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Breathing easier: Ethnographic study of acute respiratory infection in children in rural Ecuador

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Breathing Easier:
Ethnographic Study of Acute Respiratory Infection
in Children in Rural Ecuador

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
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pneumonia, Andes

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Dedication

To Marie and Carolyn

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BREATHING EASIER:
ETHNOGRAPHIC STUDY OF ACUTE RESPIRATORY INFECTION
IN CHILDREN IN RURAL ECUADOR

John S. Luque

ABSTRACT

This dissertation research utilizes anthropological methods to determine the degree to which the signs and symptoms female caregivers identify as causes of acute respiratory infections (ARIs) in under-fives in rural Ecuador correspond with Western biomedical categories. By employing both a semi-structured medical history questionnaire and more open-ended ethnographic methods such as in-depth informant interviews and focus group research, the researcher identifies the factors which determine timely health care-seeking behaviors of female caregivers in this case study. Economic factors such as the cost of medications and lost work hours were determined to be the primary financial obstacles for timely health care-seeking. Other barriers included limited and inconsistent hours at the health centers and transportation issues. Families of lower socioeconomic status were also more likely to have children suffering particular respiratory ailments. Childhood respiratory illness was identified as an outcome of poverty, which had the potential to reproduce itself through the negative effect of illness on household income. However, the research determined that there was an overall lack of recognition of the biomedical signs and symptoms of serious lower respiratory infections regardless of socioeconomic status. The model of ethnomedicine supports the finding that compliance with timely health care-seeking is limited without collaboration between healthcare professionals and communities to work towards beneficial and achievable goals that are joined by a common purpose. By understanding local cultural beliefs towards ARIs, healthcare professionals are in a better position to: (1) assess the accuracy or inaccuracy of ethnomedical beliefs and determine if there is a conflict in symptom recognition and care-seeking behavior with the biomedical model; (2) determine culturally-appropriate interventions or recommendations to address the health problems of the community and identify barriers; and (3) work with existing community resources in order to foster effective health communication. This research finds that public health messages regarding ARIs be informed by ethnomedical knowledge of home treatments and beliefs. Moreover, health centers need to adhere to regular hours of operation and increase staff capacity to better meet the needs of their clients.

CHAPTER ONE: INTRODUCTION

Statement of Problem

This dissertation research project utilizes anthropological research methods to examine maternal health care-seeking behaviors for children under five with acute respiratory infections (ARI) in Penipe, a rural setting in Andean Ecuador. The purpose of the study is to determine the degree to which the ethnomedical signs mothers identify as causes for ARIs correspond with Western biomedical categories in order to pursue timely and appropriate medical care. Ethnomedicine is broadly defined as the “study of how well-being and suffering are experienced bodily as well as socially, the multivocality of somatic communications, and processes of healing as they are contextualized and directed toward the person, household, community and state, land and cosmos (Nichter 1992:x).” Biomedicine is defined as the empirical study of medicine as it relates to all biological systems “using the standardized concepts, measures, and techniques” that are practiced in Western societies (Browner, et al. 1988:682). The lack of immediate attention for severe ARIs based on differences of judgement concerning disease severity are barriers to timely health care-seeking. The research approaches the problem of ARIs from the perspective of medical pluralism, between ethnomedicine and biomedicine, in order to gauge

perceptions of severity of childhood ARIs in the small town of Penipe. Utilizing both available epidemiological data and ethnographic information generated by the more open-ended anthropological structured survey methods, the design of this project incorporates both public health and applied anthropology.

Introduction to the Research Site

The dissertation field research visit to Ecuador was the researcher's fifth time to the country over a period of fourteen years. In 2002, the researcher worked as a research assistant at the University of South Florida under a grant funded by the Center for Disaster Management and Humanitarian Assistance (CDMHA) titled, "In the Shadow of the Volcano: Human Health and Community Resilience" (Whiteford and Tobin 2002). The principal investigators, Dr. Linda Whiteford, Anthropology, and Dr. Graham Tobin, Geography, were interested in examining the health effects of ash fall and community resilience in the face of Mount Tungurahua, an active volcano which had erupted and caused forced evacuations in October 1999 (Whiteford and Tobin 2001). The research compared three distinct areas affected by the volcano and found different patterns related to infectious disease, respiratory illnesses, risk perceptions, and economic losses (Tobin and Whiteford 2002). By working on the CDMHA grant in various capacities between 2001 and 2002 including field research, grant writing, and data collection and analysis, the researcher became very familiar with Penipe, the dissertation research study site, and had established some

contacts with in-country personnel, who would later be instrumental in facilitating entry to the research site.

I decided that the city of Riobamba, capital of Chimborazo Province, would be the most convenient place to live. The commute between Penipe and Riobamba was a mere forty-minute bus ride and cost forty cents. Most professionals working in Penipe also lived in Riobamba because Penipe has very few services. Riobamba is a small-sized city with approximately 125,000 people and has all the modern conveniences (INEC 2001). The dissertation research took place between June and December of 2004, and a follow-up site visit was conducted in July 2005.

Village life in Penipe followed a regular routine, with people working in the town from Monday until Friday, with weekends free, except in the health centers, which were open on Sundays, or market day. Many people would come to the town on Sundays from outlying rural areas to do weekly shopping or sell agricultural products, or would make the longer commute to Riobamba for its market day on Saturday.

Brief Overview of Theory and Methods

Estimates for worldwide child deaths due to acute respiratory infections (ARIs) are approximately two million annually, making it the leading cause of child mortality (Williams, et al. 2002). Rapid treatment of pneumonia with antibiotics is necessary for child survival in many of these cases (Mull, et al. 1994). Consequently, examining how antibiotics are dispensed and used for

respiratory infections is one component of an ethnographic study of ARIs. Identifying obstacles to health care-seeking is another vital component in any study, because when treatment is delayed, there are dire consequences for seriously ill children. While there have been many ethnomedical studies examining how knowledge of illness affects health care-seeking behavior, some have argued that the links are tenuous (Rubel and Hass 1990:125). In the case of Penipe and childhood ARIs, many health professionals maintain the belief that mothers' understanding of the biomedical model will improve illness outcomes. Therapeutic choices are a complex function of not only the caregiver's beliefs but of people in her social network. Generally, health care-seeking behavior is not a black and white matter of choice between home-treatment and a doctor's attention, but a mix of strategies for one illness episode.

Expensive medical interventions are not necessary to solve the worldwide problem of childhood mortality from ARIs. There are many low-cost educational strategies and medical interventions such as improving vaccination coverage that can significantly improve health in rural communities in the Andes. However, before choosing which intervention will have the desired effect, a study of the local situation and extent of the problem needs to be carried out in order to tailor a program to a specific locality. This dissertation research should be considered as a descriptive case study, and the conclusion of the dissertation makes recommendations on how to improve respiratory health for the target population.

The dissertation research approaches the problem of childhood ARIs in a rural community in a developing country from a critical biocultural approach, with

a conception of the environment as a changing Andean landscape, imbued with cultural dimensions, and actors who negotiate relationships and health in an environment of medical pluralism (Goodman and Leatherman 1998; Greenway 1998b). This research perspective is in accord with current research in medical anthropology of the Andes and social epidemiology (Koss-Chioino, et al. 2003; Pillai, et al. 2003). While many studies of medical pluralism in the Andes have been conducted in indigenous communities, the influence of indigenous ethnomedicine on the central highland provinces of mestizo communities should not be underestimated (Crandon-Malamud 1991; Finerman and Sackett 2003; Greenway 1998a; McKee 2003). Ethnomedicine is defined simply as, “culturally oriented studies of illness” (Rubel and Hass 1990:118). Approximately fifty percent of the population of Chimborazo Province is composed of indigenous people, and ethnomedical conceptions of health and illness, as well as diagnoses and home-based treatments, cross ethnic boundaries (Gerlach 2003).

This research differs from some feminist anthropological studies of Andean women because the research is not focused on folk illnesses that women suffer, who sometimes seek treatment with alternative healers, but instead examines childhood respiratory illnesses which are either treated with home remedies or with biomedicine (Greenway 1998a; Larme 1998). The language of power and praxis that has been employed in some “critical phenomenological” studies of medical anthropological problems is not invoked in this study because the researcher employs a model based on the critical biocultural approach in anthropology that examines ARIs as the interaction of

political and economic forces on the experience of health and illness, not interpreting the illness as a mask for a more hidden, insidious malady, as in the case of Scheper-Hughes ethnomedical explanation for infanticide in the *favelas* of Brazil (Leatherman 1998b; Scheper-Hughes 1990; Scheper-Hughes and Lock 1987). In the theoretical section of the dissertation, the synergism between political ecology and a critical biocultural approach is proposed as a more appropriate perspective for situating actors in the local research context of childhood ARIs. In the process of conducting an ethnomedical investigation of ARIs, the researcher explores the cultural significance of an illness, and discerns the salient features of treatment and resolution from an ethnomedical perspective (Rubel and Hass 1990).

This research elicits competing and overlapping medical systems from mother respondents and biomedical health practitioners and gauges the variables [e.g. socioeconomic status (SES), education, number of children, crowding, environmental pollutants, and nutrition] that affect the extent to which female caregivers recognize biomedically defined symptoms for childhood ARIs. In addition, perceptions of health care decisions for treatment are discussed. This information is gathered through the combination of qualitative and quantitative ethnographic method techniques including focus group discussions, key informant interviews, in-depth interviews with mother informants and healthcare practitioners, and semi-structured questionnaires.

On the one hand, the research is focused on the biomedically-defined disease of ARI, which is distinguished from the illnesses of respiratory infections,

which are culturally-defined feelings and perceptions. This is a common definitional distinction in medical anthropology (Pelto and Pelto 1990; Rubel and Hass 1990). The biomedical classification of ARIs has been defined by the World Health Organization (WHO) and is given to practicing doctors and nurses in Ecuador in the form of treatment guidelines. On the other hand, the local people use a plethora of terms to describe various respiratory illnesses, and do not use the Spanish biomedical term for the disease, *IRAs* (ARIs). Medical anthropology studies of ARIs frequently use methods such as “free listing” in order to ascertain the local terminology for illnesses in order to determine whether local people have accurate recognition of various illnesses and act appropriately. This research study follows this tradition to discover the determinants for disease recognition in a rural population in Penipe County, Chimborazo Province, Ecuador.

Research Hypotheses

- First Research Hypotheses
 - 1) Female caregivers of higher socioeconomic status with under-fives who display signs of severe respiratory distress are more likely to seek allopathic medical care.
 - 2) Female caregivers of lower socioeconomic status with under-fives who display signs of severe respiratory distress are more likely to seek alternative medical care or home-based care.

- Second Research Hypothesis

Biomedical healthcare practitioners maintain a perception that female caregivers delay seeking treatment for their under-fives who display biomedically defined symptoms for ARIs because of an inadequate understanding of the biomedical model, meaning lack of education.

These research hypotheses were determined *a priori* to performing field research. The first research hypothesis was tested using the results of the semi-structured questionnaire. The hypothesis was based on the assumption that families of lower socioeconomic status would be more likely to treat many illnesses in the home or use low-cost non-traditional healers because of the expenses of biomedical care, which included transportation to health centers and the costs of medicines. Conversely, it was also assumed that families of higher socioeconomic status would have the monetary resources to pay for either public or private medical care for their children and would have more spare time in order to seek timely medical care for under-fives.

The second research hypothesis was tested using the information from in-depth interviews with informants from the health care profession. These hypotheses guided the research agenda and were always in the researcher's mind when carrying out the multiple research methods. One of these questions, which is addressed in the second research hypothesis, aims to identify the constraints or barriers to timely health care-seeking. Some of the posited constraints were lack of economic capital, limited access to health centers, and

lack of social support. The primary constraint was economic, however access issues were also identified, in the form of transportation barriers and limited hours of the medical facilities. Lack of social support was not mentioned as a barrier to health care-seeking.

Statement of Findings

The first hypothesis of the dissertation research stated that families of low SES would be more likely to treat respiratory infections at home or do nothing. Results from the semi-structured questionnaires found that families with below-average salaries (under \$150 per month) were more likely than those with above-average salaries (over \$150 per month) to treat a child with cough, fever and nasal secretion at home or do nothing ($X^2(1) = 6.40, p < 0.05$, two-tailed). Moreover, families who lived in homes with dirt floors were more likely than those with non-dirt floors to have children with coughs and colds ($X^2(1) = 4.22, p < 0.05$, two-tailed). In addition, families with a low possession score were more likely than those with a high possession score to have a child with wheeze ($X^2(1) = 7.35, p < 0.01$, two-tailed). Results from the logistic regression procedures found that for the symptom cluster of cough, fever and nasal secretion health care-seeking, families with above-average salaries were five times as likely as those with below-average salaries to seek a doctor for their child's symptoms when controlling for the other three independent variables [odds ratio (OR) = 5.97, $p = .05$]; moreover families with non-dirt floors were 3.5 times more likely than those with dirt floors to seek a doctor than treat at home for children with

these symptoms (OR = 3.51, $p = .05$). Therefore, there was a statistically significant association between increased incidence of respiratory problems and inhibited the ability to seek appropriate care with poor housing, few possessions, and low income. In sum, household income and possession score were associated with differences in care-seeking and respiratory illness frequencies.

For the second hypothesis, there was support from the in-depth interviews that doctors and nurses believed that their patients were unaware of the seriousness of ARIs and therefore delayed care-seeking. Out of the seven doctors and nurses who responded to the question on whether mothers delayed health care-seeking, five reported that mothers delayed bringing their children to seek care because of lack of education on the importance of seeking a biomedical care for certain illnesses. Although the health professionals also listed other reasons, e.g. tending animals and treating at home or with a natural healer, to explain delay in biomedical health care-seeking, they stressed lack of education as a key determinant.

When mothers were asked to describe what they believed to be childhood respiratory symptoms, they mentioned “chest whistling, tightening of the chest, green nasal discharge, stuffy nose, cough, colds, and wheezing,” all of which could be possible symptoms for ARIs as defined in the biomedical model. Some of the mother’s other explanations for the cause of ARIs, such as change in climate, lack of vitamins, and ash rain from the volcano, were also plausible explanations from a biomedical standpoint for the onset of ARIs. The main discrepancy between the biomedical and ethnomedical models was the mothers’

use of various home remedies for an extended time, over the two-day limit as recommended by health professionals, to cure respiratory infections that would not resolve naturally. In these cases, the children likely had bacterial infections and should have consulted with a doctor. Therefore, there was considerable overlap between the biomedical and ethnomedical models for the identification of ARIs; however, the mothers were inconsistent about the specific signs that they would recognize to prompt them to seek a medical professional, because of their overall lack of knowledge of the most recognizable ARI symptoms, rapid breathing and indrawn chest. This lack of knowledge was not specific to any socioeconomic group but was more visible in mothers who had not had children with severe respiratory infections in the past. Those few mothers who had had children with pneumonia were more cognizant of the seriousness of acute lower respiratory infections.

Structure of Dissertation

Chapter Two begins the dissertation with an introduction to the geography, demography, and recent politics and history of Ecuador. Chapter Three introduces the research setting, describes prior research, and presents the rationale for site selection. Next, in Chapter Four, in the literature review, there is a discussion of theory in contemporary medical anthropology. This chapter presents the theoretical background of the dissertation, which is framed by a political ecology orientation informed by a biocultural perspective. The second section of the chapter is a critical treatment of ethnomedical studies in the Andes

and how the present research relates to these previous scholarly works. This dissertation takes a political economy approach and examines differences in socioeconomic status as a key variable determining access to health care resources. The third section of the chapter introduces methodologies used in the cross-fertilization of studies of medical anthropology and epidemiology. The argument is to undertake an ethnographic study before starting epidemiological research in order to identify the cultural factors of illness. In the fourth section of the chapter, the researcher grounds the dissertation in a discussion of the epidemiology of ARIs in the developing world. This section begins with morbidity and mortality trends, etiology and modifiable and non-modifiable risk factors. The second half discusses case management, meta-analysis of case studies, antibiotic management, prevention, and ethnographic studies of ARI. Chapter Five describes the multiple methods used to gather data for the ethnographic study. The study used a combination of focus group discussions, key informant interviews, in-depth interviews, and semi-structured questionnaires to collect ethnographic data. Chapter Six covers the results of the instruments used in data collection. In Chapter Seven, the researcher tests the hypothesis and provides an analysis and discussion of the results. The dissertation concludes with Chapter Eight and offers final recommendations to improve the health situation of under-fives in Penipe County.

CHAPTER TWO: ECUADOR – GEOGRAPHY, DEMOGRAPHY, ECONOMY, AND CHILD HEALTH

Ecuador is a country that has held a fascination for anthropologists, biologists, geographers, and historians because of its unique history, stunning landscapes, remarkable biodiversity, rich cultural traditions, and diverse indigenous peoples. This chapter introduces the reader to recent political history, population characteristics and health care system in Ecuador, and addresses some of the major issues that face Ecuador today.

Particular historical events in Ecuador, like the 1990 *Levantamiento Indigena* (Indigenous Uprising), led to a plethora of scholarly writings about identity politics, self-determination, and ethnic nationalism amongst Ecuadorian indigenous peoples (Brown 1993; Hendricks 1991; Martin 2003; Pallares 2002; Selverston-Scher 2001; Whitten 1996; Zamosc 1994). Other more gradual events, such as Ecuador's Agrarian Reform, that began to emerge in the late 1960s and 1970s, were the subject of numerous studies in anthropology, political science, history, and geography (Chiriboga 1988; Hiraoka and Yamamoto 1980; Korovkin 1997; Rudel 1995; Uquillas 1984; Zevallos 1989). Jungle border conflicts between Peru and Ecuador that began after World War II, erupted again in 1980 and also in 1995, prompted scholarly research in the area of peace

studies/conflict resolution (Herz and Nogueira 2002). While a peace agreement was signed, the tri-border area of Ecuador, Colombia, and Peru is one characterized by instability due to the multinational trade in drug trafficking and counterfeiting. Moreover, because Ecuador uses the U.S. dollar, it is attractive place for cash-placement and money-laundering operations for drug traffickers, especially along the northern border with Colombia (CIA 2005).

Third World debt has gradually increased since the 1970s, and solutions such as debt-for-nature swaps were attempted in Ecuador with the help of environmental non-governmental organizations (NGOs) and other countries because the forces of poverty were viewed as a threat to the environment (Meyer 1993; Phelps 1992; Visser and Mendoza 1993). Environmental and health crises were compounded by past illegal activities of multinational oil companies in the Amazon region of Ecuador (Sawyer 2004). Lawsuits were filed in the U.S. because of a corrupt judicial system in Ecuador, and epidemiological studies were conducted to assess cancer risks due to exposure to oil pollution in defense of indigenous peoples (Gerlach 2003; Hurtig and Sebastian 2002; Kimerling 1991). Finally, even though the 2000 dollarization of the economy curbed rising inflation, the higher price of oil has led to price hikes of basic necessities and consumer goods, producing economic hardships for the majority. While Ecuador is considered a constitutional republic, seven presidents have governed the country since 1996 (CIA 2005). The last president, Lucio Gutierrez was ousted by congress on April 20, 2005 and replaced by the then Vice-President, Alfredo Palacio, one year prior to the expiration of his term because of lack of political

support, corruption, and unpopular decision-making, among other reasons.

Many of these various historical events involved various power brokers such as multinational corporations, indigenous federations, political parties, local, national, and foreign governments, the Ecuadorian military, and local and international NGOs.

The preceding short list is merely a sample of the dramatic events that have occurred in recent Ecuadorian history. Compounding Ecuador's situation has been the ongoing internal problems of its neighbor to the north, Colombia, whose escalating drug-related violence in its major cities has led many of its citizens to emigrate to Ecuador, thus compounding Ecuador's problems of widespread poverty, lack of job opportunities, and generally weak government infrastructure.

Geography

Ecuador is a small country roughly the size of Oregon and is divided into four major regions: the coast, the sierra, the Oriente or eastern Amazon jungle, and the Galapagos Islands. Each area is environmentally distinct. Ecuador is divided into twenty-two provinces, which are in turn subdivided into cantons, or counties, which are also subdivided by parishes. Quito is the capital of the country, while the coastal port of Guayaquil is the largest city. Throughout Ecuador's post-colonial history, there have been power struggles between Guayaquil, and the more conservative Andean capital of Quito. In contrast, the Oriente is sparsely populated; however, because of its rich natural resources,

namely oil, its international appeal for ecotourism, and its value for national security, sharing borders with Colombia and Peru, the Oriente is tied to the nation's development plans and economic prosperity. While Ecuador is a small country with a land area of 276,840 square kilometers, it is noted for its "Avenue of Volcanoes" that runs through the Andes (CIA 2005). The highest peak in Ecuador is Chimborazo at 6,267 meters, to the north is Cotopaxi, the highest active volcano on the planet at 5,897 meters, and to the south is Tungurahua, another active volcano, near the research site, at 5,023 meters (CIA 2005; Whiteford and Tobin 2002).

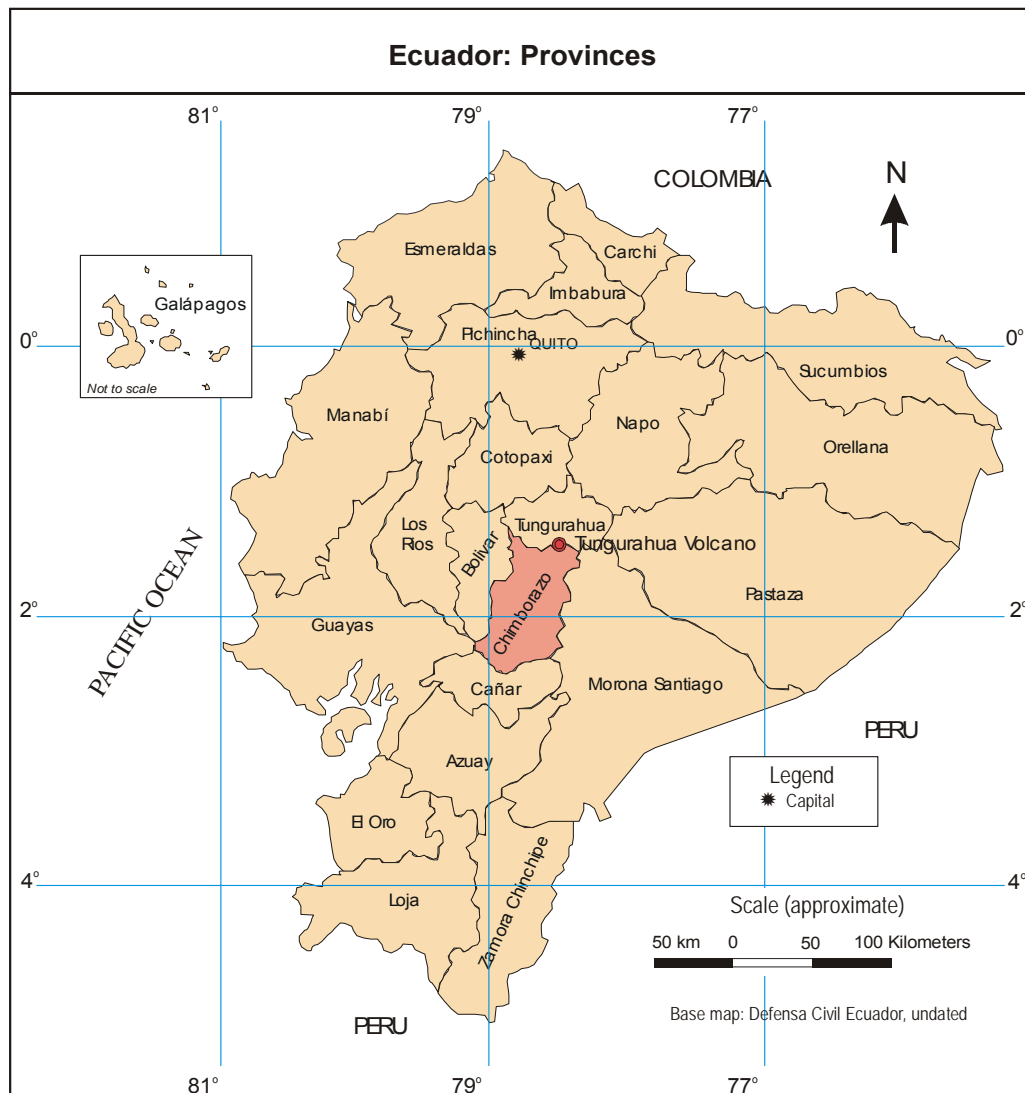


Figure 1: Map of Ecuador: (Lane 2003)

The research site of Penipe is located in the northeastern part of the Province of Chimborazo, known as “the province of high peaks,” whose capital is Riobamba, nicknamed “the sultan of the Andes” (d’Angelo 2001). Chimborazo covers an area of 5,637 square kilometers, and has a population of 403,000 people (Ecuador Ministry of Tourism: 2005). The province of Chimborazo has some of the highest peaks in Ecuador, including Chimborazo (6,310 m), Carihuairazo (5,020 m), and the paramos of Urbina, Cuvellín and Achupallas. In

the western part of the province towers the peak of Quilimas (4,919 m) and the snow-covered El Altar (5,320 m). The province is traversed by two major rivers: one is the Chanchán in the southern part of the province, and the other is the Chambo River, that runs from south to north. In addition, Chimborazo has attractive lakes: Ozogoche, Atillo, and Colta. Finally, Sangay National Park is a large ecological reserve (517,765 ha.) and a UNESCO World Heritage site that extends into three provinces, bordering Tungurahua and Morona Santiago. The snow-capped Sangay Volcano is a destination for adventurous trekkers. The province is characterized by a diverse climate, with a subtropical area in Pallatanga, passed by the traveler en route towards the coast. The average temperature of the province is 13 °C (d'Angelo 2001).

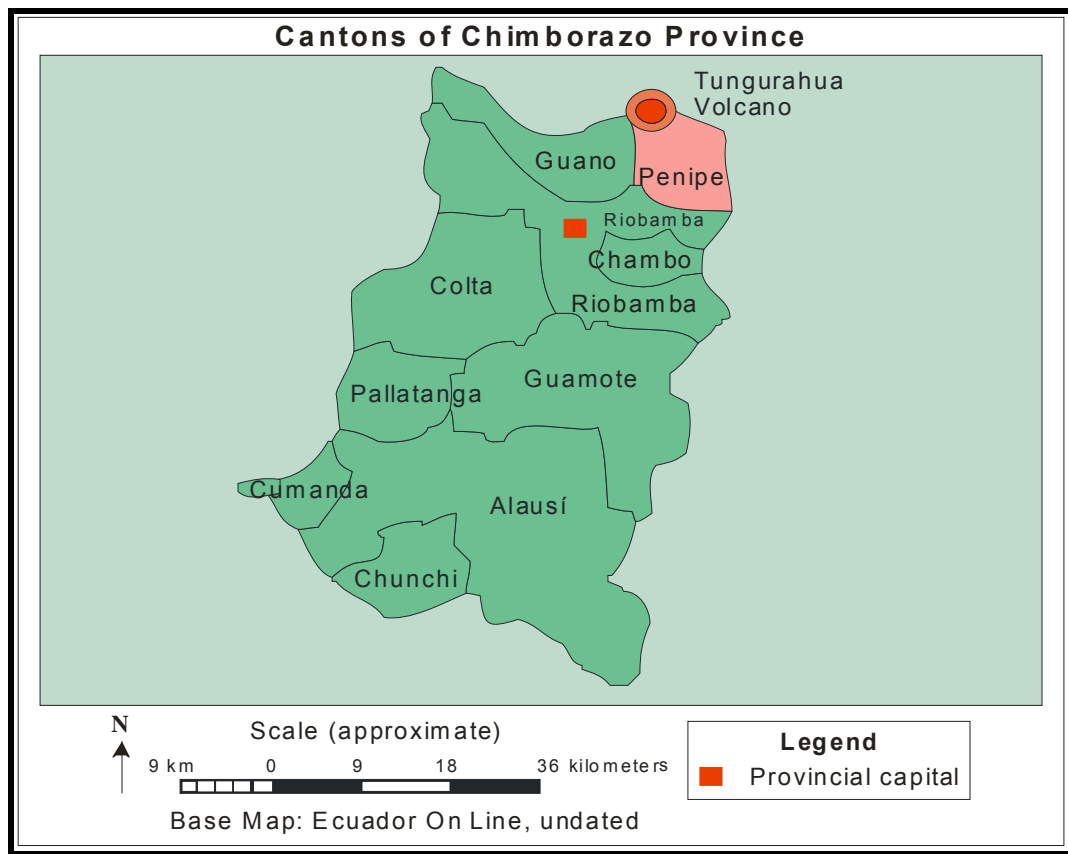


Figure 2: Map of Chimborazo Province: Lane (2003)

Demography

Ecuador has a population of 13,363,593 (July 2005 estimate), characterized by a population growth rate of 1.24 percent (CIA 2005). In 1950, the population was only 3,202,757, and in 1974, the population was 6,521,710, half of what it is today (INEC 2001). Fifty-five percent of the population live in urban areas, 50 percent live in coastal areas, 45 percent live in mountainous regions, nearly 5 percent live in the Oriente, and the remaining less than one percent live in the Galapagos Islands (PAHO 2002). Most people live in the cities, with approximately three million in Guayaquil and two million in Quito (USAID 2004; Wibbelsman 2003). Interestingly, the third-largest city of Ecuadorians is New York, not Cuenca (Wibbelsman 2003). The ethnic makeup of the population is primarily mestizo (65%), of mixed Spanish and Indian descent. The remaining population is composed of indigenous peoples (25%), people of Spanish descent and others (7%), and people of African descent (3%) (Wibbelsman 2003). While Spanish is the official language of Ecuador, thirteen indigenous nationalities inhabit Ecuador, each with their own unique language and culture. The indigenous population numbers roughly 3,655,000. The Kichwa, formerly spelled as Quichua, are the most populous of these indigenous nationalities, with a population of 3,000,000 in the Andes and 70,000 in the Oriente (Sawyer 2004; Wibbelsman 2003). The northern provinces of Ecuador have witnessed a large influx of Colombian refugees fleeing the political violence in their country, some 20,000 in 2004 (CIA 2005).

Population trends for Chimborazo Province have paralleled those of the

country, with more people moving to urban areas. In 1950, 21 percent of Chimborazo's population was rural compared to 26 percent in 1974, 33 percent in 1990, and 39 percent in 2001 (INEC 2001). To illustrate the more rapid growth of the cities of Quito and Guayaquil, located in Pichincha and Guayas provinces, respectively, in 1950, Chimborazo comprised 6.8 percent of the population of Ecuador, compared with 4.7 percent in 1974, 3.8 percent in 1990, and 3.3 percent in 2001 (INEC 2001). Therefore, while the city of Riobamba has witnessed growth, there has been substantially more growth in the major cities of Quito, Guayaquil, and Cuenca. Of the 403,632 people reported in 2001 for Chimborazo Province, 193,315 people live in Riobamba County, compared with 6,485 for Penipe County (INEC 2001). The city of Riobamba has grown from a population of 29,830 in 1950 to a population of 124,807 in 2001. The annual growth rate of the city of Riobamba has remained relatively stable, ranging from a high of 3.09 percent between the mid-1970s and the mid-1980s, to a low of 2.53 percent for the decade of the 1990s (INEC 2001). Half of the economically active inhabitants of Chimborazo Province work in agriculture, with a lesser proportion working in services (15.6%), commerce (12.6%), and manufacturing (8.6%) (INEC 2001). For the entire province of Chimborazo, 16.5 percent of the population is illiterate, compared to a country average of 10.8 percent, with a greater proportion of females (20.7%) than males (11.6%), and a higher proportion of illiteracy in rural areas (24.6%) than urban areas (4.9%) (INEC 2001).

Economy, Land, Rights, and Debt

Ecuador has an export-driven economy focused on oil, coffee, cocoa, cut flowers, bananas, and shrimp, primarily with export partners United States (48.3%), Colombia (5.5%) and Germany (4.8%) (CIA 2005). Consequently, Ecuador has a fragile economy dependent on the world market prices for these products. Petroleum continues to account for 40 percent of export earnings and consumes one-fourth of government spending (CIA 2005). Under the administration of Jamil Mahuad, while the October 1998 Peace Accords were signed with Peru, finally ending a century of conflict in 1999, the economic situation continued to worsen. Because of a combination of economic and environmental factors including falling oil prices, an international financial crisis, and a regional recession caused by the weather phenomenon of El Niño, the Ecuadorian currency, the Sucre, took a dramatic downturn, and the banking sector collapsed (Embassy_of_Ecuador 2002; Wibbelsman 2003). The 1997-98 weather pattern led to storms, floods and landslides which produced losses of \$2.6 billion (Gerlach 2003). Because of the financial crisis, Ecuador was forced to default on its international debt obligations (CIA 2005). In 2000, Ecuador dollarized its economy and Sucres were taken out of circulation. This quickly led to street protests and the ouster of President Mahuad. The subsequent administration of Gustavo Noboa sought to reach agreements with international creditors and sign agreements with international oil companies to increase foreign investment and to expand oil exploration and the oil pipeline infrastructure (Embassy_of_Ecuador 2002). While Ecuador's economy continues to grow

because of the rise in petroleum prices, the country continues to be vulnerable to price swings and international economic crises (CIA 2005).

One way to trace recent political and economic history of Ecuador is to examine the process of agrarian reform. The agrarian reform laws of Ecuador are based on a policy of integration (Davis and Wali 1993). Although the ideology of the initial agrarian reform was more influenced by theories of development concerning sparsely populated lands, the primary beneficiaries of the reform were former hacienda tenants (Crain 1990). The aim behind the agrarian reform was to integrate indigenous people into the national economy and to colonize the frontier with the overflow populations of urban areas. The method for carrying out this process was to organize indigenous people into cooperative forms of organization with the promise of land rewards in exchange for compliance.

The Law of Agrarian Reform and Colonization (1964), was passed in an effort to increase national food production in response to the United States' program for Latin America, the Alliance for Progress. The effect of the change was to eliminate the traditional debt-peonage system of the haciendas and make peasants legal owners of their land plots (Zamosc 1994). In order to accomplish this task, the newly created Ecuadorian Institute of Agrarian Reform and Land Settlement (IERAC) would be in charge of land redistribution. Since the agrarian reform, colonization was the most common method of land redistribution. The underlying political objectives of these agrarian reform laws included lessening demographic pressures in highland urban areas and assimilating lowland Indian

populations into the nationalist program (Macdonald 1981). The objective of the law was to stimulate the agricultural sector so that "unused" lands could be redistributed.

In the 1970s, the second phase of the reform was more instrumental at transferring former hacienda lands to peasants from surrounding communities (Zamosc 1994). The Law of Colonization of the Amazon Region (1977) facilitated colonization of the four Amazon provinces of Ecuador that would act as a safety valve for the densely populated urban areas. The 1977 law created INCRAE (National Institute of Colonization of the Ecuadorian Amazon Region), and this body was to oversee the quasi-military colonization of the Oriente to strengthen the Ecuadorian presence along the southern border in response to the potential military threat from Peru (Vickers 1988). The 1994 Agrarian Development Law was an attempt to apply principles of a free market economy approach in response to pressures to institute neoliberal reforms by the World Bank and International Monetary Fund. The law succeeded in eroding the land tenure stability of communal land holdings and abetted corporate interests in securing private property to stimulate the raw materials export sector (Sawyer 2004).

Parallel with the process of agrarian reform in the 1970s was the explosion of the Ecuadorian economy from new oil revenues. This allowed the Ecuadorian government, which at the time was a military regime, to engage in unprecedented development schemes. While the boom was primarily a boost to Ecuador's economy in the 1970s, even in 2001, oil revenues constituted almost

half of the country's revenue (Gerlach 2003). While oil has driven the country's economy, there have been disastrous environmental consequences, with frequent oil spills in the Amazon along the pipeline, as well as pollution from oil production wastes in fragile ecological areas (Kimerling 1991; Sawyer 2004).

In 1979, a radical change in government took place with the election of Jaime Roldos and Oswaldo Hurtado, the first democratically elected government without the support of the oligarchy or the military. President Roldos died in a plane crash halfway into his tenure and Hurtado became his successor. Hurtado was a former professor of political science and sociology at the Catholic University of Quito, and his most influential work, Political Power in Ecuador was a critique of the workings of the Ecuadorian political system and glaring social inequalities (Hurtado 1980). Hurtado concludes his book with a critique of Ecuador's dependence on oil, concluding that Ecuador's development strategy leads not only to inequities in income distribution, benefiting Quito over Guayaquil, but to a larger dependence on foreign markets. This is indeed what occurred as oil prices plummeted in the ensuing decade. At one point in the 1980s, Ecuador's foreign debt reached \$431 billion, but the debt was continuously restructured in order to be eligible for more loans (Gerlach 2003:46). During the 1970s and 1980s, high-interest loans caused these debts to grow, and consequently, the debts were continuously restructured and renegotiated.

One solution to the foreign debt problem involved debt-for-nature swaps (DNS) involving international financial institutions and environmental non-

governmental organizations (NGOs). There has been a vast proliferation of NGOs in Latin America generally and in Ecuador more specifically. As the Ecuadorian government's environmental budget was small, local NGOs expanded and assumed roles that the state agencies could not manage (Bebbington 1996; Meyer 1993). In October 1987 a DNS deal was brokered by Fundación Natura (FN), the largest private environmental NGO in Ecuador and the World Wildlife Foundation (WWF). FN received the government's permission to convert \$10 million of commercial bank debt into local government bonds. WWF acquired the first \$1 million debt for \$354,000 and placed it at the disposal of FN for the maintenance of Ecuador's national parks (Phelp 1992). The government issued long-term bonds, the interest from which funded FN activities in respect to the management of national parks. The \$10 million issued in bonds was a very small percentage of the country's total external debt. Nevertheless, while Ecuador's debt was only reduced by \$1 million, the resulting conservation fund yielded revenue equal to twice the existing government budget for parks and reserves.

The second stage of the swap involved \$9 million in 1989 purchased for \$1,068,750 (Visser and Mendoza 1993). WWF purchased \$5.4 million and The Nature Conservancy (TNC) purchased \$3.6 million, including \$400,000 from the Missouri Botanical Gardens for botanical research projects in protected areas of Ecuador (FAO 1993). The interest from the bonds funded educational and training programs in the Galapagos Islands and seven parks and reserves in the Andes and the Amazon. Some funds were designated to change the status of

some parks from poorly managed “paper parks” into conservation areas. Once the bonds matured, the principal would become an endowment for FN activities.

While this DNS transaction appeared positive there were questions about FN’s commitment to environmental protection. Local NGOs are vulnerable to co-optation by national governments or multinationals. FN received funding from a U.S.-owned oil company in exchange for exploration rights within Yasuni National Park, home to the Huaorani Indians (Phelp 1992). FN also allowed half of the park to be an open access area for mineral exploitation, and this led to a divide among Ecuadorian environmental NGOs. Another critique of FN was that it was elitist and ill suited to work with local communities. FN’s strengths were more in public relations to spread the environmental protection message (Meyer 1993). Indigenous people’s voices were excluded in the DNS negotiations. Currently, Ecuador’s external debt currently stands at \$16.8 billion (2004 estimate), and President Palacio has shown resistance to implementing structural adjustment policies imposed by the World Bank and International Monetary Fund at the expense of the health and social services for Ecuador’s citizens (CIA 2005). Future innovative means for reducing Ecuador’s foreign debts are likely.

Indigenous participation in powerful political blocs involved in decision-making in Ecuador evolved in response to the threats of agrarian laws to their traditional lands and to the perceived illegal activities of international oil companies in the 1960s and 1970s. Part of the strategy to persuade the national government to hear the voices of indigenous peoples was a revalorization of Indian ethnic identity that culminated in the *Levantamiento Indigena* of 1990.

First, during the 1970s and 1980s, agencies of rural development stepped up their efforts to integrate marginal Indian communities into the national political infrastructure. Second, voting rights and more educational opportunities were extended to Indians. Third, the promises of the agrarian reform had fallen short of expectations and the economic situation of Indians had declined drastically. Before the uprising, mestizo and Indian peasants experienced the pressures of inflation, lack of credit, usurious interest rates, and limited assistance from the government (Zamosc 1994). Fourth, the pervasive racism in Ecuadorian national society and the pejorative connotations of the term *indio*, produced a reaction, and Ecuadorian Indians (primarily speaking Kichwa) began to use *indio* to refer to themselves (Whitten 1985). A revalorization of Indian identity under the banner of Indianism painted the Kichwa Indians as returning to the Inca ideal, envisioned as a philosophy of egalitarianism and communalism. Fifth, the formation of CONAIE in 1986, the national organization representing all indigenous groups in Ecuador, concentrated on pressuring the national government to recognize Ecuador as a plurinational state, achieved under the administration of President Rodrigo Borja, and was successful in administering the program for intercultural bilingual education in all Indian parts of the country (Zamosc 1994). Working alongside CONAIE were new, powerful Indian leaders who were able to negotiate territorial autonomy for Amazonian groups and respond appropriately to pressure from regional delegates for a massive mobilization (Collins 2000; Zamosc 1994). The confluence of these factors coupled with the international attention of environmental NGOs led to a strategy

of advancing the rhetoric of Indian nationalities. The same leaders who had identified themselves as *campesinos* (peasants) in the 1970s were involved in the national uprising in 1990 demanding Indian rights to land, technical assistance, and cultural autonomy (Schroeder 1991). This is an example of how tribal identities could be created through contact with the colonial state and converted into a weapon of resistance against dominant national sectors (Whitehead and Ferguson 1992). Because of the power vacuum created by the agrarian reform, referring to the weakened power of the hacienda owners, Indian leaders were poised to broker cooperation between rural people and development agencies (Zamosc 1994).

Crain (1990) describes how in a recent period of Ecuadorian history from 1960-1984, positive symbols of Indianness and the rhetoric of a plurinational state was used by the national government in a hegemonic process to construct a national identity. While Indian leaders have participated in this process, counterhegemonic discourses disseminated by nascent Indian political parties such as *Pachakutik-Nuevo Pais* challenge the nationalist ideology. More frequently, indigenous leaders have been elected to political offices in Ecuador, and formed powerful political blocs and coalitions to change the course of political history in Ecuador. Moreover, indigenous movements have aided in developing public social sector policies and creating councils to monitor the children's rights and government fiscal responsibility (UNICEF 2003).

