community intervention projects. Compared to the reference group of those who throw their trash in the yard, kids who live in households in which the trash is collected by a truck may be 88% less likely to have a respiratory infection (95% CI 0.05 – 0.92, p= 0.115). These findings can possibly be used to persuade regional governments into initiating trash collection programs. Furthermore, the protective relationship between breastfeeding and the odds of respiratory infection and between vaccination

status and the odds of diarrhea can be used to educate on and promote the utmost importance of breastfeeding and vaccination.

As previously mentioned, the presence of any respiratory infection symptom is a very general outcome variable. Future research should investigate the proportion of children under five with an acute lower respiratory tract illness (ALRI), characterized by wheezing or pneumonia, as the rates of ALRI may be high in this population and this more specific outcome is more likely to be statistically significantly correlated with the presence of fossil fuel and cigarette smoke in the house.

Herbal Home Remedies

Of the women who reported using an herbal home remedy for the treatment of their children's respiratory infections, the most frequently reported were teas of lemon, onion, chinola or passionflower, cherry, and bitter orange with cinnamon. Although few have undergone randomized controlled trials to definitively establish their efficacy, these herbal home remedies have upheld the test of time and the constituents that are believed to be beneficial have been identified and scientifically studied. Citrus lemon (*Rutaceae*) is believed to be one of the most important and versatile natural medicines for home use. The juice of the lemon is believed to be useful in the treatment of colds, flu, and chest infections. In addition to volatile oils which are antiseptic and antibacterial and bioflavonoids which are antioxidants, one hundred grams of citrus lemon fruit contains 40 to 50 mg of vitamins A, B_1, B_2, B_3, and C. This high vitamin C content, which is twice that of oranges, helps to improve resistance to infection. Onion (*Allium cepa*), like lemon, is believed to have a long list of medicinal actions. Its juice is believed to be helpful in the treatment of colds, flu, and coughs due to its antibiotic, anti-inflammatory, analgesic, and expectorant properties. Chinola or passionflower (*Passiflora incarnate*) is a climbing vine that is believed to have gentle sedative properties. The aerial parts are infused in water to make a tea that is used to treat insomnia, anxiety, tension, irritability, and pain. Its antispasmodic and tranquilizing

properties may be useful in calming tension in the chest, headaches, and muscle aches that are associated with respiratory illnesses. Black cherry (*Prunus serotina*) contains prunasin, a chemical that may help to reduce the cough reflex. The bark of the tree is believed to effectively counter chronic dry and irritable coughs. Similar to lemon, bitter orange (*Citrus aurantium*) has useful volatile oils, especially neroli from the flower, which is a sedative, and flavonoids, which have anti-inflammatory, antibacterial, and antifungal properties. As it is an antispasmodic, tonic, and fever reducer, an infusion of the fruit, created by soaking the fruit in water, is believed to soothe headaches, calm palpitations, and lower fevers (13). It is also believed to be a nasal decongestant (14). The juice, being rich in Vitamin C, helps the immune system fight infections. Finally, cinnamaldehyde, the main volatile oil in cinnamon (*Cinnamomum verum*), is a sedative, analgesic, and antiviral. Therefore, it is believed to be helpful in treating aching muscles and other symptoms of viral conditions such as colds (15).

Less commonly reported but still important and justifiable herbal remedies for the treatment of respiratory ailments include aloe vera syrup, bacalao fish oil, and teas made with the leaves of lemon grass, custard apple, avocado, boneset, and plantain, as well as anise seeds. The clear gel contained in the succulent leaf of sábila (*Aloe vera*) contains alotectin B which stimulates the immune system. The believed protective and healing affect of the gel is said to work internally as well as externally and is used to make a cough syrup (15; 13). The green part of the leaf that surrounds the gel can also be used to produce a juice or a dried substance (called latex) that is taken by mouth (14). Bacalao fish oil is similar to cod liver oil and therefore contains n-3 polyunsaturated fatty acids as well as vitamins A and D (16). A recent study in New York found that supplementation with daily cod liver oil and a children's multivitamin-mineral statistically significantly decreased the mean number of upper respiratory tract visits to the pediatrician over time in Latino children (17). In addition to prevention, a systematic review of the relative literature found a positive treatment response for chronic sinusitis and otitis media following a course of multivitamins and cod liver oil (18). Lemon grass (*Cymbopogan citratus*), also

appropriately called fever grass, is believed to be helpful in the treatment of fevers, especially when there is significant congestion. The main constituents of its volatile oil, citral and citronellal, are markedly sedative. Guanabana or custard apple (*Annona squamosa*) is native to the Caribbean. The young shoots of the tree are believed to alleviate colds and chills. In addition to the fruit being extremely nutritious, avocado leaves (*Persea americana*) are believed to be valuable in relieving coughs. Rompe zaraguey (*Eupatorium perfoliatum*), commonly called boneset, derives its name from its supposed ability to cure "break- bone fever." The plant stimulates resistance to viral and bacterial infections and reduces fever by encouraging sweating. It also has a tonic and laxative effect; it loosens phlegm and promotes its removal through coughing. Rula (*Musa* spp.) are unripe bananas and plantains. Their leaves, dried and made into syrup, are thought to be useful in the treatment of coughs and chest conditions such as bronchitis. Finally, anise seeds' antispasmodic properties might be helpful in countering asthma, whooping cough and other spasmodic coughs, bronchitis, and headaches when the vapor is inhaled through the nose and mouth (13). The seeds also have expectorant properties that justify their use with respiratory ailments (15).