The next section turns the reader's attention to the main subject of the dissertation, that is, child health. Through the presentation of health statistics for

the country as a whole, and for the province of the study site, the research is situated in the local context.

Child Health in Ecuador

Many of Ecuador's health problems are tied to poverty and marginalization (Whiteford and Tobin 2002). One recent estimate places 45 percent of Ecuador's population below the poverty line (CIA 2005). Of this percentage, roughly half are classified as indigent, and 40 percent of the population has at least one unmet daily need regarding housing, food, health services, and education (PAHO 2002; Wibbelsman 2003). The recent population census estimates based on unsatisfied basic needs suggested by the Andean Community places 61 percent of the population in poverty; however, this estimate ignores ethnic and racial differences, since a higher proportion of indigenous and black people live in poverty than the general population (INEC 2001). Rural and indigenous areas are more severely affected by poverty. Nearly 70 percent of Ecuador's children currently live in poverty, and 15 percent of under-fives are affected by malnutrition (UNICEF 2003). Pneumonia, one of the diseases of poverty, is the primary cause of death in Ecuador with a rate of 27.2 per 100,000 people, followed by cerebrovascular diseases and cardiovascular diseases. Recently, there have been gains by government and society in social public investment, and child immunization coverage has increased from 70 percent in 1999 to almost 95 percent in 2002 (UNICEF 2003). For children under one year old, the country has achieved 90 percent

immunization coverage for diphtheria, tetanus, and pertussis (PAHO 2002).

Moreover, the last reported case of polio occurred in 1990, and since 1998, there have been no reported cases of measles (PAHO 2002).

There exist ethnic and racial health disparity challenges in Ecuador. Ninety percent of indigenous and black people live in poverty and experience higher mortality rates than other groups, and only 39 percent complete primary school, with many forced to work at a young age (UNICEF 2003). In rural mountain and Amazon regions, approximately 80 percent of indigenous children live in poverty, and along the coast, 70 percent of black children live in poverty (PAHO 2002). One of the reasons for these statistics is that oftentimes heads of households are forced to emigrate to urban areas in search of job opportunities.

The health sector in Ecuador is a combination of public and private institutions, nonprofit and for-profit. The researcher witnessed a speech by the Ecuadorian Public Health Minister, Dr. Teofilo Lama, at the main public hospital in Riobamba, where he was responding to the issue of how government clinics should respond to natural disasters. In his view, it was a question of *autogestión*, or developing from within, in order to solve the health problems caused by poverty and maternal mortality. The view of many Latin American government health ministries is that decentralization of health services serves to improve quality of care and responsiveness to local concerns and problems (LLoyd-Sherlock 2000). However, what often happens is that resources are disbursed unevenly to urban areas at the expense of more rural ones, contributing to health disparities. After the Minister spoke, the researcher heard rumblings from local

doctors and officials that the national government had still not done enough to assist with recovery efforts in certain areas of Chimborazo that had suffered health and economic losses due to mudslides and volcanic ash.

The Ministry of Public Health, Social Security Institute (IESS), the Public Health Service of the Armed Forces and Police, the National Child and Family Institute, and the Ministry of Social Welfare comprise the public subsector, which serves roughly 59 percent of the population (PAHO 2002). The Ministry of Public Health serves the most people, roughly 31 percent of the population. Those who cannot afford either the public or private healthcare providers turn to traditional medicine. PAHO estimates that there are 13.3 physicians and 4.6 nurses for every 10,000 patients (PAHO 2002). Class distinctions and preoccupations constantly come into play in daily social and business relationships. Having personal influence, the right contacts, and the right relatives propels the status seeker to forge alliances and improve one's social standing (Wibbelsman 2003). Access to property, quality health services, and loans are contingent on the ability of individuals to negotiate the social milieu that is Ecuadorian society.

Key Child Health Indicators for Ecuador's Sierra

This section presents key child health indicators for Ecuador's Andean region. The most recent figures from 2003 indicate an infant mortality rate of 24.0 per 1,000 live births for Ecuador overall; moreover, this rate is a considerable improvement from 1990 (42.8 per 1000) and 1980 (95.0 per 1000), and rates are expected to fall to 14.3 per 1000 births by 2020 (USAID 2004). In

under-fives, ARI and acute diarrheal disease accounted for 60 to 70 percent of hospitalizations, and ARI was responsible for 37 percent of deaths in infants and 32 percent of deaths in children one to four years old (PAHO 2002).

Table 1 contains information on key child health indicators for Ecuador's 10 Sierra provinces. The table contains average percentages for the country of Ecuador and the Sierra as a whole. Next, the percentages for prevalence of diarrhea, respiratory infections, vaccination coverage, and chronic undernutrition for under-fives are presented. The numbers for Chimborazo Province are highlighted for comparison purposes with the averages for the Sierra and the country as a whole. Chimborazo Province has lower prevalence of diarrhea and respiratory infection than the Sierra and country averages, but ranks worse for the indicators of complete vaccination scheme and chronic undernutrition. From this preliminary data collected by CEPAR (2004), it appears that despite performing worse in the areas of vaccination coverage and providing adequate nutrition, the province as a whole ranks second best for Sierra provinces in low prevalence of childhood diarrhea and third best in low prevalence of childhood respiratory infections.

Table 1: Key Child Health Indicators for Ecuador's Sierra Provinces (%)

Health Indicators	Ecuador	Sierra	Carchi
Prevalence of diarrhea	21.7	22.5	18.2
Prevalence of respiratory infections	42.3	35.3	40.9
Complete vaccination scheme: Children 12-59 mo.	67.0	68.1	87.8
Chronic undernutrition in under-fives	23.2	34.5	28.7
Health Indicators	Imbabura	Pichincha	Cotopaxi
Prevalence of diarrhea	12.2	21.4	25.7
Prevalence of respiratory infections	21.0	36.5	35.1
Complete vaccination scheme: Children 12-59 mo.	64.7	70.4	56.4
Chronic undernutrition in under-fives	33.7	27.9	33.8
Health Indicators	Bolivar	Tungurahua	Chimborazo
Prevalence of diarrhea	28.3	22.7	17.6
Prevalence of respiratory infections	42.7	34.5	32.7
Complete vaccination scheme: Children 12-59 mo.	56.8	77.0	54.6
Chronic undernutrition in under-fives	39.9	41.0	39.8
Health Indicators	Cañar	Azuay	Loja
Prevalence of diarrhea	22.5	29.2	26.7
Prevalence of respiratory infections	29.8	37.8	41.6
Complete vaccination scheme: Children 12-59 mo.	76.4	68.6	68.2
Chronic undernutrition in under-fives	39.8	31.3	28.9

Source: (CEPAR 2005)

In Table 2, selected health characteristics of child health were collected from the Endemian study in 2004. For breastfeeding practice, the groups with the highest percentages included rural areas (63%), Sierra (64%), women between 35-49 years old (58%), women lacking education (68%), and indigenous women (80%). This is compared with the national breastfeeding average of 49 percent. The national prevalence of diarrhea was 22 percent, with 24 percent using oral rehydration salts. Mothers under 25 years old had the highest percentage of children with diarrhea (24%) of the three age groups represented. The greatest prevalence of ARI was found in the urban areas (46%) and the coast (51%). Mothers less than 25 years old had more children with ARIs (44%) than the other two age groups and a lower percentage for antibiotic use (34%).

This suggests that young mothers are a possible risk group for having children with untreated ARIs. Less education is possibly associated with lower use of antibiotics to treat ARIs, with 26 percent of mothers with no education using antibiotics. Antibiotic usage is positively associated with education level. According to PAHO (2002) between 1990 and 2003, there was a national increase of 40 percent in the number of acute diarrheal cases and an increase of 84 percent in acute respiratory infection cases. Although not represented on the table, in Chimborazo, the prevalence of low weight-for-age in children between one and four years old was 40 percent, compared to the national average of 26 percent (PAHO 2002).

Table 2: Health of the Child, According to Selected Characteristics (%)

SELECTED CHARACTERISTICS	Weight of child at birth (a)	BREASTFEEDING (b)			DIARRHEA (a)		ARI (a)	
		Received chest	First hour	Exclusively 0 - 3 months	Prevalence	ORT (c)	Prevalence	Antibiotics
TOTAL	80.8	96.7	26.4	48.7	21.7	24.1	42.3	37.3
AREA								
Urban	92.0	95.6	22.4	32.7	20.7	24.7	45.7	40.0
Rural	67.4	98.1	31.7	63.2	23.0	23.5	38.3	33.3
REGION								
Coast	86.0	95.8	20.4	32.2	20.6	24.5	51.3	42.5
Sierra	76.1	97.4	31.7	64.2	22.8	24.4	35.7	30.4
Amazon	73.7	98.5	34.2	44.7	22.7	19.0	20.2	23.9
Insular	96.6	94.1	54.9	33.3	6.7	25.0	13.4	12.5
AGE								
Less than 25	81.1	97.5	26.3	44.0	24.3	21.3	44.4	34.1
25 - 34	82.2	96.7	26.7	52.7	18.9	29.8	42.0	43.3
35 - 49	75.3	94.0	25.8	57.5	20.3	21.5	35.0	31.7
EDUCATION								
None	48.2	98.6	28.2	68.2	20.5	40.4	29.3	26.4
Primary	69.8	96.7	31.0	55.0	24.0	21.2	44.0	30.9
Secondary	92.5	96.7	23.9	40.4	20.3	26.6	43.4	42.7
Post-secondary	97.5	96.3	18.3	48.1	18.1	23.5	35.9	49.0
GROUP								
Indigenous	51.1	98.8	31.3	79.6	25.0	27.4	35.0	21.4
Mestizo	84.5	96.7	26.5	43.7	21.4	24.1	42.0	38.3
Other	83.4	94.9	21.1	43.3	21.1	20.0	52.2	42.1

(a) born between 1999 - 2004; (b) born in 1999; (c) oral rehydration salts therapy
Source: (CEPAR 2005)

The aim of this chapter has been to introduce the geography, demography, politics, history, and status of child health in Ecuador. While brief, the major recent developments in Ecuador have been placed in a context that informs the larger dissertation project. Ecuadorians are invested in their political and social institutions, and they follow current events closely and critically. To study health care-seeking behavior in a small town in Ecuador, the researcher should not lose sight of the larger political and social context wherein these decisions are made.

CHAPTER THREE: RESEARCH SETTING, PRIOR RESEARCH, AND SITE SELECTION

Research Setting

Penipe is located in the northeastern section of the Chimborazo Province, lying 22 km from Riobamba, the capital of the province. To the north lies the Tungurahua Province and to the south are the Parish of Quimiag and Riobamba County. Penipe County lies at an average altitude of 2460 meters above sea level with an average temperature of 14° Celsius. The county is divided into seven parishes: Penipe (County Seat), El Altar, Bayushig, Puela, Matus, Candelaria, and Bilbao. Penipe County has two valleys, Penipe and El Altar, and two mesas, Matus and Bayushig. The county is carved up by various rivers, including the Chambo, Blanco, and Puela, and has various lagoons such as the Negra, Minsas, Yaguarcocha, Ventanas, Collantes, and Amarilla, all part of Sangay National Park.

From national census data, the total population of the county is 6,485 (710 living in the town of Penipe, 5775 living in rural areas) with 1,783 occupied dwellings (Table 3) (INEC 2001). There is a population density of 17.5 persons per square kilometer, the lowest for all counties in Chimborazo Province (INEC 2001). After the October 1999 Mount Tungurahua eruption, roughly half of the population of the county was evacuated, and an unknown number of these

returned (Whiteford and Tobin 2002). Because of the negative effects of the ash on animals and crops, and the lack of economic opportunities, many young workers emigrated to other regions of Ecuador (Lane 2003; Tobin and Whiteford 2002). The breakdown on ethnicity from the same population diagnostic is 90 percent mestizo, and 10 percent indigenous. From the researcher's observations, there is a discrepancy in this data since the people of Penipe did not report any indigenous people living in the county, and there was no visible presence of indigenous people during the fieldwork.

Table 3: Population of Penipe County (INEC 2001)

	Total	Male	Female
Total	6485	3226	3259
Urban	710	325	385
Rural	5775	2901	2874

The primary economic activities in Penipe County are agriculture, mainly of corn and potatoes, and cattle raising, although these businesses have suffered since the volcanic eruptions. Other agricultural products include apples, pears, claudias and capulies. The second primary economic activity is the shoe factory, which employs a large number of disabled individuals in the community and is funded by a non-profit Catholic charity. Penipe is a small, rural town and the seat of the county with one health sub center (SCS Penipe), a small soccer stadium, a main plaza with a church and convent, four restaurants, and no hotels. Some travelers pass through Penipe on their way to El Altar, (at 5,319 m., it is Ecuador's fifth highest summit) and for views of Mount Tungurahua (5,029 m.)

(Rachowiecki 1992). Local food specialties include corn tortillas cooked on hot stones, potatoes with guinea pig, roasted pig, and apple wine (Los_Andes 2004).



Figure 3: Town of Penipe

The area which is today Penipe was originally inhabited by a tribe called the Pinipis, which was a subgroup of the Puruhaes, and which meant “river of the snakes.” The Pinipis cultivated beans, corn, potatoes, and cauliflower to provide themselves with sustenance and to trade with neighboring tribes for salt. After the Spanish conquest, most of the Pinipis fled to the jungles of the Oriente. Penipe was founded in 1563 by Don Lorenzo de Cepeda and was named after the mountain “Cedral of Penipe.” The patron saint of Penipe is Saint Francis of Assisi. In 1845, Penipe became part of the Guano County as a rural parish and

church center. Penipe County was founded in February 1984 under President Oswaldo Hurtado (COSUDE 2003).

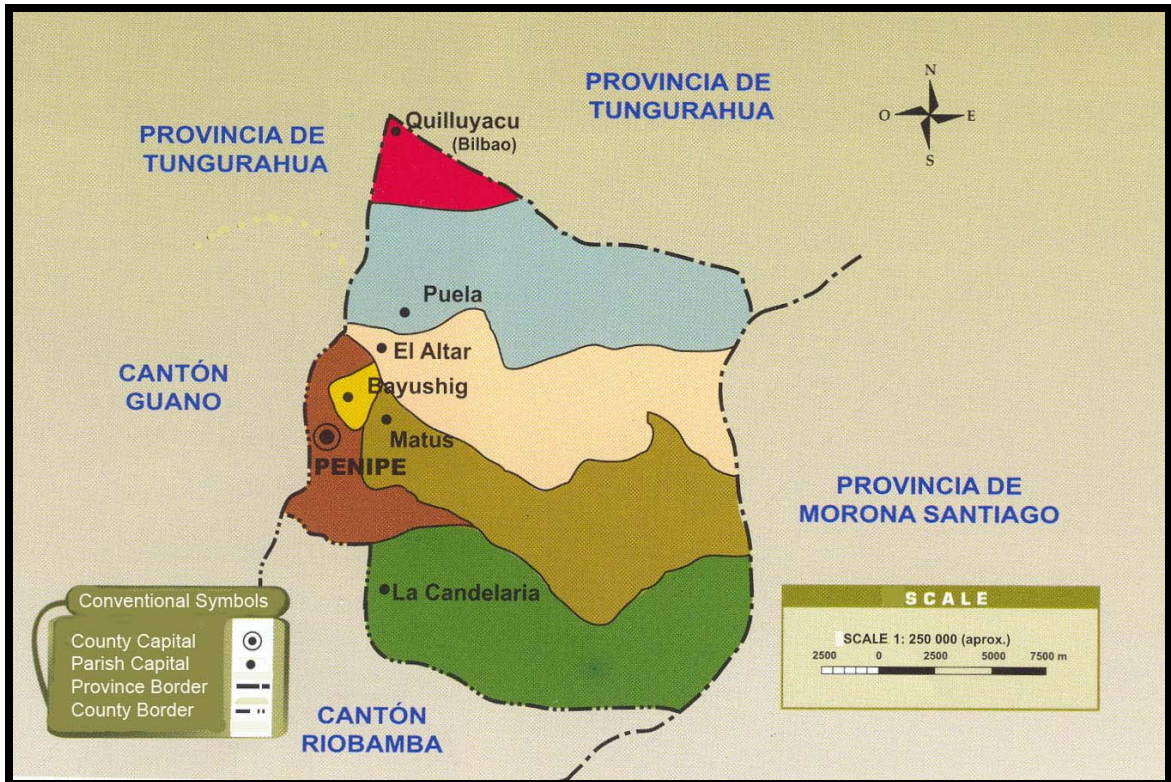


Figure 4: Map of Penipe County
Source: (COSUDE 2003)

CEBYCAM-CES

This section introduces the Center for the Eradication of Goiter and Debilitating Diseases (CEBYCAM), which was created in 1983 as an initiative by the Ecclesiastical Communities in order to address severe problems of health and disease, unemployment, and education in Penipe (Ponce 2001). The example of CEBYCAM exemplifies a successful development model for rural communities in Ecuador, and serves as an introduction to some of the problems which the people in Penipe faced in the past and continue to face today. In

addition, the researcher achieved acceptance from the community for his own research in the county through his association with CEBYCAM, so a thorough explanation of the center's activities is appropriate.

A leader of the community, Father Jaime Alvarez, arrived in Penipe in 1979 and worked together with researchers studying the relationship between poverty and illnesses such as cretinism and goiter, beginning their work in 1981. At the time there were more than 700 cases of people with goiter, twice the number of the national average, and the cause was attributed to lack of iodine intake, which is normally consumed in salt. However, goiter was not the only regional health problem, there were also many cases of deafness, language disorders, as well as mental retardation. Other problems in Penipe included lack of potable water for half of the inhabitants, poor sanitation, and lack of electricity for the majority. After more than a decade of work, the chief doctor on the project reported that the prevention of the causes of goiter had been largely achieved (Ponce 2001).

The initial group, which later became the institution of CEBYCAM, was composed of a doctor, a social worker, an educator, a physical therapist and a psychologist. In the beginning, the group sought to address the problems related to goiter, and other more general health problems. The research began with household surveys of families with members suffering from various maladies. The group sought help from other agencies in the county to assist with the work (Ponce 2001).

The development program worked at many levels simultaneously: social, economic, religious, and educational. There are three basic elements of CEBYCAM's development model: 1) health and rehabilitation services; 2) cooperative enterprises and production associations; and 3) livable communities. CEBYCAM does not envision the model they have developed as one that is replicable, but as a point of reference, noting that every situation is different. CEBYCAM trained teachers to handle physically disabled and mentally retarded students. Campaigns in the communities took place to educate people on how to improve health and nutrition through health sanitation improvements in the physical infrastructure and starting family gardens to improve nutrition. In addition, family reunions were organized for physically disabled individuals. Job creation was also a component of the program to help disabled persons find work in crafts production. Moreover, the project aided schools to institute rehabilitation programs as well as to start initiatives aimed at improving nutrition.



Figure 5: Entrance to CEBYCAM (monastery in rear)

With the large increase in respiratory problems from the Mount Tungurahua eruptions beginning in late 1999, the community faced new health challenges. In the CEBYCAM health clinic, a 47 percent increase in respiratory infections was observed between October 1999 and February 2000, the time of the orange alert for Mount Tungurahua (Lara, et al. 2000a). In particular, Dr. Lara observed an increase in bronchitis and pharyngitis in children under three years old due to exposure to volcanic ash. The epidemiological data collected in Penipe demonstrated significant increases in both outpatient consultation rates for ARIs after the eruption of 1999 as well as higher pneumonia mortality rates in infants in 2000 (Whiteford and Tobin 2002). Over 60 percent of the inhabitants of Penipe were affected with respiratory problems by the ash. Moreover, the ash

had a negative effect on agriculture, thus compounding the nutritional problems that could lead to respiratory infections.

Since the mid-1980s, CEBYCAM has been instrumental in aiding poor children and families in a variety of ways. One method has been to encourage national and international individuals to “adopt” a family in Penipe to aid with daily expenses, pay for necessary tools and small domesticated animals, and subsidize a child’s education. Around 400 children and 75 adults are supported through this program. One of the main accomplishments of CEBYCAM is the institution of the shoe factory where many wheelchair bound persons work alongside people without physical disabilities. The factory is run on the cooperative model and the shoes are sold on the national market. There is also an artisan enterprise for women in the community to produce original designs made from silk, and a gift card production cooperative. All of these examples demonstrate that CEBYCAM takes community health very seriously and believes that a multi-faceted approach which incorporates microenterprise economic development, improved health services, education, religion, and social services contribute to positive change in the community.

Overall, the projects which CEBYCAM funds with the financial support of the Swiss Agency for Development and Cooperation (COSUDE) and the collaboration of the municipal authorities, helps the people of Penipe to feel a sense of solidarity in the face of severe economic hardships and health disparities. COSUDE has had a formal relationship with CEBYCAM since 1994. Much of the work has also been in collaboration with the Interamerican Institute

for Agricultural Cooperation (IICA). CEBYCAM recently officially changed its name to CEBYCAM-CES, which stands for *Centro de Desarrollo Humano en Cultura y Economía Solidadria* (Center for Human Development in Culture and Economic Solidarity) to reflect the change in emphasis of the organization from the health problem of goiter to development more generally.

Prior Research

In the face of the Mount Tungurahua volcanic eruption, Penipe's residents had to organize in order to evacuate in October 1999. The Committee of Emergency Operations (COE) helped to organize 15 Centers of Population Reactivation (CEREPS). CEREPS were groups of evacuated peasants who organized shelters to wait out the ash fall until the people could return to their homes. Some decided to move to distant towns such as Pallatanga in Chimborazo Province (43 families from Bilbao) and Chillanes in Bolivar Province (families from Pachanillay), and carried out the same organizational and solidarity generating activities that had helped them to survive in Penipe (La_Nación 2003). Two new towns were created, Sucuso and Matapalos, for evacuated residents of Bilbao and other affected areas in Penipe County. The ash from Mount Tungurahua affected 267 families from Penipe County and 649 families from neighboring Guano County; moreover, losses in agriculture production affected over two million hectares of land (La_Prensa 2003). The health consequences, economic upheaval and community resilience of Penipe

and other surrounding communities affected by the eruption of the volcano was the subject of research by two University of South Florida (USF) professors.

During 2001 and 2002, the researcher worked under the supervision of Dr. Linda Whiteford, Anthropology, and Dr. Graham Tobin, Geography, from the University of South Florida (USF) on a Center for Disaster Management and Humanitarian Assistance (CDMHA) grant examining the health effects of volcanic ash fall and community resilience in relation to the Mount Tungurahua disaster. The hypotheses and research questions for the present research evolved out of the work the researcher conducted under the CDMHA grant (Tobin and Whiteford 2002; Whiteford and Tobin 2001; Whiteford and Tobin 2002; Whiteford and Tobin 2004). More work was needed to study health care-seeking behavior and ARI incidence in rural towns. The researcher compiled a chapter on the epidemiology of infectious disease on the areas around Mount Tungurahua for the grant final report based on the data collected by Dr. Carmen Laspina and her research team (Whiteford and Tobin 2002). The epidemiological data (1995-2001) supported one of the research hypotheses of the grant that exposure to high levels of ash fall was associated with people experiencing higher levels of both upper and lower respiratory problems than those not living in high ash fall areas (Whiteford and Tobin 2002). Possible risk factors include poverty, ash fall, and access to healthcare facilities. For the same period in 1998 and 1999 (October 16 to December 31) in seven areas of Tungurahua Province and two areas of Chimborazo Province, overall there was an alarming increase in morbidity for upper respiratory infections (2.6 times increase), lower respiratory

infections (2.5), conjunctivitis (2.3), asthma (2.1), and dermatitis (1.9) (PAHO 2000).¹ While the epidemiological data supported this hypothesis, individual self-report was contradictory. In the survey results, only six percent of respondents surveyed in the town of Penipe believed that the volcano was a risk to respiratory health. The possibility of recall bias, or illness narrative, was high in the structured interviews; therefore, this bias needed to be explained.

According to the epidemiological data, there were significant increases in outpatient consultations for ARIs during 1999 and 2001 compared to earlier years. In addition, pneumonia mortality rates for infants reached high levels. Specifically, outpatient consultation rates for ARI nearly quadrupled in Penipe County in 1999, the year of the volcanic eruption, and two years later in 2001, a year of renewed volcanic activity, rates doubled from the previous year, especially in the under five age group. The study found that Penipe had higher outpatient consultation rates for respiratory infections and diarrheal diseases and higher mortality rates for children under five than two neighboring counties also affected by the volcanic ash (Whiteford and Tobin 2002). This information was reported to the press, and when the authors of the study returned to Ecuador to present the results, there was not a lot of concern expressed on the part of the Penipe municipal authorities. The mayor of Penipe was aware of the study and mentioned the report in an interview that Penipe was the county most affected by the volcanic ash. The mayor reported that the county should have 13,000 people but only had 6,014 people (La_Prensa 2002a). The chief epidemiologist of

¹ This data was collected from daily outpatient and emergency visits in the 2 provinces. The data from the

Chimborazo Province commented in a newspaper interview that the governor of the province and the mayors of Penipe and Riobamba were not present at the meeting, yet the major authorities of neighboring Tungurahua province were all present to hear the research results of the South Florida professors (Penipe sent a representative only). The chief epidemiologist went on to warn of the dangers of the silica composition of the volcanic ash, and expressed the need for advanced detection equipment to gauge the severity of the risk caused by the particulates, which might include spikes in rates of pneumonia, bronchitis and tuberculosis (La_Prensa 2002c). Another official of the Chimborazo Health Department claimed that since the South Florida presentation of research results did not offer the local governments any monetary or food aid in response to the crisis, the municipal authorities were not interested in attending. However, he noted that CEBYCAM, the Civil Defense, and the Ministry of Health were all present at the meeting (La_Prensa 2002b). This case demonstrates that NGOs and public health authorities in Chimborazo Province were better partners in the dissemination of research findings than the local government of Penipe, which was more motivated by political and monetary concerns.

Site Selection

The main justification for selecting Penipe County as the research site was the aforementioned health disparity regarding ARI morbidity and mortality rates gained from the previous experience working on the research team. The second

Ecuadorian Ministry of Health does not distinguish whether the patients were living in shelters.

reason was that all of the residents of the county speak Spanish, and not an indigenous language. The third reason was that the area is rural, and rural children are less likely to receive care for ARIs than those living in urban areas where there is greater access to healthcare facilities. In addition, Chimborazo Province ranks very low on indicators for child well-being. According to UNICEF, Chimborazo Province ranks 2.3 out of 10 in relation to rights for children and adolescents. Moreover, the province ranks 3 out of 10 for education for children, and half of the children in the province are undernourished. Finally, the province holds the penultimate place for the overall situation of children and adolescents in Ecuador (La_Prensa 2004).

Through partnership with CEBYCAM-CES, the researcher aimed to contribute to the community's goal of improving health through the identification of barriers to health care-seeking in childhood ARI cases. CEBYCAM-CES authorized access to its files and newspaper archives. The people of Penipe were very cooperative and helpful in the research process. The health of the people had improved since the eruption of the volcano, and some explained that the people had become accustomed to the volcanic ash. Whatever the reason, the researcher was able to identify continuing health problems that needed to be addressed.

CHAPTER FOUR: LITERATURE REVIEW – THEORY, METHODOLOGY, AND ACUTE RESPIRATORY INFECTION

PART I – MEDICAL ANTHROPOLOGY THEORY

In medical anthropology theory, the two primary paradigms are medical ecology and critical medical anthropology (CMA). Medical ecology is an empirical, materialist perspective which took hold in the 1960s, that focused on human adaptations in micro-populations that allowed people to utilize the environment for the purposes of resource extraction. CMA, on the other hand, came later, and lobbied to shift the focus towards broader social relations in society and the political economy in a historical context. The critiques of medical ecology, primarily by Singer (1989), Scheper Hughes (1990), Singer and Baer (1995), and Morsy (1996), as well as attempts to achieve a new synthesis of “understanding local realities in global contexts”, by McElroy (1990), Armelagos (1993), Leatherman (1993, 1998), Goodman and Leatherman (1998), and Baer (1996, 1997) have led anthropologists to rethink the role of political economy in their research and examine how “sociocultural and political-economic processes affect human biologies” and how negative outcomes of these processes affect the larger society (Goodman and Leatherman 1998). This section will examine

these arguments and critiques and conclude with a discussion of work in political ecology, which is one example of the “new biocultural synthesis.”

Medical Ecology and Critical Medical Anthropology

One of key tenets of medical ecology is to explain how human populations adapt to a changing environment. Rather than focus on the biomedical causes of disease, medical ecology is interested in how humans adapt to particular environments through evolutionary mechanisms, that include cultural adaptations as well as genetic or immunological responses (McElroy and Townsend 1989). Like epidemiology, medical ecology recognizes the causal assemblage of factors that cause disease. Medical ecology defines disease as a chain of factors that stem from ecosystemic imbalances, and that both health and disease are consequences of interpenetrating subsystems that are physical, biological and cultural (McElroy and Townsend 1989). Therefore, the model is a holistic one, a homeostat where imbalance leads to adaptation or maladaptation, and consequently, health or disease. Like its theoretical antecedent, cultural ecology, developed by Julian Steward and later retooled as neofunctionalism by Roy Rappaport and G. Reichel-Dolmatoff, medical ecology focuses on how culture enables a population to adapt to a particular geographical area.

The critique of medical ecology by medical anthropologists is primarily aimed at biological anthropologists. Biological anthropologists have used an ecological model in order to understand biocultural responses to disease (Armelagos, et al. 1992). This ecological model takes its cue from epidemiology,

which configures disease as the outcome of the interplay between the host, agent, and environment. In epidemiology, the agent or pathogen is considered the primary cause of disease, to the exclusion of social and political factors. Traditional epidemiological approaches have been criticized as too focused on individual behavioral risk factors and not attentive to “critical contextualization” (Farmer 1999). In Latin America, the Centro de Estudios y Asesoría (CEAS) has developed what it calls a “Marxist epidemiology,” which examines the relationship between social class and health status (Morgan 1998). Social epidemiologists at CEAS have critiqued traditional epidemiological categories and methods and have examined differential morbidity and mortality according to variables of social class and historical moments.

CMA strives to combine the micro and macro to understand microparasitism (agents or proximate causes of disease) as well as macroparasitism (social relations, which are considered to be the overarching causes of disease) (Singer and Baer 1995). Nancy Scheper-Hughes identifies the “macroparasitism of class exploitation” as the social cause of mortality and morbidity (Morsy 1996). George Armelagos, et al. (1992) concede that the role of social organization as well as the ideological system has been largely neglected by medical ecologists. Armelagos, et al. (1992) echo medical anthropologists’ critiques of general medical ecology as furthering an outmoded functionalist, adaptationist model steeped in biomedical conceptions of disease and illness; however, the authors contend that the corrective, termed the “emergent biocultural perspective”, acknowledges that culture forms a part of the

environment and that biomedicine is simply another ethnomedicine, and consequently, social relations as well as subjective experiences should be incorporated into the new model to understand disease. In an attempt to appease CMA proponents who would toss out the notion of adaptation altogether, Armelagos, et al. (1992:42) reform “adaptation” by naming the concept, “adaptive process” and “coping behavior”, and stress that “a model of adaptive process conceptually locates both proximate and ultimate causation of illness within the constraints, diminished options, and contradiction in goals and responses of human populations. This, in turn, emphasizes the role of political-economic factors and social relations in the health process.”

For Merrill Singer, an *emphasis* on the role of social factors is not sufficient. In Singer’s critique of Wiley (1993), he claims that bioculturalists are overly concerned with how people cope with environmental disruptions rather than what he calls the original causes of the disruption, i.e. social relations (Singer 1993). However, Wiley counters with the argument that the crux of the debate lies with adaptation, and that as an evolutionary biocultural anthropologist, the concept of adaptation provides the best explanatory framework for causes of health and disease (Wiley 1993). Singer promotes a version of CMA whose goal is not simply to understand the social causes of disease, but to correct oppression and exploitation in the realm of health care through ethical research (Singer 1998).

Interchange Between Theories

Thomas Leatherman, et al. (1993) attempt to parse out the common elements in the debate between Wiley's bioculturalism and Singer's CMA. The authors claim that Singer's "critical bioculturalism" combined with Wiley's "new approaches to biocultural adaptation" is fertile ground for interchange between CMA and medical ecology (Leatherman, et al. 1993). While biological anthropologists have not abandoned ecology or adaptation, attempts to address the critiques of the critical medical anthropologists have placed a new emphasis on social, political and economic factors that affect human biology, health, and disease. For example, contrary to earlier studies of health and stature of Andean populations which focused on biology and genetics, although some looked at socioeconomic status, more recent research has shown that growth and stunting are highly associated with economic status and has refuted the "small but healthy" hypothesis (Leatherman 1998a). These earlier studies did not examine how differential access and control of resources could lead to varied health outcomes, an issue which is addressed in more recent studies which focus on the political economy of health. Therefore, as a corrective to the adaptation model, biological anthropologists in the 1980s began to examine the effect of social inequality on human biology from prehistoric times to the present, which has been labeled the "political economy of human biology" and "critical bioculturalism," among other names (Goodman and Leatherman 1998).

Nevertheless, one of the inherent problems of the medical ecology model is an emphasis on the pathogen, or the broad category of insults as the disease-

causing agent. When an even broader causal assemblage is considered, adding political-economic factors, the model becomes even more difficult to ascertain the magnitude of separate causes for diseases. Medical ecology is criticized for its inability to ascertain relative levels of factors affecting disease causation as well as the identification of trends across different disease complexes (Baer 1996). Armelagos, et al. (1992) attempt to address this confusion by placing coping or adaptive behavior at both the macro and micro level simultaneously in order to address social relations; however, the holistic model of adaptation is incongruent with the processual and dialectical model of CMA.

As Singer (1989) cogently points out, the medical ecology model is teleological, as the population is prompted to adapt to the changed environment in order to be healthy. The problem with adaptation, according to Singer (1989:230), is to answer the question of “what is adapting to what”. Rather than focus on how culture helps individuals or populations adapt to changes in the environment, Singer argues that medical anthropology should be concerned with how social transformation differentially affects the health of individuals and populations. Because medical ecology is unable to address social transformation, Singer argues that medical anthropologists should consider CMA as the more defensible paradigm.

Some critics have accused critical medical anthropologists of misusing the term “biomedical hegemony” to refer to the process of the proliferation of poverty and disease in the developing world and delegitimizing ethnomedicines (Csordas 1988; Estroff 1988). Another critic of CMA, states that proponents of the new

paradigm only shared terminology is “the hegemony of biomedicine” which by itself has relatively little meaning (Pelto 1988). The problem with CMA, as Pertti Pelto sees it, is that a new paradigm should generate new research questions, but he sees CMA as a *post facto* theory used to interpret and understand findings. Pelto points out that medical anthropology is largely an applied field, concerned with the development of new methods and seeking answers to the question of how to make things better in a given situation.

Paul Farmer (1999) is adept at shifting from the medical gaze to the critical (self-critical) one. Farmer’s work is more akin to Scheper-Hughes’ poststructuralist critical reflexive medical anthropology than Singer’s political economy of medical anthropology. However, Farmer (1999:58) clarifies his approach as “ecumenical and complementary”, in contrast to Scheper-Hughes’ activist, revolutionary approach.

Scheper-Hughes in-depth work, Death Without Weeping, is a postmodern treatment of childhood death in a shantytown in northeastern Brazil. The two folk illnesses affecting infants, *nervos* (nerves) and *doença de nervos* (nervous sickness), are interpreted as Foucauldian discourses, reinforced by medical practitioners and accepted by the disenfranchised sector, despite the belief by Scheper-Hughes that these terms mask the real, unspeakable cause of illness, namely slow, forced starvation (Scheper-Hughes 1992). Scheper-Hughes (1990) argues for three different ways to develop a “critically applied medical anthropology”: 1) to further a program of demedicalization which recognizes that persons other than biomedical practitioners are more adept at identifying the

social causes of disease; 2) to encourage anthropologists to collaborate with medical practitioners outside the realm of biomedicine; and 3) to initiate a revolution in how medicine is practiced in hospitals and clinics to achieve a “radicalization of medical knowledge and practice.”

Farmer’s intention is not to supplant complementary methodologies of related disciplines with his critical approach; rather, he aims to add an equal dose of anthropology to biomedicine in order to lead to a more accurate understanding of disease and care for his patients. Farmer criticizes the biomedical gaze as too narrow, not as overly hegemonic. Singer appears to be influenced by James Scott’s theories of peasant resistance when he writes of the locus of the sufferer’s experience in the context of hegemony and resistance. Farmer’s critical perspective allows him to ask provocative questions such as, “By what mechanisms have international changes in agriculture shaped recent outbreaks of Argentine and Bolivian hemorrhagic fever, and how do these mechanisms derive from international trade agreements such as GATT and NAFTA? ... Does privatization of health services buttress social inequalities, increasing risk for certain infections - and poor outcomes - among the poor of sub-Saharan Africa and Latin America?” (Farmer 1999:52). These are the types of questions that medical anthropologists should be asking in relation to emerging infectious diseases in the developing world.

Hans Baer makes the point that CMA needs to incorporate political ecology into its political economy perspective (Baer 1996). Baer (1996) argues that medical anthropologists should focus on processual, dialectical models

rather than homeostatic ones. Political ecology recognizes that capitalism is the force behind the destruction of the environment and the exploitation of nonrenewable natural resources, and only through a commitment towards changing the social relations of production and reproduction, is health to be achieved.

Theory in Research Context

The political ecology approach permits the researcher to start with the social relations imposed by the political economy and examine the implications for the overall cultural coping mechanisms of the community in response to the volcano hazard and limited health care options. The volcano hazard has varied effects on the community depending on the internal social differentiations of the community; therefore, a family's ability to seek timely medical attention is a factor of its socioeconomic status.

The purpose of this research is not to gauge the environmental risk factors for ARIs, such as volcanic ash, but the possibility of ash exacerbating the problem of respiratory infections in this community is noted. The research focuses on the response of mothers to their children's respiratory infections to identify the multiple strategies for seeking health care. The research aim is to determine how female caregivers make health care decisions when their children suffer from respiratory infections depending on their own perceptions of illness etiology and diagnosis, and the multiple constraints on their health care-seeking behavior. This enters the realm of ethnomedicine and is the topic of the next

chapter. In conclusion, at the macro-level, actors are situated in the political-economic-environmental context, but at the micro-level, ethnomedically defined conceptions of health and illness and health care-seeking decisions based on access to monetary resources and healthcare facilities comprise the mosaic of people's everyday lives.

Political Ecology

Anthony Oliver-Smith is a proponent of the political ecology (PE) approach to understanding environmental hazards and disasters (Hoffman and Oliver-Smith 2002; Oliver-Smith and Hoffman 1999). Oliver-Smith begins with the political economy framework and infuses it with the social science perspective of medical ecology (Oliver-Smith 1999). He begins with the concept of vulnerability, synonymous with a community's adaptive failure, in order to characterize a disaster, emphasizing that it is the patterns of vulnerability in a society that affect how events play out even more than the actual catastrophic event of the disaster. Segments of society, depending on the degree of social differentiation, are better equipped to cope with a disaster when it occurs because they are in a more privileged position in terms of power relations. Oliver-Smith (1999) proposes that a PE framework succeeds at explaining not only the causes and effects of disasters but at elucidating the complex dynamics of the social and environmental processes, cultural adaptations, and community developments that are also implicated in a disaster, thereby linking society, environment, and culture.

Oliver-Smith's version of political ecology represents one side of the ongoing debate between cultural constructivists or what Vayda and Walters call the camp that has turned political ecology into "politics without ecology" and the scholars who have fused human ecology with political economy (Brosius 1999; Escobar 1999; Vayda and Walters 1999). That the terrain of political ecology represents a relatively new paradigmatic trend is evidenced by the definitional debates and contested definitions in recent book chapters and journal articles (Escobar 1999; Paulson, et al. 2003; Vayda and Walters 1999; Watts 2002). Whereas Escobar and Watts represent the constructivist camp, Vayda, Oliver-Smith, and Stonich are more representative of the ecologist/materialist side in their insistence on the transformative power of the environment and their adherence to the concept of adaptation (Stonich 1999).

Despite different orientations and emphases, advocates for a political ecology approach do share some common concepts. Watts (2002) defines the conceptual toolkit as: 1) marginality (the cause-effect relationship of social relations and environmental degradation); 2) pressure of production on resources (also implicated in social relations); and 3) a plural approach (recognizing the effects of discourse on policy and practice and the politics of representation). One example of marginality examined land degradation in the Amazon where the "irrationality hypothesis" of peasant land destruction by cattle ranching was refuted and replaced with an explanation that accounted for social and legal forces (Blaikie and Brookfield 1987). The researcher explored these themes in his Master's thesis, and was largely influenced by William Durham's work to

understand the processes of deforestation in the Ecuadorian Amazon (Durham 1995; Luque 1997).

Durham (1995) describes two positive feedback loops - one labeled impoverishment and the other capital accumulation. The capital accumulation loop begins when a consortium of entrepreneurs, companies, and small farmers work together either directly or indirectly to create avenues for the development and deforestation of large blocks of forest in order to extract valuable natural resources. Contributing factors include domestic and foreign demand and the appropriate government policies in place to facilitate these activities. Population displacement and land scarcity are the product of these forces and a secondary cycle of poverty results, fed by a lack of economic alternatives and dwindling household incomes. Durham infers that one of the possible responses to impoverishment is migration wherein the cycle of impoverishment and environmental degradation is reproduced in frontier regions.

The previous example demonstrates that by stressing social relations, while maintaining a holistic framework, one can construct a model for how a disaster process may be conceptualized. In the context of Mount Tungurahua and its affected communities, the political ecology framework fits well with the research concerning vulnerability and adaptation to adverse circumstances. In the case of Penipe, many young people left the community because of the lack of economic opportunities and the negative impact of volcanic ash on their crops and livestock (Whiteford and Tobin 2002). However, not everyone had the economic or social resources to leave the community, so they adapted to living in

a hazardous area. Vulnerability, expressed in terms of negative health outcomes, increases as poverty increases, and a perpetual cycle of disease and poverty ensues in the face of an on-going hazard. Leatherman argues that vulnerability has its roots in unequal social relations, wherein rural producers endure illness, which in turn increases their vulnerability to economic exploitation because of limited household production and reproduction (Leatherman 1998b). Vulnerability therefore means exposure to risk of disease, hunger, and poor living conditions, including access to potable water. The response to risk exposure is resilience, which in the case of childhood illness, takes the form of a mother's strength and perseverance to overcome these risks through coping mechanisms, which are strengthened by her educational and economic resources, as well as social support network. One of the limitations of the Ecuador study is that the researcher was not able to interview the people who had already left the community, in order to understand why they had opportunities that the ones who remained did not. There are visible economic disparities in the town, and the health of the impoverished members of the community, in terms of respiratory health, is worse for those who live in houses with dirt floors or are poorly insulated, and who cook with wood fires near the areas where they sleep, because they cannot afford gas fuel.