For the treatment of diarrhea in children, an infusion with the leaves of eating oregano and cooking oregano is the most common herbal home remedy reportedly used, sometimes along with the leaves of an unripe guayaba. Eating oregano (*Coleus forskohlii*) is a digestive remedy believed to relieve gas, bloating, and abdominal discomfort. Its active constituent, forskolin, relaxes smooth muscle and increases the release of hormones from the thyroid gland, stimulating digestive secretions. Cooking oregano (*Origanum cilgare*) is also believed to help settle flatulence and stimulate the flow of bile. As an antispasmodic, the oreganos calm stomach colic, and as an antiemetic, they alleviate vomiting. They can be prepared as a tea or as a tincture, a stronger preparation made by soaking the leaves in alcohol (13). Although they share similar common names and therapeutic uses, the plants look nothing alike. Eating oregano has tuberlike roots and wide, serrated green leaves whereas cooking oregano has square, red

stems, elliptical flowers, and clusters of deep pink flowers (15). Extracts and metabolites from the leaves and fruits of the guayaba plant (*Psidium guajava*) have antidiarrheal and antibiotic activities that are believed to be useful in the treatment of diarrhea and dysentery. The antidiarrheal action is attributed to the inhibition of acetylcholine and intestinal motility as well as the aspasmoltic activity of quercetin (19). Through a multitude of in vitro studies, the antibiotic action has been linked to its methanol and galactose-specific lectin. Methanol extract from the leaves shows activity against simian rotavirus, Salmonella spp., and Shigella spp.; galactose-specific lectin has been shown to bind to *Escherichia coli*, preventing its adhesion to the intestinal wall and thus preventing infection resulting in diarrhea (20; 21).

In addition to respiratory infections, bitter orange and citrus lemon are believed to aid in the treatment of diarrhea. The strongly acidic fruits are thought to stimulate digestion, open the bowels, relieve flatulence and abdominal bloating, and help to cleanse the digestive tract. Ripe, roasted coffee beans (*Coffea arabica*) are also believed to be useful in the treatment of diarrhea as coffee stimulates digestive juices and is a powerful diuretic. In addition, coffee enemas are thought to effectively cleanse the large bowel. Finally, lemon grass taken as a tea might remedy digestive problems. It is said to relax the muscles of the stomach and gut and relieve cramping pains and flatulence. Its gentleness is particularly suitable for children.

Garlic, pumpkins seed, wormsweed, coffee, guayaba, cucumber, and carrot are all thought to have anti-parasitic properties. Garlic (*Allium sativum*) has always been esteemed for its alleged healing power. Before the invention of antibiotics, garlic was a treatment for all manners of infection. Digestive infections, in particular, are thought to respond well to garlic, and it is believed to rid the body of intestinal parasites. Pumpkin seeds(*Cucurbita pepo*), which contain mostly linoleic and oleic acid fixed oil, are believed to be a safe and effective deworming agent, especially in pregnant women and children

for whom other strong and toxic remedies are inappropriate. They are thought to be most effective in removing tapeworms. Aposate or wormseed (*Chenopodium ambrosioides*) is native to the Caribbean. It contains volatile oil, of which up to 90% is ascaridol, a powerful worm expellant. It is thought to be an especially powerful expellant of roundworm and hookworm. It is also used as a digestive remedy to settle colic and stomach pains. Cucumber is said to increase appetite and strength and is used to generally regulate metabolism. It acts as a powerful diuretic (13). Carrots (*Daucus carota*) are considered to be a general cleansing aid. The raw root, grated or mashed, is thought to be a safe treatment for threadworms, especially in children; the juice is thought to be a detoxifier; and the leaves are thought to be a diuretic. Senna (*Cassia senna*) is one of the best- known and well-understood herbal medicines. A key constituent, anthraquinone glycosides (sennosides), irritate the lining of the small intestine, causing the muscles to contract strongly, resulting in a bowel movement about 10 hours after the dose is taken. They also stop fluid from being absorbed from the large bowel, helping to keep the stool soft. Therefore, senna is believed to be a good, short-term laxative. Finally, neem or the margosa tree (*Azadirachta indica*) is considered a pharmacy in itself. Specifically for the treatment of intestinal worms, the leaves are taken as an infusion (15).

Although the vast majority of the herbal home remedies reported are overwhelming helpful and their benefit scientifically validated, there are some that can be dangerous if overused or misused. Piñon (*Jathopha curcas*) was reported for the treatment of diarrhea, specifically to alleviate stomach pain and act as a purgative. However, all parts of the piñon are harmful, and the seeds are extremely toxic; the consumption of 15 seeds will kill a child (22). Tuatua (*Jatropha gossypifolia*) is commonly used to treat parasites. However, taken over many years, tuatua damages the liver. In addition, like piñon, its seeds are highly venomous (22). Higuera or castor bean plant (*Ricinus commun*) produces castor oil which is well known for its strongly laxative, and in higher doses purgative, action, prompting a bowel movement about 3 to 5 hours after ingestion. It is so effective that it can be used to clear the digestive system in

case of poisoning. However, castor oil should not be taken during pregnancy or more than once every few weeks. More importantly, the seeds are highly poisonous and should not be eaten. Two seed are sufficient to kill an adult, but fortunately the toxins do not pass into the expressed oil, so the oil is safe to use in moderation (15). Finally, aposate (*Chenopodium ambrosioides*), mentioned above as a safe and effective treatment for intestinal parasites, should only be used in moderation and for short periods of time. It should not be given to old, weak, pregnant, or hard-of-hearing people as the plant can damage the nerves, harm a fetus, and cause hearing loss. A child dosage should not exceed one tablespoon of crushed leaves in a half a glass of water daily for four continuous days (13). It is toxic if overdosed and is even subject to legal restrictions in some countries (15).