There is still much work to be done on the combination of a political ecology framework with medical anthropology questions. Central to a political ecology approach is a concern with power relations and how politics is used to wrest power from some to be wielded by others. An understanding of various

stakeholders' interests and goals assists the anthropologist to ascertain which communities are considered integral to the local economy and which specific actors shape these policies. In the context of medical anthropology, a political ecology approach allows the anthropologist to consider the social causes of disease, in this case acute respiratory infections in children. Because of lack of education, limited access to medical care, and few financial resources, studies have shown that rural, impoverished communities are at a greater risk for childhood ARIs (Nichter 1994). While other factors are also significant, the political-economic causes of disease must be part of the causal assemblage of multiple factors.

PART II – ETHNOMEDICINE IN THE ANDES

Recent medical anthropological studies of the Andes support the thesis that medical systems act as discourses about the human body (Koss-Chioino, et al. 2003). These systems are conceptualized by anthropologists dichotomously as ethnomedicine and Western biomedicine. Ethnomedicine is composed of various “folk” illnesses, healing traditions, and beliefs that may or may not have a scientific basis according to Western biomedicine. Folk illnesses are those which Western biomedicine acknowledges that it possesses a lack of expertise and understanding and lacks the diagnostic categories to define (Browner, et al. 1988; Stein 1981). Some anthropologists identify Western biomedicine as another ethnomedicine, whose treatments and cures have successes and failures just as ethnomedicine, and are also products of long-term processes influenced by culture, history, and politics (Rubel and Hass 1990). This chapter traces recent research on Andean ethnomedicine with an emphasis on anthropological studies carried out in Ecuador.

Studies of Andean Ethnomedicine

The first major collaborative work on the medical anthropology of the Andes was Health in the Andes, published from the collection of papers at the American Anthropological Association meetings in 1978 dealing with Andean health, nutrition, medicine and mortality (Bastien and Donahue 1981). The collection was divided into three sections, which mirrored the panel discussions:

Andean ethnomedicine, Andean environment, and improving Andean health.

The physical environment and human adaptation to it were dominant themes in anthropological theory of this period. Factors such as altitude and verticality were cultural determinants for biological and behavioral adaptations. Another major theme was reciprocity, both in terms of labor and gender relations and ritual obligations.

In the section on Andean ethnomedicine, Joseph Bastien exemplified the importance of reciprocity in his descriptions of the people of Qollahuaya, who employed the metaphor of the mountain to understand the health or sickness of the human body (Bastien 1978; Bastien 1981). Bastien explained that the traditional healer's function was to restore the body's harmony by "feeding" the mountain and resolving conflicts such as land disputes. Through ritual, the healer reordered the universe through fulfilling reciprocal relationships between people and the mountain. The section on ethnomedicine demonstrated how a proper understanding of folk illnesses was necessary for the delivery of health care services. Stein's chapter employed language which anthropologists today would not use by describing the residents of Vicos as "ignorant, poor, and unhealthy" (Stein 1981:64). Stein made this characterization to argue that the enemy of Western biomedicine was not erroneous ethnomedical understanding, but rather poverty and isolation. While some anthropologists today might agree with his conclusions, they would couch it in different language and not impose biomedically-based value judgments on ethnomedical beliefs. Other authors in this section, Buechler and Urioste, described different ethnomedical conditions in

an effort to explain how such beliefs shed light on the interrelationships between culture, biology, health practices, and ritual.

Throughout the 1970s and 1980s, Andean anthropology shifted from ecological orientations towards approaches which incorporated hegemony, political economy, feminist theory, and post-colonial theory to analyze complex processes of cultural change and assimilation of indigenous peoples (Miles and Leatherman 2003). In one of the most extreme examples from medical anthropology, Mary Crain describes devil possession in Andean women as an ethnomedically-appropriate response to exploitative hegemonic relationships in society (Crain 1991). This article draws from previous works which view esoteric cultural phenomenon such as devil possessions and contracts as reactions to the introduction of the capitalist mode of production (Ong 1987; Taussig 1980). In this model, medicine is construed as “a metaphor for social relations embedded in a political economy” (Crandon 1986:466). Health and illness were now being explained by medical anthropologists in the Andes as not only caused by culture and biology, but also intertwined with social and political relationships. Embodiment was introduced as a new theoretical concept meaning the “inscription on the body of social inequalities,” and it gained currency in the anthropological literature (Miles and Leatherman 2003:7).

A special issue of the journal, *Social Science and Medicine*, titled “Landscapes of Health in the Andes,” revisits some of the themes and issues from Health in the Andes (Greenway 1998b). Greenway explains that medical anthropologists have moved away from adaptationist theories which emphasize

environmental constraints, towards interdisciplinary models which take account of the plurality of health systems in the Andes. Greenway examines the diagnosis and treatment of *susto* (fright sickness) in highland Peru. By analyzing *susto* from an emic, or insider, perspective, Greenway argues that the sufferer is playing out a deep cosmological discourse through the experience of being sick and existing outside of the normal cultural boundaries. The Quechua worldview is a holistic one, and consequently, healing is achieved through the restoration of cultural and cosmological balance by the healer who reintegrates the patient to the Quechua universe who, in the experience of *susto*, experiences a conflict of identity. Greenway concludes that ethnomedical understanding will facilitate improved health care delivery (Greenway 1998a).

In another article focused on ethnomedicine, Larme reiterates the importance of economic reform, as stated in Bastien and Donahue (1981), as critical to improving Andean health (Larme 1998). Larme's article focuses on the concept of human vulnerability in Andean ethnomedicine in order to analyze, from a feminist perspective, why women suffer from emotion-based illnesses more than men. She concludes that ethnomedical knowledge in the southern Peruvian highlands which classifies women as vulnerable and weak has negative consequences for women's health, status, and power in Andean society.

Bastien has examined underutilization of health services in Bolivia and biomedical practitioners' ignorance of indigenous traditional beliefs, which would aid in the transference of health information to treat diarrheal disease (Bastien 1987). Bastien argues that the primary reason that Indian peasants resist

modern medicine is due to “financial, psychological, physical, and *cultural*, barriers” (Bastien 1987:1111). Bastien demonstrates how applied anthropology can make a difference for a serious health problem in his description of how a myth was retold in a health information brochure to teach peasants the importance of using rehydration salts for the treatment of severe forms of diarrhea with culturally-appropriate language.

Biocultural Approach

Two of the journal articles, Leatherman (1998) and Oths (1998), employ a biocultural perspective to Andean anthropology. Leatherman (1998) advocates for a critical biocultural model as a corrective for previous adaptationist approaches that combines biology, ecology, and political economy. Biological anthropologists adopting the critical biocultural perspective have placed a new emphasis on social, political and economic factors that affect human biology, health, and disease. Medical ecology was ill-equipped to deal with resistance, conflict, and revolt as adaptive behaviors, behaviors which were omnipresent in Latin America throughout the 1970s, and continue today.

The problem of specific etiology, or germ theory of biomedicine, applied to Andean peoples is highlighted in Oths’ work in highland Peru. In her discussion of the illness *debilidad* (weakness), Oths finds that the illness is most often experienced by women in vulnerable times of their lives from household stresses, and is explained as resulting from a confluence of biological and social factors (Oths 1999). She employs the concept of embodiment to demonstrate how

debilidad is manifested in people at the height of their status in the community, but at the same time during their least productive years. In her journal article from the special issue, Oths proposes a biocultural model to understand regional differences in Andean health status to demonstrate that intracultural diversity is a predictor for health differences (Oths 1998). Oths conducts a meta-analysis of health indicators to show the range of diversity in health status within regions. A more recent research study examines the effect of women's food consumption on household economic standing in the southern Andes and finds that lack of money is a greater risk factor for lower nutritional status than landholdings during pre-harvest season (Graham 2004). Previous models failed to gauge economic, cultural, and health differences within particular regions, thus making health interventions less effective.

Medical Pluralism

The third major compilation of essays on Andean ethnomedicine was the publication of Medical Pluralism in the Andes (Koss-Chioino, et al. 2003). This volume was dedicated to the life and work of Libbett Crandon-Malamud, and in particular, to her contribution to the field of medical anthropology with the publication of From the Fat of Our Souls, a study of medical pluralism in highland Bolivia (Crandon-Malamud 1991). The book is divided into four sections. The first is a collection of four essays on the contributions of Crandon-Malamud and Andean medical anthropology. The second section is composed of three case studies of medical pluralism in the Andes. The third section is an eclectic mix of

three essays ranging from a chapter by Bastien on Chagas' disease to an article on ethnomedicine by McKee dealing with *mal aire* (evil wind). The final section is subtitled, "Gender, power, and health" and is a further exploration of ethnomedicine and traditional healers. The edited volume is a significant addition to studies of medical pluralism in the Andes. In the opening chapter, Miles and Leatherman point out Crandon-Malamud's major contribution to this area of study in their assertion that she identified medicine as a resource that was both negotiated and was a method by which different social actors "expressed cultural identity and political and social power" (Miles and Leatherman 2003:8).

The authors of the Medical Pluralism in the Andes recognize that myriad health practices and systems operate simultaneously in the Andean context. Choices of care depend on a variety of factors, and different types of health practitioners, including biomedical practitioners, are sought depending on the particular cultural, political, and social circumstances of the actors seeking care. Crandon-Malamud demonstrated that in the diagnosis of *susto* (fright sickness), diagnosis was more of an economic decision because it meant that treatment would be at home rather than at a more expensive biomedical facility (Crandon-Malamud 1983; Crandon-Malamud 1989). Crandon-Malamud's main argument is that "medical dialogue is a means by which political and economic resources are exchanged and is thus a mechanism that facilitates or inhibits change" (Crandon 1986:466). Broadly defined folk illnesses such as "evil eye" are oftentimes treated by lay traditional health practitioners, known as *curanderos*

(healers), *brujos* (sorcerers), *chamanes* (shamans), or *herbalistas* (herbalists) in the Andean context, and these treatments are both more easily accessible and less expensive than biomedical care. In highland Bolivia, there are multiple medical traditions, and treatment choice involves both the negotiation of ethnic identity and exchange of political and economic capital across ethnic and class boundaries (Crandon 1986).

Both mestizo (of mixed parentage) and indigenous people of the Andes, maintain a belief in *mal aire*, a potentially fatal malady caused by winds from the dead upon the living (McKee 2003). The young are especially susceptible to this illness. McKee suggests that the ethnomedical diagnosis of *mal aire* in children in indigenous highland Ecuador is a method of enculturation, or “internalization of world view” (McKee 2003:133). McKee argues that blood and fat are symbols which stand for vitality and energy; therefore, children who are malnourished are often diagnosed with *mal aire* because they are considered weak and susceptible to attacks from the evil spirits. Other anthropologists have noted the importance of *wira*, *tulla*, and *yawar* (Quichua for fat, bones, and blood) as three basic bodily principles whose well-being was seen as a sign of health for Andean peoples (Bastien 1978; Weismantel 1988). Blood and fat are, like personal property, subject to robbery, and “weak blood” is the disastrous result of such an attack. Traditional healers are employed to purge the victim of the malady, and oftentimes use foul-smelling herbs or tobacco to cure the patient.

Of all the journal articles related to ethnomedicine in Ecuador, one by McKee in particular relates to the dissertation research. In this article, McKee

identifies three main ethnomedical categories for the diagnosis of gastrointestinal disease in children (McKee 1987). Such illnesses are classified as: 1) for the doctor; 2) not for the doctor, home treatment; and 3) supernatural afflictions, treatment by traditional healer. All diagnoses are made after an examination of the stool. McKee concludes that the folk taxonomy of gastrointestinal diseases is accurate enough, and from the standpoint of the rural poor, most treatments will be home-based regardless. The class of disease “for the doctor”, is believed to be caused by infection and is treated by antibiotics. In other cases, either dietary improvement or treatments for incurable parasitosis are recommended. In the latter case, medical attention would be in vain because of the guarantee of reinfection in poor areas with unsafe water sources.

Although not represented in the three collections on Andean ethnomedicine previously discussed, the work of Ruthbeth Finerman has contributed to the knowledge of home-based health care and women’s roles in the southern highlands of Ecuador (Finerman 1983; Finerman 1987; Finerman 1989a; Finerman 1989b; Finerman and Sackett 2003). Finerman’s first published study draws from her dissertation research in Saraguro, an indigenous community in southern Ecuador and home to the former president of the Confederation of Indigenous Nationalities of Ecuador (CONAIE), Luis Macas. In this article, Finerman examines diagnosis and health care-seeking behavior of Saraguro women (Finerman 1983). She finds that indigenous ethnomedical illness categories, such as the belief in humoral imbalances (hot, cold), soul loss, *mal aire*, etc., do not figure in the diagnostic categories of biomedically-trained

physicians, and this denial threatens the world view of indigenous people seeking care. Finerman concludes that because of this disconnect and lack of health access issues, people from Saraguro are more likely to seek traditional healers. She reiterates these findings in a later article but shifts the focus to the household, which she identifies as a locus for refuge from illness. Home-based care is considered most appropriate for some types of illnesses when leaving the home and being exposed to strangers and foreign illnesses would be considered dangerous (Finerman 1987). Finerman adds to the knowledge on ethnomedical beliefs of Andean peoples in order to assist health authorities adopt culturally-appropriate preventive health measures.

Because of Finerman's long period of research in Saraguro, she is able to make observations regarding changes in the home-based health care system in highland Ecuador. Through the results of qualitative and quantitative studies, Finerman finds that women's gossip networks are the most common sources of new knowledge on health care (Finerman 1989b). She concludes that home-based health care is receptive to particular elements of biomedicine, and that for home-based illness treatments, biomedical products are combined with herbal remedies. In a recent article, Finerman finds that the quality of women's medicinal gardens reflect a woman's status and that judgments by peers on the quality of a women's gardens gauge that particular family's health and economic status (Finerman and Sackett 2003). Through her carefully constructed research studies of home-based health care, Finerman significantly contributes to the discourse on medical pluralism in the Andes.

Finerman and Sackett (2003) describe home gardens as “medicine cabinets,” and claim that the majority are medicinal plants used to treat *nervios* (nerves), *mal aire*, colds, colic and reproductive ailments. The authors reaffirm that Andean ethnomedicine maintains the humoral opposition of hot and cold, so, for example, for a “hot” illness such as a stomach ache, “cool” mint tea is the appropriate remedy. Curiously, shamanism is not mentioned in this article, although the primary hallucinogenic plant in Andean shamanism is listed in garden inventories, the San Pedro cactus. The majority of shamans in Andean countries whose charge is to cure sorcery-induced afflictions are men; however, powerful curanderas (women healers) are also a feature in many communities, although less has been written about them (Glass-Coffin 1998; Glass-Coffin 2003; Muratorio 1998). In both the highlands and the lowlands, predominantly male shamans cure sorcery-induced afflictions in a ritual ceremony assisted through visions induced by hallucinogenic substances. These maladies are considered outside of the purview of curanderas.

In the highlands, shamans or curanderos perform all-night healing ceremonies called *mesas* (a table or altar with various religious icons) in order to cure their patients. One of the most famous Andean shamans in the anthropological literature is Eduardo Calderón, whose folk-healing practices have been described by anthropologists (Joralemon and Sharon 1993; Sharon 1978; Villoldo and Jendresen 1990). Sharon (1978) compares shamanism to a form of symbolic communication, and like verbal communication, it adapts over time. The healing shaman’s task is to cure the victim of sorcery-induced illness caused

by another shaman, who was either hired or attacked the victim directly. Envy of the victim is usually the alleged motive behind sorcery attacks (Glass-Coffin 2003). The healing shaman, in exchange for payment, cleanses the victim with chants, cane liquor, and medicinal plants, while in a hallucinogenically-induced trance state. Andean shamanism is considered syncretic, a mixture of Inca, Catholic, and Western esotericism, and many of the chants and idols used in the *mesa* combine multiple religious symbols (Sharon 1978).

This brief review of Andean ethnomedicine discussed the major anthropological works which have shaped theory and practice in this subfield. Researchers in medical anthropology have generally followed the trends in anthropological theory and method in their field studies and publications. Like the variegated discipline of anthropology, different researchers have followed divergent research agendas. Some like Leatherman and Oths have pursued quantitative studies based on biocultural models, while others, like Greenway and Larme, have followed a political economy approach focused on power relations. The approach of this dissertation research draws on the latter, with an emphasis on power relations and an attention to differences in ethnomedical and biomedical understandings of illness. What these anthropologists all have in common is a genuine concern for improving Andean health. McKees' insights are particularly illuminating to the present research because she focuses on home-treatments for childhood illnesses, a significant finding in this research. By eliciting pertinent ethnomedical categories, McKee finds that diagnoses of childhood diarrhea are not only medical decisions, but economic ones as well.

Rural peoples in the Andes make the most of limited medical resources available to them. Expensive medical technology is not necessary to raise the level of health care to rural peoples of the Andes. Through understanding ethnomedical categories and explanations, the anthropologist comes closer to cultural understanding in the research setting, and is therefore better able to recommend educational materials and low-cost medical interventions to improve health in struggling communities.

PART III – METHODOLOGY

There has been considerable debate by academics and practitioners on the relative compatibility or incompatibility of the disciplines of epidemiology and anthropology, more specifically, both descriptive and analytic epidemiology and cultural anthropology. Most of the literature on the subject is written by anthropologists, who are also trained in epidemiology. Anthropology has a long tradition of crossing disciplinary boundaries, and in medical anthropology such cross-fertilization of theories and methods is a product of the emergence of this particular subdiscipline.

Both disciplines require methodological rigor, with medical anthropology employing a combination of qualitative and quantitative methods and epidemiology utilizing primarily quantitative methods. Positive commentaries reflecting the potential collaboration between the two disciplines highlight the complementarity of methods (Agar 1996; Dunn and Janes 1986; Hahn 1995; Inhorn 1995; Trostle and Sommerfeld 1996; True 1996). For example, Dunn and Janes (1986) note that methodological issues between the two disciplines are easily overcome because quantitative and qualitative methods are complementary. On the other end of the spectrum are the critics. One anthropologist points to the methodological “rigor mortis” of epidemiology (Nations 1986). Another anthropologist argues that since the methodology of the two disciplines is fundamentally different, this limits the types of research questions that can be considered as well as the answers or explanations to these

questions (DiGiacomo 1999). According to DiGiacomo (1999), anthropology is both diverse and eclectic in its myriad theoretical perspectives. Theories are frequently stated *a priori* to any methodological discussions; however, in epidemiology, theory is neither a prerequisite to methodological discussions, nor is there any required explanation for its absence (Krieger 1994).

DiGiacomo recounts her largely negative experiences to integrate an anthropological perspective into an epidemiological cancer research project. Her criticisms may give one reservations on the prospects of convincing epidemiologists of the merits of particular anthropological theories and methods. For example, DiGiacomo (1999) remarks that the old static view of culture as a closed and stable system has persisted in epidemiology because it provides an easier fit into causal models. Nevertheless, other anthropologists remain optimistic. For instance, Agar (1996) views ethnography as not simply a new method that epidemiologists might employ, but as a tool that could transform how epidemiology is practiced.

Ethnography for Epidemiologists

In order to evaluate the usefulness of ethnography for epidemiologists, the strengths and weaknesses of the ethnographic method must be assessed. One text that would appeal to the scientific-minded epidemiologist argues that ethnographic research and methods are not only practical but can be used to evaluate and test scientific hypotheses (deMunck and Sobo 1998). Ethnographic research contrasts with epidemiological methods in a number of ways.

According to deMunck and Sobo (1998), the aim of ethnographic research is generally: 1) exploratory, 2) classificatory, or 3) associational. In contrast, analytic epidemiology is primarily concerned with testing hypothetical relationships and satisfying causal criteria, after conducting case-control, cohort, or clinical trial studies. Infectious disease epidemiology is a more expensive undertaking than an ethnographic study by definition, because in addition to large sample sizes, it requires laboratory support (specifically microbiology and serology) and complex statistical analyses (Jekel, et al. 2001).

Two important concepts to evaluate any scientific research project are validity and reliability. Validity refers to the accuracy of the findings, and reliability means that the methodology is sound, or that the study is replicable. Validity for ethnography refers to whether the researcher's conclusions based on ethnographic research reflect reality in the world (deMunck and Sobo 1998). Because of the ethnographer's deep familiarity with the community, observational data correlate with cultural meaning, thus increasing validity (Weiss 1988). For ethnographers, research bias is the result of too many preconceptions about a culture based on lack of familiarity or theoretical preconceptions that the researcher brings to the field and determines the choice of methods (deMunck and Sobo 1998).

In epidemiology, compromised validity is a result of selection bias or allocation bias. Selection bias refers to the situation where subjects are permitted to choose in which arm of the study (intervention or control) they wish to participate. Allocation bias occurs when study investigators fail to employ a

random method of allocating participants to arms of the study (Jekel, et al. 2001). Epidemiologists aim to minimize bias, while anthropologists attempt to explain it (Trostle and Sommerfeld 1996). In epidemiology, sample selection is based upon predetermined demographic characteristics and disease status (Dunn and Janes 1986). Epidemiologists discuss internal and external validity. External validity exists when the study findings can be extended and hold true for a larger population and not just for the study sample, whereas internal validity is found when the study results hold true only for the study population (Jekel, et al. 2001). A study must have at least internal validity to be considered worthwhile. In order to establish validity, one prerequisite is the randomization of study participants, so that each individual has an equal chance of being selected. When randomization is compromised, due to selection bias for example, external validity is compromised, so the results are only generalizable to the study population rather than to the general population.

In the past, an ethnographic sample was infrequently based on a sampling method because ethnographers generally worked with small, delineated populations in order to establish a range of cultural phenomenon, not a statistical frequency distribution of such elements (deMunck and Sobo 1998). In the field of ethnomedicine, there have been issues in the past of insufficient sample sizes, limiting the statistical power of ethnomedical observational studies of treatment efficacy, thereby decreasing validity (Anderson 1992:9). However, this sampling strategy has been changing as more anthropologists are trained in quantitative methods and sampling techniques. Especially in medical anthropology, where

researchers face a tremendous variation in people's attitudes and beliefs towards traditional medicine and biomedicine, there is a need for representative, random samples to be collected (Pelto and Pelto 1990). Samples are based upon cultural features. Other older ethnographic techniques such as in-depth interviews with key informants are still essential because they assist in situating the quantitative data in a cultural context.

For the sake of comparison with epidemiological methods, one particular method of ethnography, the focus group, will be used as an example. The focus group method is a group interviewing technique commonly used in medical anthropological research employing five to fifteen participants who are not randomly selected in order to perform exploratory research in a particular cultural domain. The purpose is to develop theories, devise more valid measurement instruments, and to make sense of quantitative survey results (Schensul, et al. 1999). Focus group interviews last from between one hour to ninety minutes and require the facilitator to guide the group interview with previously identified discussion questions. A note-taker or tape recorder assists the facilitator so the interviews can be transcribed. Focus group questions should be open-ended in order to generate discussion. For example, in this study several focus groups were conducted with mothers of young children to collect information on maternal knowledge and care-seeking for childhood respiratory infections. One example of a focus group question was, "What are the different types of respiratory problems your children experience?" It is the facilitator's job to ensure that everyone in the focus group participates, that no one dominates the discussion,

that key questions chosen beforehand are discussed, and that potentially harmful misinformation is corrected.

Schensul, et al. (1999) suggest a number of ways that validity can be enhanced in focus group interviewing. First, they suggest pilot testing of questions to ensure comprehension. Second, they encourage consulting with the group participants in order to ensure a welcoming environment. Third, they advise selecting group facilitators who are members of the target group. Fourth, they suggest choosing an appropriate location for the focus group. Fifth, they stress ensuring clarity of the research questions and resolving ambiguity in the process, and sixth, they discuss consulting with participants for further interpretation before the research results are published or disseminated to ensure accuracy and validity. Epidemiologists use *p*-values and confidence intervals to demonstrate the statistical significance of their findings, which do not necessarily translate into clinical significance. On the other hand, ethnographers establish confidence in their findings if they have followed a series of steps, that include: 1) building a familiarity with the culture through extensive research and living with the people there; 2) establishing the elements involved in the topic of study through extensive ethnographic methods; and 3) recognizing that their synthesis of the research results represents not the actual culture itself but a model of it (deMunck and Sobo 1998).

Reliability is not important for focus group research because the results of such research are not generalizable and will produce different results each time, even with the same facilitator (Schensul, et al. 1999). Nevertheless, focus group

research alone without a combination of other research methods is not sufficient to establish reliability and validity. Dunn and Janes (1986) argue for the combination of methods, stating that qualitative research is powerful in its ability to achieve high validity, whereas quantitative research, with its emphasis upon sampling procedures and limiting observer bias, is noted for its strength to produce reliability. Such an explanation appears plausible at first reading; however, is validity compromised in the pursuit of reliability in epidemiological studies? Is there any way that the methodological rigor of epidemiology can be saved from “rigor mortis” (Nations 1986)? Anthropologists argue that in order for statistical relationships between risk factors and disease for example, to be valid, an ethnomedical perspective is necessary (Weiss 1988). Hahn (1995) criticizes the standardized interview instrument tool, a common epidemiological method, as not following the conventions of normal conversation and preventing the chance for clarification by research subjects, thus obscuring the results. Consequently, the rigorous pursuit of reliable instruments may lessen the validity of the study results (Hahn 1995). This is a valid argument for incorporating an ethnographic component into an epidemiological study, because one primary goal of health research is to generate more useful hypotheses that connect perceptions of illness to particular health outcomes (Weiss 1988).

Collaborative Projects

Trostle (1986:80) provides a selective history of collaborative projects between anthropology and epidemiology in the twentieth century, a history he

characterizes as one of “benign neglect”. Trostle describes the South Africa Polela project in the 1950s that used epidemiological and social science methods to design a project to improve community health. The project identified social class and poverty as important determinants of health. Trostle identifies key studies in the 1950s and 1960s, such as Rubel’s work on the epidemiology of the folk illness, *susto*, at the University of North Carolina – Chapel Hill, and the projects designed to study the ecology of diseases in developing countries by the Geographic Epidemiology Unit at Johns Hopkins School of Hygiene and Public Health (Trostle 1986).

A more recent example of a synergistic effort to combine methods from both disciplines was a study of infertility in Egypt (Inhorn and Buss 1994). In this study, Inhorn and Buss used a case-control epidemiological design combined with an ethnographic component. In a case-control study, two groups are selected based on either having the outcome of interest or not having the outcome of interest. The researchers emphasized that while they were interested in identifying the significant risk factors for infertility, their main focus was the ethnographic contextualization, i.e. the persistence of cultural practices that diminish fertility in the Egyptian setting. In this case, the following potential risk factors were identified: cervical electrocautery, male occupational exposure to noxious agents, male waterpipe smoking, and close cousin marriage practices. To ignore the cultural reasons for the persistence of these practices is to ignore the cultural context.

In a later article, Inhorn (1995) writes that there are few examples of “ethnographic-epidemiological” research. She cites Janes’ study of risk factors for hypertension among migrant Samoans and Zunzunegui’s research on male sexual practices as a risk factor for cervical cancer in migrant Hispanic women in southern California (Inhorn 1995). Inhorn issues a caveat, however, because she is concerned that if medical anthropologists become overly concerned with the creation of sociocultural risk data, this will further the undesirable trend of the medicalization of life. The concern is that the biomedical community would identify more “at-risk” groups for intervention based on sociological/anthropological studies.

Another attempt at explicitly combining anthropological and epidemiological methods is the Bedouin infant feeding study (Lewando-Hundt and Forman 1993). This study was a cohort study that collected data on infant feeding patterns, the social environment, health service utilization, home health care, and anthropometrics. A cohort study differs from a case-control study in that one or more cohorts is selected based on exposure to one or more risk factors and are followed over time to determine whether the cohort develops the outcome of interest. In the data analysis phase, the researchers found that some of their hypothesized quantitative associations were not statistically significant. However, because of the complement of ethnographic information they had collected, they were able to determine how certain variables were interrelated in a multivariate regression model. For example, the researchers found that as the length of time of assistance with cooking to mothers increased, the likelihood of

exclusive breastfeeding rather than bottle-feeding increased. Another study examining breastfeeding also benefited by using a combination of methods (Nations 1986). Nations argues that only with anthropological observations is one able to understand the complex web of causation in disease etiology. Such observations led Nations to hypothesize a relationship between breastfeeding and the incidence of diarrheal diseases. The anthropologists found that bottle-feeding increased the risk of diarrhea due to water contamination and lack of protective chemicals contained in mothers' milk.

Integration of Methods

From this brief review of the interface between epidemiology and medical anthropology, one may conclude that to combine both epidemiological and anthropological methods in a study design is problematic because of the different type of research questions that are posed as well as the data collected. For this reason, the dissertation research was primarily ethnographic, with an epidemiological component built into the semi-structured questionnaire and supplemented by the collection of epidemiological data from the health department. Trostle (1996) argues that a preliminary qualitative, ethnographic component preceding an epidemiological study can increase validity and generalizability as well as improve access to study populations. This call for integration of methods is echoed in another paper where it is argued that by failing to employ preliminary qualitative research studies before the analytic epidemiological study runs the risk of finding independent variables that may be

statistically significant but are not comprehensible from a clinical standpoint or from an interventionist perspective (Yach 1992).

Anthropological research adds the cultural dimension that is often missed in epidemiological studies, which focus primarily on identification of risks and disease control. As the discipline of anthropology expands and crosses disciplinary boundaries, practitioners must adapt by becoming experts in a subspecialty where anthropology informs the practice of related disciplines. In medical anthropology, there is a need for more studies, which employ anthropological methods to complement epidemiological investigations so the cultural dimension is not subsumed by the quantitative results.

PART IV – EPIDEMIOLOGY OF ARI

In a majority of the developing world, acute respiratory infections (ARIs) constitute the major causes of death in children under five years old. These deadly ARIs are comprised of pneumonia, bronchitis, bronchiolitis, and croup. Similar to diarrheal diseases, ARIs are often related to malnutrition and poverty. In fact, malnutrition is associated with about half of all child deaths; moreover, based on the results of community-based studies, a dose-response relationship exists between poor anthropometric status and increasing risk of mortality from ARIs and pneumonia in children (Rice, et al. 2000). ARI deaths are primarily caused by pneumonia, usually the bacterial type, which is potentially treatable with antibiotics. Poor access to biomedical care and lack of sufficient community health workers (CHW) educated to detect early signs of pneumonia contribute to the problems faced in developing countries (Kelly, et al. 2001). Annually, ARIs cause approximately 1.9 million deaths in children under five years old, making it the leading cause of death in this cohort, with over 70 percent of these deaths occurring in Africa and Asia (Williams, et al. 2002). For comparative purposes, between one and three percent of pneumonia deaths in children under five occur in developed countries compared to 10 to 25 percent in developing countries (Benguigui, et al. 1999). Ninety-nine percent of all deaths from ARI occur in young children in developing countries, and of these, 90 percent die from pneumonia, and approximately 76 percent of these deaths occur in infants (The_Wellcome_Trust 2001). If case-fatality ratios could be reduced to those

observed in the developed world, almost 98 percent of ARI deaths could be prevented (Stansfield 1987). A myriad of factors aid in the explanation of this discrepancy: larger family sizes, crowding, lack of education, poor access to health care, an elevated exposure to second-hand smoke and combustion particulate matter, nutritional deficiencies, lower rates of breastfeeding, and exposure to a variety of environmental pollutants (Graham 2001).

ARIs are appropriately referred to by Frank Shann as the “forgotten pandemic” (Shann 1999). Because most types of ARI resolve naturally, there is a degree of complacency over the problem. Moreover, because of the inadequacy of health services in developing countries, the diversity and complexity of etiological agents, and failed interventions, there is a prevalent fatalistic attitude towards ARI at the time when more effective ARI control programs need to be implemented in developing countries.

In the developed world, ARI management and classification is based upon radiographic and microbiologic data, as well as physical examination and clinical history (Stansfield 1987). ARI is the general label applied to encompass both upper (URI) and lower respiratory tract infections (ALRI) which are distinguished by a complex etiology and display diverse symptoms. One well known URI is the common cold, which has high incidence and is of great public health concern. Pneumonia is the most severe respiratory infection which results in mortality and is linked to ALRI. In the developing world, more than 75 percent of ARI deaths are caused by pneumonia, primarily of the bacterial strain (PAHO/SHA 2001). While bacterial pneumonia is a major cause of childhood mortality in the

developing world, it is treatable with antibiotics and proper case management and potentially preventable with affordable vaccines and nutritional interventions.

There have been serious issues raised concerning the methods that epidemiological studies have estimated the incidence of ARI episodes (Lanata, et al. 2004). A recent estimate is 165 million new ALRI episodes globally for children under four years old, with approximately 2.1 million ALRI-related deaths. Between 2000 and 2003, the Child Health Epidemiology Reference Group (CHERG) was formed by the WHO Child and Adolescent Health and Development programme in order to study the published data on ARIs to estimate the global disease burden (WHO 2004). Out of the 2000 studies surveyed, only 28 met the criteria for accurate ALRI incidence estimates based on the merits of their research designs for prospective community-based surveillance for new episodes of ALRI.

This review of the epidemiological literature will discuss strategies for the prevention, treatment, and control of acute respiratory infections in children in developing countries. Beginning with the morbidity and mortality trends and etiology of the disease, the review moves on to risk factors, case management, antibiotic management, prevention, and application of ethnographic methods to study ARIs.

Morbidity and Mortality Trends

Since most types of ARI are viral in origin, the worldwide incidence of ARI is similar in both developed and developing countries, with higher incidence in

urban than rural areas. Cross-country comparisons should be approached with caution because of different research methods, study designs, case definitions, and lab culture techniques, but generally, for developing countries, an estimate of 4 to 7 ARI episodes per child per year has been proposed (Lanata and Black 2001). Incidence rates are highest for infants between 6 to 11 months of age. However, for specific types of ARI, the differences between developed and developing countries are striking. The incidence of pneumonia remains 3 to 10 times higher in developing countries (The_Wellcome_Trust 2001). Moreover, the risk of dying from measles, pertussis, and *H. influenzae* type b (Hib) is greater in developing countries. The reasons for this discrepancy stem from incomplete vaccination coverage and a number of risk factors associated with developing countries, such as malnutrition and crowding. In terms of morbidity, ARI is the primary reason for pediatric outpatient visits and outpatient antibiotic use (The_Wellcome_Trust 2001). Rough estimates of all outpatient pediatric consultations are between 20 and 60 percent for ARI, and between 12 and 45 percent for all hospital admissions in developing countries (Stansfield 1987). While incidence rates are not dissimilar between developed and developing countries, mortality rates are 10 to 50 times greater, indicating the greater need for ARI prevention and control in developing countries (Stansfield 1987).

ARI is most acute in young children for three main reasons: 1) the anatomy of children makes them more susceptible to infection given the proximity of particular organs in the head and body; 2) children's immune systems are not developed; and 3) there is a high risk of exposure to infection

(The_Wellcome_Trust 2001). Other risk factors such as malnutrition and lack of breastfeeding also contribute to the problem of ARI in young children. In both developed and developing countries, the incidence of ARI is inversely proportional to age, with children under five at greatest risk, and within that group, infants under two months are at highest risk (The_Wellcome_Trust 2001). After the first few months of the infant's life, the risk of death from pneumonia decreases progressively as the child ages, particularly between ages two and five (The_Wellcome_Trust 2001).

Estimates of ARI morbidity and mortality are characterized by widespread under-reporting; nevertheless, the following figures estimate the burden of disease. In 2000, approximately 10,891,000 deaths occurred in young children, and of this number around 2,126,000 were due to ALRI and 47,000 to URI (The_Wellcome_Trust 2001). Ninety-nine percent of these ALRI deaths occurred in developing countries. Further breaking down the 2 million deaths from ALRI, the following estimates are provided: 253,000 from neonatal pneumonia; 246,000 from pertussis; 393,000 from measles; and 105,000 from HIV/AIDS (The_Wellcome_Trust 2001). Most of the ALRI deaths were caused by either primary or secondary pneumonia. Other than pneumonia, croup and bronchiolitis compose roughly 5 percent of ALRI deaths. Deaths from secondary pneumonia are high because of the severity of the bacterial infection, the weakened immune systems caused by co-infection with other diseases such as measles, pertussis, or HIV infection, and other contributing risk factors such as malnutrition (The_Wellcome_Trust 2001).

Etiology of ARI

ARI is composed of both upper and lower respiratory infections; however, accurate data concerning the bacterial and viral etiologies for ARI in infants and children is incomplete because of the problems encountered in making accurate clinical and microbiologic diagnoses (Stansfield 1987). Because of lack of consolidation from the pneumonia, young children are frequently unable to produce enough sputum, so microbiologic diagnoses are problematic.

The etiological aspects of ARIs include both viral and bacterial agents, and these may occur as a single or mixed infection. While most cases of ARI are of viral origin, only a small fraction result in severe or fatal disease (The_Wellcome_Trust 2001). A longitudinal study found that among the viruses associated with ARIs, respiratory syncytial virus (RSV), adenoviruses, influenza viruses, and enteroviruses were the most frequent (Portes, et al. 1998). Severe ARI often develops after a primary viral infection (e.g. RSV) is succeeded by a secondary bacterial infection (The_Wellcome_Trust 2001). Upper respiratory infections (URI) consist of coughs, colds and croup often caused by a viral agent. Examples of URIs are the common cold, sinusitis, nasopharyngitis(coryza), otitis media, and pharyngotonsillitis, none characterized by high mortality risk (Stansfield 1987). Unlike ALRI, URI do not require antibiotics.

ALRI in the International Classification of Diseases is defined as infections affecting the airways below the epiglottis. These infections encompass laryngitis, tracheitis, bronchitis, bronchiolitis, lung infections, as well as combinations of these, or together in combination with URIs, including influenza. The major

burden of disease from ALRI involves pneumonia and bronchiolitis, according to WHO, and programmatic efforts are concentrated on case management of these diseases to reduce the global burden of disease from ARI in children (Lanata, et al. 2004).

Laryngitis (croup), tracheobronchitis, and bronchiolitis are examples of viral ALRIs, and only bronchiolitis, caused by RSV, is characterized by high mortality risk (Stansfield 1987). RSV can cause different types of ARI, including bronchiolitis, pneumonia, croup, and otitis media (The_Wellcome_Trust 2001). On the other hand, in children, bronchiolitis can be caused by a number of viruses, such as RSV, parainfluenza, and influenza viruses (The_Wellcome_Trust 2001). Bronchiolitis is an infection of the bronchioles common in infants less than 18 months.

Despite the threat of viral agents, ALRI deaths are primarily caused by pneumonia, which is usually bacterial and potentially preventable with the proper treatment of antibiotics. Respiratory bacteria may be either primary pathogens, opportunistic organisms, or constituted in the normal flora of the respiratory tract (The_Wellcome_Trust 2001). Despite difficulties in obtaining accurate etiological data, there is a consensus that two bacteria, *Streptococcus pneumoniae* and *Haemophilus influenzae*, cause most cases of bacterial pneumonia in children from developing countries, and these occur sporadically, not in outbreaks (Graham 2001). *S. pneumoniae* has been found in 30 percent of hospitalized children in 60 percent of the studies undertaken in developing countries, and *H. influenzae* in 11 to 50 percent of cases. These bacteria may spread to other

parts of the body, such as the meninges of the brain, causing bacterial meningitis. *H. influenzae* type b (Hib) comprise 95 percent of the strains that cause infections (The_Wellcome_Trust 2001).

In developing countries, accurate ARI morbidity and mortality data are extremely difficult to obtain. Accurate etiologically specific morbidity and mortality data are necessary to design effective public health policy strategies and to provide directions for vaccine development. The major barrier to accurate data is lack of reporting. However, because of the etiology of ARI, proper diagnosis is difficult; therefore, other problems in data collection include failing to distinguish between primary and secondary infection, to determine between concurrent infections, and to classify cases correctly as either ARI, URI, or ALRI, or misdiagnosis (The_Wellcome_Trust 2001). Moreover, the signs and symptoms of ARI are also related to other childhood conditions such as meningitis and septicaemia, and conditions such as measles or pertussis may be recorded as the cause of death instead of pneumonia. Other problems related to the reliability of ARI mortality data are cultural differences in the recognition and diagnosis of ARI by CHWs and mothers, and differences in methodology carried out by investigators, such as the variable use of hospital-based data to estimate disease burden in a community, resulting in selection bias (The_Wellcome_Trust 2001).

In developing countries, many young children have reservoirs of asymptomatic nasopharyngeal *S. pneumoniae* and *H. influenzae*, which may lead to opportunistic infections. Therefore, reliable and accurate samples must

be taken by either blood collection or the invasive lung aspiration technique. The blood culture technique has low sensitivity to determine bacterial etiology of pneumonia, and the lung aspiration technique, while highly sensitive, is an invasive procedure that is both expensive and ethically objectionable (The_Wellcome_Trust 2001). Blood culture is the most accurate and widely available technique used to determine bacterial etiology of pneumonia (Berman 1991). In any specimen of sputum, blood, or even pleural fluid, there are a myriad of possible pathogens present, making isolation of a single agent difficult (Stansfield 1987). Depending on the type of diagnostic tests used, inter-study comparisons are not possible because of the varying sensitivity and specificity of the tests. Other problems include differential distribution of bacterial pathogens between communities, variation in the prevalence of risk factors, and lack of appropriate training and laboratory facilities necessary to carry out reliable tests (The_Wellcome_Trust 2001).