CONCLUSIONS

This paper thoroughly assesses child health indicators in the batey communities of Monte Plata and Sanchez Ramirez. Compared to the regional statistics of the 2006 ENHOGAR and 2007 ENDESA, the communities under study are poorer, more rural, have less adequate water and sanitation facilities, have more indoor air pollution, have worse nutrition statistics and vaccination coverage, and have a greater burden of respiratory infection and diarrhea.

Although regression analysis did not find any statistically significant relationships between the various demographic characteristics, sanitary conditions, and health requisites and the odds of respiratory infection and diarrhea, various weak associations were observed that will be useful in prioritizing and planning community intervention projects. Such community projects may a include water purification campaign; an energy-efficient, clean stove project; a latrine construction project; a smoking cessation campaign; a breastfeeding promotion campaign; a vaccination promotion campaign; and a trash collection program.

Finally, investigations into the biochemical properties and mechanisms of the most commonly used herbal home remedies largely support their use in the treatment of respiratory ailments, diarrhea, and parasites. Knowledge of the benefit of the majority but also precautions of the few that can be toxic in large doses will aid in the design of educational seminars on the topic.

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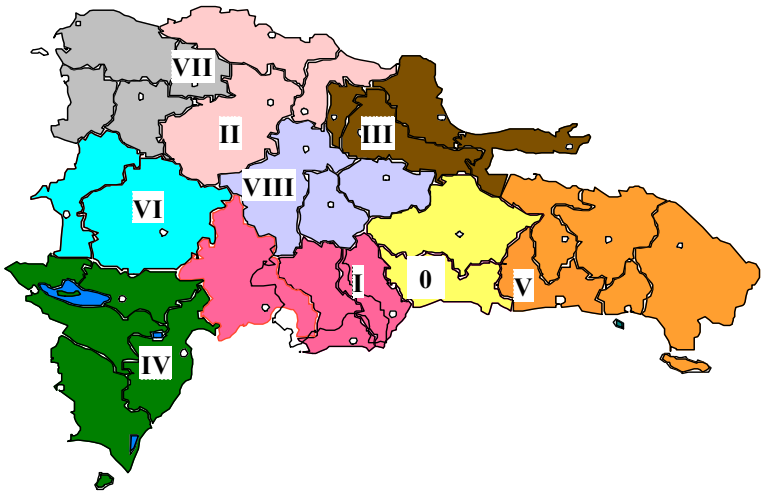
APPENDICES



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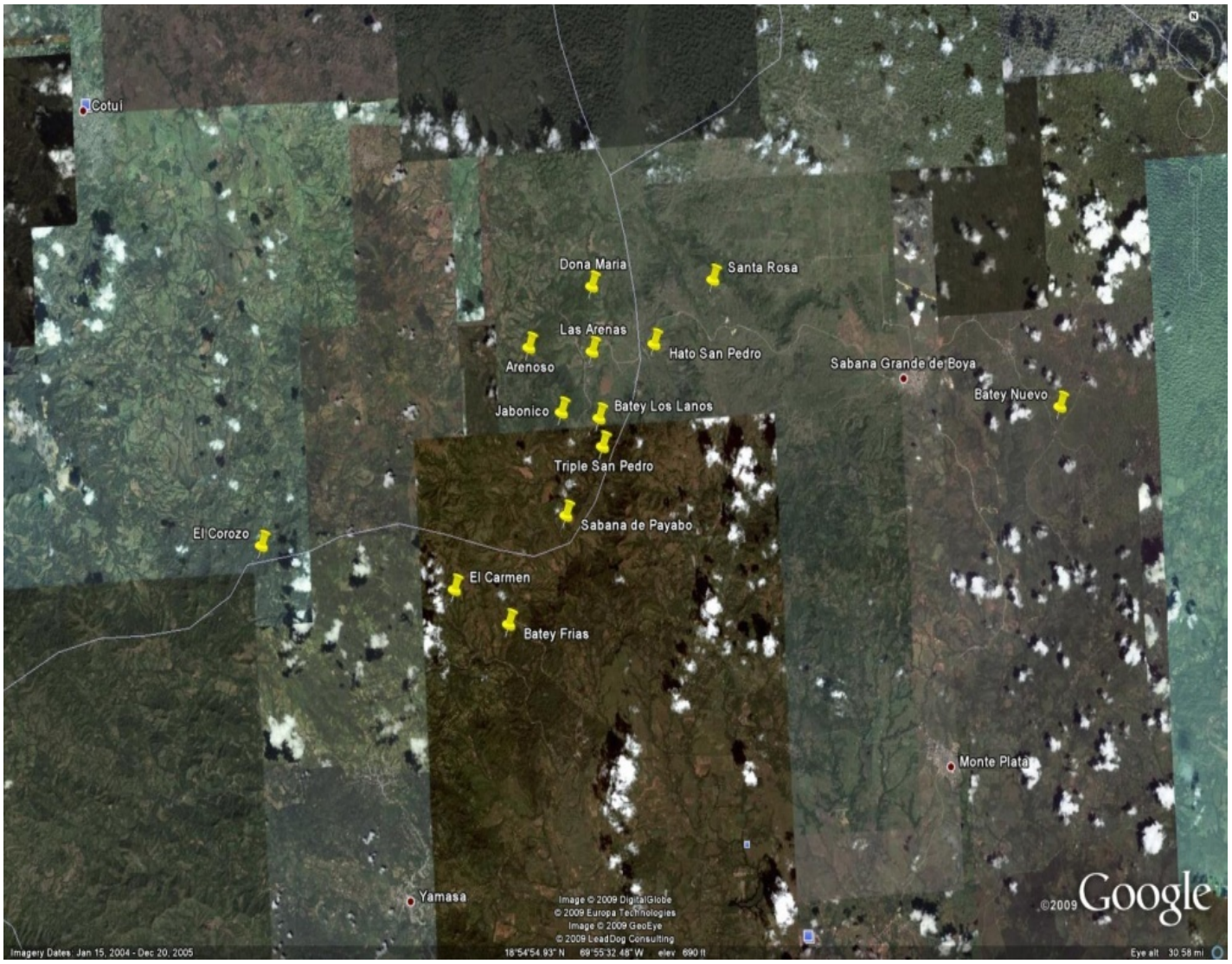
- **Region I**: San Cristóbal, Azua, Peravia & Ocoa.
- **Region II:** Santiago, Espaillat & Puerto Plata.
- **Region III**: Duarte, Salcedo, Samaná & María Trinidad Sánchez
- **Region IV**: Barahona, Bahoruco, Pedernales & Independencia.
- **Region V**: San Pedro de Macorís, La Romana, El Seybo, Hato Mayor & La Altagracia.
- **Region VI**: San Juan de la Maguana & Elías Piña.
- **Region VII**: Valverde, Santiago Rodríguez, Dajabón & Montecristi.
- **Region VIII**: La Vega, Sánchez Ramírez & Monseñor Nouel


Cotui
Dona Maria
Santa Rosa
Las Arenas
Arenoso
Hato San Pedro
Sabana Grande de Boya
Batey Nuevo
Jabonico
Batey Los Lanos
Triple San Pedro
Sabana de Payabo
El Corozo
El Carmen
Batey Frias
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Imagery Dates: Jan 15, 2004 - Dec 20, 2005
18°54'54.93" N 69°55'32.48" W elev 690 ft
Eye alt 30.58 mi

Diagnóstico Comunitario de las Condiciones de Salud

Entrevistador(a): _____ Nombre de la comunidad: _____ # de casa: _____ Fecha de la visita: _____
Nombre de la persona entrevistada: _____ Apodo:_____

A. Datos Principales

Para cada PERSONA MAYOR DE 5 AÑOS que vive en la casa, rellene los cuadros (incluso la persona entrevistada):

Nombre	Edad	Sexo B= barón H= hembra	Escuela P= primaria B= bachillerato U= universidad N= nada	Curso	¿Tiene acta de nacimiento o cedula?
1.					
2.					
3.					
4.					
5.					
6.					
7.					

Para cada NIÑO MENOR DE 5 AÑOS que vive en la casa, rellene los cuadros:

Nombre	Edad (indique años o meses)	Sexo B= barón H= hembra	Brazo (cm)	¿Ha tenido la gripe en los últimos 15 días?	¿Ha tenido diarrea en los últimos 15 días?	¿Le dio o está dándole el seno?	¿Por cuánto tiempo le dio el seno EXCLUSIVAMENTE? (meses)	¿Está vacunado completamente (C), está en proceso (P), o falta (F)?	¿Tiene una tarjeta de vacuna de SESPAS en la casa? **	¿Tiene acta de nacimiento?
1.										
2.										
3.										
4.										
5.										
6.										
7.										

**Para cada niño que tiene una tarjeta de vacuna de SESPAS, pregúntele ver la tarjeta y verifique que el niño esté vacunado completamente para la edad o indique las vacunas que falten para la edad:
Recién nacido: BCG (tuberculosis), Hepatitis B
2, 4, y 6 meses (3 dosis): Anti-polio, Pentavalente (DPT/HepB/Hib)
1 año: SRP (Sarampión)
18 meses: Anti-polio, DPT (Difteria, Tos ferina, Tétanos)

B. Condiciones de Vivir- Saneamiento Ambiental

1. ¿En que tipo de casa vive? □ Bloc □ Madera □ Bloc/Madera □ Zinc □ Lata 2. ¿Tiene piso de cemento? □ Sí □ No
3. ¿Hay luz? □ Sí □ No 3a. ¿Tiene…? □ Planta □ Paneles □ Inversor
4. ¿Cuáles la fuente de agua? □ Río □ Llave privada □ Lluvia □ Llave pública □ Otro: _____
5. ¿Purifica el agua antes de tomarlo? □ Sí □ No 5a. ¿Qué método usa? □ Hervirlo □ Cloro □ Filtrarlo □ Comprarlo □ Otro:
6. ¿Qué hace con la basura? □ Botarla □ Quemarla □ Enterrarla □ Camión la recoge □ Otro: _____
7. ¿Tiene…? □ Fogón □ Estufa 8. ¿Tiene…? □ Inodoro □ Letrina □ Letrina colectiva □ No hay nada
9. ¿Hay alguien quien fuma en la casa? □ Sí □ No
10. ¿Tiene gallos o gallinas? □ Sí □ No 10a. ¿Tiene una jaula para sus gallos o gallinas? □ Sí □ No

C. Opiniones

1. En su opinión, ¿qué son las ventajas (los recursos, las cosas buenas) en su comunidad?

2. En su opinión, ¿qué son las necesidades en su comunidad?

3. ¿Qué usted piensa son los problemas de salud más grande en su comunidad?