Etiology of Pneumonia

Pneumonia, an inflammation of the lung, is characterized by cough and rapid breathing, which can sometimes be accompanied by fever and muscle aches (CDC 2002). From recent studies on children aged two to 59 months in developing countries, 49 percent are viral only, 34 percent are bacterial only, and 17 percent are mixed infections (The_Wellcome_Trust 2001). The primary viral causes of pneumonia and ARI are adenovirus, parainfluenza virus, and RSV, the most common viral agent to cause severe ALRI. In a clinical study in poor, urban

Uruguay, RSV was the main agent producing annual outbreaks (Hortal, et al. 1994). The primary bacterial causes of pneumonia are *S. pneumoniae* (responsible for 30 percent of pneumonia deaths), Hib, and *Staph. aureus*, which particularly affects infants (The_Wellcome_Trust 2001). *S. pneumoniae* is responsible for high mortality in children less than two years, causes around one million deaths per year, and spreads to other parts of the body, leading to other diseases such as acute bacterial meningitis and otitis media (The_Wellcome_Trust 2001).

Even though approximately 30 percent of ARI-related mortality occurs in infants under three months of age, there is scant etiologic information available on the etiology of pneumonia for this age group (Berman 1991). Lung aspirates are expensive and invasive, and consequently, they are not frequently done in developing countries. Blood culture is the most common and accurate form of determining the bacterial etiology of pneumonia (Berman 1991). Young infants are especially susceptible to bacterial infection because of transmission of infection from the mother at birth and more vulnerable respiratory tracts. Because pneumonia is primarily bacterial, there is justification for the treatment of suspected infection with antibiotics.

Risk Factors

Risk factors are divided into two categories: modifiable and non-modifiable. Modifiable risk factors known to increase the relative risk of ARI include vitamin A deficiency, air pollution, parental smoking, and overcrowding.

Non-modifiable risk factors include the age and sex of the child, genetic factors, allergy status, congenital abnormalities, and geographical factors. The risk factor that is linked to the highest case fatality is malnutrition, followed by low birth weight and lack of breastfeeding. These three risk factors are related to the risk of severe pneumonia (The_Wellcome_Trust 2001).

Modifiable Risk Factors

The relationship between ARIs, malnutrition, and poverty has been well documented since the early 1990s (Lanata and Black 2001; Ray, et al. 2001; Shann 1999). Malnutrition reduces the body's immunity to infection, increasing the risk of ARI. Malnutrition is linked to increased severity of ARIs, as well as increased risk of bacteraemia, pleural effusion, and other factors that lead to pneumonia. Malnutrition also leads to malaria, and consequently, in endemic countries, it is difficult to make the proper diagnosis between pneumonia and malaria (Lanata and Black 2001; Rice, et al. 2000). Compared to a normal child, a malnourished child is 19 times more likely to acquire pneumonia (Nichter 1993). Based on large studies conducted in the Philippines, malnutrition is linked to a moderate to severe risk for developing ARI or pneumonia (Lanata and Black 2001). In a population-based survey in northeastern Brazil, ARI prevalence was highest in children with either acute or chronic malnutrition, after adjusting for potential confounding variables (Cunha 2000). In a hospital-based study in the Central African Republic, researchers found that the status of being a child under one year old and acute malnutrition were the two risk factors most highly

associated with mortality risk from ALRI (Demers, et al. 2000). Based on the available evidence and data, there is strong argument for the cause and effect relationship between malnutrition and ARIs.

In addition, particular micronutrient deficiencies are implicated as modifiable risk factors. One important micronutrient is vitamin A, which is found active in the body as retinoids, and the body has cells which convert these into vitamin A when needed (Whitney and Rolfes 2005). The amount of vitamin A in the body depends on availability of vitamin A stored primarily in the liver, and of protein which acts as a carrier. The primary roles of vitamin A are to support the immune system, and promote vision, growth, and cell differentiation, the latter of which helps to maintain the epithelium of the respiratory and gastrointestinal tracts (Whitney and Rolfes 2005). When a deficiency occurs, these tracts are more susceptible to bacterial infections (Biswas, et al. 1994; Semba 2001). Sources of vitamin A include pre-formed vitamin A, found in butter and egg yolks, and carotenoids, found in spinach, carrots, and papayas (Semba 2001). Children with severe ARI have lower serum vitamin A levels than those with mild forms (Dudley, et al. 1997; Küçükbay, et al. 1997). Moreover, children with vitamin A deficiency suffer more ARI episodes per year compared to those without the deficiency (Pandey and Chakraborty 1996). Over 100 million children are burdened with vitamin A deficiency worldwide (Whitney and Rolfes 2005). Initially, because vitamin A is lost in the urine during infection, the belief was that vitamin A supplementation would help children recover from ARIs. A number of placebo controlled trials tested this hypothesis (Biswas, et al. 1994; Dudley, et al.

1997; Küçükbay, et al. 1997; Pandey and Chakraborty 1996; Ramakrishnan and Martorell 1998; Reyes, et al. 2002). Studies that demonstrated a decrease in childhood mortality due to vitamin A supplementation reflected reductions in death due to acute gastroenteritis and measles, rather than ARIs and malaria (Ramakrishnan and Martorell 1998). The high mortality in children with vitamin A deficiency has also been linked to protein deficiency, diarrhea, and respiratory tract infections (Biswas, et al. 1994).

While poor vitamin A status has been linked to higher ARI and pneumonia morbidity and mortality, this does not necessarily mean that vitamin A supplementation is the answer. In fact, supplementation with vitamin A has *not* been found to be significant in the fight against lower respiratory infections or RSV infections in children (Semba 2001). RSV is the leading viral pathogen involved with ARI since approximately 30 percent of children harboring the virus also have pneumonia (Lanata and Black 2001). While vitamin A supplementation has been shown to reduce morbidity from pneumonia in acute complicated measles, there has been no comparable observable effect with other lower respiratory infections (Semba 2004). Both WHO and UNICEF recommend regular vitamin A supplementation for children with measles in areas with high vitamin A deficiency or high rates of measles (Whitney and Rolfes 2005). Vitamin A supplementation in children aged six months to five years old has demonstrated a lowering of childhood mortality from measles-associated pneumonia from randomized trials but not with non-measles-associated pneumonia (The_Wellcome_Trust 2001). Vitamin A supplementation has also

been shown to reduce the incidence of severe diarrhea (Ramakrishnan and Martorell 1998). However, in a case-control study, vitamin A supplementation did not alter vitamin A deficiency status because of frequent respiratory infections (Rahman, et al. 1996). Malnutrition is both a cause and an effect of ARI, as the two behave synergistically. Malnutrition is associated with a greater frequency of complications related to ARI, such as sepsis and meningitis, which contribute to increased mortality (Tupasi, et al. 1988).

Vitamin D, selenium, and zinc deficiencies are also risk factors for ARIs in children. In a pooled analysis of several clinical trials in different geographic locations, zinc supplementation led to a 41 percent decrease in childhood pneumonia (Lanata and Black 2001). Dietary sources of zinc include shellfish, nuts, beans, beef, and chicken. Zinc deficiency can lead to increased infections as well as growth abnormalities and other disorders (Semba 2001). Zinc deficiency is usually the result of inadequate dietary intake, and the groups most at risk include pregnant and lactating women, infants, and young children; moreover, zinc deficiency interferes with vitamin A metabolism, so vitamin A deficiency may result (Whitney and Rolfes 2005). A possible result of poor nutrition on the part of the mother is low birth weight babies, defined as less than 2500 grams. This outcome affects roughly 19 percent of infants in developing countries (The_Wellcome_Trust 2001). The risk of pneumonia mortality increases as birth weight decreases, and low birth weight is a factor in 25 percent of childhood pneumonia deaths (The_Wellcome_Trust 2001). While in general

low birth weight does not increase the risk of ALRI, it may increase the frequency of severe ALRI (Demers, et al. 2000; Dudley, et al. 1997).

Breastfeeding is a behavioral practice that has obvious implications for the nutrition of infants as well as conferring passive immunization. In order to reduce malnutrition among infants, breastfeeding should be continued for at least one year (Lanata and Black 2001). South Asia and Latin America are two regions where the combination of inadequate breastfeeding and malnutrition has led to high mortality from pneumonia (Lanata and Black 2001). Breastfeeding is a protective factor for ARI because of transfer of immunity by breast milk, which contains antibacterial and antiviral elements such as secretory IgA and neutrophils. Breastfeeding reduces pneumonia mortality by a factor of two and reduces incident cases of otitis media and ALRI by 50 percent (The_Wellcome_Trust 2001). In a case-control study among urban Malaysian children, breastfeeding for at least one month was found to be a protective factor for ARI [odds ratio (OR) = 0.58] (Azizi, et al. 1995). Bottle-feeding can contribute to infections because of unsafe drinking water containing pathogens. A comprehensive approach that addresses overall nutrition, living conditions, and childcare practices is a more appropriate intervention strategy in developing countries.

Risk factors associated with poverty are associated with ARIs. These include crowding, exposure to indoor air pollutants such as smoke from biomass fuels, low education levels, and poor housing (Ezzati and Kammen 2001a; Ezzati and Kammen 2001b; Hoque, et al. 1999; Rahman and Shahidullah 2001). A

recent study using a national sample of children in Bolivia suggests that socioeconomic factors are the most important links in the chain connecting maternal education and child nutritional status (Frost, et al. 2005). A prospective study carried out over a year in Calcutta, India found ARI incidence to be significantly worse for undernourished children in the lowest socioeconomic class (Biswas, et al. 1999). The finding that malnutrition and low socioeconomic status are tied to increased ARI case fatality rates, especially for infants, is a constant theme throughout the epidemiological literature (Tupasi, et al. 1988). Since respiratory infections are transmitted through droplet nuclei in the air, crowding increases the probability of transmission. Case-control and longitudinal studies have demonstrated the effects of crowding on risks of transmission of respiratory infection (Azizi, et al. 1995; Lanata and Black 2001; Rahman and Rahman 1997). Overcrowding may lead to doubling of ARI episodes because unexposed, susceptible children are exposed to carriers or those infected by ARI. Children who attend day care are at higher risk of both upper and lower respiratory infections. A case-control study of urban Malaysian children found that the presence of a sibling with a cough (OR = 3.76), a household comprising five or more people (OR = 1.52) and sleeping with three or more people (OR = 1.45) were all significant independent risk factors for ARI (Azizi, et al. 1995). Increased contact with other children or adults due to sleeping arrangements or crowded quarters is a significant risk factor for ARI and pneumonia.

In developing countries, the use of biomass fuels, which includes wood, manure, or waste, is prevalent because heating oil, electricity, or other less air-

polluting methods of heating and cooking are scarce or too expensive. Consequently, because of poor ventilation or insulation, families utilizing biomass fuels are at greater risk of aggravating childhood respiratory infections. A longitudinal study in Kenya found an exposure/response relationship between the inhalation of particulate matter from biomass combustion and ARIs (Ezzati and Kammen 2001b). Various biomass combustion fuels produce high concentrations of particulates in the air, which increases the risk of pneumonia. Some studies have shown that indoor air pollution increase the risk of ARI by two to five times (The_Wellcome_Trust 2001). In addition, passive smoking from parents increases childhood risk in a dose-response relationship to ARI, otitis media, bronchitis, and pneumonia. To compound the problem of indoor air pollution, in many developing countries, because of weak environmental legislation and enforcement, outdoor environmental pollution from vehicles and industrial emissions is a contributing factor.

In this study, the inhabitants have been exposed to volcanic ash for roughly five years (Tobin and Whiteford 2002; Whiteford and Tobin 2001; Whiteford and Tobin 2002). Many studies of the health affects of volcanic ash do not implicate its role in the incidence of ARIs but hypothesize a relationship with chronic bronchitis and silicosis. Nevertheless, people experiencing health threats from volcanic ash, or living in temporary shelters because of evacuation from a natural disaster, have a greater relative risk of developing respiratory infections and other infectious diseases (Noji 1997). Results from the national epidemiological surveillance system in Nicaragua found significantly higher visits

to healthcare facilities for acute diarrhea and acute respiratory infections in the affected communities following the eruption of the Cerro Negro Volcano in 1992 (Malilay, et al. 1996). In one of the communities, rates for consultations for ARIs surged from 17.4 per 1000 before the eruption to 83.6 per 1000 after the eruption. This amounted to a relative risk of 6.0 for this community, meaning that the risk was six times greater for children under five to seek a medical consultation for ARI after the eruption. The researchers in this study found especially high rates of ARI among infants and attributed the finding to a combination of risk factors, including volcanic ash and crowding in the shelters (Malilay, et al. 1996).

Two areas of epidemiological investigations related to volcanic ash exposure are air pollution and workplace exposure to crystalline silica. Studies have shown that short-term exposure to urban air pollution is associated with higher prevalence of symptoms related to respiratory disorders such as bronchitis and asthma (Moore, et al. 2002). Exposure to fine particulates in urban environments has been shown to be associated with the risk of developing chronic bronchitis (Searl, et al. 2002). Silicosis, a progressive, irreversible scarring of the lungs that may lead to lung cancer, is an outcome associated with long-term exposure to crystalline silica. Investigations of crystalline silica in high concentrations of volcanic ash have been conducted on the eruption of the Soufriere Hills Volcano in Montserrat, active since 1995 (Baxter, et al. 1999; Moore, et al. 2002; Searl, et al. 2002; Wilson, et al. 2000). In the 1991 Mount Pinatubo eruption in the Philippines and the Mount St. Helens eruption, the

volcanic ash contained between three to seven percent crystalline silica, which could prove to be a risk factor for silicosis and an occupational hazard for loggers or farmers if exposure were maintained through frequent eruptions (Baxter 1997; Dollberg, et al. 1986). The particular dynamics of the Soufriere Hills Volcano have produced PM10 ($\leq 10 \mu\text{m}$ in diameter) volcanic ash created through pyroclastic flows of lava dome collapses with concentrations between 10 to 24 percent on a continual basis (Baxter, et al. 1999). Explosive eruptions produce much lower percentages of crystalline silica.

The second factor, concerning the health effects of volcanic ash depending on the size of the ash particles, has been described. Research into the health effects has found that fine-grained volcanic ash particles, even at low concentrations, have had adverse consequences for respiratory health in the case of the 1992 Mount Spurr eruption in Anchorage, Alaska. In contrast, the coarser particles ($> 15 \mu\text{m}$) produced by the 1985 - 86 Mount Sakurajima eruption produced only ocular problems (Moore, et al. 2002). Ash particles may cause corneal abrasions and irritations, but these effects are generally minor and can be prevented with protective eyewear (Baxter 1997).

The third and fourth factors that determine the health effects of volcanic ash are evident in the case of the Soufriere Hills Volcano. The third factor relates to exposure because of climatological factors, and the fourth concerns the frequency of eruptions. The long-term risk for lung disease in the Soufriere Hills Volcano case is considered high since the eruptive cycle is active, especially for people working outdoors and children playing outside. Baxter (1999) makes the

observation that human activity determines exposure levels. For example, people working in agricultural activities stir up ash while performing necessary tasks. This type of knowledge prompted authorities to dampen school playgrounds in Montserrat after findings that children exposed to the volcanic ash had a higher prevalence of wheeze symptoms (Searl, et al. 2002). People who are involved in agricultural or other work activities that agitate ash areas are at higher risk for respiratory problems. Moreover, those who stay indoors in well-insulated homes are at lower risk for breathing ash than people who are otherwise exposed. For this reason, even in the absence of epidemiological data, since poor housing is a characteristic of people in developing countries, these people are at higher risk for inhaling potentially harmful ash particles (Baxter 1997).

Non-modifiable Risk Factors

Non-modifiable risk factors for ARI are necessary to understand and consider, but interventions cannot be planned around them. Age and sex are risk factors for ARI. As mentioned previously, children under five, especially infants, are at greatest risk. Moreover, boys appear to account for more of the disease burden of ARI and pneumonia than girls. However, this is most likely a result of reporting bias, since in some cultures, more attention is given to the health of young boys than girls, so more cases are reported (The_Wellcome_Trust 2001). Both atopic allergies and asthma lead to an increased risk of childhood ARI. Moreover, congenital abnormalities such as

cystic fibrosis and heart conditions are implicated in childhood ARI (The_Wellcome_Trust 2001). Genetic abnormalities such as homozygous sickle cell disease leave individuals prone to pneumococcal infections; therefore, such persons should receive an early vaccination against *S. pneumoniae* (The_Wellcome_Trust 2001). Another biological risk factor not frequently reported for ALRI is birth in a cold season, found to be statistically significant in a cohort study in Chile (López Bravo, et al. 1997).

Environmental and geographical factors such as seasonal patterns have an effect on ARI incidence. RSV and bacterial epidemics are more frequent in the colder months in temperate climates and during wet seasons in tropical climates. During cold temperate weather, infants may experience chilling which increases the risk of ARI, and during wet weather, the protective barrier of the respiratory system becomes less effective, likewise predisposing to ARI (The_Wellcome_Trust 2001). A case-control study in rural Bangladesh studying environmental risk factors found a significant association between sources of drinking water and deaths due to ARI after controlling for confounding variables (Hoque, et al. 1999). For this research, because the study site is near the equator, the environmental conditions for ARI are present year-round. Finally, quality and access to health services varies between geographical regions depending on geographic location, terrain, population density, and whether the region is urban or rural.

This review of risk factors for ARI illustrates why ARI incidence is so much greater in developing rather than developed countries. Modern care, in the form

of antibiotic case management and preventive vaccines, can accelerate the process of lessening the burden of disease. However, other factors are also important. One study by Caldwell, which examined the correlation between infant mortality and a number of risk factors in 99 developing countries, found the highest correlation with female literacy, and concluded that the most dramatic effect on reducing infant mortality would be found by increasing access and affordability of basic health services to regions which had previously been wanting (Douglas 1990). Female literacy was also found to be a significant factor in correct attitudes and practices towards ARI in a study in India (Khan, et al. 1995). A review by Douglas made general recommendations for interventions in two parts of the tripartite epidemiological equation, namely the host and environment, which included better nutrition and hygiene, access to medical care combined with maternal education, and increased female autonomy (Douglas 1990). Great gains can be made to lessen the burden of ARI and pneumonia mortality by increasing access and efficiency of health services, together with mothers educated to detect the signs and symptoms of ARI in order to act appropriately.

Case Management

In the late 1980s, the World Health Organization (WHO) National ARI Control Programme was launched in many developing countries. The strategy used early detection, case management, and health education of CHWs and mothers to reduce childhood pneumonia and limit the misuse of antibiotics.

WHO guidelines recommend that CHWs classify ARI by signs and symptoms in order to: 1) treat with antibiotics; or 2) treat as an outpatient; or 3) refer for hospital admission (Stansfield 1987). An ARI control program follows four basic steps: 1) recognition by the primary caregiver that the child needs treatment; 2) clinical assessment by a physician or trained CHW; 3) ARI treatment with oral antibiotics for outpatient non-severe cases and with parenteral antibiotics for inpatient severe cases, admission to healthcare facility and supportive therapy for severe ARI; and 4) follow-up (The_Wellcome_Trust 2001). Pneumonia, if not severe, can be treated on an outpatient basis with proper antibiotics, and URIs without ear infections or streptococcal throat infections can be managed on an outpatient basis without antibiotics (Berman 1991). The results of the WHO strategy have been largely successful, but in the most remote, rural regions, effective interventions remain problematic.

WHO recognizes the clinical symptoms of early pneumonia, such as rapid breathing and an indrawn chest, to be the standard upon which to gauge the incidence of critical ARI episodes, and to be the best predictor for antibiotic therapy. ALRI diagnosis is based on presence of a cough, as well as one of the following symptoms: rapid breathing (tachypnea) (>60/min. in infants less than two months, >50/min. in infants 2-11 months, and >40/min. in children older than one year), crepitations, wheezing, stridor, and chest indrawing (Lanata and Black 2001). Chest indrawing, inability to drink, nasal flaring, and cyanosis are signs of more severe ALRI (Lanata and Black 2001). In infants less than two months of age, fever or low body temperature (sepsis and meningitis) are additional signs

used to identify illness (Berman 1991). The presence of a cough, chest indrawing, and an increased respiratory rate is 70 percent sensitive and specific in diagnosing pneumonia (Lanata and Black 2001). In one study of 395 children in the Central African Republic who were hospitalized according to the WHO clinical definition of pneumonia, chest indrawing was found to be the independent risk factor most strongly associated with mortality in a multivariate model (OR = 22.99; 95% CI 3.81 - 935.20) (Demers, et al. 2000).

For all types of ARI, supportive treatment includes fluids, continued food intake, antipyretics, maintaining moderate room temperature, and clearing of nasal and ear cavities (Stansfield 1987). Because in developing countries, half of pneumonia cases in children are bacterial, treatment with antibiotics, such as parenteral penicillin because of its affordability and effectiveness, is suggested for both moderate and severe ARI (Berman 1991). Depending on whether the recommended treatment is of an outpatient or inpatient variety, different combinations and types of antibiotics are used. A later section on antibiotic management discusses this topic in more depth.

Another strategy of the WHO ARI program is to improve maternal education. In order to address education in terms of childhood infectious diseases, it is necessary to reach a cultural understanding in order to improve childcare practices, which includes care-seeking, maternal education, and child spacing. Some of the material and economic barriers that prevent timely care-seeking include lack of transportation, inability to pay for drugs or medical attention, scarcity of needed antibiotic treatments, and lack of social support

(Gove and Pelto 1994; McNee, et al. 1995). Poor access to medical services combined with misunderstanding of the severity of pneumonia symptoms can lead mothers to delay treatment or apply remedies that are harmful, either one of which could lead to increased mortality risk for the child (Rashid, et al. 2001; Sáenz de Tejada 1997; Teka and Dagneu 1995).

The work of anthropologists and medical scientists sensitive to the importance of cultural understanding has led to new approaches towards ARI control programs in developing countries in conjunction with WHO (Gove and Pelto 1994; Hudelson, et al. 1995; Hudelson 1994; Kresno, et al. 1994; Mull and Mull 1994; Mull, et al. 1994; Nichter 1994; Nichter and Nichter 1994; Pelto 1996; Rashid, et al. 2001; Stewart, et al. 1994; WHO 1993). A qualitative study in rural Bangladesh found that it was important not only to educate mothers to detect the early signs of pneumonia, but other family members as well (Rashid, et al. 2001). Care-seeking is also an economic decision and is not always made by the mother of the child. In this same study, the researchers discovered that it was important to differentiate 'hot' illnesses from 'cold' ones. A child may suffer from diarrhea, a 'hot' illness, and a cough, a 'cold' illness, at the same time and would consequently, be deprived of both 'hot' and 'cold' foods, thus exacerbating the child's nutrition deficiencies and infections (Rashid, et al. 2001).

Education is also necessary to discourage potentially harmful treatment practices, such as the use of kerosene for body rubs of the child observed in poor, rural Bolivia, which can cause burning or damage to the lungs (Hudelson, et al. 1995). In a study among women traders in urban Ghana, mothers were

found to use castor oil or enemas of ginger or pepper as preventive measures for ARIs (Denno, et al. 1994). Another study of mothers in a rural district of Ghana found that because of lack of finances and poor attitudes towards ARI by CHWs, inadequate treatment was provided for mild and severe forms of ARI, which was compounded by withholding of food during disease episodes (Amofah, et al. 1995). While perceptions of severe forms of ARI were high, community members found difficulty in distinguishing severe signs for children less than two months old (Amofah, et al. 1998). Similar findings were reported in an urban Ghanaian population, where poor maternal understanding of the signs and symptoms of ARI were common. For instance, mothers interviewed reported that they would delay treatment if they observed chest retraction, rapid breathing, and cough and fever, all which could be symptoms of severe respiratory problems (Demers, et al. 2000).

Community-based interventions which include education on detecting the signs of pneumonia and case management instruction for CHWs have proven effective in preventing severe ARI-related diseases and deaths (Fagbule, et al. 1994; Pandey, et al. 1989). In one study, a practical recommendation relating to the detection of rapid breathing by CHWs and thus better case recognition was increasing access to watches or timers in order to facilitate this task (Kambarami, et al. 1996). In rural India, a community-based intervention trial with a case-control design using mass education about childhood pneumonia and case-management of pneumonia with antibiotic use as interventions, the case-fatality rate among 612 cases was 0.8 percent compared to 13.5 percent in the control

area (Bang, et al. 1990). After one year, pneumonia-specific childhood mortality, infant mortality, and mortality for children under five were all significantly lower in the intervention group. In another case in rural northern Pakistan, a community-based case management program was implemented, and the result was a reduction in total and ALRI-related mortality (Khan, et al. 1990). An example of a successful application of the WHO National ARI Control Programme occurred in Pakistan where the use of antibiotics was cut in half, as was the case fatality rate of children admitted to healthcare facilities with signs and symptoms of ARI (Qazi, et al. 1996). Another pilot project in rural Nepal demonstrated the effectiveness of active health service outreach programs focusing on education of the community and CHWs in order to reduce ARI-related childhood mortality (Pandey, et al. 1989). In a later study in the same region, a carry-over effect was observed where prevention of pneumonia deaths through proper antibiotic use indirectly affected mortality from measles and diarrhea (Pandey, et al. 1991). Ethnographic data on local cultural understandings of ARI as well as practices related to care and treatment are useful in the design and implementation of ARI control programs (Awedoba 1996; Stewart, et al. 1994).

Meta-analysis of Intervention Trials on Case Management

Sazawal and Black (1992) performed a meta-analysis of six published intervention trials on ARI case management. The researchers controlled for the effects of immunization or diarrhea treatment, and found a pooled relative risk estimate that amounted to a 35 percent reduction in overall ALRI-specific

mortality. From their calculations on pooled rate differences, the researchers reported a 20 percent reduction in infant mortality and a 35 percent reduction in mortality among children aged one to four (Sazawal and Black 1992). A major finding was that in areas with an infant mortality rate of at least 90/1000, a pneumonia case management approach had a significant effect on lowering both infant and under-five mortality rates (Sazawal and Black 1992). This meta-analysis provides strong evidence that a pneumonia case management approach should be considered for any major intervention concerning child survival and ARI control.

The WHO ARI Control Programme has been shown to be capable of reducing ARI mortality by 25 to 30 percent (Sazawal and Black 1992). However, because of increased antibiotic resistance among pneumococcal isolates, lack of antibiotics in some rural areas, and inappropriate health care-seeking behavior, the current emphasis has shifted to vaccination for pneumococcal diseases (Lucero, et al. 2003). Nevertheless, pneumonia case management remains an integral component of any ARI control program.

Antibiotic Management

A final issue related to education deals with the proper use of antibiotics to treat ARIs. According to the Integrated Management of Childhood Illness (IMCI) guidelines, antibiotics are recommended for pneumonia, acute otitis media, and mastoiditis, but not for chronic otitis media and any form of pharyngitis besides the bacterial form (The_Wellcome_Trust 2001). IMCI is a fairly recent WHO-

UNICEF initiative whose aim is to improve childhood illness prevention through nutrition, immunization, maternal health education, and vitamin A supplementation (Nicoll 2000). Antibiotics prescribed to patients for ARI depend on whether the patient is receiving inpatient or outpatient therapy. For outpatient antibiotic therapy, patients receive cotrimoxazole, amoxicillin, ampicillin, or procaine penicillin (Berman 1991; The_Wellcome_Trust 2001). WHO recommends treatment for five days. For inpatient antibiotic therapy, especially when the mortality risk is high, patients receive broad-spectrum antibiotics. WHO recommends chloramphenicol for severe pneumonia cases and for children suffering malnutrition (Berman 1991). For infants less than two months of age with pneumonia, the recommendation is for treatment with benzyl penicillin plus gentamicin, and for other children, treatment with benzyl penicillin is recommended (Berman 1991). Additional treatments include oxygen, bronchodilators, steam humidification, fluids, and other supportive care.

There are primarily three main problems regarding antibiotic use: 1) use for upper-respiratory problems such as coughs or colds; 2) adherence problems to the full prescribed regimen; and 3) using leftover medicines for treatment of future episodes (Gove and Pelto 1994; Simon, et al. 1996). This is an area where proper case management training for CHWs, as well as home management, is crucial. Misuse of antibiotics may lead to bacterial resistance to anti-infective drugs. This is a problem for ARI case management, which relies on these drugs. In addition, *S. pneumoniae* and *H. influenzae* are characterized by showing the highest resistance to common antibiotics, such as penicillin, co-

trimoxazole, chloroamphenicol, and erythromycin. Drug resistance occurs rapidly and renders previously used drugs ineffective. Nevertheless, antimicrobial resistance varies greatly among regions, independent of economic status, because some population groups may have higher nasopharyngeal carriage of bacteria that demonstrate resistance to antibiotics, or inappropriate use of antibiotics allows the body's nasopharyngeal bacteria to develop resistance (The_Wellcome_Trust 2001).

One recent study of private pharmacy staff in Hanoi, Vietnam demonstrated that inappropriate dispensing of antibiotics for mild cases of ARI was a common practice (Chuc, et al. 2001). Another study based on 29 healthcare facilities in Rio de Janeiro, Brazil found that antibiotics were prescribed incorrectly in 8.9 percent of ARI cases (Cunha 2002). A study of physicians in Havana, Cuba provided evidence that a refresher training program may rapidly reduce inappropriate prescribing of antibiotics, but that public education efforts alone are not sufficient (González Ochoa, et al. 1996). Better training, supervision and organization of services are all necessary for improving antibiotic case management (Iqbal, et al. 1997).

Prevention

Immunization is the primary preventive measure of ARI control programs. Successful immunization programs decrease the incidence of ARI; therefore, the burden on health services is lessened and inappropriate use of antibiotics is curtailed. Immunization programs in developing countries target measles,

pertussis, and diphtheria in order to prevent transmission of ARI (The_Wellcome_Trust 2001). In developing countries, young children are at increased risk for ARIs because vaccination coverage is limited, and clean water and sanitation is frequently not available. In contrast to developed countries, where the goal is to eliminate these childhood diseases, in developing countries, the goal is to control morbidity and mortality rates to acceptable levels.

H. influenzae type b (Hib) conjugate vaccines were introduced into vaccination programs in the 1990s and have caused significant drops in the incidence of Hib diseases in developed countries (The_Wellcome_Trust 2001). While Hib is only responsible for a small amount of pneumonia, it is 21 percent protective against broadly defined pneumonia, thus making the case for the Hib vaccine as another protective measure (Lanata and Black 2001). In addition, the Hib vaccine prevents bacterial meningitis and significantly reduces the nasopharyngeal carriage of Hib (The_Wellcome_Trust 2001). According to the Centers for Disease Control and Prevention (CDC), conjugate vaccines for Hib and *S. pneumoniae* (licensed in the U.S. in 2000) provide the greatest hope of reducing pneumonia morbidity and mortality in the developing world, yet such hopes remain unrealized (CDC 2002). Use of the Hib conjugate vaccine combined with the conjugated *S. pneumoniae* vaccine is currently too expensive to implement in many of these countries (Lanata and Black 2001). Today, only some countries in Latin America, South Africa, and The Gambia are using the newly available Hib vaccine. Some of the other barriers to its use besides cost include: absence of data on the burden of Hib disease; lack of proper etiological

diagnoses of pneumonia for surveillance purposes; and introducing another vaccine into the standard childhood immunization schedule (The_Wellcome_Trust 2001).

The older pneumococcal polysaccharide vaccine has proven effective in preventing pneumococcal disease in children older than two years of age and adults, but the challenge has been to develop a vaccine effective for young children and infants (The_Wellcome_Trust 2001). The pneumococcal conjugate vaccines only potentially prevent particular serotypes; however, research has found that ten serotypes comprise approximately 80 percent of pneumococcal disease in the world, so the future development of a single vaccine of nine to 11 serotypes is a plausible solution (The_Wellcome_Trust 2001). Such a candidate has apparently been found in the new pneumococcal vaccine called Prevnar, approved by the U.S. Food and Drug Administration in February 2000. Prevnar was found to be 90 percent effective against all strains of the pneumococcus bacteria in a Kaiser Permanente study of 38,000 infants in northern California (childrensvaccine.org 2004). Despite the development of the pneumococcal conjugate vaccine, its potential utility in the developing world remains unknown because of issues relating to affordability, supply, and route of immunization in early infancy (The_Wellcome_Trust 2001). The application of ethnographic methods to the study of acute respiratory infections is the subject of the remainder of this chapter.

Ethnographic Methods for the Study of ARI

A comprehensive collection of studies of health-related research methods from anthropology and epidemiology, as applied to the study of ARIs in young children, was published in a special edition of *Medical Anthropology* (Nichter 1994). These ethnographic studies of ARI looked at program needs such as: mother's recognition of signs and symptoms of pneumonia, ARI home management practices, and health care-seeking behavior. Current research recognizes the clinical symptoms of early pneumonia to be the standard upon which to gauge the incidence of critical ARI episodes.

Further anthropological studies which use highly focused methodological tools to answer specific research hypotheses are needed to examine this worldwide problem. The most effective method to elucidate cultural understanding of ethnomedical terms and practices is through ethnographic interviews, which might include focus groups or key informant interviewing (Hudelson, et al. 1995; McNee, et al. 1995; Nichter 1994; Oyejide and Oke 1995; Rashid, et al. 2001; Stewart, et al. 1994). This methodological turn represents an improvement from earlier Knowledge, Attitudes, and Practices (KAP) surveys that were more limited in the type and scope of information collected.

For example, in Bangladesh and Pakistan, an indrawn chest was seen as a health concern, but rapid breathing was not. In contrast, in Indonesia, the opposite occurred, with rapid breathing viewed as a cause for alarm, but not an indrawn chest. In other places like India and the Philippines, neither sign was regarded as a health concern (Nichter 1994). The focused ethnographic study

(FES) was developed at WHO in order to understand people's cultural explanatory models of ARIs in young children and to model health care-seeking behavior (WHO 1993). Study results of the FES methodology illustrate the merits of this ethnographic approach to studying childhood diseases, and the value of social/cultural factors for the functioning of successful health care program interventions (Pelto and Pelto 1996).

The FES method relies on the triangulation of qualitative methods and small sample quantitative techniques. The focus of FES is to answer National ARI Control Program questions that include the following: "Do mothers recognize fast breathing and chest indrawing? If so, what terms do they use to describe it? What are the sequence and timing of care-seeking for a child with ARI? How do they vary with the perceived severity of illness and age of a child?" (Gove and Pelto 1994:411). The ethnographer employs collection of illness episodes, free-listing exercises, viewing of illness episode videos, and structured sorting tasks. The basic ethnographic methods used for this type of study are described in two texts by Susan Weller and Russ Bernard (Bernard 1994; Weller 1998). The varied sorts of data collected through the different techniques allows for cross-comparisons of information concerning illness behavior and terminology.

For an infectious disease like ARI, Nichter (1994) makes the case for why medical anthropological methods are necessary to tell the whole story. Before the FES protocol, most of the emphasis on studying ARI related to identifying symptoms, classifying illness, and determining causes. However, other factors need to be understood and explained, such as access to resources and health

care, treatment expectations, understandings of prognosis, cultural variation in illness determination, and policy implications of findings. In both epidemiology and anthropology, budget concerns limit the success of policy interventions proposed by the research findings. In the final analysis, what distinguishes medical anthropology from epidemiology regarding people's health behavior is its ability to model decision making processes in a particular cultural context.

Future improvements to decrease morbidity and mortality from childhood ARIs require a worldwide commitment and inter-institutional collaboration. Agencies and institutions such as the World Health Organization, the International Union against Tuberculosis and Lung Disease, UNICEF, research institutions and universities, national government agencies involved in foreign aid, and professional lung health associations must collaborate to improve health care in developing countries to address the problem of ARI (Miller 1999). For example, the Integrated Management of Childhood Illness (IMCI) (developed by WHO and UNICEF) works on improving case management skills of CHWs, strengthening national health systems for effective management, and improving family and community practice in the detection of signs and symptoms of ARIs (Kalter, et al. 2003; Nicoll 2000). This initiative is a switch from vertical child health programs of the past towards an integrated approach to the management of childhood illness. WHO is advocating IMCI and seeking additional partner agencies to advance this strategy (Miller 1999).

The WHO Programme for the Control of Acute Respiratory Infections has recognized that ethnographic findings related to respiratory illnesses are relevant

both in terms of prevention and treatment of ARIs. Through the development of the “focused ethnographic study,” data were collected concerning cultural practices towards care-seeking behavior. Since one of the tasks of cultural understandings of treatments for ARIs involves asking people how they use antibiotics or other over-the-counter medicines, it is the hope that through proper education on the use of such medicines, further resistant strains of bacteria can be avoided, and education materials developed will be practically relevant and locally specific towards ARI prevention and control.

Capacity building and health sector reform are two processes currently being made by governments of many developing countries in order to strengthen their health care systems, provide better curative and preventive services, and offering more comprehensive and accurate health surveillance systems (The_Wellcome_Trust 2001). Reducing indoor air pollution through the introduction of cleaner indoor energy sources is one area where government interventions may be targeted.

While the last twenty years has seen remarkable achievements in the control of ARIs, including better surveillance, new vaccines, and refinement of case management guidelines, there are still gaps in collaborative research and the mobilization of resources that need to be realized in order to effect significant changes in ARI morbidity and mortality in the developing world (Miller 1999). Moreover, there are both methodological and quality issues in epidemiological studies of ARIs in developing countries that need attention in order to improve

future research and allow meta-analysis in order to more accurately predict the global burden of the disease (Lanata, et al. 2004).

This review has highlighted the interstices between malnutrition, poverty, and the transmission of ARIs. The key factors implicated are crowding, malnutrition, environmental degradation, poor housing conditions, and lack of access to health care and maternal education. Primary avenues for intervention include micronutrient supplementation, increased childhood vaccination, improving sanitation and water purification systems, better education of CHWs, widening health care access, and improving caregivers' ability to recognize signs and symptoms of ARIs. While rapid and reliable identification of ARI etiology is still elusive, controlled field trials have demonstrated that the combination of maternal education and proper case management for CHWs has had a significant impact upon ARI-related mortality among under-fives. Epidemiological studies have contributed to the identification of successful intervention strategies for addressing this worldwide problem.

Conclusion

This review of the literature began with medical anthropology theory and narrowed the discussion to Andean ethnomedicine in a context of medical pluralism. Next, the argument was made for the addition of an initial ethnographic component to epidemiological investigations. Finally, the epidemiology of ARI was elaborated upon and examples of the use of ethnographic methods for the study of the disease were emphasized.

From this discussion, there are three main points concerning ARIs in the developing world that call our attention. First, childhood ARI is a preventable disease that requires a worldwide commitment of resources and people to make a difference. Strong immunization programs providing affordable vaccines will play a major role in the future to reduce the disease burden, especially by improving vaccination coverage of the pneumococcal conjugate and Hib vaccine. Second, one of major challenges for treatment will be growing antibiotic resistance to different strains of bacterial infections because of improper case management of respiratory illnesses generally. Improved case management through proper training of medical staff and CHWs is another key component of ARI programs. Second, malnutrition has been identified as a major risk factor for the disease; however, vitamin A supplementation has not proven effective as it has for other childhood diseases such as measles, although the use of micronutrient supplementation has shown promise. There is no “magic pill” that cures severe infection, thus making the case for early detection and treatment as crucial strategies for intervention. Third, the ethnographic literature has shown that training peer educators or CHWs to teach caregivers to recognize the signs of ARI has met with success, strengthening the case for addressing the problem of childhood mortality from ARIs with low-cost educational strategies. Ethnographic research has also determined that barriers to health care-seeking need to be measured and understood in order to measure overall risk. While epidemiological methods allow the researcher to gauge independent risk

exposures, it misses the ethnographic component of cultural and political context and ethnomedical categories of illness.

CHAPTER FIVE: METHODS

This dissertation project collects qualitative and quantitative data by three main methods: focus group sessions; in-depth interviews with female caregivers and informants from the health care setting; and a semi-structured questionnaire. The methodology borrows from the focused ethnographic study (FES), but does not follow the FES protocol precisely, which is a rapid survey technique. Further explanation of the methods used is the focus of this chapter.

CEBYCAM-CES served as the base for the initial research. The researcher presented a letter of introduction to Padre Jaime Alvarez, the director of CEBYCAM-CES, who approved the study. This formal relationship had been made possible as a result of the work of Dr. Linda Whiteford and Dr. Graham Tobin on the USF CDMHA Grant (Whiteford and Tobin 2002). A copy of the letter was also submitted to Mayor Juan Salazar in Penipe town hall. Sandra Moreno, a CEBYCAM-CES staff member, is in charge of the adoption of families from a distance program. This program is funded by Italian donors. The program provides assistance to over 500 children. Part of the requirement for a family to receive aid from this program (about \$28 every two months for one child) is to attend monthly meetings. The families receiving aid are divided into 10 separate groups of 20 to 30 people. At these meetings, the pediatrician from

CEBYCAM-CES would give talks about first aid, family planning, and other health topics. Each meeting lasted two hours, with the first hour spent on the catechism led by a nun from the convent. All of the meetings took place in a classroom on a separate piece of property from the CEBYCAM-CES headquarters on the opposite side of the main plaza. The people attending these meetings were from various socioeconomic backgrounds, but most were on the lower-end of the scale and worked as farmers. At the end of the two hour meeting, the researcher would ask the women who had children under five to stay for a focus group discussion, which typically lasted between a half hour and an hour.

For the first two months, the researcher rented a room from a family near the bus terminal in Riobamba; however, this arrangement became untenable, and the researcher moved to a one-bedroom apartment in the center of town. This new arrangement worked out better because of proximity to restaurants, internet cafes, and a gymnasium. Moreover, the researcher found part-time work teaching English to professionals in the evenings for five weeks in the same building where he was living as a diversion from the daily routine. By working for a local professional, the researcher was invited to social events such as soccer matches which provided a window into the local culture. He used this same approach in Penipe, where he attended local league soccer matches on Sundays. There was a very active local soccer league in Penipe County with around 32 teams.

The researcher traveled via bus to Penipe in the morning, worked all day conducting interviews and questionnaires, and returned late in the afternoon,

making valuable contacts and conducting informal interviews during the daily morning commute of 45 minutes with teachers and healthcare workers. These conversations produced field notes that enriched the overall picture of working professional's opinions of the people of Penipe.