D. Salud de los Niños (Pregunte aunque no hayan niños en la casa)
1. ¿Cómo sabe usted cuando un niño tiene una infección respiratoria o pecho apretado?

2. ¿Cómo sabe usted cuando un niño está deshidratado?

3. ¿Qué tratamiento le da a un niño con la gripe?

4. ¿Qué tratamiento le da a un niño con diarrea?

5. ¿Qué tratamiento le da a un niño con parásitos?

6. ¿Sabe usted cómo preparar un suero oral con los sobres del medico? □ Sí □ No 6a. ¿Para que los usan?

7. ¿Sabe usted cómo preparar un suero casero sin los sobres del medico? □ Sí □ No 7a. ¿Cómo?

8. Con su último niño, en cual mes empezó a darle:
El biberón _____ El agua _____ El Té _____ El jugo _____ La comida sólida _____

9. Si no le dio el seno nunca, ¿por qué no?

10. En su opinión, ¿por qué algunas madres escogen no dar el seno o dejar dando el seno cuando el niño es muy joven?

11. ¿Cuál usted cree es lo más conveniente? □ Seno □ Biberón
12. ¿Cuál usted cree es lo mejor para el bebe? □ Seno □ Biberón

13. En su opinión, ¿por qué algunos niños no están vacunados completamente para sus edades?

E. Nutrición de la Familia
1. Descríbame un ejemplo de una comida balanceada (una comida que tiene toda la nutrición que una persona necesita en una comida):
_____

2. ¿Qué comió la familia ayer?
2a. Para el desayuno:
2b. Para el almuerzo:
2c. Para la cena:

3. ¿Tiene conuco personal o ha sembrado alimentos (comida) en el patio de su casa? □ Sí □ No
3a. ¿Qué tiene sembrados? _____
3b. ¿Qué hace con la cosecha? □ Consume en casa □ La vende

4. ¿Tiene matas? □ Sí □ No 4a. ¿Qué tipo de matas tiene? _____

5. ¿Cría animales en su casa? □ Sí □ No 5a. ¿Qué animales tiene o ha tenido recientemente? _____
5b. ¿Qué hace usted con la producción de estos animales? □ Consume en casa □ Los vende

F. Salud de la Madre
1. ¿A qué edad tuvo su primer embarazo? _____ 2. ¿Cuántos embarazos ha tenido? _____

3. ¿Ha perdido una barriga? □ Sí □ No 3a. ¿Cuántos? _____ 3b. ¿Por qué lo tuvo el aborto?_____
4. ¿Se ha muerto a usted un hijo? □ Sí □ No 4a. ¿Cuántos?_____ 4b. ¿Qué edad tenía el hijo cuando se murió? _____
4c. ¿De qué se murió?_____

5. ¿Durante su último embarazo, cuántos veces fue al chequeo medico? _____
6. ¿Durante su último embarazo, dónde usted fue a dar a luz? _____
7. ¿Tuvo algunos problemas al dar a luz (incluso cesaría)? □ Sí □ No 7a. ¿Qué problemas tuvo? _____

8. ¿Hay mujeres embarazadas en la casa en este momento? □ Sí □ No 8a. ¿Cuántas mujeres? _____ 8b. ¿Cuántos meses? _____

G. Planificación Familiar
1. ¿Qué métodos de planificación familiar conoce usted? (No diga las respuestas, solamente apunte las repuestas que diga la persona entrevistada)
□ Preparación □ Condón □ Vasectomía □ DIU □ Pastilla □ Inyección □ Otro: _____

2. ¿Algunos métodos de planificación familiar le hacen daño? □ Sí □ No 2b. ¿Cuáles?_____

3. ¿Está usando un método de planificación familiar ahora (incluso preparación)? □ Sí □ No 3b. ¿Cuál método? _____
4. ¿Qué tipos de planificación familiar ha usado en su vida? _____

5. ¿Alguien más en la casa está usando un método de planificación familiar? □ Sí □ No 5a. ¿Cuál método? _____

6. ¿Dónde una puede conseguir un método de planificación familiar? _____

7. En su opinión ¿en cuál edad empiezan a casarse o tener relaciones sexuales las mujeres hoy en día? _____

H. Papanicolau y Examen de los Senos
1. ¿Sabe usted qué es el Papanicolau? □ Sí □ No 1a. ¿Por qué las mujeres se lo hacen? _____

2. ¿Se ha hecho un examen de Papanicolau en su vida? □ Sí □ No
2a. ¿Cuándo fue la última vez que se lo hizo? _____
2b. ¿Cada cuanto tiempo usted se lo hace? _____

3. ¿Con qué frecuencia las mujeres deben hacerse el Papanicolau? _____

4. ¿Dónde una puede ir para hacerse el Papanicolau? _____

5. ¿Sabe usted qué es el Auto-examen de senos? □ Sí □ No 5a. ¿Para que se lo hace? _____

6. ¿Usted se hace el Auto-examen de senos? □ Sí □ No

7. ¿Con qué frecuencia las mujeres deben hacerse el Auto-examen de senos? _____

8. ¿Ha recibido el examen de senos del médico? □ Sí □ No

I. ITS/VIH/SIDA
1. ¿Qué infecciones de transmisión sexual ha escuchado mencionado? (No diga las respuestas, solamente apunte las repuestas que diga la persona entrevistada)
□ VIH □ SIDA □ Gonorrea □ Sífilis □ Herpes □ Otro: _____

2. ¿Qué es el VIH?
2a. ¿Hay una diferencia entre VIH y SIDA? □ Sí □ No 2b. ¿Qué es la diferencia?_____

3. ¿Cómo se transmite el VIH? (Diga cada opción a la persona entrevistada y apunte las respuestas)
3a. Madre a hijo durante el parto □ Sí □ No 3e. Madre a hijo dando el seno □ Sí □ No 3i. Relaciones Sexuales □ Sí □ No
3b. Usando la misma gillette □ Sí □ No 3f. Usando la misma jeringa □ Sí □ No
3c. Abrazo □ Sí □ No 3g. Beso □ Sí □ No
3d. Una silla caliente □ Sí □ No 3h. Saludando por mano □ Sí □ No 3j. Compartiendo vaso □ Sí □ No

4. ¿Cómo se previene VIH-SIDA y las enfermedades de transmisión sexual? _____
5. ¿Es posible que una persona quien parece saludable tiene el VIH o SIDA? □ Sí □ No
6. ¿Conoce usted alguien quien tiene VIH o SIDA o quien ha muerto de SIDA? □ Sí □ No

J. Extras
1. ¿Sufre usted de un problema con la presión de la sangre? □ Sí □ No 1a. ¿De qué tipo (alta o baja)?_____
1b. ¿Qué hace usted para evitar o controlar los problemas con la presión? _____

2. ¿Sufre usted de una enfermedad respiratoria? □ Sí □ No 2a. ¿De qué tipo? _____

3. ¿Sufre usted de un problema diabético? □ Sí □ No
3a. ¿Qué hace usted para evitar o controlar los problemas con la diabetes? _____

4. ¿Qué tipo de medicamentos toma la familia a menudo?

5. ¿Qué son algunas maneras se puede protegerse y mantener sana los dientes y las encías?

Community Health Promoter	Community
Celestina Fivis	Sabana de Payabo
Julio Brito Arcangel	La Ermuth
Ana Maria del Rosario	Triple San Pedro
Digna M. Roa León	Batey Nuevo
Margarita de León	Hato San Pedro I
Paula Melo	Hato San Pedro II
José Miguel Peña	Santa Rosa
Blasina Martes	Loma de la Gallina
Valentina Paulino	La Guardia Arriba
Maria Virgen Figueroa	La Guazama
Ivelisse Ramírez	El Corozo
Luz Sagrario Antigua	Mano de Pilón
Griselda Nuñez	El Carmen

Simplified field tables

Arm circumference-for-age GIRLS
3 months to 5 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
0: 3	3	10.2	11.1	12.0	13.0	14.2	15.4	16.8
0: 4	4	10.5	11.3	12.3	13.4	14.5	15.8	17.2
0: 5	5	10.7	11.5	12.5	13.6	14.8	16.1	17.6
0: 6	6	10.8	11.7	12.7	13.8	15.0	16.3	17.8
0: 7	7	10.9	11.8	12.8	13.9	15.1	16.5	18.0
0: 8	8	11.0	11.9	12.9	14.0	15.2	16.6	18.1
0: 9	9	11.0	11.9	12.9	14.1	15.3	16.7	18.2
0:10	10	11.1	12.0	13.0	14.1	15.4	16.7	18.2
0:11	11	11.1	12.0	13.0	14.2	15.4	16.8	18.3
1: 0	12	11.1	12.1	13.1	14.2	15.4	16.8	18.3
1: 1	13	11.2	12.1	13.1	14.2	15.5	16.8	18.3
1: 2	14	11.2	12.1	13.2	14.3	15.5	16.9	18.4
1: 3	15	11.3	12.2	13.2	14.3	15.6	16.9	18.4
1: 4	16	11.3	12.2	13.3	14.4	15.6	17.0	18.5
1: 5	17	11.4	12.3	13.3	14.4	15.7	17.0	18.5
1: 6	18	11.4	12.3	13.4	14.5	15.7	17.1	18.6
1: 7	19	11.4	12.4	13.4	14.5	15.8	17.1	18.7
1: 8	20	11.5	12.4	13.5	14.6	15.8	17.2	18.7
1: 9	21	11.6	12.5	13.5	14.7	15.9	17.3	18.8
1:10	22	11.6	12.6	13.6	14.7	16.0	17.4	18.9
1:11	23	11.7	12.6	13.7	14.8	16.1	17.5	19.0
2: 0	24	11.7	12.7	13.7	14.9	16.1	17.5	19.1
2: 1	25	11.8	12.7	13.8	15.0	16.2	17.6	19.2
2: 2	26	11.8	12.8	13.9	15.0	16.3	17.7	19.3
2: 3	27	11.9	12.9	13.9	15.1	16.4	17.8	19.4
2: 4	28	11.9	12.9	14.0	15.2	16.5	17.9	19.5
2: 5	29	12.0	13.0	14.1	15.3	16.6	18.0	19.6
2: 6	30	12.0	13.0	14.1	15.3	16.6	18.1	19.7
2: 7	31	12.1	13.1	14.2	15.4	16.7	18.2	19.8
2: 8	32	12.1	13.1	14.2	15.4	16.8	18.3	19.9