Focus Groups

Focus

Through the focus group discussions, local ARI terminology was collected through techniques of "free listing" (Weller and Romney 1988). For this task, respondents were asked to list the terms they used for coughs and colds as well as all of the home treatments they used. Other topics included: what was their opinion of these home treatments; how long did mothers delay treatment before seeing a doctor or lay health practitioner; what sort of prescriptions had they used; what were the most severe childhood illnesses; had they had heard of pneumonia or the symptoms of severe respiratory distress such as rapid breathing; did they think that they had all the information they needed to treat their children; and whose task was it to provide them with this information. By collecting all of this information, the researcher was able to gather local terminology, identify new research questions, refine research hypotheses, and further develop the structured questionnaire. The sessions were tape-recorded and field notes were taken. The tapes were later transcribed.

Selection Criteria

There were a total of six focus groups conducted with female caregivers about barriers to seeking a doctor, home treatments for common childhood illnesses, and local illness terms. There was an average of ten participants in the groups. For five of the groups, from CEBYCAM-CES, female participants were asked to stay after the meeting if they were in care of a child under five years old. Each of the five groups had different participants because each of the ten adopted families groups had a name assigned by CEBYCAM-CES. The five groups chosen for the focus groups were a convenience sample of the ten groups already established by CEBYCAM-CES. Initially, the researcher attended two adopted families group meetings by lecturing on first aid and family planning when the doctor was absent, without carrying out the focus group afterwards. After five focus groups, the focus groups were not producing any new information, so the remaining five adopted families groups were not interviewed. In one of these meetings, Sandra Moreno assisted with the tape recorder, but the researcher conducted the other four focus groups alone. Comparison of the groups did not reveal significant differences, despite the presence of this authority figure in one of the focus groups.

The sixth and final focus group was held with a women's group in *Subcentro de Salud* (SCS) Penipe (Health Subcenter), which held monthly meetings to discuss various issues. The researcher hypothesized that this group might produce different data than the previous five focus groups. However, the discussions and responses to the focus group questions paralleled the other

focus groups, even though the participants were not affiliated with CEBYCAM-CES. This particular focus group was conducted after their regular meeting and informed consent was obtained. By chance, all the women in this focus group were mothers or grandmothers, so the focus group composition was different than the others because not all participants were female caregivers of children under five years old; however, all were able to respond to the focus group questions related to children's health care.

Participant-observation and Mother Informants

Focus

Concurrent with the focus group meetings, the researcher spent time taking field notes in the CEBYCAM-CES Health Clinic, as well as SCS Penipe. The researcher observed how long people were waiting for attention, how many people were in the waiting room, what were the characteristics of the waiting room and surrounding area, what information was posted on the walls, what procedures were followed between check-in and departure, and what was the general atmosphere. In CEBYCAM-CES, the health staff assisted in recruiting mother informants to check the information collected from the focus groups. Eight in-depth interviews were conducted with individual mother caregivers on the same themes as the focus group discussions, while in CEBYCAM-CES. Mother informants were asked to list the terms they used to describe respiratory problems, what home remedies they used, how long they waited to seek care, how much the care cost, and what were the most common childhood illnesses.

Participants were also asked why on that particular day they had come to the clinic and were asked to describe their child's symptoms.

Selection Criteria

Because this part of the research was conducted in the beginning of the field study, all informants were selected in CEBYCAM-CES where the researcher had the most rapport with the health clinic staff. Only mothers accompanied by their children under five years old were asked to participate in the interview. The mother informants were predominately selected by the clinic staff while the mothers were waiting in the waiting room to participate in the study. The interviews were brief, typically taking around ten minutes, while the mother would be waiting to see the nurse or doctor in the waiting room. Informed consent was obtained.

In-depth Interviews from Health Care Setting

Focus

In addition to focus groups and in-depth interviews with mother caregivers, the researcher interviewed informants in the health care setting. These in-depth informant interviews with members of the health professions allowed the researcher to gauge the most pressing health problems and resource needs in Penipe County. These individuals included doctors, nurses, nurse aides, pharmacists and other health sector employees, including traditional healers. They were asked to describe their educational preparation for their job, their job

responsibilities, what skills or training they needed to perform their job better, what were the most pressing health needs and problems of the community, and what resources were lacking in the healthcare facilities. The semi-structured interview also included the following questions (when interviewing a doctor or a nurse): 1) who provides care to children with ARI; 2) who is in charge of prescribing antibiotics; 3) do the health providers identify a delay in mothers seeking care for their children with ARI; 4) do the health practitioners use local terminology when dealing with mothers who bring their children in for care; 5) what do local healthcare practitioners perceive to be the mothers' knowledge regarding the signs and symptoms of ARI; 6) what were the regular clinic hours and how many people worked there; 7) what were the costs to the patients; and 8) were there too many, or too few patients.

For all of the interviews and focus groups, both written and computer versions of field notes were maintained. Usually, more information would later be added in the computer version of the field notes. This stage of the research was conducted from June until July of 2004.

Selection Criteria

The informants from the health care setting were selected based on the personnel that were available to be interviewed. All health staff agreed to be interviewed. There were two cases where interns in SCS Penipe were not interviewed because of their limited familiarity with the study site. Because the interview was semi-structured, new follow-up questions and discussions were

also common. A total of 25 different people in the health care setting were interviewed in four different areas of the county. Two of these were curanderos, or lay natural health practitioners. In addition, two people were interviewed who worked for the Municipality of Penipe; one, an agronomist in charge of a joint development plan with CEBYCAM-CES, and the other, an engineer knowledgeable of the town's potable water system.

Semi-structured Questionnaire

Sampling Issues

The questionnaire phase of the research began with a mapping exercise. With the assistance of a map provided by the town hall planning department, all 147 households in the town of Penipe and the nearby hamlet of Penicucho Bajo were identified. All residences were surveyed and the 31 households where children under five years old were living with female caregivers were identified. The initial plan was to take a random sample of these 147 households for the survey. Unfortunately, because of the low number of households that satisfied these criteria, all 31 households had to be interviewed. The same procedure was conducted in the two other areas surveyed (Puela and Matus), locating 30 households in each area which satisfied the inclusion criteria, for a total of 91 interviews. In each of the two areas, the inhabited households were surveyed fully for eligibility in the survey. All households in the other two areas were surveyed near the hamlets of Palictahua, Puela, El Altar, Pachanillay, Matus, and Calshy. Maps were created for each community, noting the number of the

household where the questionnaire was administered, because the twenty-four-hour dietary recall section of the questionnaire required a return to the household after eight days in order to perform a second dietary recall. While the sample is a convenience sample and not randomly selected, the sample does offer a large cross-section of households and exhausts the number of target households for the areas represented in the sample. Given the financial and time constraints of the project, there was no other feasible alternative than the sampling method ultimately chosen to carry out the research.

The twenty-four-hour recall was used primarily because of its ease of use and its incorporation into the semi-structured questionnaire. The other option was to conduct a food frequency questionnaire which would require the researcher to compile a list of all the types of foods consumed as well as a list of traditional dishes for respondents to keep track of their children's diets with a food diary. This approach was unfeasible because of lack of financial incentives and the fact that many caregivers in the study were illiterate. Because of time constraints, the twenty-four-hour recall was the preferred method to characterize the habitual food intake of children through the collection of two twenty-four-hour recalls. The disadvantages of the twenty-four-hour recall are that it depends on the respondent's memory of foods consumed and ability to remember accurately the sizes of food portions, and it may collect inaccurate information relating to the ingredients and cooking methods used to prepare the foods (Gibson 1993).

Focus

With all of this information from the previously-described research techniques, an in-depth semi-structured questionnaire was finalized to administer in three different areas. The questionnaires and interviews employed a vocabulary appropriate to the study site. The language of the semi-structured survey instrument was slightly modified with the assistance of one of the doctors from CEBYCAM-CES to ensure that subjects would understand the terminology, and the questionnaire was pilot tested with one key informant from the focus groups to ensure comprehensibility and validity of responses. For example, on the questionnaire, the Spanish word for “clinic” was changed to “doctor”, because in Ecuador, health clinics are private and expensive, and the intent of the question was to ask the mother respondent under what circumstances she would seek a doctor. In addition, questions on home treatments were supplemented with knowledge gained from the focus group discussions. These discussions aided the researcher to use local idioms and expressions in the wording of the questionnaire. Because of time and financial constraints, a more thorough pilot study was not possible before the administration of the questionnaires.

The semi-structured questionnaire was administered in Penipe County with female caregivers to obtain more data on health care-seeking behavior and childhood respiratory problems. The administration of the questionnaires was completed in two months from August to October, 2004. The questionnaire is a detailed health record of respiratory illness in the youngest child, the female caregivers’ use of healthcare facilities, a detailed twenty-four-hour dietary recall

of the child, and an inventory of medications used in the home. There are also questions about socioeconomic status, employment, education, ethnomedical terms, and symptom recognition for respiratory illnesses. The questionnaire produced 81 categorical and continuous variables, answers to 11 open-ended questions, and a twenty-four-hour dietary record.

Selection Criteria

The original inclusion criteria for the questionnaire stated that the female caregiver be the primary caregiver of a child under five, had lived in the community for at least 3 years, had the mental capacity to answer questions for the 45 minute questionnaire, and was a Spanish speaker.² In the town of Penipe, 31 female caregivers satisfied the inclusion criteria. Two female caregivers did not satisfy the inclusion criteria.³ The goal was to match the number of interviews in Penipe to two other areas of Penipe County. Of the two other areas, one area was located in the designated “Area of Risk” for the Tungurahua Volcano, and an adjacent area was not, even though this region also was exposed to volcanic ash. The second area spanned from the Parish of Puela to Ganzhi (in El Altar Parish), including the communities of Pungal, Palictahua, and Pachanillay. Exactly 30 female caregivers matched the inclusion criteria in this second area: one female caregiver chose not to participate in the

² The early assumption that there were Quichua speakers living among the study population turned out to be false so this criterion was unnecessary

³ The researcher changed the inclusion criteria with USF IRB to increase the age limit from 44 to 65 because it was not uncommon to find grandmothers or older mothers as the primary caregivers.

study, and one did not satisfy the inclusion criteria. The third area included mainly the Parish of Matus, with a few female caregivers interviewed in nearby Calshy and upper El Altar Parish. Thirty female caregivers met the inclusion criteria in the third area. One female caregiver did not meet the inclusion criteria for living at least three years in the community. Overall, 91 interviews were completed with female caregivers about the health of their youngest child under five in Penipe County.

Upon contacting potential research subjects in their homes, the researcher identified himself, explained the inclusion criteria and that all responses were confidential, and the risks and benefits of the study as outlined in the verbal informed consent agreement (see Appendix A). Participants were compensated with either a baseball cap or an eye shadow compact at the conclusion of the interview. There were no early withdrawals. On the cover sheet of the questionnaire, the subject identification number was recorded (no names were used), as well as the date and the place of the interview. Eight days after the initial interview, the same study participant was contacted to conduct a follow-up twenty-four-hour dietary recall. The same subject identification number was employed on the dietary recall sheet for ease in collation. This second recall was not possible for 16 of 27 interviews in Matus because of the threat of aggressive dogs. Therefore the dietary information for the Matus respondents had lower validity than the other two groups of Penipe and Puela, which combined had 43 out of 47 records with two dietary recalls collected.

At the end of each day, the total number of completed questionnaires was calculated and the map was updated. In addition, the completed questionnaires were checked for accuracy. A calendar served to schedule the second dietary recall visit. According to convention, it was important not to perform the second dietary recall on the same day of the week as the initial questionnaire.

Additional Research

After completing the questionnaires, further ethnographic research was conducted in the two health centers in the town of Penipe. The researcher also carried out newspaper archival research and collected epidemiological data from the Ministry of Health in Riobamba. The information collected from the Ministry of Health included population projections for the counties of Penipe and Guano, as well as general morbidity data from 2002 to 2004. The morbidity data were problematic because for 2002 and 2004 the data covered the months from January to June, but for 2003 the data covered January through August, making meaningful comparison difficult. Moreover, the population estimates were unreliable, thus computing morbidity rates would be problematic. Finally, impromptu interviews with healthcare workers and other persons of interest were sometimes possible during the morning commute to Penipe.

Data Analysis

Qualitative data analysis was iterative and depended on careful interpretation of observational and interview data. Transcriptions from the focus

groups were entered into Microsoft Word and grouped into thematic categories for analysis. Simple frequencies of responses were tabulated for analytic purposes. Similarly, in-depth interviews with healthcare workers and mother informants were transcribed from handwritten field notes into Microsoft Word and analyzed for content. Quantitative data from the semi-structured questionnaires were entered into a Microsoft Access database, and imported into SPSS Release 13.0 software for statistical analysis (SPSS 2005). Logistic regression procedures were conducted with SAS Release 8.2 statistical software (SAS Institute 2001). Dietary information from the twenty-four-hour food recall was entered using First DataBank software Nutritionist Pro Version 1.2.207 (First DataBank 2002). After the data were entered, the dietary information was exported to Microsoft Excel and imported into SPSS for statistical analysis.

For the quantitative data from the semi-structured questionnaire the key index variable created from other variables is referred to as SES score or possession score. There were 9 variables which when combined created a possession index. This created a ten-point (0-9) scale. Those who scored 5 or above ranked high on the SES score and those who scored below 5 were ranked as low on the index. It was not possible to calculate a reliability coefficient because after the questionnaires were completed, neighbors were not asked to identify households of greater economic means to verify the results on the scale; however, these scales are very similar across rural regions in the world (Weller 1998; Weller, et al. 1997). Based on the Weller, et al. (1997) study in Guatemala, the SES items included: salary above \$150 per month, more than

three rooms in the house, a non-dirt floor, wall of blocks or bricks as opposed to wood, land, television, bicycle, and appliance ownership, and ownership of more than three agricultural animals.⁴ One check on the validity of the possession score was to crosstabulate ownership status of land for agriculture with possession score and salary above or below the mean. The results found that of the 10 families that rented land, signifying low socioeconomic status, only one family earned above \$150 per month. Similarly, seven families ranked as low on the possession score index and three ranked high. In contrast, of the 18 families that tilled land that they owned, five ranked low on the possession score index, and 13 families ranked high on the index, suggesting an association between land ownership and high socioeconomic status.

Two demographic continuous variables were recoded into categorical variables for analytical purposes: age of respondent and monthly salary. Four key qualitative variables were coded and converted into categorical variables for analysis: hot and cold cough knowledge, use of curanderos, barriers to seeking a doctor, and attitudes towards healthcare facilities.

The initial stage of data analysis entailed calculating frequencies and descriptive statistics for the quantitative variables. In the next step, crosstabulations were performed between self-reported childhood illness categories and demographic variables to perform chi-square tests of association. The same procedure was carried out to correlate hypothetical treatment seeking strategies for specific childhood illness symptoms with demographic data.

⁴ Weller et al. (1997) used an 8 item scale. Television ownership was added as a possession variable in this study.

Responses were compared between the two groups of questions listing illness symptoms, i.e. treatment choice and level of severity, to determine whether there was a consistency of responses based on the chi-square test. In other words, do respondents who answer that cough, phlegm and nasal secretion is a case for the doctor, also rank the symptom as “serious” to “emergency”? In addition, a score was generated to quantify ARI knowledge based on correct responses to the question on perceived level of severity for the symptoms of rapid breathing and indrawn chest as well as the combination of the two (see Appendix A). An answer was scored as 0 or 1, for incorrect or correct, respectively, for a maximum score of 3. The same procedure was used to generate an overall score for all nine symptom clusters to generate a knowledge score of respiratory illness. After determining where the bivariate statistical associations were located, a binomial logistic regression procedure was used, employing the forward stepwise method, to gauge the predictive effect of demographic and SES independent variables on the dependent variable of treatment choice for each of the nine symptom clusters (Kinnear and Gray 2004:396).

The nutritional data were tested for normality and descriptive statistics were calculated to determine mean, median, range, and standard deviation. These resultant macro- and micronutrient values were compared with RDA nutrition goals according to age group, and nonparametric Kruskal-Wallis tests, similar to one-way (between subjects) ANOVA, were conducted to compare the means of these macro- and micronutrient values between the three age groups to determine if there were significant differences between the means. Next,

Mann-Whitney tests, a nonparametric version of the independent samples *t* test, were carried out to compare the means of the macro- and micronutrient data stratified by gender and income to determine if there were significant differences between the means.

The combination of quantitative and qualitative methods produced a rich body of data that could be analyzed to test the research hypotheses of the study. In addition to the primary data that were collected and analyzed, secondary data from the Chimborazo Ministry of Health was collected and analyzed to calculate outpatient consultation rates for ARIs in under-fives in Penipe County in order to compare with previously collected data by Whiteford and Tobin (2002). The triangulation of methods increased the validity of the findings.

Limitations

This final section delineates some of the limitations of the research methods employed. In five of the focus groups, participants were chosen based on an opportunistic sample of the participants in the health educational sessions held by CEBYCAM-CES. Therefore, the participants who stayed for the focus group discussions may have been biased towards CEBYCAM-CES, since they were receiving monetary support from them for their children. This may have produced bias in responses related to access to health resources. However, the participants in the focus groups understood that the researcher did not work for CEBYCAM-CES, and were very frank in their responses. The presence of a CEBYCAM-CES staff worker in one of the focus groups and of a nurse in the

final focus group at SCS Penipe may have inhibited responses because of the presence of an authority figure. However, upon analysis of the focus group data, the responses of these two groups did not contrast with the other four focus groups.

Another limitation was logistical. Since the researcher did not have an assistant for the focus groups, in order to obtain a quality recording of the participants, he had to circulate the room with the tape recorder. In the first focus group, the tape recorder was placed in the center of the circle of chairs, resulting in a poor quality recording. Therefore, even though written notes were taken during and after the focus group, since a tape recorder was not used, extensive note-taking during the focus group was unfeasible. However, by transcribing the focus group session on the same day, the researcher was able to complement note-taking with the literal translation of the focus groups.

Since the in-depth interviews with the mother informants were frequently short, the amount of information gleaned from these interviews was not as extensive as the focus groups. However, since some of these interviews were conducted in the week before the focus groups, some questions emerged that had not occurred to the researcher in the initial formulation of the focus group questions, and were henceforth incorporated to the list of questions. Another limitation was that all mother informants were from one health clinic. More varied responses may have been collected if the mother informants had been expanded to other health clinics in the county. Finally, because the interviews were

conducted in the public waiting room space, the range of responses may have been limited.

The in-depth interviews proceeded without incident. The primary limitation was the time constraint placed on the healthcare workers to take the time necessary to complete the interview. However, this was not problematic because in general, the healthcare workers were interviewed during slow times or times of their choosing. Because the interviews were conducted in offices or areas away from other people, the healthcare workers were very forthcoming with responses to the researcher's questions.

The specific challenges of the semi-structured questionnaire are presented in Appendix D. More generally, the questionnaire was primarily composed of yes/no responses, so there was the potential drawback that respondents might fall into a rhythm of answering all "yes" or all "no". There was one section of the questionnaire that presented a moderate level of difficulty to respondents, who had probably never answered a questionnaire before. The question was, of the following list of symptoms, which type of provider you would seek first and why. Many answered for example, "first I treat at the home, and if the illness did not improve, I would seek a doctor." This was problematic because the researcher had to choose one answer for each symptom. The second set of questions asked the respondents to rate the severity of the same symptoms on a Likert scale. By comparing the responses to these two sets of questions, the aim was to determine whether for the symptoms the respondents rated as "serious" or "emergency" in the second set of questions, they chose

“doctor” in the first set of questions, and likewise for symptoms rated as “moderate” or “not serious” in the second set, chose “home remedy” or “nothing” in the first set of questions. Responses correlated for these two related sets of questions for the symptom clusters of coughs, fevers, and phlegm but not for the symptom clusters of ARIs, which should have been classified as “serious” to “emergency” and treatment choice of “doctor”. This may be explained by the generalized lack of recognition of the seriousness of ARI symptomology, which is discussed later in the results and analysis chapters. A complete pilot study of the questionnaire may have led to the development of a different format for asking disease severity and help seeking questions. Therefore, a general limitation of the questionnaire format rather than an open-ended interview was the difficulty for respondents to answer according to the pre-determined list of responses as delineated by the researcher.

A related limitation to this question was the choice of illness categories. The researcher was interested in the two primary symptoms of ARI, chest retraction and tachypnoea, or rapid breathing. The list of symptoms should also have included dyspnoea, or labored breathing, anorexia, lethargy and restlessness, in combination with other symptoms, in order to more fully elicit the ethnomedical model (Denno, et al. 1994). In Denno’s study, the question of treatment choice was asked directly after the severity of the symptom was established. In this study, the treatment choice was asked first according to the list of symptoms, and the level of severity second. Whether the order of the questions biased responses to the level of severity is unknown; however,

according to the results of the data analysis, the responses to the first group of questions largely parallel those of the second group.

Another limitation that the researcher had to negotiate was the case where the respondent would answer the question with her husband present. As much as possible, the researcher attempted to limit the input of the husband by maintaining eye contact with the female respondent and emphasizing that there were no right or wrong answers to the questions. If the researcher sensed that the woman might only be answering what her husband had said, the respondent would be asked again if that was what she thought. Although there were only a few cases of husbands influencing the responses, the researcher sought to limit the effect of their presence as much as possible. Usually, in these cases the husband would wander off half way through the questionnaire session, which typically lasted between 30 to 45 minutes. A related issue to spousal relationships was the inability of the questionnaire to capture who was in charge of the household finances. The questionnaire asked for overall household income but did not differentiate the salary of the husband from the wife nor who controlled the money and made financial decisions related to medical care. In one case, a mother did not know how much her husband earned, which suggests that he controlled the money; however, her husband was a well-paid working professional, an agronomist, and he reported his income to the researcher in order to complete the questionnaire.

Finally, relating to sampling issues, the 91 surveys captured approximately 28 percent of the children under five years old in Penipe County. According to

data from the Ministry of Health for Penipe County in 2004, there were 152 children under one year old and 169 children between the ages of one and four, for a total of 321 children. Some of the children from the most rural areas of the county were missed as well as children from the parishes of Bayushig and Candelaria (which were not designated as “areas of risk” from Mount Tungurahua), which combined, accounted for 53 children. These parishes were not one of the three areas selected for the questionnaires because of their distance from the volcano and logistical factors such as regular bus transportation, in the case of Candelaria.

The methods used in the research were a combination of qualitative and quantitative data collection techniques. The information generated from these data collection instruments is complementary and paints a more complete picture than would one method used exclusively. The initial plan was to informally interview more mother informants, but they were yielding the same information as the focus group meetings, and the focus group meetings were more successful in generating lists of terms and vocabulary. The in-depth interviews of the healthcare worker informants was an ongoing project throughout the fieldwork, and many of the respondents were genuinely interested in the research study.

The data generated was both qualitative and quantitative and aided the researcher in interpreting the other research results, such as the epidemiological data from the Ministry of Health. Results from the quantitative (semi-structured questionnaires) and qualitative (in-depth informant interviews and focus group

discussions) methods provide insights into maternal knowledge of home treatment, health care-seeking behavior, and ethnomedical and biomedical models for treating childhood respiratory infections.

CHAPTER SIX: RESULTS

As detailed in the methods chapter, the researcher collected qualitative and quantitative data by three main methods: focus group sessions; in-depth interviews with mothers and informants from the health care setting; and a semi-structured questionnaire administered to 91 female caregivers in Penipe County. Part I is a discussion of the focus group sessions. The six focus groups are organized according to 13 different main discussion topics carried out with mother respondents. The in-depth interviews with female caregivers were carried out concurrent with the focus group discussions and centered around the same themes. Part II summarizes the main themes from the in-depth interviews with the informants from the health care setting, who were comprised of doctors, nurses, and other healthcare professionals. Some of the major themes that emerged relate to primary health needs, people's opinions of health service, and health service utilization. Part III is a discussion of the epidemiological information gathered from the Chimborazo Ministry of Health related to outpatient consultation rates for ARI, pneumonia, and malnutrition. In Part IV, the descriptive statistics from the semi-structured questionnaire are presented in tabular form with the accompanying explanations. In addition, the results of the dietary analysis are presented in this section. Finally, in Part V, the qualitative

data from the semi-structured questionnaire is presented, which consisted of use and attitudes towards healthcare facilities, barriers to care, ethnomedical knowledge of coughs, use of curanderos, and herbal remedies.

PART I – FOCUS GROUP DISCUSSIONS

The six focus group discussions carried out with mothers of children under five were broken down into 13 different thematic categories. The focus groups were all transcribed and responses were grouped in relation to these thematic categories. Particular themes emerged from the analysis of the focus group discussions, and the results are presented in this section. The focus groups lasted from 30 to 45 minutes depending on the number of people in the groups.

The first category dealt with childhood diseases. Childhood diseases were described as respiratory problems, health problems from the volcanic ash, stomach problems, and other health problems. Volcanic ash, coughs, and colds were all mentioned once at each focus group as major health problems for children. Diarrhea was listed as a major health problem in three out of the six focus groups. Intestinal infections, phlegm, eye and skin problems, varicella, fever and cold weather were each mentioned in two of the six focus groups. Other health problems mentioned once were allergic rhinitis, asthma, lack of hygiene, respiratory problems, unsafe water, and general stomach disorders. Complaints about health problems caused by the volcano ran the gamut. The health effects described were respiratory, skin, and eye problems. Other issues concerned water and food contamination from the ash. One mother commented, “lo que necesita para que formar los niños, una ceniza bien finita, problema del agua también, cosas del comer, se enferman los niños” [what you need for children to grow, the very fine ash, problems with the water, food, the children get

sick]. Finally, focus group participants complained of their children's stomach problems which included parasitosis, diarrhea, and other intestinal infections. Other health concerns included lack of vitamins, poor hygiene, and protection against chicken pox (*varicella zoster*).

The second discussion topic focused on household remedies. For common colds and coughs, lemonades and teas with various herbs were used. Most frequently mentioned were the herbal remedies, *poleo* and *borraja*, which were used to cure coughs.⁵ Also frequently mentioned were chamomile, garlic and lemon as remedies. Clearly, the section on the semi-structured questionnaire dealing with home treatments yielded more valuable information for this category.

The third topic asked focus group members to talk about hot coughs versus cold coughs. Respondents were asked if they knew the difference between the two types, and what remedies were used to treat these illnesses. More information on this topic was generated in the semi-structured questionnaires. A general belief regarding the difference between the two types of coughs is illustrated by the following quote:

“Tos fría, cuando tiempo es muy frío, tos caliente cuando hay mucho calor por los soles” [Cold cough, when the climate is cold, hot cough when it is very hot because of the sun].

⁵ *Borraja* pertains to the family *Boraginaceae* and is of European and North African origin. It has attractive blue flowers with a white center and is cultivated widely. It is used as a sudorific and to calm the chest. It is also reported to help the liver when eaten in a salad. The herb *poleo* was not able to be identified.

One person said that for a hot cough, herbal remedies such as *borraja* and *poleo* were to be used, and for a cold cough one should breathe the vapor of eucalyptus leaves. Another woman commented:

“Tos caliente, ya ha salido al frío, tos fría, no se ha abrigado, sin chompa, poner mentol en pecho y espalda con un periódico caliente” [For a hot cough, the cold has gone out, for a cold cough, you have not covered yourself up with a jacket, so put menthol on your chest and back with a hot newspaper].

On the fourth topic, the researcher asked people to discuss what signs or symptoms they recognized in their children where they would seek a doctor’s help. Six caregivers in five of the six groups agreed that one would wait for two days and treat a cough or cold with home remedies. Then, if the illness did not resolve, they would take the child to see the doctor. One person said it was difficult to cure a child of cough and fever with home remedies. Another remarked that if the fever did not subside, they would take the child to see the doctor the next day. One mother commented, “está con bronquitis, dice, el doctor conoce dando las medicinas” [(the child) has bronchitis, the doctor knows to give medicines].

The fifth topic addressed the terms the doctors used to describe illnesses and whether they used the same terminology as the mothers. One person commented that the doctors know about hot coughs, and children have more

rapid recoveries after visiting the health clinic. Three people said that they agreed that the doctors used the same terminology, although one person complained that a doctor advised against using a particular herbal remedy that was apparently good for coughs. Both the nurses in CEBYCAM and in SCS Penipe have worked for many years in Penipe, so they use the same language as the local people to describe illness terms.

The sixth topic asked participants to list the obstacles to seeing a doctor. The most common obstacle to seeking care for their children was lack of money. One person mentioned having to borrow money from a neighbor in a dire situation, suggesting the importance of social support mechanisms in the community. This respondent remarked, “dinero en el campo, no hay una facilidad de dinero diario, cosecha cinco meses adelante, allí tenemos dinero extra” [money in the rural area, it is not easy to have money daily, the harvest is five months away, then we have extra money].

The concern about money was directed at the issue of having to pay for medications. In accord with the results of the semi-structured questionnaires, money was the primary concern related to health care. Another obstacle was limited bus transportation for people who live in rural areas outside of Penipe, but this was only a problem in the evenings. Another obstacle was the limited health clinic hours, so if a child fell ill on Friday, the family would have to wait until Sunday for medical treatment.

The seventh topic asked participants if they had seen a curandero, or natural healer. The researcher used the term curandero, which was the common

term to describe these alternative healers, while some used the term *fregaduras* (bone-setters), who were distinguished from curanderos because they were not as well trained or prepared. A few people said they had never seen a curandero. Another admitted using curanderos, but added that people used curanderos more for problems related to childbirth than for childhood illnesses. A couple of people commented that curanderos cure folk illnesses such as *mal aire* (bad air) and *espanto* (fright). When a curandero cures an individual, it is called a cleansing, and he or she employs eggs, guinea pig and specific herbs such as *Santa Maria* in practice. More information on this topic was gathered in the semi-structured questionnaire and in the in-depth interviews with two curanderos.

The eighth topic for discussion asked participants to comment on whether they felt they had the information they needed to make informed decisions on childhood illnesses and how to act on them. The consensus of the women in the focus groups was that they did not have all the information they needed to diagnose childhood illnesses on their own. They wanted the doctors from CEBYCAM to give talks at the Development Center or in their communities so they could become better educated.

The ninth topic asked participants whose job it was to provide them with this health information. One person suggested that they needed more information about which herbal remedies were efficacious. People thought it was the job of SCS Penipe to give them talks on these topics, but conceded that CEBYCAM had done a good job at providing them with some information. For example, the pediatrician from CEBYCAM had given talks on first aid and family

planning to the adopted families groups. One participant remarked, “personas más preparados que nosotros porque no tenemos la capacidad para saber, capacidades, charlas en la medicina, remedios caceres, a veces hace mal, no se sabe” [people more knowledgeable than us because we do not have the training to know, classes, talks in medicine, home remedies, sometimes do harm, there is no way to know].

The tenth topic addressed vaccination coverage. People reported that their children were vaccinated, although some reported that there was no vaccine available against varicella. The eleventh topic asked participants to list their knowledge of pneumonia. Most of the women recognized the term “pneumonia” but did not know what it was. More commonly used was the term *pulmonía*, or sickness of the lungs. The women did not recognize an indrawn chest or rapid breathing as symptoms of respiratory infections. One person commented that in the case of pneumonia, you would have to bring your child to the hospital or risk death. Another person said their child had pneumonia, and the doctor said to keep the child inside and covered up, whereupon the child was supposedly cured with cough syrups.

The twelfth topic asked respondents about prescription medicines, especially antibiotics. Sometimes the women would only buy half of the prescription if they did not have enough money. People most frequently mentioned Tempra, which was given for free by the government health clinics to treat fevers. This was confirmed by the semi-structured questionnaire section on household medicine inventory.

Finally, focus group participants were asked to make suggestions to improve the current situation. People mentioned that they needed to earn more money for basic food items such as rice and pasta. Moreover, one person suggested that they needed more collaboration with the people from the neighboring province of Tungurahua, who had suffered similar economic losses because of the destructive effects of the volcano on agriculture and animal husbandry. One person suggested one area she saw needing improvement, “alimentación, en el campo, alimentos básicos, desnutrición en los niños” [nourishment, in the rural areas, basic foods, undernutrition in the children].

Table 4: Summary of Focus Group Discussions

Thematic Category of Focus Group	Most Frequent Responses
Most Common Childhood Health Problems	volcanic ash, coughs, colds, diarrhea
Home Treatments	poleo, borraja, lemon juice
Time to Wait before Seeking a Doctor	treat at home for 2 days, then seek doctor
Doctors and Nurses Use Language you Understand	use same language we understand
Major Obstacles to Seeking a Doctor	lack of money and restricted bus hours
Health Information	we lack information on treating children
Responsibility for Providing Health Information	doctors, SCS Penipe, and CEBYCAM
Awareness of Pneumonia	referred to a <i>pulmonía</i>
Suggestions for Improvements	more money for food, food assistance

These focus group discussions were helpful in the final formulation of the semi-structured questionnaire. Moreover, for the ethnomedical question on hot and cold coughs in the semi-structured questionnaire, the researcher was able to further probe on this question because of the experience with the focus groups. Finally, the focus group discussions provided another perspective that was useful in the analysis of the in-depth interviews with the healthcare staff.

The primary findings of the focus groups were that mothers in Penipe viewed money as the primary obstacle to seeking medical care for their children because they needed money to pay for the bus and for medications. The most common childhood illnesses were listed as coughs and colds, and skin, eye, and throat problems caused by the aggravating effects of the volcanic ash. There was a consensus among the mothers that they lacked the necessary health information to make informed health care decisions when their children suffered from respiratory infections, and they believed that it was the responsibility of CEBYCAM and the government health centers to provide them with this education and training. There was a general lack of knowledge of the signs and symptoms of pneumonia and other severe respiratory infections. Moreover, when mothers perceived that their children were suffering from severe coughs and colds, some would use antibiotics inappropriately by not following the full course of the prescription or using leftover medications. There was a delay in seeking a doctor's attention because mothers would attempt to treat their children at home with herbal remedies, although they would not seek the help of curanderos, because they were not viewed as effective in healing these types of childhood respiratory illnesses. Finally, the mothers believed that the doctors and nurses used terminology that they could understand, a positive finding of the focus groups, since good health communication is one necessary component for a healthy community.

PART II – IN-DEPTH INTERVIEWS IN HEALTH CARE SETTING

In Penipe County there are two government health posts or *subcentros de salud* (SCS), one in Penipe proper (SCS Penipe), and one in the town of Matus (SCS Matus). These health centers are distinguished from the ancillary health outposts in the county because they have at least one permanent staff person (*de planta*), either a physician or nurse, assigned by the Ministry of Health of Chimborazo Province and their facilities are of higher quality. Because Penipe is the major town in Penipe County, the two healthcare facilities in town, CEBYCAM (the only private clinic in the county) and SCS Penipe (the major public health center in the county) were selected for the healthcare staff interviews. SCS Penipe has a permanently assigned doctor, nurse, and nurse's assistant, along with a dentist completing her year of rural service and a permanent dentist's assistant. Moreover, SCS Penipe has the health inspector and another doctor who works once a week. The private health clinic CEBYCAM in the town of Penipe operates with a pediatrician, gynecologist, dentist, laboratory technician, pharmacist, nurse, nurse's assistant, and psychologist. Its facilities are superior to the government's Ministry of Public Health centers, and it is the only health facility with a laboratory for blood, urine and fecal tests. SCS Matus in the town of Matus has a permanently assigned nurse and a doctor completing her year of rural service. There are health outposts or *puestos de salud* (PS) in El Altar, Bilbao, Bayushig, Candelaria, Palictahua, Shamanga, and Nabuzo. Only Palictahua and Bayushig are regularly staffed. Only PS Palictahua, in the tiny

hamlet of Palictahua, has a permanently assigned nurse’s assistant and a doctor completing her year of rural service. PS Bayushig has a nurse’s assistant and a doctor completing her year of rural service who visits intermittently. Because the only other healthcare facilities in Penipe County with a doctor were PS Palictahua and SCS Matus, the researcher also interviewed the health staff at these health posts. By covering all four health centers (CEBYCAM, SCS Penipe, SCS Matus, and PS Palictahua), all health workers in the county were contacted and interviewed. The unstaffed health outposts rely on visits from the doctors or nurses from the public health centers or outposts approximately every two weeks. These health outposts have very limited hours and weak infrastructure. The purpose of these in-depth interviews was to identify barriers to access which could explain delays in health care-seeking for mothers of young children.

Table 5: Summary of Staff for Health Posts in Penipe County

Name of Health Post	Doctors	Nurses	Other Professionals	Other Staff
CEBYCAM	2	2	4	4
SCS Penipe	1	1	3	2
SCS Matus	1	1	0	0
PS Palictahua	1	1	0	0
PS Bayushig	0	1	0	0

In the in-depth interviews with informants from the health care setting there were eight doctors, six nurses and eleven healthcare workers from other fields for a total of 25 people. Of the doctors, two were male, and the other six female (including a dentist and a psychologist). All the nurses were female, although only one was a nurse professional, all the others were classified as

nurse assistants. The eleven healthcare workers were a varied group, and included a physical therapist, two curanderos, a nurse/social worker, a health inspector, a pharmacist, a cashier, a laboratory technician, a program coordinator, and an agronomist. During the time of the fieldwork, all essential healthcare personnel in Penipe County were interviewed, with the exception of one dentist in CEBYCAM, who was not able to be interviewed. The interviews revolved around fourteen major categories of questions. The following discussion summarizes the findings of the three categories of respondents, and conclusions will be drawn from the comparison and summation of their responses.

Training

For the public sector facilities under the Ministry of Public Health, which included SCS Penipe, PS Palictahua, and SCS Matus, the trend was to have doctors who were carrying out their year of rural service, a requirement after they completed their seven years of training before they start their career. The typical salary of these doctors was approximately \$350 per month. In contrast, at CEBYCAM, a private clinic, there was an experienced psychologist, gynecologist, pediatrician, dentist and laboratory technician. Towards the end of the fieldwork session, a permanent doctor had been assigned to SCS Penipe. Most of the nurses interviewed were actually nurse assistants. The one nurse professional in the county spent five years studying nursing and an additional two

years for the master's degree. The nurse assistants generally had a high school education and had received additional technical training.

Access

Two of the doctors in the rural clinics of PS Palictahua and SCS Matus would travel to rural areas every 15 days such as Bilbao, Nabuzo and Candelaria in order to attend patients there. In Bilbao, there was regular medical attention until the Mount Tungurahua eruption of 1999, which has effectively cut off this region from the rest of the county, due to the destruction of bridges. In emergencies, residents of Bilbao travel to Baños for medical attention. The rural doctors reported elderly patients living in the countryside who could not afford medicines, so in these cases the doctors would bend the rules and dispense medicines and care without cost.

Because of the issues of the research related to barriers to care, doctors were asked what they believed to be people's opinions of the health clinics. One of the doctors from SCS Penipe believed that there should be information campaigns to educate people of the services they offer. In the case of one of the rural clinics, the doctor commented that the people are content with the services, but sometimes they do not want to pay. One nurse from SCS Penipe explained the need for a laboratory in order to perform urine and fecal testing, and a vehicle to transport patients in emergencies. The request for an ambulance had been presented to the head of the Ministry of Social Welfare at a public event in town in summer 2004, and a year later, the promise was fulfilled. The nurses at the

rural clinics also commented on the lack of necessary equipment, such as more sterile equipment, stethoscopes, as well as supplies of medications and vitamins. Moreover, the nurses in the rural clinics pointed to staff needs such as an obstetrician, dentist, and a permanent doctor position. According to the doctor, SCS Matus was lacking in certain areas. Some of the primary identified needs included a dentist and equipment for childbirth. In addition, the doctor recommended community education courses on hygiene and boiling water. Finally, the doctor recommended dispensing free medications to the elderly, who were often unable to pay, and this sentiment was echoed by other doctors. Therefore the consensus among healthcare professionals was that the primary barrier to care was education, followed by services and transportation.



Figure 6: Penipe County Ambulance

Primary Health Needs

There was a consensus among doctors and nurses that respiratory problems, parasitosis, and diarrhea were the primary health problems affecting children. Some mentioned poverty as the underlying cause of health problems in the community, leading to undernutrition. The nurses focused on the health risks caused by the volcanic ash, particularly respiratory problems. Another nurse commented that agriculture and cattle-raising had been devastated by the volcanic eruption, thus exacerbating poverty.

The health inspector gave a long list of health problems in the community. He identified the unsafe water as a major problem causing parasitosis in 80 percent of the population. Secondly, he listed the active volcano as a major hazard, causing people to lose their crops and to now be dependent upon raising pigs. He also listed the limited hours of the health clinics, the open dumping of garbage in ravines, and poverty as major health problems in the community.

Delay in Health Care-seeking

Another major focus of the in-depth interviews was to identify what the health professionals believed to be the reason that mothers delayed care-seeking for their children when they became sick with respiratory ailments. One nurse commented that people are accustomed to treating childhood respiratory problems at home by purchasing medications in the pharmacy. If the problems did not resolve at home, mothers would come to the clinic and were given Tempra for fevers or antibiotics like ampicillin.

A very interesting question which elicited different answers from mothers and doctors was whether the mothers delay seeking the doctor's attention for their child's health problems. In one of the rural clinics, the doctor commented that the people did not come down to the clinic readily and were more likely to use curanderos or *fregaduras* (bone-setters). It was the doctor's responsibility to convince the people of the importance of seeking a doctor. Another doctor observed that the mothers would use home remedies, such as herbal teas, for as long as four days before bringing a child to the doctor. In SCS Penipe and one of the rural clinics, the doctors did not perceive a delay in mothers bringing their children to the health centers.

One doctor suggested that the people knew very little about respiratory infections and had become accustomed to the ash since it had been falling for around five years. The doctor added that poor nutrition, which weakened the body's defenses, and the cold climate were contributing factors. Another doctor commented that people would use terms such as "chest whistling" and "green discharge from the nose" to describe the symptoms of ARIs. Another doctor commented that the public was quite sophisticated in the treatment of ARIs, because after the 1999 Mount Tungurahua eruption, volcanic ash was a health threat, and there were numerous health campaigns. Therefore, the people know that they could buy amoxicillin for respiratory problems and cotromixidazol for intestinal problems. However, the doctor said the public did not follow the proper regimen for these prescriptions.