Arm circumference-for-age GIRLS
3 months to 5 years (z-scores)

World Health Organization

Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
2: 9	33	12.1	13.2	14.3	15.5	16.8	18.3	20.0
2:10	34	12.2	13.2	14.3	15.5	16.9	18.4	20.1
2:11	35	12.2	13.2	14.4	15.6	17.0	18.5	20.1
3: 0	36	12.2	13.3	14.4	15.6	17.0	18.5	20.2
3: 1	37	12.3	13.3	14.4	15.7	17.1	18.6	20.3
3: 2	38	12.3	13.3	14.5	15.7	17.1	18.7	20.4
3: 3	39	12.3	13.4	14.5	15.8	17.2	18.8	20.5
3: 4	40	12.3	13.4	14.6	15.9	17.3	18.8	20.6
3: 5	41	12.4	13.4	14.6	15.9	17.3	18.9	20.7
3: 6	42	12.4	13.5	14.6	16.0	17.4	19.0	20.8
3: 7	43	12.4	13.5	14.7	16.0	17.5	19.1	20.9
3: 8	44	12.4	13.5	14.7	16.1	17.5	19.1	21.0
3: 9	45	12.5	13.6	14.8	16.1	17.6	19.2	21.0
3:10	46	12.5	13.6	14.8	16.1	17.6	19.3	21.1
3:11	47	12.5	13.6	14.8	16.2	17.7	19.4	21.2
4: 0	48	12.5	13.6	14.9	16.2	17.8	19.4	21.3
4: 1	49	12.6	13.7	14.9	16.3	17.8	19.5	21.4
4: 2	50	12.6	13.7	15.0	16.3	17.9	19.6	21.5
4: 3	51	12.6	13.7	15.0	16.4	18.0	19.7	21.6
4: 4	52	12.6	13.8	15.0	16.4	18.0	19.8	21.7
4: 5	53	12.7	13.8	15.1	16.5	18.1	19.8	21.8
4: 6	54	12.7	13.8	15.1	16.6	18.1	19.9	21.9
4: 7	55	12.7	13.9	15.2	16.6	18.2	20.0	22.0
4: 8	56	12.7	13.9	15.2	16.7	18.3	20.1	22.1
4: 9	57	12.7	13.9	15.2	16.7	18.3	20.1	22.2
4:10	58	12.8	14.0	15.3	16.8	18.4	20.2	22.3
4:11	59	12.8	14.0	15.3	16.8	18.5	20.3	22.4
5: 0	60	12.8	14.0	15.4	16.9	18.5	20.4	22.5

WHO Child Growth Standards

Simplified field tables

Arm circumference-for-age BOYS
3 months to 5 years (z-scores)

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Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
0: 3	3	10.7	11.6	12.5	13.5	14.5	15.6	16.7
0: 4	4	10.9	11.8	12.8	13.8	14.9	16.0	17.2
0: 5	5	11.1	12.0	13.0	14.1	15.2	16.3	17.5
0: 6	6	11.3	12.2	13.2	14.2	15.4	16.5	17.8
0: 7	7	11.4	12.3	13.3	14.4	15.5	16.7	18.0
0: 8	8	11.4	12.4	13.4	14.5	15.6	16.8	18.1
0: 9	9	11.5	12.4	13.4	14.5	15.7	16.9	18.2
0:10	10	11.5	12.5	13.5	14.6	15.7	17.0	18.3
0:11	11	11.6	12.5	13.5	14.6	15.8	17.0	18.3
1: 0	12	11.6	12.5	13.6	14.6	15.8	17.1	18.4
1: 1	13	11.6	12.6	13.6	14.7	15.8	17.1	18.4
1: 2	14	11.6	12.6	13.6	14.7	15.9	17.1	18.5
1: 3	15	11.7	12.6	13.6	14.7	15.9	17.2	18.5
1: 4	16	11.7	12.7	13.7	14.8	16.0	17.2	18.6
1: 5	17	11.7	12.7	13.7	14.8	16.0	17.3	18.6
1: 6	18	11.8	12.7	13.7	14.8	16.0	17.3	18.7
1: 7	19	11.8	12.8	13.8	14.9	16.1	17.4	18.8
1: 8	20	11.9	12.8	13.8	14.9	16.1	17.4	18.8
1: 9	21	11.9	12.8	13.9	15.0	16.2	17.5	18.9
1:10	22	11.9	12.9	13.9	15.0	16.3	17.6	19.0
1:11	23	12.0	12.9	14.0	15.1	16.3	17.6	19.1
2: 0	24	12.0	13.0	14.0	15.2	16.4	17.7	19.2
2: 1	25	12.1	13.0	14.1	15.2	16.4	17.8	19.2
2: 2	26	12.1	13.1	14.1	15.3	16.5	17.9	19.3
2: 3	27	12.2	13.1	14.2	15.3	16.6	17.9	19.4
2: 4	28	12.2	13.2	14.2	15.4	16.6	18.0	19.5
2: 5	29	12.3	13.2	14.3	15.4	16.7	18.1	19.6
2: 6	30	12.3	13.3	14.3	15.5	16.8	18.1	19.7
2: 7	31	12.3	13.3	14.4	15.5	16.8	18.2	19.7
2: 8	32	12.4	13.3	14.4	15.6	16.9	18.3	19.8