Nurses were asked their opinion of whether mothers delayed in seeking medical attention for their sick children. There was some consensus that the nurses believed the people were more concerned with tending their crops and caring for their animals than with seeking immediate care. Another nurse commented that the largest obstacle was transportation, a sentiment that was not echoed by the people themselves, who listed money as the greatest barrier. Related to the costs of the medications, one nurse commented that at the government clinic, the cost of medicine equaled a small donation, and the patient would only have to pay one dollar. Finally, related to barriers, another nurse commented that the hours of the clinic were restrictive, and the people would seek care more readily if their hours were extended. Another health worker believed the people lacked education and would usually attempt to treat illness at home, but that they do not know if the treatments they used caused more harm than good. One reason cited for this treatment choice was that people felt they could save money on medications by using herbal remedies instead. In sum, the healthcare professionals believed that the people of Penipe County delayed treatment because of lack of education of the seriousness of respiratory infections, preferred to treat these illnesses at home because they thought it would be cheaper, and would use a combination of herbal remedies and prescription medicines that in the end could do more harm than good.

Antibiotic Dispensing

A difficult topic to get accurate information on was the frequency of antibiotic dispensing. At SCS Penipe, amoxicillin and ampicillin were prescribed according to the AIEPI chart the doctor showed me.⁶ For example, first a nebulizer was used to clear out most of the phlegm, and then either amoxicillin or cephalexin would be prescribed for a seven day regimen. At one of the rural clinics, the doctor said amoxicillin was prescribed for fever. At CEBYCAM, they used a nebulizer which delivered a pain reliever, cortisone, and saline solution. They would also prescribe antibiotics. Some doctors commented that if the case was severe, such as pneumonia, the patient would be referred to a hospital in Riobamba.

Nurses were permitted to prescribe antibiotics. One nurse described a particular scenario. She said, “If he comes with a fever, I take vital signs, and then put a cold cloth on his head. I give him medications. We prescribe amoxicillin or give Tempra if he has a lot of cough, lung secretions, or rhinorrhea.” Another nurse answered, “I can give amoxicillin, diclofenar, paracetamol, and ampicillin. I cannot give medicine for arterial pressure, only a doctor can give medicine for attacks.” One nurse explained that ARIs and bronchitis were very frequent in children, and they would frequently give amoxicillin and Tempra, or another antibiotic, cephalexin, for more serious cases. Another nurse observed that the volcano had led to many cases of adenoiditis, but the people had learned to protect their children by keeping them inside,

⁶ AIEPI stands for *Atencion, Integral, Enfermedades, Prevalentes en la Infancia* [Attention, Integral, Sickneses, Prevalent in Infancy] and was developed in conjunction with WHO.

sweeping their homes, and using breathing masks or handkerchiefs to cover their mouths. When asked to describe how they detected ARI in children, one nurse responded that fever, headache, inflamed adenoids, cough, and nasal secretion were the prevalent symptoms.

One health worker mentioned giving penicillin for adults and children, and nebulizations for women and children. Another health worker gave nebulizations with medications such as salbutamol and ventolin to assist breathing. The community health nurse, who was a Penipe resident, worked for the Ecuadorian equivalent of the Department of Children and Families and had her office separate from the health centers in Penipe in one of the old municipal offices, had medications such as penicillin to give to people with respiratory problems, and she said they did not need a prescription if there was no doctor available. The nurse said the mothers were not very timely in bringing their children to seek medical care. She said the mothers would sometimes wait until their children were in a very grave condition before seeking care, and she would refer them to SCS Penipe or the Multiclinic Hospital in Riobamba, sometimes helping with the bus fare. Another health worker was dismayed about how some mothers would leave their young children at home alone while they went to work in the fields. The community health nurse talked about respiratory illness treatments she prescribed such as Berodual (Boehringer Ingelheim) and Flixotide (Glaxo Wellcome), as well as herbs like *salbarea*, *poleo*, peach flowers, violets, and blackberry leaves.⁷

⁷ Berodual is a bronchodilator inhaler used to treat asthma and COPD. Flixotide is a corticosteroid used to treat asthma by reducing swelling and irritation in the wall of air passages

Vaccination Coverage

Finally, the researcher asked doctors about vaccination coverage and medication costs. The vaccines were given in the government health clinics, not CEBYCAM. There is a new vaccination called pentavalente that is being used, but its implementation has encountered some resistance according to Penipe doctors because occasionally there are side effects like a rash. Pentavalente protects against diphtheria, tetanus, hepatitis B, and haemophilus influenzae type b. This vaccine will soon be introduced in the U.S. under the brand name Pentacel, and it has been given in Canada for about a decade. It is given in three doses to children less than one year old. Other vaccinations included bacillus Calmette-Guérin (BCG), against tuberculosis, measles vaccine, triple vaccine DPT (against pertussis, diphtheria, and tetanus), varicella zoster vaccine, and the polio vaccine. As far as costs, at CEBYCAM, the costs of the laboratory and pharmacy are split in half, and the consultation is free. For SCS Penipe, the cost for consultation was fifty cents and the medications that they had, which were not extensive, were dispensed either without cost or for a nominal fee.

Traditional Healers

One elderly curandera interviewed explained that she attended patients on Tuesdays and Thursdays. The curandera explained that she cured patients

in lungs, thereby alleviating respiratory distress. The herbal remedies are discussed in a later section in this chapter.

using *cuy* (guinea pig), cane liquor, tobacco, and herbs such as *Santa Maria* and *marco* to cure patients of *mal humor* and *mal aire* (bad bile and bad air, both folk illnesses). Another curandero explained that he cured children by putting an egg in the glass, examining the egg, cleaning the back of child with perfume, and then blowing on them with cigarettes. The typical day for this curandero was to attend patients on Sunday after the market. The curandera identified two types of coughs: *tos de frío* and *tos de calor* (cold and hot cough). For cold coughs she recommended *poleo* and *borraja*, and for hot coughs, teas of *malva* (an herb used to treat bronchitis), thereby confirming the information from the semi-structured questionnaires.

Costs

Finally on the question of costs, patients would pay fifty cents for a consultation at SCS Penipe; however the major costs were for the medications, especially at CEBYCAM, where there was a pharmacy. The CEBYCAM cashier said the most expensive medications were hormone medications and vitamins, and a routine clinical exam with laboratory tests would cost around twelve dollars. The pharmacist listed regimens of antibiotic medications or other medications that people would purchase for childhood infections. A 30 tablet, 500 mg prescription of amoxicillin would cost \$5.40 compared to a 24 capsule regimen of ampicillin at \$2.88. Another antibiotic was cephalexin at \$3.00 for a 30 tablet regimen of 250 mg each. A penicillin treatment for childhood bronchitis cost \$2.17. A child with an intestinal infection would take trimetoprin, costing

\$3.60 for the 30 pill regimen. The most common cough syrup was Stoptos at \$1.46 for a 60 ml bottle, but there were others in the three to four dollar range. While these costs do not appear high to people in the United States, for people making less than \$150 per month, a prescription costing \$5 to \$10 is a significant slice of their income.

Table 6: Summary of Responses from In-depth Interviews

Thematic Category of In-depth Interview	Most Frequent Responses
Primary Health Needs	respiratory problems, parasites, diarrhea
Suggested Improvements	lab equipment, childbirth facilities, more staff
Public Opinion of Health Service	generally positive
Number of Patients	manageable number of patients
Need for More Training	amenable to idea of further training
Delay in Patient Health Care-seeking	too much emphasis on home treatment
Use of Local Terminology	appropriate use of local terms
Cost of Service	consultation costs fifty cents at health posts, compared to higher costs of medicines

While the opinions of the healthcare workers were varied, some common themes emerged. There was a general consensus that the government clinics needed to expand their staff, build infrastructure, extend their hours, and reach out to the community to better inform them of the medical services offered. Moreover, there was a concern that there was a delay in care-seeking by mothers, who needed to be better educated to recognize the signs of serious illnesses in their children instead of trying to treat at home with herbal remedies because they were cheaper than prescription medicines. Finally, the healthcare workers shared a belief that the public they served generally respected their

professionalism and expertise in offering the services that they were capable of providing.

PART III – EPIDEMIOLOGICAL DATA FROM MINISTRY OF HEALTH

Extensive epidemiological data were collected by the research team under the CDMHA grant (Whiteford and Tobin 2002). One objective of further epidemiological data collection was to collect information from 2002 to 2004 to complement the data collected earlier. However, because of unreliable population data, it was not possible to calculate ARI morbidity rates to compare with earlier years; moreover, the morbidity data collected represented six months for the years 2002 and 2004 and eight months for 2003, thus making comparison across the years difficult. In this study, secondary morbidity data for ARI, pneumonia and malnutrition were collected and analyzed from records at the Chimborazo Ministry of Public Health. The following figures show the number of cases reported in Penipe County by SCS Penipe, CEBYCAM, SCS Matus, and PS Palictahua (No data were provided by CEBYCAM for 2002). There were 63 total pneumonia cases over a three-year period for under-fives; however, there were no cases in 2002. The pneumonia incidence rate for 2003 in the less than one-year-old age group was 649 per 10,000 and for 2004, 216 per 10,000 population. In the one to four-year-old age group, the pneumonia incidence rate for 2003 was 173 per 10,000 and for 2004, 95 per 10,000 population. The highest rate recorded in the prior research by Whiteford and Tobin (2002) was in 1999 where the rate in the less than one-year-old age group was 250 per 10,000 and 53 per 10,000 in the one to four-year-old age group (Whiteford and Tobin 2002). The rates in 2003 appear unusually high; however, the small population

sample size numbers for the age groups cause even small increases in pneumonia consultations to produce comparatively higher rates. The data for cases are presented for two age groups, less than one-year-olds and children between one and four years old.

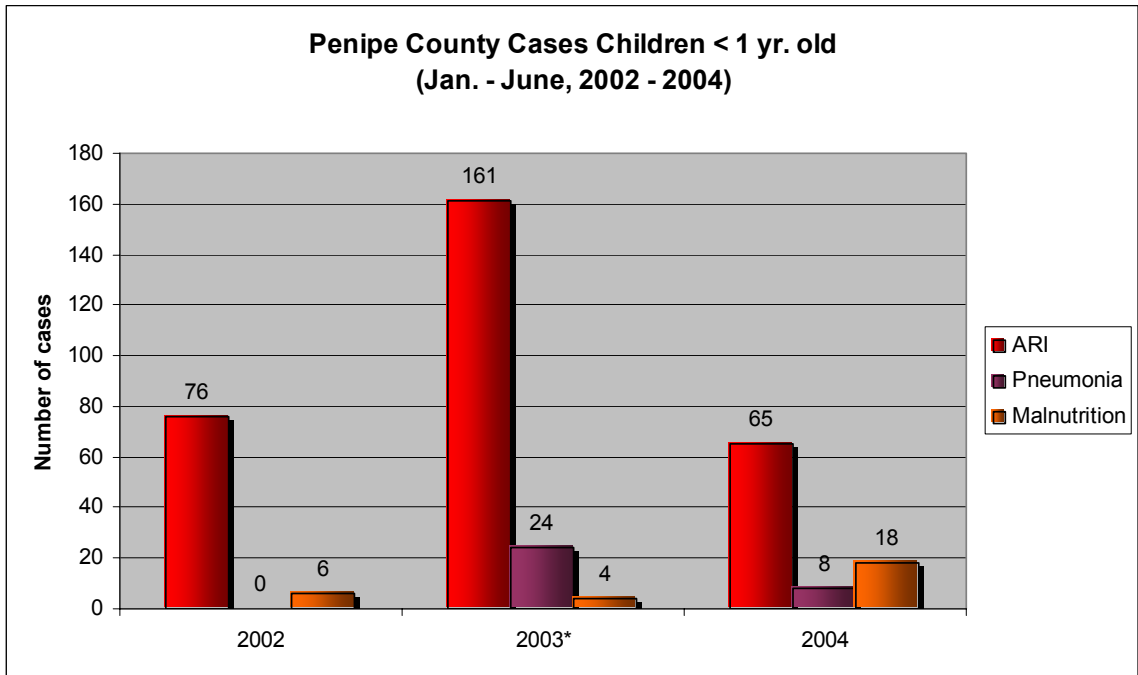


Figure 7: Penipe County Cases, Children < 1 yr. old
 * 2003 covers January thru August, Source: (Ministry of Health Chimborazo 2004)

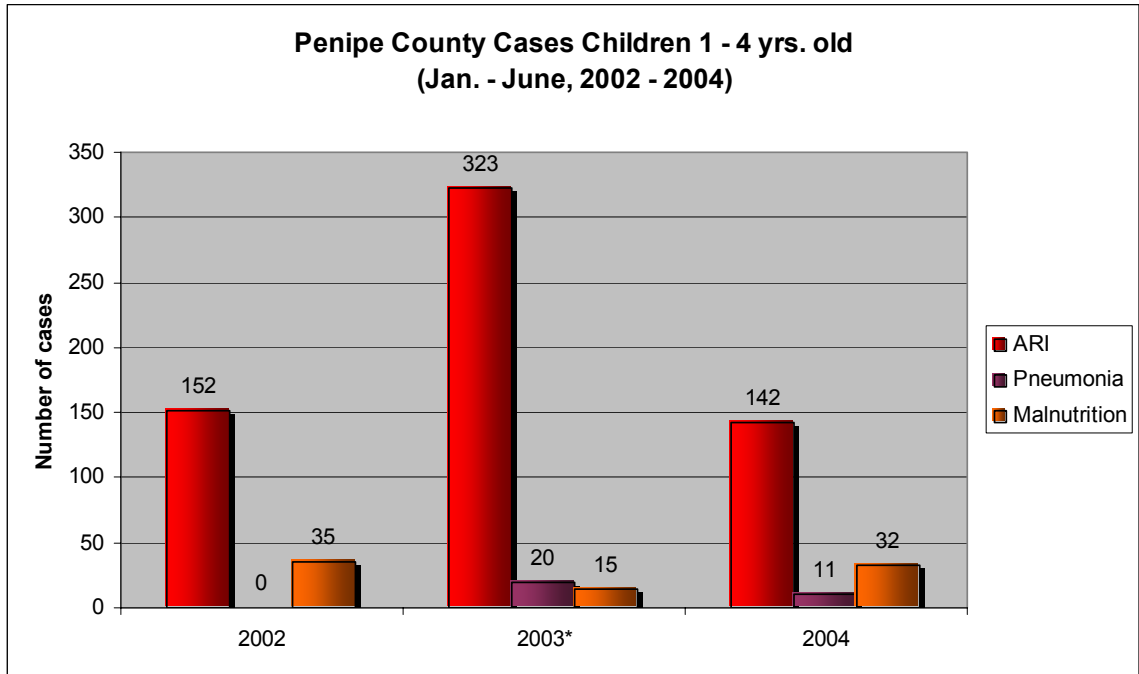


Figure 8: Penipe County Cases, Children 1 – 4 yrs. old
 * 2003 covers January thru August, Source: (Ministry of Health Chimborazo 2004)

Population estimates from the Ministry of Health in Chimborazo for under one-year-olds are 372 (2002), 370 (2003), and 370 (2004). For children between one and four the population estimates for Penipe County are 1152 (2002), 1153 (2003), and 1153 (2004). However, there are another set of figures for 2004 which count 152 children under one year old and 169 for children between one and four. From the researcher’s observations, this latter figure is more accurate, considering the researcher canvassed half of the county asking for households with under-fives and only encountered less than one hundred households satisfying the criteria. The pneumonia incidence rates demonstrate that infants had higher risk for pneumonia than the young child age group. Moreover, using the population overestimates produces some alarming ARI consultation rates. To calculate the rates, the number of cases is divided by the population subgroup

and multiplied by 10,000. For the under one-year-old group the estimated ARI consultation rates are as follows (Figure 9): 2,043 per 10,000 (2002); 4,351 per 10,000 (2003); and 1,757 per 10,000 (2004). Similarly alarming statistics for one to four year olds are presented for the six-month period: 1,319 per 10,000 (2002); 2,801 per 10,000 (2003); and 1,232 per 10,000 (2004). Both the pneumonia and ARI incidence rates for the under one-year-olds are higher than the older age group, suggesting higher vulnerability to respiratory infections among infants in this region.

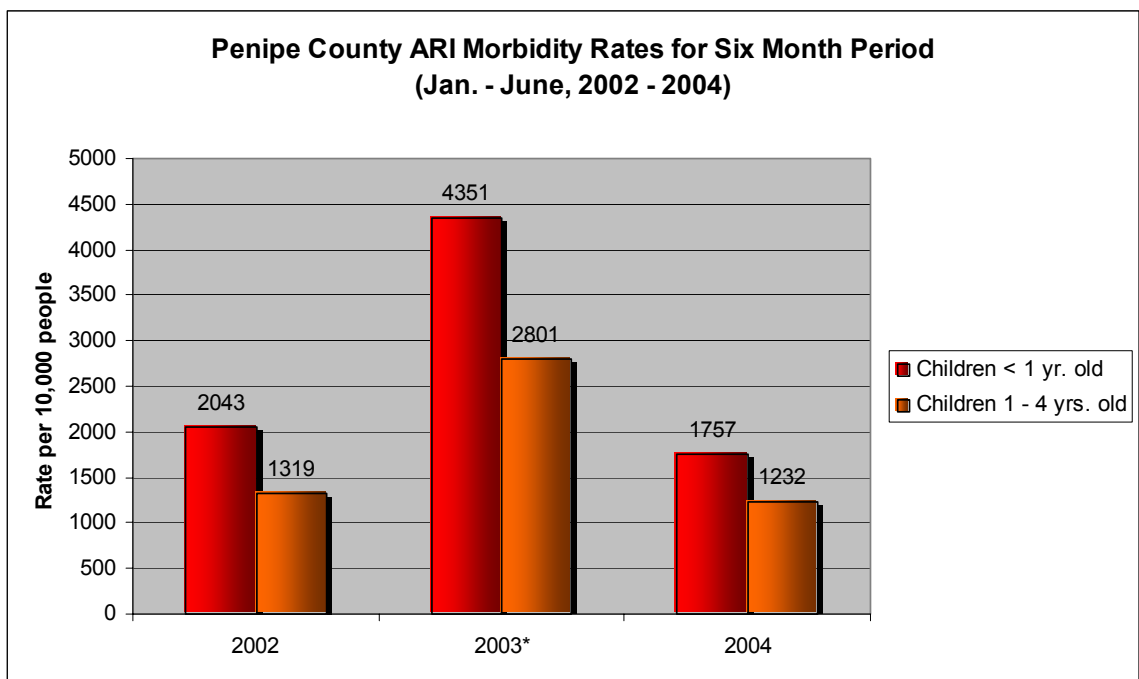


Figure 9: Penipe County ARI Morbidity Rates for Six Month Period
 * 2003 covers January thru August, Source: (Ministry of Health Chimborazo 2004)

The trend of the above graph shows a doubling of ARI morbidity rates from 2002 to 2003, and then lower rates again in 2004. In the prior research by Whiteford and Tobin (2002), outpatient consultation rates for ARI more than

quadrupled in Penipe County in 1999 for under-fives, the year of the volcanic eruption (see Figure 10). There is no evidence that this occurred again in 2003, but this is one possible explanation for the spike in outpatient consultation rates for ARI, before returning to pre-1999 rates in 2004. During the field period in 2004, volcanic activity was relatively low, with occasional emissions of volcanic ash. A separate report carried out by Dr. Jorge Lara of CEBYCAM found that bronchitis and pharyngitis incidence rates among under three-year-olds rose dramatically after the volcanic eruption of Mount Tungurahua in October, 1999 (Lara, et al. 2000a). The rates of common respiratory infections rose from an average of 16 to 18 percent to 42 percent within the year.

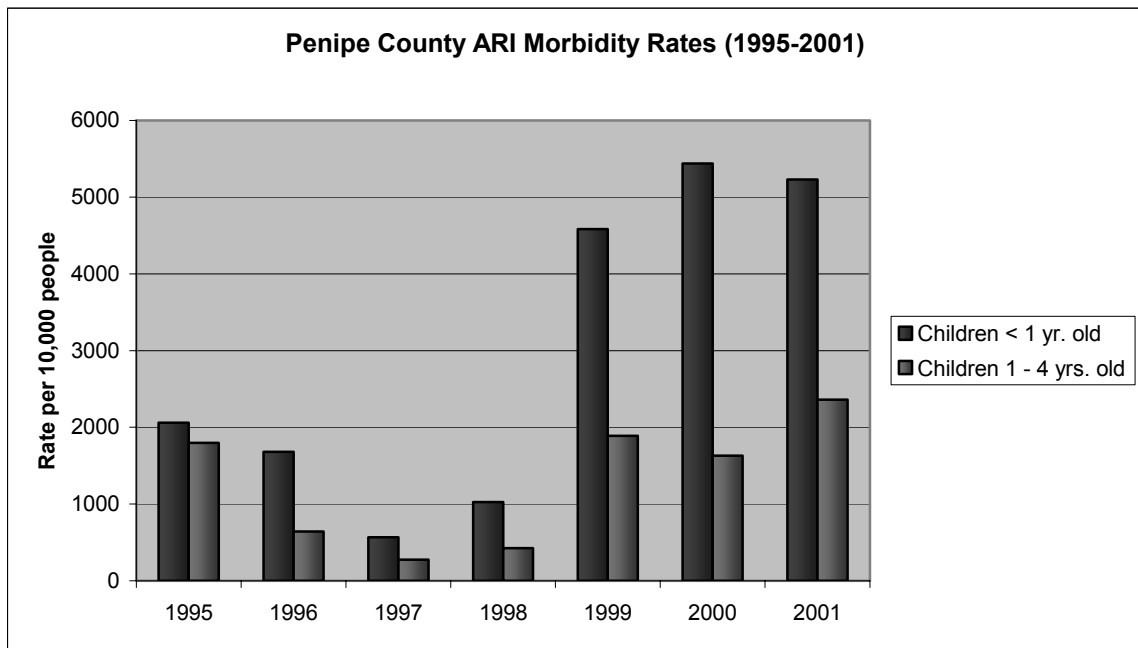


Figure 10: Penipe County ARI Morbidity Rates (1995-2001)
Source: Adapted from Whiteford and Tobin (2002)

The attitude of the nurses in Penipe County was that the people had grown accustomed to the volcanic ash in the air, and consequently, rates of

outpatient consultations for respiratory infections had stabilized. According to the literature, there is no evidence that suggests that people can develop resistance to volcanic ash in the way described by the nurses, and this should be considered a folk belief. Moreover, there was no evidence that the health workers themselves protected themselves against the ash by wearing masks or scarves, suggesting that they may have thought that they themselves had developed a resistance to the volcanic ash. The epidemiological data suggest that respiratory infections will continue to be an acute problem for children in the zone.

PART IV – QUANTITATIVE DATA FROM QUESTIONNAIRE

This section introduces the descriptive statistics results from the semi-structured interview instrument. The information included in this section are frequencies and percentages of the variables discussed. There are 108 quantitative variables, and twelve questions which ask purely qualitative information. The quantitative data discussion is broken down into the following sections: demographics, socioeconomic status, risk factors for ARIs, child's respiratory problems, use of health resources, and diet of youngest child in the last twenty-four hours. The qualitative data discussed include use of local healthcare facilities and resources, attitudes towards healthcare options, knowledge of home remedies, use of curanderos, and folk illnesses.

Demographics

The total number of female respondents was 91. There were three groups of respondents distinguished by geographic area. The first 31 respondents were from the town of Penipe proper. The second 30 respondents were from an area the researcher designated as Puela, but actually included the nearby hamlets of Palictahua, Pungal, and Ganzhi. The final 30 respondents were from an area the researcher designated as Matus, which also included a few respondents from neighboring Calshy and El Altar. The age of respondents ranged from 18 to 57, with an average age of 30. Eighty-four respondents (92.3%) were mothers of the children whose health history was questioned. The others were relatives such as

grandmothers or aunts. Twenty-eight respondents (30.8%) were between the ages of 31 to 44. Six respondents were over 45 years old. Roughly half of respondents (53.8%) were married, the rest were either in a *unión libre* (cohabitating) or single. Only one of the 16 single female-headed households had a monthly salary over \$150 per month and only two out of 16 ranked above average on the possession score index (5 items or above on a scale of 9).

Table 7: Demographics and SES of Female Caregiver Respondents (n=91)

Category	Number
Female caregivers 18 to 30	57 (62.6%)
Female caregivers 31 to 44	28 (30.8%)
Female caregivers 45 or older	6 (6.6%)
Female caregivers (mothers)	84 (92.3%)
Female-headed households	16 (17.6%)
Primary education only	65 (71.4%)
Secondary level education	16 (17.6%)
College education	10 (11.0%)
Primary occupation at home	76 (83.5%)
Work in agriculture	77 (84.6%)
Salary above \$150/month	28 (30.8%)
Mean monthly salary (\$)	\$126.71
Median monthly salary (\$)	\$100.00
Receive outside help	33 (36.3%)
CEBYCAM source of help	28 (30.8%)
SES score above average	53 (58.2%)
Home ownership	41 (45.1%)
Land ownership	39 (42.9%)
Five or more dependents	13 (14.3%)

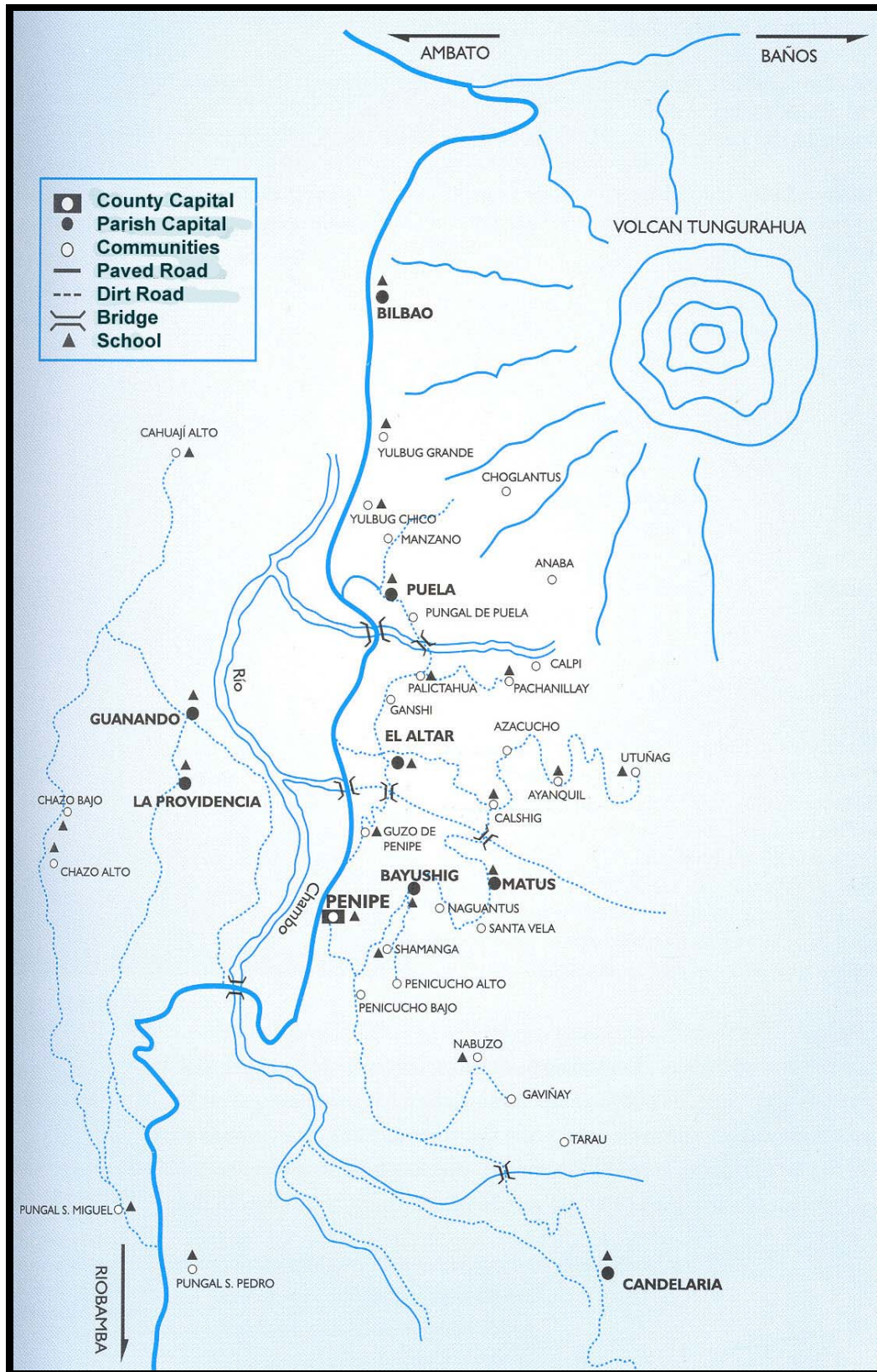


Figure 11: Map of Penipe County Towns

Source: (COSUDE 2003)

The average level of education of respondents was primary school with some secondary, or approximately 8.78 years of schooling. There was a positive correlation between years of education with monthly salary ($r^2 = 0.54$, $p < .001$, two-tailed). Sixty-five respondents (71.4%) only had primary schooling. Seventy-six respondents (83.5%) claimed homemaker as their principal occupation. Seventy-seven respondents (84.6%) also worked in agriculture, at least in some capacity. There was an open-ended question that asked for the primary breadwinner's occupation. Most women responded that their husbands either worked in agriculture or construction jobs, such as bricklaying. Other common occupations for husbands or boyfriends were driving trucks or buses and chainsaw work. Ten respondents (10.9%) answered that their husbands had professional jobs such as teaching or working for the government or a company.

Respondents were required to live in the area for at least three years to participate in the questionnaire. The average time in town for respondents was approximately 10 to 11 years.

Socioeconomic Status

The primary hypothesis of the study involves socioeconomic status (SES). Therefore a number of questions were posed to gauge SES. The first and most obvious question involved household income. The monthly salary of families ranged from \$0 to \$500 a month. The average salary in the sample was \$126.71 per month, with a median salary of \$100. A baseline of \$150 per month was set as the average salary for the area based on population census data for

Chimborazo Province (INEC 2001). Since roughly 85 percent of respondents worked in agriculture in some capacity, the average salary for Penipe County residents would be lower if the few respondents with high salaries from the town of Penipe were removed. The proportion of people working in agriculture in this sample is greater than the proportion of agriculturalists for Chimborazo Province (49%), emphasizing that Penipe has primarily a rural, agriculturally-based economy (INEC 2001).

As mentioned, other forms of income such as agriculture could increase household income. Fifty percent of respondents worked in agriculture seasonally, and forty-seven percent of respondents owned more than three agricultural animals. In addition, many respondents answered that they received outside help. Of the thirty-three respondents who received such help, most received help from CEBYCAM, which consisted of monetary aid (around \$28 every two months for their children's welfare).

A series of questions were asked in order to create a possession or SES score. These questions asked whether the respondent owned any kitchen appliances, a bicycle, a television, more than three agricultural animals, lived in a home with walls of blocks or bricks rather than wood or plastic, had a non-dirt floor, and had a home with more than three rooms. Together with the question on monthly household salary (which was converted into the dichotomous variable above or below mean salary), a SES score was generated which ranged from 0 to 9. Thirty-eight respondents (41.8%) rated low on the SES score (below 5), and fifty-three respondents (58.2%) rated high on the scale (5 or above). The

mean SES score was 4.7 (SD = 1.94; minimum = 1; maximum = 8). The SES score moved ten people who had salaries below \$150 per month into the high end of the SES score, so there were differences between the two measures. It was determined that all of the variables on the SES score receive equal weight, because there were no criteria to determine whether some of the possession items were more important than others. There was a positive correlation between SES score and monthly salary ($r^2 = 0.54$, $p < .001$, two-tailed), indicating that as monthly salary rose, socioeconomic status rose proportionately according to the scale. The validity of the SES score as an accurate measure of the respondent's socioeconomic status was limited because it did not take into account either education or occupational status; however, because of complex issues involved in weighting these variables, a simpler model was adopted for analytical purposes (Weller 1998).

Forty-one respondents (45.1%) owned their home, and thirty-five answered (38.5%) that it was owned by a relative. Respondents had an average of three rooms in their homes. Fifty-two respondents (57.1%) did not own land compared to thirty-nine (42.9%) who did. Respondents were asked to report how many dependents lived in the household. The responses ranged from one to eight dependents, with an average number of three dependents (mean = 3.24 dependents).

Risk Factors for ARIs

A number of questions asked respondents about the environment in which their child or children lived. These questions identified the age and gender of the child, how many people lived in the household and shared the child's bedroom, whether the person who shared smoked cigarettes, if the child shared a bed, what were the methods used for heating and cooking, and whether the family owned household pets. This section continues with the frequencies for each response.

The average age of a child in the study was between 17 and 18 months old. There were more boys (49) than girls (42) in the study. There were questions to determine if crowding was a risk factor for the health of the child. Therefore, respondents were asked about the number of persons in the household and the characteristics of the child's home environment. The average number of people in a household was five, with a minimum of three and maximum of twelve people. Only nine percent of households surveyed had children under five with his or her own room. The average child shared his or her room with two or more people. This number is inflated by the very young children surveyed, who generally shared their bed and room with their parents. Sixty-eight of the children (81.9%) who shared their rooms, also shared their bed with others.⁸

⁸ The female caregivers of children who had his or her own room were not asked the question of whether the person with whom their child shared a room smoked cigarettes or whether the child had his or her own bed and fall into the category "not applicable", hence eight cases are excluded from the percentages for those two questions.

Table 8: ARI Risk Factors for Youngest Child (n=91)

Category	Number
Child less than 6 months old	8 (8.8%)
Child 6 - 17 months old	23 (25.3%)
Child 18 - 29 months old	26 (28.6%)
Child 30 months - 5 years old	34 (37.4%)
Gender of child (male)	49 (53.8%)
Gender of child (female)	42 (46.2%)
Over 5 people in household	31 (34.0%)
Child shared room	83 (91.2%)
Child shared bed	76 (81.9%)
Child shares room with smoker	18 (21.7%)
Smoker in family	36 (39.6%)
Boils drinking water	57 (62.6%)
Pet owners	75 (82.4%)
Pets enter home	41 (54.7%)
Heat home with wood	47 (51.6%)
Cook with wood only	19 (20.9%)
Child sleeps in kitchen	7 (7.7%)
Child vaccinated	90 (98.9%)

There were questions about smoking, which is another risk factor for ARI in children. Of those children who shared a room with another person, twenty-two percent of these children shared their room with a smoker. The other question on smoking asked more generally whether or not there was a smoker in the household. Thirty-six people (39.6%) responded that there was a smoker in the household. When asked how much the person in the household smoked (usually a husband or boyfriend), the answer was generally “only when he goes out and drinks”, or “very rarely.” It was not possible to gauge the smoking frequency of the family member in question, who was always someone other than the respondent.

There were three questions about water usage. The first question asked whether the respondent received water from a well, fresh water source, or a

municipal source. Virtually everyone responded that their water was piped in from a municipal source (three people responded “well”). Next, respondents were asked if they boiled their water to drink and if so, for how many minutes. Fifty-seven respondents (62.6%) answered that they boiled their water, and thirty-four respondents (37.4%) did not. Of the fifty-seven respondents who boiled water, one was the minimum number of minutes that water was boiled, and the maximum was 30 minutes (60 minute outlier removed from analysis). Seven and a half minutes was the average number of minutes that respondents boiled water to drink and cook; however, some people seemed to be aware that ten minutes was the standard.

Pets are another risk factor for respiratory infections because of the dust and dander that they track into the home. Respondents were asked if they had cats and dogs, and whether the pets were allowed to enter the house. Frequently, respondents would answer that the cats could enter, but not the dogs; however, a limitation of the questionnaire is that it did not distinguish which type of pet was allowed to enter. Dogs were more common pets than cats, and many people had more than one dog. The dogs were trained to be hostile to strangers. Sometimes the dogs were tied, but more often, dogs were allowed to roam freely. The majority of respondents owned cats, dogs, or both (82.4%). Of the respondents who had pets, forty-one (54.7%) allowed their pets to enter the home while thirty-seven (45.3%) did not.

Another risk factor for ARI is exposure to cooking smoke in the home (Mishra and Retherford 1997). Therefore, there were two questions about

cooking method and home heating. First, respondents answered how they heated their home. Twenty respondents (22%) responded that they did not heat their home. The rest answered that they primarily heated their home with wood (51.6%) or gas (25.3%). While heating the home may have been a foreign concept to some, everyone understood the cooking question. Many respondents answered that they cooked with both wood and gas (34.1%), but more relied on gas exclusively (45.1%). A smaller proportion depended on cooking with wood only, because they could not afford gas (20.9%). A common feature for households who cooked with wood was to have a separate kitchen area away from the living quarters because of the smoke problem. A related question to these two questions on fuel consumption was whether the child slept in the kitchen, where exposure to smoke is a problem. Seven respondents (7.7%) answered that their child slept in the kitchen, usually because the house was very small. Finally, another risk factor for ARIs is vaccination status. Only one respondent (1.1%) in the sample responded that her child had not been vaccinated.

Child's Respiratory Problems

The bulk of the questionnaire asked about the child's respiratory health history. Most of these questions were in a "yes/no" format, and there were a number of follow-up questions that were contingent upon an affirmative response to the first question. Half of respondents said that their children normally had cough with colds. Twenty-nine (31.9%) respondents answered that their youngest child normally had cough apart from colds.

Table 9: Youngest Child's Respiratory Problems (n=91, unless otherwise noted)

Category	Number
Cough with cold	46 (50.5%)
Cough without cold	29 (31.9%)
Frequent cough (n=52)	19 (36.5%)
Eliminates phlegm	58 (63.7%)
Frequent phlegm (n=55)	24 (43.6%)
Attacks of phlegm	24 (26.4%)
Wheeze	47 (51.6%)
Wheeze with cold (n=48)	37 (77.1%)
Wheeze apart from colds (n=48)	18 (37.5%)
Wheeze days and nights (n=48)	21 (43.8%)
Wheeze attacks cause rapid breathing	9 (9.9%)
Wheeze attacks with exercise	3 (3.3%)
Severe chest illness	28 (30.8%)
Hospitalized for chest illness	18 (19.8%)
Other chest illness before age 2	10 (11.0%)
Measles or Rubeola	3 (3.3%)
Varicella	12 (13.2%)
Sinusitis	1 (1.1%)
Bronchitis	19 (20.9%)
Pneumonia	10 (11.0%)
Adenoiditis	14 (15.4%)
Bronchopneumonia	6 (6.6%)
Asthma	4 (4.4%)
Allergies	11 (12.1%)

If the respondent answered affirmatively to either of these questions on coughs and colds, the respondent was then asked whether her child had a cough more than four times a week for at least three months out of the year. For those who answered this question, nineteen respondents (36.5%) had children with a frequent cough and thirty-three respondents (63.5%) did not. Of those who had a persistent cough, the average child had had a cough for approximately two years.

Fifty-eight children (63.7%) eliminated phlegm or were congested when they had a cold. Of those who eliminated phlegm, twenty-four cases (43.6%) were congested, and eliminated phlegm four times a week for at least three months a year.⁹ Of those who eliminated phlegm, they had done so for an average of one and a half years.

Twenty-four children (26.4%) had attacks of cough, congestion or phlegm that lasted at least a week each year. Of those who had had attacks, the average number of years living with this health problem was around a year and nine months (mean = 1.84 years). In addition, five colds per year was the average number for those who suffered these attacks.

Forty-seven respondents (51.6%) had a child whose chest had wheezed sometime, normally with colds (77.1%). In contrast, wheezing apart from colds was less common (37.5%). For those children who had wheeze symptoms, when asked if they wheezed most days and nights, the answers were split, forty-four percent of respondents answered “yes” and fifty-six percent answered “no”.

⁹ Three cases not applicable because the child was less than a year old and therefore too young for the question to be relevant.

For the respondents who were asked the number of years their child had had wheeze symptoms, the average was around one year and eight months (mean = 1.73 years).

A small percentage of respondents (9.9%) answered that their child had wheeze attacks which had caused rapid breathing. These respondents were asked five follow-up questions. The first asked if the child had had two or more wheeze episodes, and only one respondent answered in the affirmative. The second question asked whether the child took any medicine for the wheeze attacks when they occurred. Seven respondents (77.8%) responded in the affirmative. The third question asked for the age of the child when the wheezing symptoms began. The average age was one and a half years old for the beginning of wheeze symptoms. The fourth question asked whether there was normal breathing between the attacks. Most respondents (55.6%) answered that there was normal breathing. Finally, if there was a doctor's diagnosis, the respondent was asked to describe the results of the consultation. The most common responses to this question were either pneumonia or bronchitis as the doctor's diagnosis. The last question on wheezing asked the respondent if the child had had wheeze attacks while exercising, a sign of asthma. Only three respondents (3.3%) answered in the affirmative.

The next section of the questionnaire asked about chest illnesses. Twenty-eight respondents (30.8%) had a child with a chest illness that lasted three days and had impeded normal activities in the last three years. Within the group of severe chest illness sufferers, eighteen children (64.3%) had more

congestion than normal with these illnesses, and twenty children (71.4%) had between one and seven chest illnesses per year. Moreover, fifteen children (53.6%) suffered chest illnesses that lasted seven days or longer.

Eighteen children (19.8%) in the study were hospitalized between one and three or more times for chest illnesses. Ten respondents (11%) answered that their child had suffered another grave chest illness before reaching two years old. The most common childhood respiratory illnesses were bronchitis (19), followed by adenoiditis (14), chicken pox (12), and pneumonia (10). Bronchopneumonia (6), asthma (4), sinusitis (1), and measles/rubeola (3) were less frequent illnesses reported by respondents.

There were three follow-up questions for the four respondents who answered “yes” to the asthma question. With such a small sample of respondents, the following statistics are reported for informational purposes only. The first question asked at what age asthma symptoms started. The average age for the four respondents was around two years old. Of the four respondents with asthmatic children, three out of four no longer had asthma. For the three respondents who reported that their child’s asthma had resolved, the question was posed at what age this had occurred. For the first child, asthma symptoms began at around nine months and resolved at one year old. The second child began asthma symptoms at one and a half and resolved at age two. The third child began to have asthma at four years old and resolved at four and a half, and the fourth child began to have symptoms at a year and seven months and never became asymptomatic. For the three children whose asthma symptoms

resolved, the average time was five months. When asked if the child continued to take medicine for their asthma now, one of the respondents who reported that asthma symptoms had resolved continued to give asthma medicine to her child.