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2:10	34	12.4	13.4	14.5	15.7	17.0	18.4	20.0
2:11	35	12.4	13.4	14.5	15.7	17.0	18.4	20.0
3: 0	36	12.5	13.5	14.5	15.7	17.1	18.5	20.1
3: 1	37	12.5	13.5	14.6	15.8	17.1	18.6	20.2
3: 2	38	12.5	13.5	14.6	15.8	17.1	18.6	20.2
3: 3	39	12.5	13.5	14.6	15.8	17.2	18.7	20.3
3: 4	40	12.6	13.6	14.7	15.9	17.2	18.7	20.4
3: 5	41	12.6	13.6	14.7	15.9	17.3	18.8	20.4
3: 6	42	12.6	13.6	14.7	15.9	17.3	18.8	20.5
3: 7	43	12.6	13.6	14.7	16.0	17.4	18.9	20.6
3: 8	44	12.6	13.6	14.8	16.0	17.4	18.9	20.6
3: 9	45	12.7	13.7	14.8	16.0	17.4	19.0	20.7
3:10	46	12.7	13.7	14.8	16.1	17.5	19.0	20.8
3:11	47	12.7	13.7	14.8	16.1	17.5	19.1	20.8
4: 0	48	12.7	13.7	14.9	16.1	17.6	19.1	20.9
4: 1	49	12.7	13.8	14.9	16.2	17.6	19.2	21.0
4: 2	50	12.7	13.8	14.9	16.2	17.6	19.2	21.0
4: 3	51	12.8	13.8	14.9	16.2	17.7	19.3	21.1
4: 4	52	12.8	13.8	15.0	16.3	17.7	19.3	21.2
4: 5	53	12.8	13.8	15.0	16.3	17.8	19.4	21.2
4: 6	54	12.8	13.9	15.0	16.3	17.8	19.4	21.3
4: 7	55	12.8	13.9	15.0	16.4	17.8	19.5	21.4
4: 8	56	12.8	13.9	15.1	16.4	17.9	19.5	21.4
4: 9	57	12.9	13.9	15.1	16.4	17.9	19.6	21.5
4:10	58	12.9	13.9	15.1	16.5	18.0	19.6	21.6
4:11	59	12.9	14.0	15.2	16.5	18.0	19.7	21.6
5: 0	60	12.9	14.0	15.2	16.5	18.0	19.8	21.7

WHO Child Growth Standards

REPUBLICA DOMINICANA

Secretaría de Estado de Salud Pública

y Asistencia Social

DIRECCION GENERAL MATERNO INFANTIL Y ADOLESCENTE

Cédula de Salud del Niño(a)

No. de Registro del Niño(a)

☐☐☐ – ☐☐☐☐☐☐☐ - ☐☐

Centro de Salud

Provincia | Municipio

Nombre del Niño (a)

Fecha de Nacimiento | Código PAI

☐☐ - ☐☐☐☐

Libro Orden

Nombre de la Madre y Apodo | Edad de la Madre

PROGRAMA AMPLIADO DE INMUNIZACION (PAI)
REGISTRO DE VACUNACION

TIPO VACUNA	FECHA DE VACUNA APLICADA				
	1RA. DOSIS	2DA. DOSIS	3RA. DOSIS	1er REFUERZO	2do REFUERZO
BCG					
HEPATITIS B					
ANTI-POLIO					
PENTAVALENTE (DPT/HepB+Hib)					
DPT/Hib					
DPT					
SRP					
SR					
dT					

☐ Esquema Básico de Vacunación ☐ No se aplica ninguna vacuna

☐ Ante la eventual falta de Vacuna. **Pentavalente**, se aplica por separado la vacuna **DPT**, Hepatitis **B** y **Hib**, el color amarillo nos indica el número de dosis aplicadas.

ORIENTACION SOBRE LAS VACUNAS

VACUNAS	EDAD OPTIMA DE VACUNACION
BCG (contra Tuberculosis)	Recien Nacido
HEPATITIS B(contra Hepatitis B)	Recien Nacido
Anti-Polio (contra Poliomielitis)	2, 4, 6 - 18 meses y a los 4 años
Pentavalente (contra **Difteria**, **Tosferina**, **Tétano**, **Hepatitis B**, **Haemophilus influenzae**)	2,4, y a los 6 meses
DPT (contra Difteria, , Tosferina y Tétanos)	18 meses y a los 4 años
SRP (Contra Sarampión)	12 meses
SR (Contra Sarampión, Rubeola) y Papera	Otras Edades
dT (contra tétanos y difteria a partir de los 7 años de edad)	Gestantes y Mujeres en edad fértil. 10-49 años, que inician con el esquema de vacunación. 1ra. Dosis: en la primera oportunidad. 2da. dosis: un mes despues. 3ra. dosis: 6 meses despues. 4ta. dosis: 1 años más tarde. 5ta. dosis: otro año más tarde.

DPT (contra Difteria, Tosferina y Tétanos)	2, 4, 6 -18 meses y a los 4 años
HEPATITIS B (contra Hepatitis B)	Recién nacido, 2, 4 y a los 6 meses
Hib (Contra Infecciones por Haemophhilus Influenzas Tipo b)	2, 4 y a los 6 meses