The next section of the questionnaire asked respondents to report on allergies in their children. The first question asked whether the child was allergic to food or medicine, or anything else. The most common response to medicine allergy was penicillin. Eleven respondents (12.1%) answered in the affirmative that their child had allergies of some form. All respondents were asked the follow-up questions regardless of their response to the first question. Seven respondents reported that their child was allergic to pollen or dust, and one reported an allergy to chemicals, in this case, particles from the active volcano. Five respondents reported that their child received injections for their allergies.

Use of Health Care Resources

The most difficult yet interesting part of the questionnaire dealt with use of health care resources and perception of severity of illness symptoms. It was necessary to take time to explain this part of the questionnaire to respondents because initially, the questions had the potential to cause confusion. There were a series of nine separate illness symptoms listed. The final symptoms on the list, indrawn chest and rapid breathing, are the classic symptoms of ARI. The objective of these questions was to determine the female caregiver's care-seeking behavior depending on the severity of the symptoms.

The first set of questions asked respondents to answer where they would treat their child first: at home, at the doctor's office, or do nothing. For the symptom "cough and nasal secretion", 80 percent of respondents would go to a doctor first. For "cough and fever", 75 percent would see a doctor first. For "fever and nasal secretion", "cough, fever, and nasal secretion", and "cough and phlegm" 76 percent would see a doctor first. When hearing the word "fever", many respondents deemed this term serious and suggested that seeing a doctor was appropriate. For the symptoms, "cough, phlegm, and nasal secretion", the result was 84 percent seeking a doctor first. For all of these symptoms, relatively few respondents answered "nothing" (maximum = 3.3%). The results of the final three symptom combinations were telling. For "rapid breathing", 84 percent of respondents answered that they would seek a doctor first, and 11 percent would do nothing. When asked what action they would take in the case of "indrawn chest", 77 percent of respondents would seek a doctor first, and 26 percent would do nothing. Finally, for the combination of symptoms "rapid breathing" and "indrawn chest", 78 percent would see a doctor first, and 19 percent would do nothing. Therefore, for these final three symptoms, female caregivers were more likely to seek a doctor first than the average for the previous symptoms, but they were also more likely to take no action at all.

Table 10: Caregiver Treatment Choice Depending on Symptom Cluster (n=91)

Category of Symptom Cluster	Home remedy	Doctor	Nothing
Cough with nasal secretion	17 (18.7%)	73 (80.2%)	1 (1.1%)
Cough and fever	22 (24.2%)	68 (74.7%)	1 (1.1%)
Fever and nasal secretion	19 (20.9%)	69 (75.8%)	3 (3.3%)
Cough, fever and nasal secretion	21 (23.1%)	69 (75.8%)	1 (1.1%)
Cough and phlegm	20 (22.0%)	69 (75.8%)	2 (2.2%)
Cough, phlegm and nasal secretion	14 (15.4%)	76 (83.5%)	1 (1.1%)
Rapid breathing	5 (5.5%)	76 (83.5%)	10 (11.0%)
Indrawn chest	6 (6.6%)	61 (67.0%)	24 (26.4%)
Rapid breathing and indrawn chest	3 (3.3%)	71 (78.0%)	17 (18.7%)

The next section of the questionnaire asked respondents to rank the level of severity for the same list of symptoms as previously described. In the analysis section, the responses between the two groups of questions are compared to determine whether there was a consistency of responses. In other words, do respondents who answer that indrawn chest is a case for the doctor also rank the symptom as “serious” to “emergency”? For the illness symptoms cough and nasal secretion, 71 percent ranked it as “not serious” to “moderate”, and 29 percent ranked it as “serious” to “emergency”. For the symptoms of cough and fever, 69 percent ranked the level of severity as “not serious” to “moderate”, and 31 percent classified it as “serious” to “emergency”. For both fever and nasal secretion, and cough, fever and nasal secretion, 65 percent ranked the symptoms as “not serious” to “moderate” and 35 percent ranked them as “serious” to “emergency”. Cough and phlegm were ranked as “not serious” to “moderate” by 70 percent of respondents and as “serious” to “emergency” by 30 percent of respondents. The symptoms of cough, phlegm and nasal secretion

were considered “not serious” to “moderate” by 65 percent of respondents, and as “serious” to “emergency” by 35 percent of respondents.

Table 11: Level of Severity of Symptom Cluster (n=91)

Category of Symptom Cluster	not serious	moderate	serious	emergency
Cough with nasal secretion	28 (30.8%)	37 (40.7%)	18 (19.8%)	8 (8.8%)
Cough and fever	22 (24.2%)	41 (45.1%)	19 (20.9%)	9 (9.9%)
Fever and nasal secretion	27 (29.7%)	32 (35.2%)	25 (27.5%)	7 (7.7%)
Cough, fever and nasal secretion	25 (27.5%)	34 (37.4%)	25 (27.5%)	7 (7.7%)
Cough and phlegm	27 (29.7%)	37 (40.7%)	20 (22.0%)	7 (7.7%)
Cough, phlegm and nasal secretion	21 (23.1%)	38 (41.8%)	24 (26.4%)	8 (8.8%)
Rapid breathing	25 (27.5%)	31 (34.1%)	24 (26.4%)	11 (12.1%)
Indrawn chest	43 (47.3%)	18 (19.8%)	15 (16.5%)	15 (16.5%)
Rapid breathing and indrawn chest	39 (42.9%)	19 (20.9%)	14 (15.4%)	19 (20.9%)

The last three cluster of illness symptoms, of most importance to the study, were ranked in the following fashion: rapid breathing was deemed “not serious” to “moderate” by 62 percent of respondents, and as “serious” to “emergency” by 38 percent of women surveyed; indrawn chest was ranked as “not serious” to “moderate” by 67 percent of respondents and as “serious” to “emergency” by 33 percent; and finally, rapid breathing and indrawn chest were ranked as “not serious” to “moderate” by 64 percent of respondents, and as “serious” to “emergency” by 36 percent of respondents. In contrast to the other illness symptoms, for the last three questions on symptoms, the answers in the “not serious” to “moderate” categories were weighted more towards the “not serious” response category. After these series of questions, respondents were asked to look at a photo of a child with an indrawn chest, taken from an educational CD-ROM on ARI (The_Wellcome_Trust 2001). Only seven percent

of respondents identified the photo correctly as either a respiratory ailment or needing a doctor's immediate attention. The remaining 93 percent responded that they did not know what the problem was or thought the sign was a result of a fall and that the child had possibly suffered a broken rib. The descriptive statistics results suggest that there was poor recognition of the severe signs of ARIs. There was greater recognition of the more common signs of colds and flus.

Diet of Child in the Last Twenty-four Hours

Undernutrition affected roughly a third of the children in Penipe County in October 2000, a year after the eruption of Mount Tungurahua, partly due to the disruption of agricultural production in the sector (Lara, et al. 2000b). An unpublished study carried out by CEBYCAM in 2001 found that poor nutrition affected 43 percent of children under 14, and if only children less than six years old were considered, the figure of undernourished children rose to 64 percent. From a survey of 362 school children in Penipe County, daily consumption of foods included mainly sugars ("empty calories"), tubers (mostly potatoes), and oils (such as lard and cooking oils). The children also consumed a high quantity of corn and peas. Bananas were the most commonly eaten fruits. The study also found that milk and eggs were consumed daily; however, daily consumption of meat and fish was rare because these and other products could only be obtained at the weekly market. The main diet of people of Penipe is based on corn and pasta, while the ingestion of proteins is scarce. According to the chief

doctor at CEBYCAM, there also exists a cultural barrier that adults should eat better than children (Lara, et al. 2000b). The nutrition of people in the zone has been negatively affected by the volcanic activity of Tungurahua, which has destroyed and damaged crops, and diminished incomes.

One of the last sections of the semi-structured questionnaire asked respondents to report their child's dietary intake in the last twenty-four hours. This section yielded quantitative data in the form of nutrient and micronutrient frequencies in order to calculate the child's daily nutrition intake. The researcher recorded the time and place the food or beverage was consumed, the type of food or beverage, the brand if applicable, and the quantity, which was measured using a typical bowl and cup. The bowl measured 21 oz./650 ml, and the cup measured 12 oz./375 ml. The researcher would ask for example the quantity of tea the child consumed, and if the respondent answered "half a cup," after being shown the cup that the researcher carried with him, the quantity would be registered as six ounces for data entry purposes. Efforts were made to make a second visit to each family to collect a second dietary recall after eight days. If, for example, the child were sick on the first visit and not eating properly, a more exact dietary record would be collected the following week.

A typical breakfast for a child was an oatmeal beverage with milk and sugar, juice, coffee or tea, bread, and fruit. For lunch, the child usually ate the same meal as the adults, albeit smaller portions, such as a potato or yucca soup appetizer before the main course, chicken or beef with rice, beans and vegetables. Lunch was the main course of the day. For dinner, the child

generally ate soup, as well as another helping of oatmeal, and either soda or tea. Between meals, some children occasionally ate ice cream, *chochos* and *mote* (beans and peeled white corn, respectively), fruit, oatmeal, or an occasional soda. The children's diets were high in proteins from the milk, beans and chicken, and in carbohydrates from the potatoes and plantains.

The diet of the family consisted mainly of rice, potatoes, pasta, beans, chicken, and vegetables. Eighteen different varieties of soup were recorded, consisting of different combinations of vegetables (corn and green peas), rice, legumes, grains, beef, chicken, fish, potatoes, and pasta. One soup particular to the Andes is called *locro*, a potato soup with eggs and cheese, and some recipes include turnips. Another popular soup is known as *sancocho*, made from plantains, yucca, beef, and peas. A popular food for children is known as *colada*, or porridge, and consists of grains mixed with sugar and milk. Different varieties of *coladas* were made from bean, oatmeal, cornmeal, barley, and quinoa. Popular main courses included beef or chicken stew, potato omelette, chicken with rice, and fried fish, chicken or pork. In times of celebration or festivals, popular dishes include potatoes and peanut sauce with roast *cuy* (guinea pig), *fritada* (roast pig), and *llapingachos* (fried potato patties with eggs, cheese, and sausage).

In this study, there are four groups of children: under six months (17 children); six to 17 months (14 children); 18 to 29 months (26 children), and 30 months to under five years old (34 children). No dietary records were collected for the children in the infant baby category, who were almost exclusively

breastfed. That left a total of 74 children with dietary information. After entering the daily diet for the 74 children for the twenty-four hour period, Nutritionist Pro software allows the user to generate a dietary analysis for each individual client.

The dietary analysis includes a breakdown of macronutrients, amino acids, vitamins, and minerals. The macronutrient data extracted from the dietary analysis included carbohydrates, kilocalories, fats, and proteins. The collection of macronutrient data is standard for nutritional analysis to gauge the energy and general nutritional value of foods ingested. The micronutrient data extracted, based on the ARI literature, were for vitamin A and E. Vitamin A forms a family of fat-soluble compounds that help to regulate the immune system, as well as maintain the healthy lining of the respiratory, urinary, and intestinal tracts. Vitamin A is a more likely micronutrient deficiency than others because it is not widely distributed across different foods. Vitamin E regulates the immune system and acts as an antioxidant, protecting cells from free radicals. The minerals data, also collected based on the ARI literature, were extracted for zinc and selenium. Zinc is an essential mineral for the body, and supports a healthy immune system. Zinc deficiency can lead to observable signs such as growth retardation, diarrhea, and loss of appetite. Selenium is a trace mineral with antioxidant properties, aiding immune functions, and is required in small quantities to ensure good health.

The nutrition data were analyzed using the statistical software, SPSS for Windows, Release 13.0 (SPSS 2005). Of the 74 children with dietary data (the other 17 children in the sample were exclusively breastfed - referred to as Group

1), there were 14 children in the 6 to 17 month age category (Group 2); 26 children in the 18 to 29 month age category (Group 3); and 34 children in the 30 month to 5 years old age category (Group 4). Of these 74 children, 50 (67.5%) children had two days of dietary data collected. For these 50 cases, the average of the two days of nutritional data was used for statistical analyses. The distribution of the data was tested for normality, and descriptive statistics were generated. Because the macronutrient and micronutrient data were not normally distributed, nonparametric statistical tests were employed, and because of the small sample size, outliers were not excluded. The mean values of the nutrients were compared with recommended daily allowances (RDA) for the three different age groups.¹⁰ For the purposes of dietary intake comparisons, the RDA dietary goal was used instead of the 1990 WHO Study Group proposed population nutrient goals which are expressed as ranges, rather than exact values, and focus on macronutrients (Truswell 1999). After these values were compared with the nutrition goals, nonparametric tests were performed to determine if there were differences in nutrition intake when stratified by age groups, gender, and SES. The results of these comparisons and statistical tests are presented in the next chapter under data analysis. The following table is a summary of the results of the nutritional intake for the children in the study from all three age groups compared to the RDA values for a three-year-old child in the United States.

¹⁰ The RDA values were taken from an inside cover table in Whitney and Rolfes (2005) and are based on average daily intakes of energy and nutrients which would be considered sufficient for health in the U.S. The main problems in applying RDAs to Ecuador are the scarcity of food composition data and the range of nutritional status (undernutrition in the poor and overnutrition in high SES groups) (Truswell 1999).

Table 12: Daily Nutrition Intake for Children (6 Months to < 5 Years Old)

n = 74 (day 1)	kcal/day	carbs ¹	fat ¹	protein ¹	vit. A ²	vit. E ³	zinc ³	selenium ²
Mean	1133.44	176.97	31.05	42.09	597.45	3.25	5.57	41.14
Std. Deviation	415.53	65.65	19.25	19.79	501.50	2.34	2.80	19.35
n = 50 (day 2)								
Mean	1074.67	168.26	29.05	39.41	520.37	3.10	5.08	37.15
Std. Deviation	435.27	65.21	17.25	17.80	401.14	1.75	2.69	16.08
n = 74 (day 1 & 2)								
Mean	1100.87	172.56	32.43	40.71	593.84	3.29	5.35	40.18
Std. Deviation	363.62	58.29	25.41	15.26	421.83	2.24	1.99	15.43
RDA Goal (Children 1-3)	1300.00	130.00	30.00	16.00	300.00	6.00	3.00	20.00

¹ = g/day; ² = µg/day, [vitamin A unit is termed retinol equivalents (RE) = 1 µg of all-*trans* retinol or 6 µg beta-carotene or 12 µg of other vitamin A precursor carotenes]; ³ = mg/day [RDA values based on National Academies of Sciences (2004)]

According to the table, the average children in the study were meeting their daily nutritional requirements for the macro- and micronutrients selected for analysis, with the possible exception of vitamin E, which was lower than the RDA goal.

The data is presented for the first day of dietary data (n=74), the second day of dietary data (n=50), and the two days of dietary data combined (n=74). A second dietary recall was carried out with 67.5 percent of the respondents of the semi-structured questionnaire.

PART V – QUALITATIVE DATA FROM STRUCTURED QUESTIONNAIRE

In addition to the primarily close-ended questions, there were sections of the questionnaire that were open-ended and generated a vast amount of qualitative data. These data fell into five main categories: use of local healthcare facilities and resources, knowledge of hot and cold coughs, use of curanderos, and knowledge and use of home remedies. The qualitative data were rich and some categories were specific enough to be coded and converted into categorical data. This section will begin by explaining the variation in use of local healthcare facilities and barriers to doctor access.

Use of Healthcare Facilities

Because there were three major site areas where the questionnaires were administered, there was considerable variation in the use of healthcare facilities. The three government health outposts used by questionnaire respondents were the main center in Penipe (SCS Penipe), a secondary health center in Matus (SCS Matus), and an ancillary post in Palictahua (PS Palictahua). There was also the private health clinic at CEBYCAM, an arm of the San Francisco Catholic Church of Penipe. At CEBYCAM, there were around twenty to thirty patients a day, half of whom were children. At SCS Penipe, the average was higher, at thirty to forty patients daily, a manageable number for the clinic. The other two rural health posts attended fewer patients because of their limited hours and smaller area population. The highest number of patients seeking attention in

Penipe occurred on Sunday, market day. Waiting times were around 15 minutes, and patients at all clinics received between fifteen minutes to a half an hour of attention.

CEBYCAM had a psychologist, gynecologist, pediatrician, dentist, and laboratory technician. All four doctors were well trained and experienced. There was also a professional nurse, a pharmacist, and a nurse assistant. SCS Penipe had one doctor and one dentist carrying out their year of rural service without the advantage of a laboratory. There was also a health inspector, two nurse assistants, and a dentist assistant. When the SCS Penipe doctor completed her year of rural service, a permanent doctor was assigned to the clinic, and she had previously worked there a year before. SCS Matus and PS Palictahua each had a female doctor performing their year of rural service, and each had a nurse assistant. The nurse assistant at SCS Matus was studying to become a professional nurse.

The aim of the question was to gauge mother's opinions of the healthcare facilities in order to identify potential barriers of access. The major barrier identified was money for medicines and transportation [52.8% of all respondents (medicine 31.9%; transportation 20.9%)]. However, while money for medicines was a complaint equally distributed across the three surveyed areas, money for transportation was primarily a complaint of Matus area residents (2:1 compared with Puela and 12:1 compared with Penipe).

Because the SCS Matus hours were not as frequent or regular as SCS Penipe, Matus area residents would have to travel to Penipe for healthcare or

Riobamba for a pharmacy (46.7% of Matus residents reported using SCS Penipe; 36.7% using CEBYCAM; and 46.7% using a pharmacy). Puela area respondents reported a different proportion (51.7% reported using SCS Penipe; 56.7% using CEBYCAM; and 63.3% using a pharmacy). Penipe respondents used the health centers in their town more than the other two areas which used PS Palictahua for the Puela area residents and SCS Matus for the Matus area residents. In Penipe, 87.1 percent reported using both SCS Penipe and CEBYCAM, and 41.9 percent visited pharmacies. The proportion of those using private doctors in Riobamba was the following: in Penipe two respondents (6.5% of Penipe respondents); in Puela one respondent (3.3% of Puela respondents); and in Matus two respondents (6.7% of Matus respondents). Overall, only five percent of respondents reported using a private doctor, so according to the data, most people with young children use either the local government health centers or CEBYCAM, depending on whether they live in Penipe.

Table 13: Use of Treatment Facility by Area

Category of Treatment Facility	Penipe	Puela	Matus
CEBYCAM	87.1%	56.7%	36.7%
SCS Penipe	87.1%	51.7%	46.7%
SCS Matus	0.0%	0.0%	100.0%
PS Palictahua	0.0%	100.0%	0.0%
Pharmacies	41.9%	63.3%	46.7%
Private Doctors	6.5%	3.3%	6.7%

One of the barriers identified in Penipe and Puela was the sometimes limited and erratic hours of the government clinics (14.3% of all respondents, 6 in Penipe, 6 in Puela, and 1 in Matus). Since all but one of the health staff of the government health posts lived in Riobamba, if for some reason they did not work

on a particular day, the post remained closed; moreover, sometimes the hours of operation were both limited and confusing, such as regular hours on Monday, Tuesday, and Thursday, from 8 am to 1 pm.. For the Penipe area, people used both CEBYCAM and SCS Penipe. Everyone would have to go to the government health posts for childhood vaccinations, which were not offered at CEBYCAM. In Puela, Palictahua and Pachanillay, there was more difficulty in accessing health services because of the restrictive hours of the local health outpost. There was planning to establish a *puesto de salud* (health outpost) both in El Altar and Puela to resolve this problem.¹¹ In the hamlet of Palictahua, there was a small health outpost (PS Palictahua) that people in the area used primarily, or if the outpost was closed, the mothers would bring their children to SCS Penipe. In Matus, they had their own government health center (SCS Matus), so people would use this resource, however the hours were often erratic. In addition to the health centers, people had the option of going to pharmacies in Riobamba, or to use a curandero or herbalist for folk illnesses. For each resource, the respondent answered the last time she had used the resource for her child and for what purpose.

The conclusion of the Development Plan for Penipe states that the problem of quality and regularity of service in the government health clinics was more of a problem than the absence of services, thus corroborating the field observations (COSUDE 2003). The report quotes an unknown source from Matus that the health services are deficient in the case of emergencies, since

¹¹ The buildings were in place, they were just waiting for the equipment.

there are no services later in the afternoon or in the evening. This complaint was echoed by one respondent in Matus.

“Subcentro de Salud Matus, un mes, estaba enferma de la garganta, le dio fiebre. No atiende todo el día, hasta mediodía no más.” [SCS Matus, one month ago, she was sick in her throat, and had a fever. They do not attend all day, until noon only].

Attitudes towards Healthcare Facilities

The attitude of the female caregivers towards CEBYCAM (95%), SCS Penipe (82%) and the other government health centers (81%) was largely positive. Of those who received services at CEBYCAM, there was a higher proportion of positive responses for the facility than those who went to SCS Penipe because the doctors were more experienced and the treatment more comprehensive, since they had laboratory facilities as well as a psychologist. The doctors at the government clinics were typically doctors performing their one year rural service requirements whereas the doctors at CEBYCAM were hired as permanent staff. However, the respondents also complained that the medicines were expensive in the CEBYCAM pharmacy (the only pharmacy in Penipe County). The negative responses towards pharmacies in Riobamba also referred to the high cost of medicines. Those who went to CEBYCAM generally did not go to SCS Penipe, except for vaccinations. When giving reasons for visiting healthcare facilities for their children, stomach parasites figured

prominently as the primary reason, as well as general control measures for young children.

Table 14: Attitudes towards Healthcare Facilities

	CEBYCAM	SCS Penipe	Other*	Pharmacy
negative	1 (1.1%)	5 (5.5%)	3 (3.3%)	9 (9.9%)
positive	52 (57.1%)	46 (50.5%)	50 (54.9%)	24 (26.4%)
neutral	2 (2.2%)	5 (5.5%)	9 (9.9%)	13 (14.3%)
not applicable	36 (39.6%)	34 (37.4%)	29 (31.9%)	45 (49.5%)

* private doctor 5(5.5%); PS Palictahua 32(35.2%); SCS Matus 25(27.5%); n/a 29(31.9%)

There were only a few complaints of SCS Penipe. One described a problem with a dentist who supposedly carried out unnecessary tests and was not well trained. There was also one complaint against a nurse who, according to the respondent, did not know how to treat people, but the same person said she liked SCS Penipe because the medicines were free. Another complained that they used to give medicines for free, but now they charged a dollar, and fifty cents for the consultation. In one case, a respondent complained that the doctor at PS Palictahua gave her a medicine for her child's parasites that worsened the child's condition. In yet another case, a mother reported that the pediatrician referred her to a hospital Riobamba because her child had pneumonia.

Barriers to Care

Women talked about barriers to care. The number one reason cited as an obstacle to seeing a doctor was lack of money for transportation (20.9%) and to purchase medicines (31.9%). A few people also mentioned transportation issues

in the evenings and the restrictive hours of the clinics as barriers (14.3%). For example in Penipe, one complaint was that in SCS Penipe, they would attend people coming in from rural areas on Sunday, the market day, so people who lived in the town of Penipe only received attention from Monday through Thursday, since the clinic was closed on Friday and Saturday. Another related issue was the complaint that the health centers were too far from their homes (6.6%). Two people (2.2%) mentioned their long work hours as barriers to seeking care, and two people (2.2%) mentioned that it was a barrier when the clinic employees were on strike. During the fieldwork session, there was a national nurse assistant's strike that lasted an entire month. Fifteen people (16.5%), primarily from Penipe and Matus, did not identify any barriers to seeking a doctor's care.

Hot Cough versus Cold Cough

From the focus group discussions, a category emerged termed "hot coughs" and "cold coughs". These are ethnomedical terms to describe a type of cold that children experience. There was some consensus on the definition of the difference between the two types based on the fifty-eight respondents (63.7%) who had knowledge of the difference. First, cold coughs were considered more severe than hot coughs; moreover, the causes and cures of the two coughs were different. Cold coughs were caused by the cold weather and the wind, and the remedies were to keep warm and drink particular herbal remedies. Hot coughs were caused from spending too much time in the sun, and

the remedies included bathing in temperate water and drinking cold beverages. Two herbs, *tilo* and *borraja*, were frequently mentioned as proper herbal treatments for cold coughs.¹² The following three quotes illustrate some of the individual variations in treatment strategy.

“Tos fría, resfriada, es de calor ataca los pulmones. Flota mentol chino, funda de gallina, pone en la espalda. Tos caliente, aguitas frescas, poniendo con limón” [Cold cough, get a cold, is when the heat attacks the lungs. With Chinese menthol, a bag of chicken broth, you put on the back (of the child). For hot cough, cool liquids, with lemon].

“Tos fría, peligroso resfriada, jarabes, consigue borraja, tilo. Tos caliente, tos, lo más problema, mora comuna, cocina bien, pone borraja, agua caliente, tos fría, ajo mochacado con leche” [Cold cough, dangerous sickness, infusions, get *borraja*, *tilo*. Hot cough, cough is the problem, mora is common, cook well, put *borraja*, hot water, for cold cough, ground garlic with milk].

“Es de frío, le da limonada con trago (solo tosiendo), es de calor, bañar con trago manteca de cacao en la barriga, bastante calor sufre mucho, queda con aguas frescas” [For the cold cough, give lemonade with whisky (only if coughing), if it is a hot cough, bathe with whisky, cocoa butter on the stomach, if very hot and you are suffering, give cool liquids].

¹² Tilo pertains to the family Tiliaceae in the genus *Tilia*. Its flowers and stems are used as sedatives. It is used as a sudorific for coughs, colds and fevers, and as an expectorant.

Cold cough was viewed as more serious in the ethnomedical model and the aim was to heat the body. The opposite was true for hot cough, although in one case a person prescribed a hot herbal remedy for hot cough. Also interesting is that all cures use herbal remedies or baths, not drugs from the pharmacies.

The following table summarizes the number of respondents who had knowledge of hot coughs and cold coughs. Fifty-eight respondents (63.7%) knew what the terms meant and the differences between them while 33 (36.3%) did not. In general, those who were knowledgeable of hot and cold coughs also had a more extensive knowledge of medicinal plants and herbs.

Table 15: Hot and Cold Cough Knowledge

	frequency	percent
yes	58	63.7%
no	33	36.3%
Total	91	100.0%

Use of Curanderos

As with knowledge of hot and cold coughs, some people were more knowledgeable about seeing a curandero. Curanderos are natural healers who heal the body and mind through magical means by working in the spirit world. These natural healers were both male and female, although the gender of the healer reported in the questionnaire was not quantified. Some people had taken a child to see a curandero, but were unfamiliar with what was treated or why. Also included in this class of healers are *fregaduras* (bone-setters). Twenty-one

respondents (23.1%) had taken their child to see a curandero. They usually talked about a *limpieza* or cleansing, which cost around ten dollars. To cleanse someone of illness, the curandero would pass a *cuy* (guinea pig) and medicinal herbs over the body.¹³ Some of the folk illnesses that curanderos would cure were *mal aire* (bad air), *mal humor* (bad fluid), *arco iris* (rainbow), and *espanto* (fright). An illness such as *mal aire*, which is generally believed to be transmitted through the air from the dead to the living, is a long-standing traditional belief in Andean cultures (McKee 2003:131). All respondents reported a positive experience with the curanderos, who had all reportedly cured their children. The following quote illustrates an illness episode of bad air for a child.

“Vive acacito, mal aire les da al niño, dos meses, para pequeño, limpia con unas plantas bendecitas, bendición, si es bueno, limpia niños comen mejor, no cuesta nada, lleva plantitas” [He lives close by, my child got bad air, two months old, he was cleansed by blessed plants, received a benediction, yes it is good, he cleans children, they eat better, it is free, you just have to bring the plants (that they use for the healing)].

While mothers did not seek the help of the curandero in the case of respiratory infections, apparently this was not the case with diarrhea. The following quote illustrates this point.

¹³ More information is presented on curanderos in the key informant interview section in the beginning of the chapter.

“Curandera, seis meses, tenía mucha diarrea, se compuso. Si es bueno, es de Penipe” [Woman healer, my child was six months old, she had a lot of diarrhea, she got better. Yes the healer is good, she is from Penipe].

There is a generational difference in the belief of *curanderismo*. The younger generation is more skeptical regarding the use of *curanderos*, illustrated by the following statement:

“Una vez, estaba espantada. Limpieza, no creo en estas cosas, más para mi mama” [One, time, he received “the fright”. After a cleansing, cured, I don’t believe in these things, I did it because my mother does].

The small sample shows that *curanderismo* is alive and well in Penipe County. Twenty-one respondents (23.1%) had used *curanderos* to treat their children. Considering that *curanderos* are more often employed to cure folk illnesses in adults than children in this area, the proportion would have been higher had the respondent been asked if they had seen a *curandero* for anyone in their family, rather than only for their child.

Table 16: Use of Curandero/a for Child

	frequency	percent
yes	58	63.7%
no	33	36.3%
Total	91	100.0%

Home Remedies

All respondents were asked to give an inventory of the medications they keep in the home, whether herbal, over-the-counter, or prescription medicines. Oftentimes, for herbal remedies, the families maintained herb gardens around their home, and they would pick the herbs as needed. Some people responded that they did not have these herbs, but they could acquire them from a neighbor. Most herbal remedies were used daily in teas to aid digestion and ease cough symptoms. For the medications, the respondent would often go to where they stored the medicine and show the product so the researcher could accurately write down the name. Many of the medications were obtained in the government health centers without cost. For each medicine or herb, the question was posed as to the use, cost, and last time used.

When asking informants for a medicine inventory, the answers were extremely diverse. Some people mentioned hot cloths as a remedy as well as particular herbs to cure folk illnesses. Of the 129 different herbs and medicines mentioned, 60 were either over-the-counter or prescription medicines and 69 were herbal remedies. The two most common herbs used were *manzanilla* [chamomile, 48 (52.7%) respondents], oregano [26 (28.5%) respondents] and *toronjil* [19 (20.9%) respondents], all used to aid the stomach in digestion.¹⁴ The most common cold remedy was Tempra, a cough and fever suppressant

¹⁴ Chamomile is considered good for the digestion, by combating gases in the intestinal tract. It is taken in the form of tea. The plant has red leaves and yellow flowers. Oregano, also known as wild marjoram, has small leaves and pink flowers. The leaves and flowers are used as tonics, condiments, and perfumes. The plant is also used as a mouthwash to fight mouth and throat infections. Toronjil, like manzanilla or chamomile, is also used in teas. It is a herbaceous plant and has pink flowers and a smell similar to lemon. It is used to treat gout and urinary tract infections.

available in either tablet or syrup form [31 (34.1%) respondents]. Tempra was so common because the health centers gave this remedy away for free in the tablet form (the syrup version was available for around a dollar). The next most common remedies were *tilo* [17 (18.7%)] and *borraja* [17 (18.7%)], herbs used to cure cold coughs, as previously mentioned. Other herbs that were very common were *llantén* [16 (17.6%)], *malva* [14 (15.4%)], *menta* (mint) [14 (15.4%)], *cedrón* [10 (11.0%)], *mora* (raspberry) [10 (11.0%)], *poleo* [9 (9.9%)], and *eucalipto* (eucalyptus) [8 (8.8%)].¹⁵ These herbs were used in teas to cure coughs, colds, colics, and other stomach ailments. Antibiotics were present in a few people's homes, such as amoxicillin [3 (3.3%)] and ampicillin [3 (3.3%)]. Two respondents (2.2%) reported having Ventolin asthma inhalers in their home for their child. Finally, a handful of respondents reported having medicines to cure folk illnesses. These remedies included *ruda* (unknown root), *quantu blanco* (morning glory), and *huevos* (eggs).¹⁶ The eggs were not eaten, but passed over the body of the sick person by a curandero in order to have the contents of the egg examined for diagnostic purposes.

¹⁵ Llantén pertains to the genus *Plantago*, of the family Plantaginaceae. It is a herb that is used as a tea against chest problems and chronic dysentery. Malva is an herb of the family Malvaceae. Its infusions are used against bronchitis. Menta, or Mint, is an herb used as a stimulant and anti-spasmodic, as well as a condiment and flavoring. Cedrón is an arboreal plant with aromatic fruits and leaves. Infusions of the plant are used to treat stomach and chest ailments such as asthma. Mora, or blackberry, is used to make drinks and teas. It is used as a purgative. The leaves of the eucalyptus tree are used to treat respiratory problems for its decongestive properties. The herb poleo was not able to be identified.

¹⁶ According to a pamphlet on natural medicines, ruda is a well-known plant whose infusion is used to wash the vagina to initiate menstrual flow.

Table 17: Commonly Used Remedies

Name of Remedy	Number
chamomile	48 (52.7%)
Tempra	31 (34.1%)
oregano	26 (28.5%)
<i>toronjil</i>	19 (20.9%)
<i>tilo</i>	17 (18.7%)
<i>borraja</i>	17 (18.7%)
<i>llantén</i>	16 (17.6%)
<i>malva</i>	14 (15.4%)
mint	14 (15.4%)
<i>cedrón</i>	10 (11.0%)
raspberry	10 (11.0%)
<i>poleo</i>	9 (9.9%)
eucalyptus	8 (8.8%)
amoxicillin	3 (3.3%)
ampicillin	3 (3.3%)

The respondents were also asked the price of the remedy. All the herbs were acquired without cost. The most expensive medications were the vitamins, which cost around ten dollars. Ventolin, the asthma drug, cost around eight dollars. The next on the list were the cough syrups, which cost between three and six dollars. Antibiotics were not expensive, ranging from one to two dollars. People would generally go to Riobamba to purchase these remedies and find the pharmacy with the best price.

The combination of qualitative and quantitative research methods produced a rich, multi-layered matrix of data. The strategy of beginning the research with the focus group discussions aided the researcher in the development of a culturally-sensitive semi-structured questionnaire which elicited emic information from respondents. By collecting the local terminology in these focus group discussions, questions in the semi-structured questionnaire were

tailored to elicit emic categories, such as the differences between hot and cold coughs and local terminology for common childhood illnesses. Meticulous care was taken to accurately record responses that emerged from all the ethnographic tools used in the dissertation research.

The focus group sessions were a productive qualitative data gathering exercise. The focus groups established a cultural knowledge domain regarding types of respiratory illnesses, health care-seeking strategies, home remedies, and barriers to seeking care. The major barrier identified to seeking medical help was lack of financial resources, and this was corroborated by the semi-structured questionnaires. Moreover, an ethnomedical model of treatment for respiratory illnesses emerged from the focus groups which included assessment, treatments with medicinal herbs, and decisions on whether or not to seek medical help. The mothers in the focus groups also acknowledged that they needed more education and training in order to make informed treatment decisions relating to their children's respiratory infections. In the in-depth interviews, the healthcare workers reiterated this concern and believed that if the people were better educated on symptom recognition, they would not delay seeking care for their ill children. Nevertheless, the healthcare workers identified education as the primary barrier for the mothers to seek medical care, whereas the mothers cited lack of money and limited hours of the clinics as the primary barriers.

In the next chapter, statistical tests from data gathered from the semi-structured questionnaires demonstrate the positive association of low SES with frequency of respiratory infections, and the negative association between low

SES and timely health care-seeking behavior. Moreover, the results of the semi-structured questionnaire found a generalized lack of recognition of the primary signs of ARIs. Through the explanation of the research analysis, research hypothesis results, and discussion, a more in-depth understanding of the significance of the research results are presented in the following chapter.

CHAPTER SEVEN: ANALYSIS, TESTING THE RESEARCH HYPOTHESES, AND DISCUSSION

PART I – ANALYSIS

In order to justify performing statistical tests on the study data taken as a whole, it was necessary to establish that the three groups of geographically-dispersed respondents (Penipe, Puela, and Matus) were similar for certain key demographic variables. Because of the small sample size for the three different areas of 30 respondents each, the validity of the results from the data analysis would be strengthened by the larger sample size of 91 respondents. A Kruskal-Wallis test, a nonparametric equivalent of the one-way ANOVA, was performed to determine if there were any significant differences between the means for the respondent's age, salary, and years of education for the three areas. The test determined that the differences for two of the variables were not significant (age: $X^2(2) = 4.24$, $p > 0.05$, two-tailed; education: $X^2(2) = 2.73$, $p > 0.05$, two-tailed). The mean ranks for age and education indicated that the average age was highest in Puela, and the average number of years of education was highest in Penipe. However, the only statistically significant result was for mean salary between the three locations. This was to be expected since most of the

professional occupations were located in Penipe, and a few high salaries inflated the mean (salary: $X^2(2) = 10.23$, $p < 0.05$, two-tailed). The mean rank for salary in Penipe was significantly higher than Matus, which was in turn higher than Puela. Nevertheless, statistical tests were performed on the whole data set, rather than comparing these three groups separately, because a larger sample size increases the validity of statistical results. The average salary for the region was \$127 per month, with a median of \$100 per month, and as the following histogram demonstrates, the salary numbers were not evenly distributed ($p < .0001$).

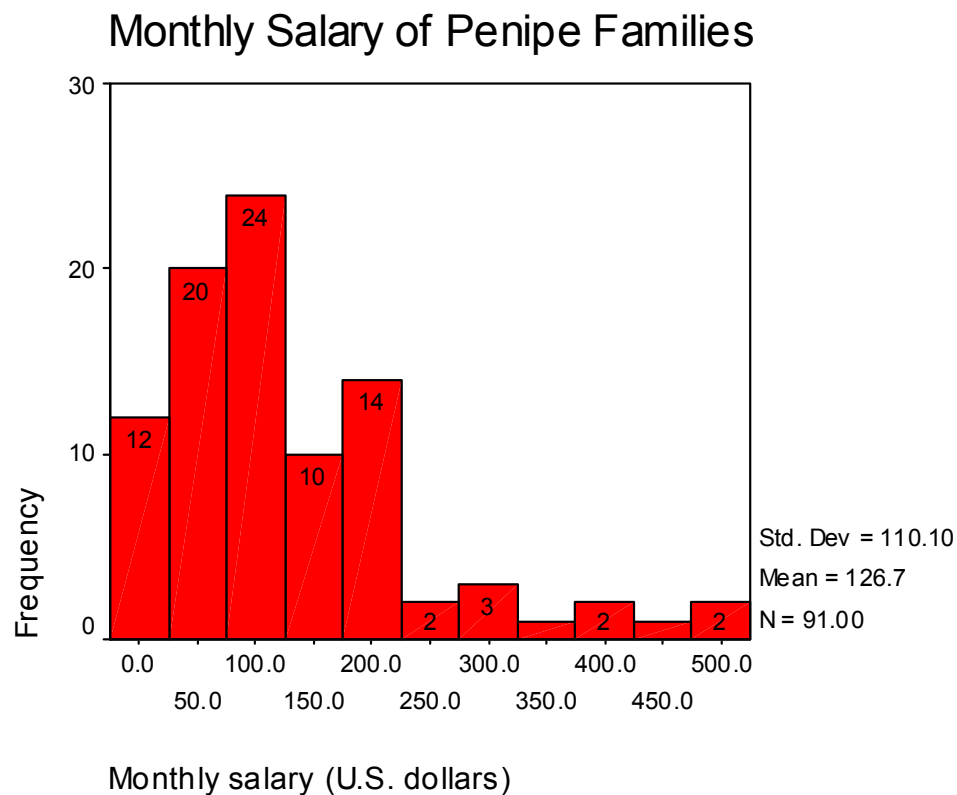


Figure 12: Monthly Salary of Penipe Families

After the descriptive statistics for the semi-structured questionnaire were tabulated, crosstabulations of variables of interest were performed with

appropriate chi-square statistics calculated. Next, a binomial logistic regression procedure using the forward stepwise method was employed to determine if socioeconomic status (SES) variables could improve the predictive accuracy of reported care-seeking behaviors, as described in the following section on research hypotheses results.

In the semi-structured questionnaire, the most frequently mentioned barrier to seeking care was lack of money. Agricultural work contributed to this problem because of the long hours involved in this activity and limited hours of the clinics. Low possession score was highly associated with not owning land ($X^2(1) = 15.90, p < 0.001$, two-tailed). Therefore, these families survived by working on rented land, land owned by kin, or land owned by an employer. Therefore, because of high work demands from agriculture, the first hypothesis of the dissertation research was that families of low SES, as measured by possession score, would be more likely to treat respiratory infections at home or do nothing. While the overall possession score did not turn out to be the most significant variable in the results, the individual components of the possession score indicated some trends in favor of the hypothesis. Families with below average salaries (\$150 per month and less) were more likely to treat a child with cough, fever and nasal secretion at home or do nothing ($X^2(1) = 6.40, p < 0.05$, two-tailed). When families with salaries of over \$150 per month were compared with families earning \$75 per month or less, the difference was even more significant with mothers more likely to treat a child at home when presenting with cough, fever and nasal secretion ($X^2(1) = 6.96, p < 0.01$, two-tailed). Since

salary, as the key measure for SES, was a significant factor in the bivariate tests for treatment seeking, the other eight SES indicators were used in the initial binomial logistic model. In addition, some of the other SES indicators were associated with negative respiratory illness outcomes.

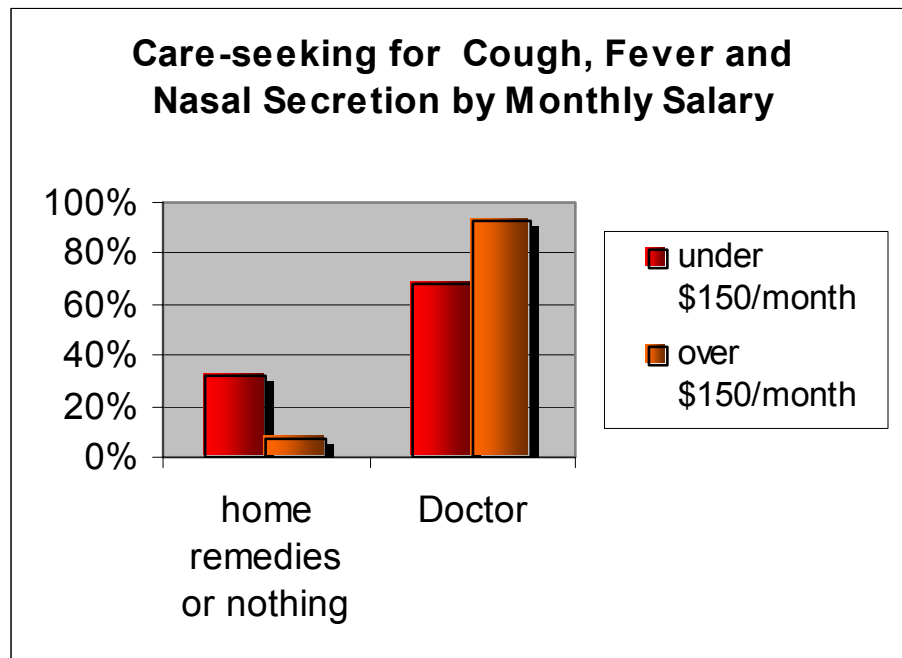


Figure 13: Care-seeking for Cough, Fever and Nasal Secretion by Monthly Salary

For example, families with dirt floors were more likely to have children with coughs and colds ($X^2(1) = 4.22, p < 0.05$, two-tailed). Families with less than three agricultural animals were more likely to have their youngest child hospitalized for a chest illness ($X^2(1) = 5.64, p < 0.01$, two-tailed). Finally, families with a low possession score were more likely to have a child with a wheeze ($X^2(1) = 7.35, p < 0.01$, two-tailed). Therefore, low SES, as measured by salary, housing quality, and possession score, was associated with a medical history of respiratory problems in children and a lesser inclination to seek appropriate medical care for particular symptoms. Even though single female-

headed households had lower incomes than married or open union households, there was little measurable effect on ARI symptom recognition or treatment choice. Contrary to expectation, for the symptom of indrawn chest, single mothers were more likely to seek a doctor than married or open union women ($X^2(1) = 3.68, p = .05$, two-tailed). In sum, household income and possession score exhibit some differences in care-seeking and respiratory illness frequencies. The female caregiver's education level and the child's gender had little effect on care-seeking behavior for childhood symptom clusters in the bivariate statistical analysis.

For the specific symptoms of ARIs, there was an overall lack of knowledge of rapid breathing and indrawn chest, or the significance of the combination of the two. Only seven percent of respondents correctly identified a photo of a child with an indrawn chest as a respiratory ailment or in need of a doctor's attention. The lack of symptom recognition is illustrated in the following table and figure which show that more than half of the respondents (54.9%) did not rank the symptoms of ARI either as serious or emergency, while 29 percent ranked the symptoms of rapid breathing and indrawn chest correctly as serious to emergency.

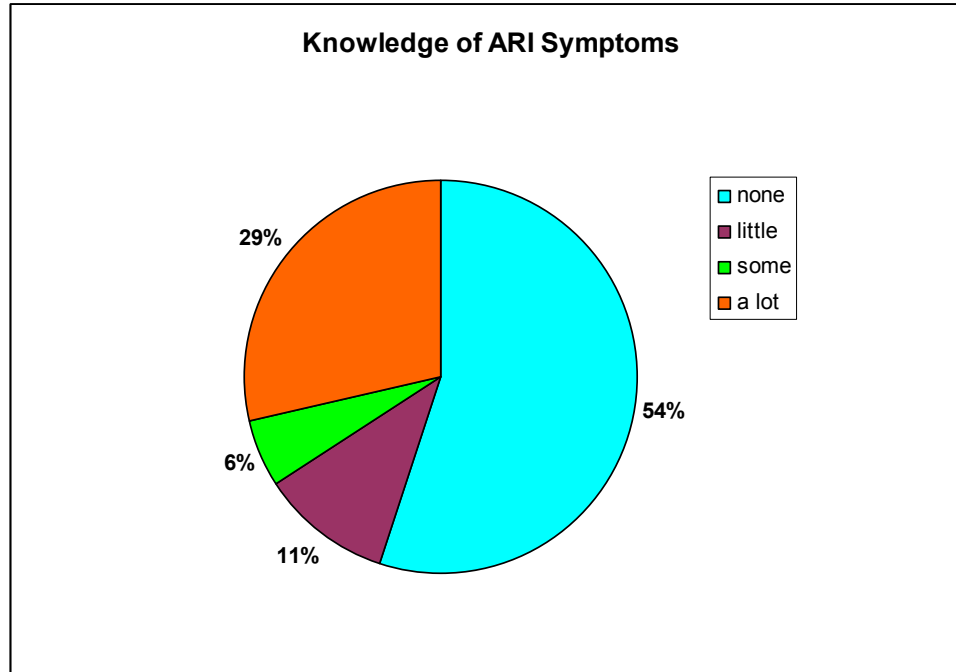


Figure 14: Knowledge of ARI Symptoms

Based on the answers to questions relating to the severity of nine clusters of symptoms, ranging from cough and fever to indrawn chest and rapid breathing (refer to Table 11), a score was generated to tabulate the number of incorrect responses versus correct responses, scored as 0 or 1, respectively (compare with Denno, et al. 1994:299). For the purposes of creating a range of scores, each question received the same weighting, even though the researcher was most interested in symptom recognition and appropriate treatment for acute lower respiratory infections. The mean score for all respondents was 5.2 out of a possible score of 9. Figure 15 illustrates the range in scores for the outcome of this computation.

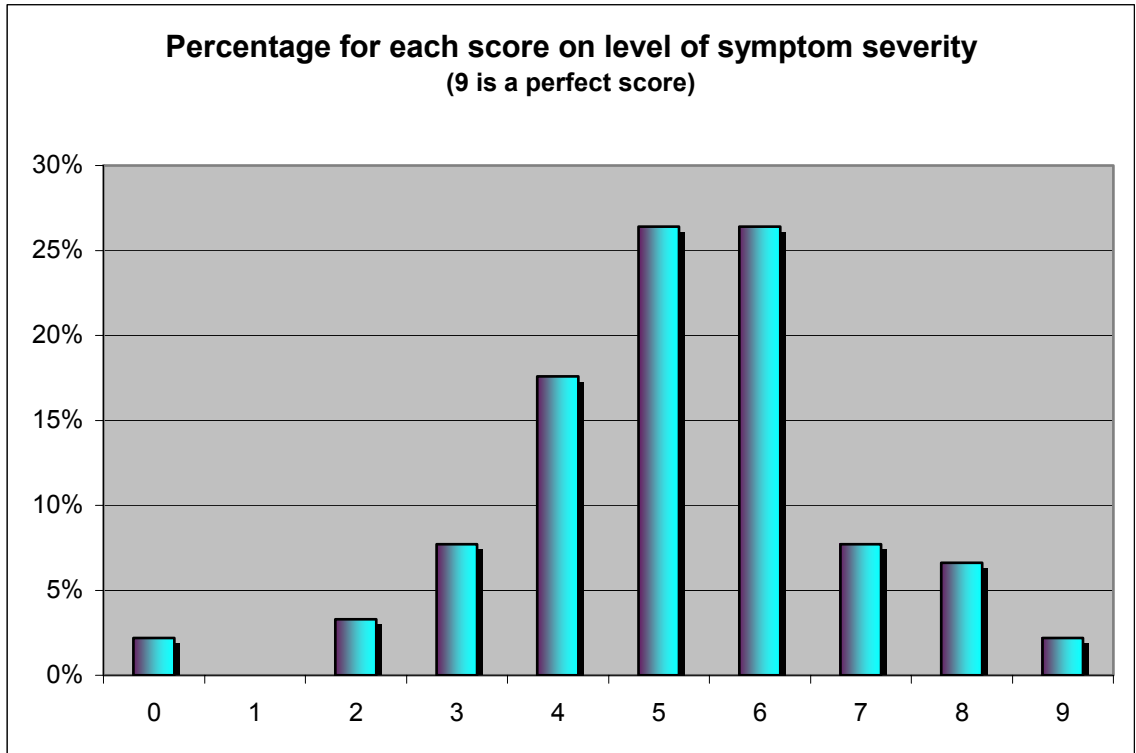


Figure 15: Percentage for each score on level of symptom severity

There was a generalized lack of recognition of appropriate biomedical treatment choice for the last three symptom clusters related to severe ARIs. Nineteen percent would do nothing if their child presented with both indrawn chest and rapid breathing, and 43 percent thought these signs were not serious. Therefore, there was a lack of connection between perception and care-seeking. The following pie charts (Figures 16 - 18) illustrate this discrepancy.

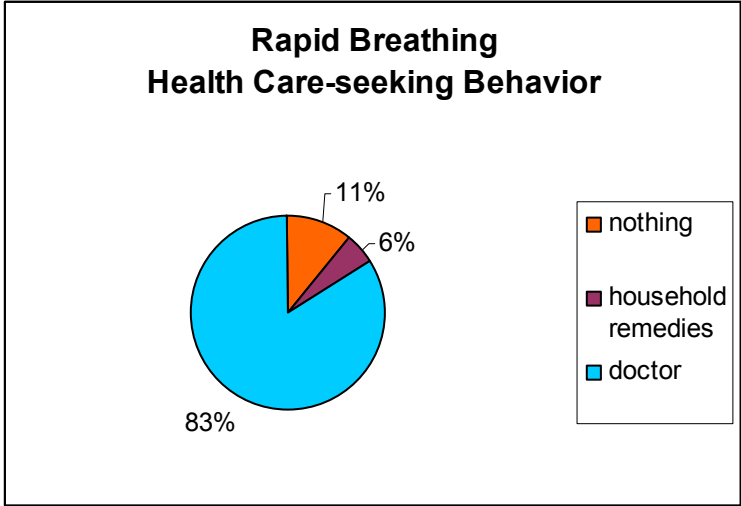


Figure 16: Rapid Breathing Health Care-seeking Behavior

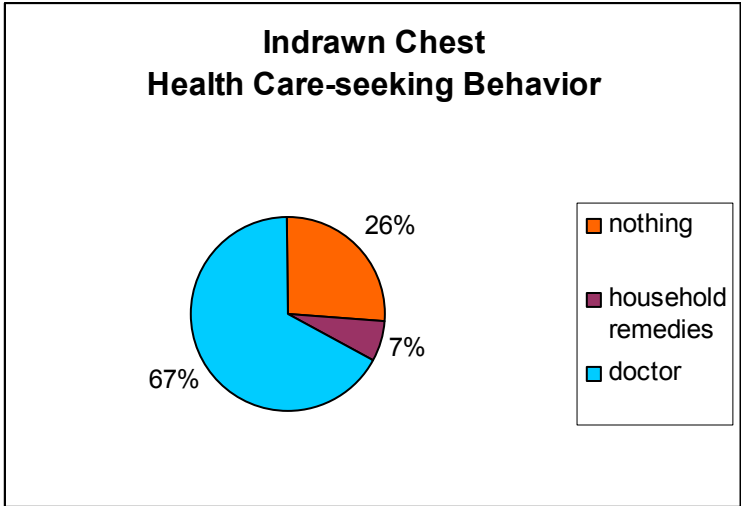


Figure 17: Indrawn Chest Health Care-seeking Behavior

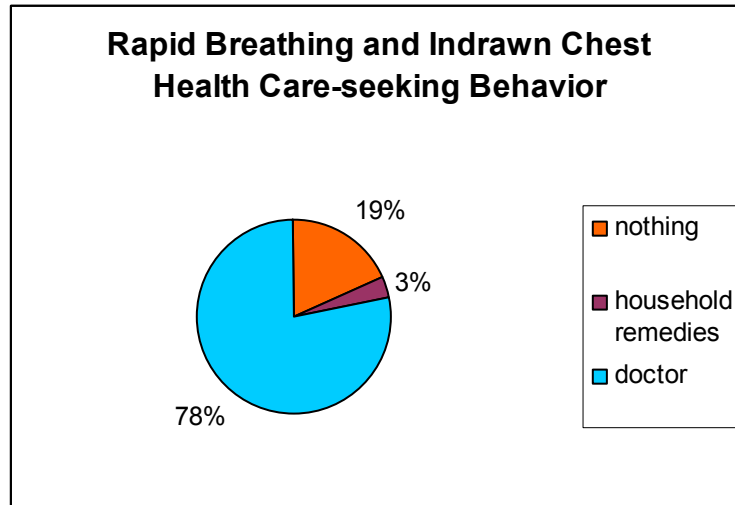


Figure 18: Rapid Breathing & Indrawn Chest Health Care-seeking Behavior

According to the figures, rapid breathing was a more recognizable sign of respiratory infection than an indrawn chest (83% seeking a doctor for rapid breathing compared to 67% for indrawn chest). Oftentimes, when shown the picture of the child with an indrawn chest, the respondent thought the sign was an injury caused by a fall. For both symptoms, the number of respondents who would do nothing outnumbered those who would treat the illness with household remedies. These data are sharply contrasted with the number of respondents who would do nothing regarding the other illness symptoms mentioned in the same part of the questionnaire, such as cough, fever, or nasal congestion. In the case of all other illness symptoms related to coughs and colds, very few respondents answered that they would do nothing if their child presented with these other illness symptoms.

Another interesting finding was the lack of connection between people's perception of severity of rapid breathing and indrawn chest symptoms, and their approach to seeking care for these symptoms. For the symptom of rapid

breathing only, the chi-square statistic was not significant between perception of severity and treatment choice. However, for indrawn chest there was a lack of connection between perception and treatment ($X^2(1) = 10.68$, $p < 0.01$, two-tailed). Furthermore, for the aggregate of symptoms indrawn chest and rapid breathing, there was also a lack of connection between perceived severity and treatment choice ($X^2(1) = 7.65$, $p < 0.01$, two-tailed). This suggests that the symptom of an indrawn chest was not well understood, and that while the symptom may have been perceived to be serious, fewer respondents were inclined to seek a doctor's attention than for the symptom of rapid breathing.

Crowding is another risk factor for ARIs. The degree of crowding in household was determined using the combined data between the number of rooms in the house and the number of dependents. One-room households, two-room households with four or more dependents, three-room households with five or more dependents and households with six or more dependents were coded as crowded because there would be a least two or more dependents living in a room. This resulted in 24 "crowded households" and 67 regular households. However, when the chi-square statistic was calculated comparing the variables for history of childhood illnesses and respiratory problems with "crowded households", the results were not significant. When the variable for crowded households was compared with possession score, the chi-square statistic was borderline significant ($X^2(1) = 3.68$, $p = .05$, two-tailed). Almost half (47.3%) of the households that were classified as not crowded ranked on the high end of the possession index. In addition, more than twice as many households with lower

than average incomes had households with five or more dependents than households with higher than average incomes, suggesting that lower income households tended to have more dependents, thus exacerbating their negative economic situation. Caregivers' level of education cross-tabulated with the variable for crowded households produced a significant chi-square statistic ($X^2(1) = 4.13, p < 0.05$, two-tailed). This result suggests that caregivers with secondary education or more were associated with households that were not crowded when compared with caregivers with primary education only. Therefore, in this research crowding was associated with lower SES and less education, but not with respiratory symptoms or history of childhood illness.

Moreover, the same assumption for crowding as a risk factor applied to exposure to smokers and indoor smoke from cooking in the household. When the variable for "smoker in the household" was compared with "child frequently has cough or cold", "child hospitalized for chest illness", "child had bronchitis", and "child had pneumonia", the results were not significant. This may partly be explained by the respondents' assertions that their husbands, brothers, fathers, or boyfriends who smoked, usually smoked elsewhere or outdoors. Finally, the chi-square test was performed with cooking and the four illness variables described above. Cooking with wood as opposed to gas or coal, likewise did not make a difference in outcomes for children to suffer from frequent cough with colds, bronchitis, pneumonia, or history of hospitalization for a chest illness. However, there was a significant chi-square statistic between homes with non-dirt floors and homes that cooked with wood only ($X^2(1) = 15.18, p < 0.01$, two-

tailed). This result suggests that homes with non-dirt floors were less likely to cook with wood exclusively than homes with dirt floors. Therefore, homes with dirt floors, in addition to having the problem of poor insulation from outdoor environmental pollutants such as volcanic ash, were more likely to add to this indoor air pollution with smoke from wood fires.

Poor nutrition is another significant modifiable ARI risk factor. In order to gauge the effect of nutrition on child health, nonparametric tests were performed on the macronutrient and micronutrient data to determine if there were any differences when stratified by age, gender, and income. A Kruskal-Wallis chi-square test, a nonparametric equivalent of one-way (between subjects) ANOVA, was performed to compare the three age groups (Groups 2, 3 and 4) for which dietary data were collected [under 6 months (Group 1, exclusively breastfed); 6 – 17 months (Group 2); 18 – 29 months (Group 3); and 30 months to under five years old (Group 4)] (Kinnear and Gray 2004). The Kruskal-Wallis chi-square test was not found to be significant for any of the macronutrients or micronutrients, except for the mineral selenium and vitamin E, meaning that there was only a minor difference in mean dietary nutrition intake between the three age groups. For the mineral selenium, the chi-square statistic was significant, with a higher intake among Group 4 than Group 3, which in turn was higher than Group 2 ($X^2(2) = 9.17, p < .05$, two-tailed). In addition for vitamin E, the chi-square statistic was significant, with the highest intake among Group 4, and the lowest intake among Group 3 ($X^2(2) = 7.58, p < .05$, two-tailed).

Table 18: Frequency of Nutrient Intake by Age Group

	Age Group	n	Mean	Std. Dev.	Mean Rank
kcal	6 - 17 mo.	14	1129.46	268.01	40.36
kcal	18 - 29 mo.	26	1046.51	310.82	34.54
kcal	30 mo. - 5 yrs.	34	1130.66	432.91	38.59
carbs	6 - 17 mo.	14	174.04	49.02	37.93
carbs	18 - 29 mo.	26	167.13	51.50	36.69
carbs	30 mo. - 5 yrs.	34	176.10	67.26	37.94
protein	6 - 17 mo.	14	40.83	9.77	39.43
protein	18 - 29 mo.	26	39.19	16.43	34.12
protein	30 mo. - 5 yrs.	34	41.83	16.44	39.29
fat	6 - 17 mo.	14	32.73	11.33	43.07
fat	18 - 29 mo.	26	26.64	10.48	33.69
fat	30 mo. - 5 yrs.	34	36.73	35.34	38.12
vitamin A	6 - 17 mo.	14	488.86	347.22	28.71
vitamin A	18 - 29 mo.	26	624.63	528.59	37.00
vitamin A	30 mo. - 5 yrs.	34	613.52	358.66	41.50
vitamin E	6 - 17 mo.	14	2.86	0.93	34.50
vitamin E	18 - 29 mo.	26	2.58	1.09	29.65
vitamin E	30 mo. - 5 yrs.	34	4.02	2.97	44.74
					X ² = 7.58; P = .02 ¹
zinc	6 - 17 mo.	14	5.32	1.61	38.14
zinc	18 - 29 mo.	26	5.22	2.32	34.62
zinc	30 mo. - 5 yrs.	34	5.46	1.89	39.44
selenium	6 - 17 mo.	14	31.28	11.85	25.00
selenium	18 - 29 mo.	26	37.24	13.05	34.62
selenium	30 mo. - 5 yrs.	34	46.08	16.31	44.85
					X ² = 9.17; P = .01 ¹

¹Kruskal-Wallis test on ranked data

A Mann-Whitney U test, a nonparametric equivalent of the independent samples *t* test, was performed to compare the means of the nutrient data stratified on gender and income (Kinnear and Gray 2004). Although the mean ranks were higher for all macronutrients in boys than girls, the Mann-Whitney U test failed to show statistical significance. Likewise, the mean ranks were higher for all macronutrients in families with incomes above \$150 per month except for carbohydrates, yet the Mann-Whitney U test failed to show significance. While the mean nutritional intakes demonstrated some trends of higher nutrition among

boys and families of higher household incomes, the results were not statistically significant.

Table 19: Frequency of Macronutrient Intake by Gender and Salary

	n	Mean (g)	Std. Dev.	Mean Rank
Boys: kcal	37	1117.94	366.27	38.35
Girls: kcal	37	1083.80	365.19	36.65
Boys: carbs	37	173.90	58.09	38.65
Girls: carbs	37	171.22	59.27	36.35
Boys: protein	37	42.72	16.83	39.89
Girls: protein	37	38.71	13.45	35.11
Boys: fat	37	35.45	31.55	40.65
Girls: fat	37	29.41	17.17	34.35
> Avg. Salary: kcal	24	1115.80	334.32	39.63
< Avg. Salary: kcal	50	1093.70	379.95	36.48
> Avg. Salary: carbs	24	168.75	51.40	36.58
< Avg. Salary: carbs	50	174.39	61.74	37.94
> Avg. Salary: protein	24	43.64	17.28	40.71
< Avg. Salary: protein	50	39.31	14.17	35.96
> Avg. Salary: fat	24	31.59	13.97	41.00
< Avg. Salary: fat	50	32.83	29.49	35.82

Compared with the nutrition goals for the appropriate age ranges in the United States, the children in the study ranked above the recommended daily allowances (RDA) for macro- and micronutrients in the following age groups: carbohydrates, proteins, selenium, and zinc in all three groups; kilocalories in groups 2 and 3; fats in groups 2 and 4; vitamin A in groups 3 and 4. The following age groups performed below the RDA: group 4 for kilocalories; group 3 for fats; group 2 for vitamin A; and all three age groups for vitamin E. The major trend of the data indicated vitamin E deficiency. However, dietary vitamin E deficiency occurs very rarely. Deficiency of vitamin E only occurs in two classes of people: 1) low birth weight infants whose low vitamin E levels have been linked

with their medical problems; and 2) people who do not absorb fat normally such as sufferers of cystic fibrosis (National_Research_Council 1989:99). Therefore, the apparent low intake of vitamin E compared to the RDA goal is likely insignificant in this study and can be explained by insufficient sample size or incomplete dietary records. There were no reported cases of childhood blindness nor measles-complicated pneumonia, which would be a sign of possible vitamin A deficiency.¹⁷ Figures 19 through 21 illustrate where the different age groups rated for vitamin A, E, and zinc for the two-day combined recall compared to RDAs.

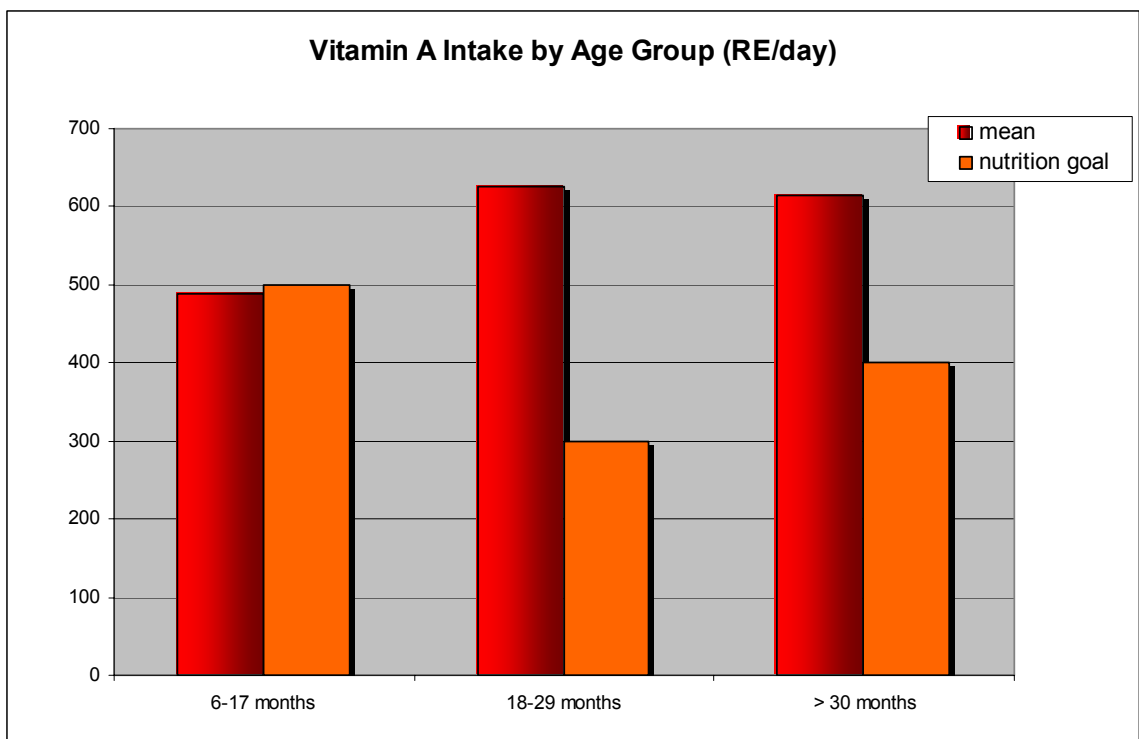


Figure 19: Vitamin A Intake by Age Group

¹⁷ There were 10 cases of pneumonia and 3 cases of measles in the medical histories of the 91 children in the semi-structured questionnaires, but none of the children suffered from both diseases.

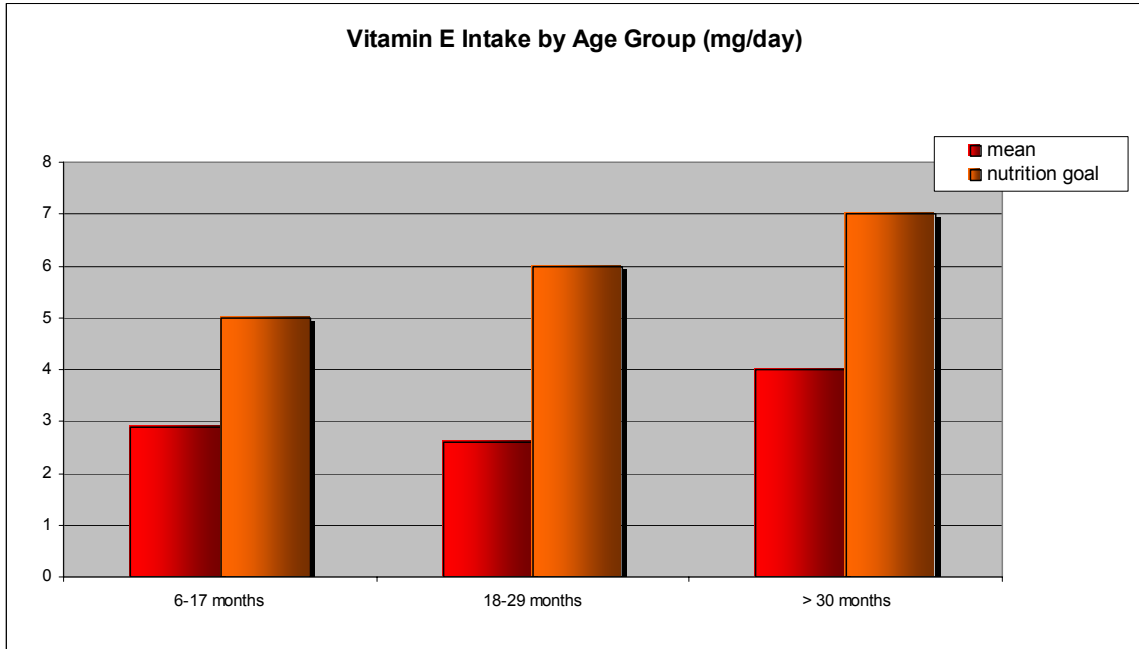


Figure 20: Vitamin E Intake by Age Group

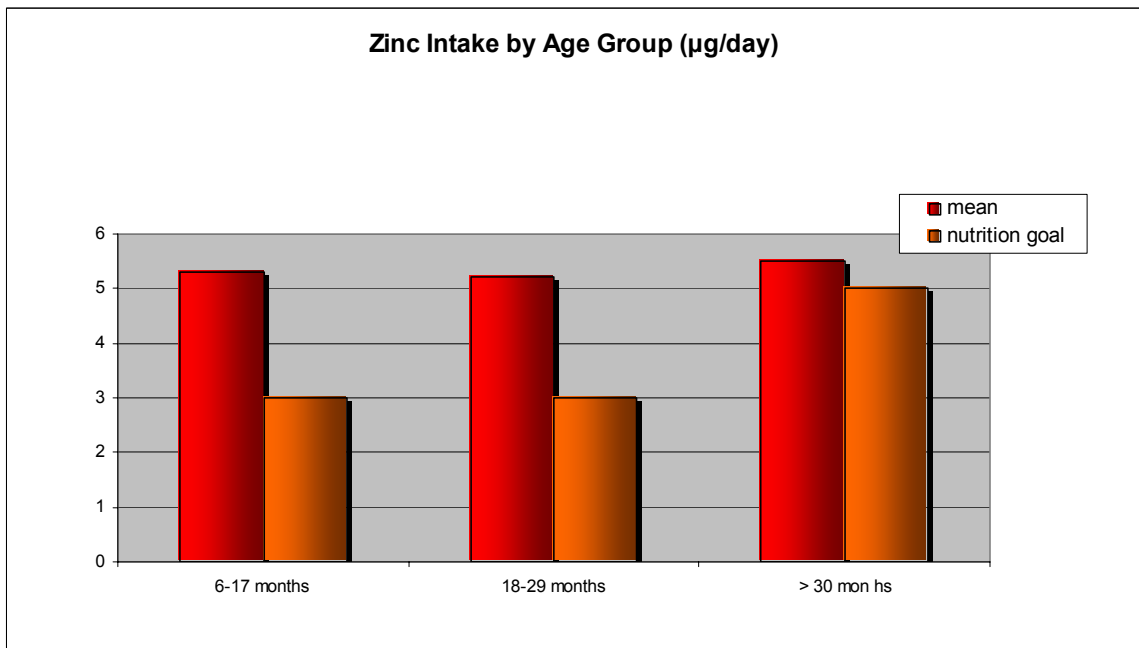


Figure 21: Zinc Intake by Age Group

The dietary data has limitations because the researcher was unable to determine the cooking method used in the preparation of the meals, so the dietary recall was not able to capture which type of fats and oils were used in

cooking nor which condiments were used in seasoning of the food. Therefore, the dietary analysis should be considered as incomplete and suggestive only, and cannot be used to accurately correlate with frequency of self-reported childhood respiratory illness outcomes. Moreover, if nutritional deficiencies are indeed present in the children of Penipe, a thorough nutritional study would have to be undertaken to measure food intake more precisely and include anthropometric data. The exercise was instructive to assist the researcher to understand the basic diet of the children in the study and to determine the quantity and frequency of consumption of particular foods such as meat, dairy products, and vegetables to estimate whether they were receiving enough calories, carbohydrates, fats, protein, vitamins, and minerals in their daily diet. On the basis of the preliminary dietary data collected, this study concludes that the children's daily dietary requirements were being met.

The analysis of the quantitative data results was useful to show statistical associations for the primary variables of interest. While the chi-square test of association has limitations, some inferences can be made. In the following section on research hypothesis results, the researcher employs the binomial logistic regression procedure to better understand the relationship between SES and treatment choice.

PART II – TESTING THE RESEARCH HYPOTHESES: RESULTS

The aim of the binomial logistic regression analysis was to determine the socioeconomic factors which were associated with seeking a doctor rather than employing household remedies for a series of symptom clusters. The three categories of health care-seeking behavior were recoded into two categories: doctor and household remedies or nothing in order to create dichotomous variables for chi-square tests. These variables were used as the dependent categorical variables, and the nine SES indicators were used as independent variables based on the results of the bivariate statistical tests. According to convention in binomial logistic regression, the number of independent variables cannot exceed 10 percent of the sample size. Using the treatment choice for the nine clusters of respiratory illness symptoms as the dependent variable, nine logistic regression procedures were carried out using the forward stepwise likelihood ratio method. After running the logistic regression procedures, five SES independent variables were removed from the analysis during the procedure because of lack of effect on the outcome variable.¹⁸ It was important to leave all of these SES variables in the initial model because it was not clear which variables would be associated with help-seeking behavior, although from the bivariate tests, salary had emerged as a significant variable.

This left four remaining independent variables in the models which included: salary above the mean, non-dirt floor, owning a television, and owning

¹⁸ The variables removed were appliance ownership, more than 3 rooms in the home, wall of blocks or bricks, land ownership, and owning more than 3 agricultural animals.

a bicycle. For the symptoms of interest (rapid breathing and indrawn chest), high SES on the independent variables of owning a bicycle and a television were associated with treating the child at home for rapid breathing and indrawn chest, respectively [odds ratio (OR) = .14, $p < .05$; OR = .34, $p < .05$]. This finding was the opposite for the other symptom clusters, which found an association between high SES and treatment choice of a doctor, yet the odds ratios are not high enough to discount the other more significant findings. The result may be explained by an overall lack of recognition for these severe ARI symptoms, thus confounding the results (Mull, et al. 1994). For fever and nasal secretion health care-seeking, families with a non-dirt floor were two times as likely to seek medical care for their child (OR = 2.07, $p < .01$). For cough, fever and nasal secretion health care-seeking, families with an above-average salary were five times as likely to seek a doctor for their child's symptoms when controlling for the other three independent variables (OR = 5.97, $p = .05$); moreover families with non-dirt floors were 3.5 times more likely to seek a doctor than treat at home for children with these symptoms (OR = 3.51, $p = .05$). Finally, for cough and phlegm health care-seeking, families with a non-dirt floor were six times more likely to seek medical care (OR = 5.91, $p < .05$), and families who owned a television were 3.6 times more likely to seek a doctor for these symptoms (OR = 3.62, $p < .05$). The results of the binomial logistic regression procedures demonstrated an association between owning particular material possessions and earning an above-average salary with a pattern of seeking help at a medical facility rather than treating at home to address childhood illness signs. In

Table 20: Logistic Regression for Health Care-seeking Behavior

Variable	Odds Ratio	95% CI	β	s.e.	P-value
Cough and Nasal Secretion					
salary	2.38	0.59-9.43	0.8650	0.7033	0.2187
non-dirt floor	3.95	0.98-15.95	1.3724	0.7127	0.0541
television	0.42	0.12-1.47	-0.8657	0.6395	0.1758
bicycle	0.38	0.11-1.29	-0.9797	0.6334	0.1219
Cough and Fever					
salary	1.18	0.36-3.85	0.1633	0.6049	0.7482
non-dirt floor	3.08	0.86-11.04	1.1245	0.6517	0.0844
television	0.90	0.31-2.62	-0.1100	0.5480	0.8409
bicycle	0.92	0.28-3.06	-0.0807	0.6117	0.8950
Fever and Nasal Secretion					
salary	1.64	0.42-6.35	0.4951	0.6903	0.4732
non-dirt floor	7.91	2.02-31.01	2.0683	0.6970	0.0030
television	1.18	0.37-3.75	0.1690	0.5879	0.7738
bicycle	0.23	0.07-0.80	-1.4592	0.6302	0.0206
Cough, Fever and Nasal Secretion					
salary	4.97	0.94-26.19	1.6028	0.8482	0.0588
non-dirt floor	3.51	0.97-12.73	1.2551	0.6576	0.0563
television	1.61	0.54-4.80	0.4783	0.5561	0.3897
bicycle	0.53	0.14-1.96	-0.6347	0.6681	0.3421
Cough and Phlegm					
salary	0.67	0.17-2.66	-0.3973	0.7023	0.5715
non-dirt floor	5.91	1.42-24.57	1.7764	0.7271	0.0146
television	3.62	1.03-12.79	1.2873	0.6435	0.0454
bicycle	0.12	0.03-0.45	-2.0983	0.6634	0.0016
Cough, Phlegm, and Nasal Secretion					
salary	1.68	0.36-7.88	0.5195	0.7884	0.5100
non-dirt floor	2.17	0.52-9.01	0.7741	0.7264	0.2866
television	2.24	0.64-7.85	0.8046	0.6405	0.2090
bicycle	0.34	0.09-1.31	-1.0760	0.6849	0.1162
Rapid Breathing					
salary	1.28	0.31-5.21	0.2464	0.7161	0.7308
non-dirt floor	2.05	0.42-10.12	0.7179	0.8145	0.3781
television	1.02	0.28-3.78	0.0205	0.6677	0.9756
bicycle	0.14	0.04-0.51	-1.9473	0.6491	0.0027
Indrawn Chest					
salary	0.89	0.31-2.55	-0.1127	0.5358	0.8333
non-dirt floor	3.24	0.84-12.49	1.1748	0.6889	0.0881
television	0.34	0.11-1.00	-1.0866	0.5545	0.0501
bicycle	0.54	0.19-1.60	-0.6098	0.5496	0.2672
Rapid Breathing and Indrawn Chest					
salary	1.02	0.32-3.25	0.0216	0.5902	0.9709
non-dirt floor	1.37	0.31-6.01	0.3149	0.7542	0.6763
television	0.55	0.71-1.74	-0.6076	0.5913	0.3042
bicycle	0.60	0.19-1.92	-0.5057	0.5911	0.3922

particular, having a non-dirt floor improved predictive accuracy of the models, except in the case of the symptoms of rapid breathing and indrawn chest, which displayed inconsistent treatment choices irrespective of SES because of overall lack of recognition of these biomedical symptoms.

- First Research Hypotheses

- 1) Female caregivers of higher socioeconomic status with under-fives who display signs of severe respiratory distress are more likely to seek allopathic medical care.
- 2) Female caregivers of lower socioeconomic status with under-fives who display signs of severe respiratory distress are more likely to seek alternative medical care or home-based care.

For the first hypothesis, from the semi-structured questionnaire results, no significant difference in health care-seeking behavior based on salary level or possessions for the two primary signs of ARI, rapid breathing and indrawn chest, was found, possibly explained by an overall lack of recognition of the biomedical symptoms of severe ARIs by the subject population. However, the results of the binomial logistic regression tied ownership of particular material possessions and above-average salaries with seeking a doctor's help for other respiratory symptoms. One gauge of a caregiver's use of home remedies is recognition of the ethnomedical category of hot versus cold cough. A crosstabulation between television ownership and hot/cold cough knowledge was performed, and the

resulting chi-square statistic was highly significant ($X^2(1) = 8.12$, $p < 0.01$, two-tailed). This result suggests that caregivers without televisions, i.e. of low SES, were associated with possessing hot/cold cough knowledge, suggesting the use of home herbal remedies, the preferred treatment for this illness. Therefore, there is some evidence that caregivers of low SES were likely to employ home or herbal remedies.

The results of the binomial logistic regression confirmed the results of the preliminary chi-square tests, which found an association between certain SES variables and treatment choice. Moreover, since families of low SES were associated with children who had a medical history of frequent coughs and colds, wheeze, and hospitalization for a chest illness, their strategy of attempting to treat childhood ailments at home first was a cost-saving mechanism to avert the potentially high costs of medical care, which could place a further strain on already limited household economic resources in the case of a hospitalization, for example. While not a definitive result, from the research results of the focus group sessions and the in-depth interviews with healthcare professionals, there is a higher tendency for people of low SES to treat their children at home initially rather than seek help at a healthcare facility, where they may incur expenses for medicines and travel, and lose time from agricultural work.

- Second Research Hypothesis

Biomedical healthcare practitioners maintain a perception that female caregivers delay seeking treatment for their under-fives who display

biomedically defined symptoms for ARIs because of an inadequate understanding of the biomedical model, meaning lack of education.

For the second hypothesis, there was support that doctors believe that their patients are unaware of the seriousness of ARIs due to lack of health education and therefore delay care-seeking. This conclusion is based on the qualitative data from the in-depth interviews with the healthcare workers and the focus groups with mother respondents. Of the seven doctors and nurses who responded to the question on maternal health care-seeking delay, five emphasized the need for more health education on the importance of seeking biomedical care for certain serious conditions and following prescription regimens properly. The doctors from CEBYCAM had undertaken monthly health education classes with the groups of families that CEBYCAM was assisting with money for education costs courtesy of Italian donors for the children of these poor families. As described in the section under focus groups, the doctors were educating these people on topics of first aid and family planning, so there was the belief on the part of the doctors that they needed to receive this health information. The healthcare workers expressed the need for more health education on respiratory infections for their clients during the interviews, yet this was not part of the curriculum of the health education lectures by CEBYCAM. For example, one doctor observed that the mothers would use home remedies, such as herbal teas, for as long as four days before bringing a child to the doctor. However, the health professionals also listed other reasons to explain the delay in health care-

seeking, e.g. tending animals and treating at home or with a *curandero*. Another doctor mentioned that mothers know about ARIs, but do not follow their prescriptions properly. The healthcare professionals' recommendation was to wait no longer than two days to seek treatment if the child's condition did not improve.

The nurses' and doctors' biomedical model followed AIEPI guidelines for the treatment and symptom recognition of ARIs.¹⁹ In the pamphlet produced by the Ministry of Public Health to warn of ARIs, several risk factors are mentioned, including poor nutrition, poor vaccination coverage, lack of breastfeeding, as well as smoke and lung irritants, quick changes in outside temperature, and exposure to dirt or dust. The primary symptoms mentioned in the pamphlet are cough, wheeze, fever, pain in the throat and ear, and nasal obstruction. The pamphlet offers some simple home remedies that can be applied to alleviate some symptoms, such as tapping the back to relieve phlegm, placing cold compresses on the forehead and stomach to lower the child's temperature, and offering more liquids. The pamphlet warns of the signs of pneumonia such as difficulty breathing, indrawn chest, a pallid hue to the skin, inability to eat or drink, and lack of response to stimulation, and suggests that if these signs are present to bring the child to the doctor immediately.

When mothers were asked to describe what they believed to be ARI symptoms, they mentioned "chest whistling, tightening of the chest, green nasal discharge, stuffy nose, cough, colds, and wheezing," all of which could be

¹⁹ AIEPI stands for *Atencion, Integral, Enfermedades, Prevalentes en la Infancia* [Attention, Integral, Sickneses, Prevalent in Infancy] and was developed in conjunction with WHO.

possible symptoms for ARIs as defined in the biomedical model. Some of the mother's other explanations for the cause of ARIs, such as change in climate, lack of vitamins, and ash rain from the volcano, were all also plausible explanations from a biomedical standpoint for the onset of ARIs. The main discrepancy between the biomedical and ethnomedical models was the mothers' use of various home remedies for an extended time, over the two-day limit as recommended by healthcare professionals. From the information collected regarding the ethnomedical category of hot/cold coughs, the use of cold compresses was only employed for hot coughs, which were considered less severe than cold coughs.

Therefore, there was considerable overlap between the biomedical and ethnomedical models for the identification of ARIs, but some inconsistencies between the type and length of application of home remedies employed. Moreover, the results of the chi-square tests confirm the doctor's assertions of lack of recognition and treatment delay, especially for indrawn chest and the aggregate of symptoms of indrawn chest and rapid breathing, which indicated a lack of congruence between perception and treatment, meaning that while caregivers perceive the symptoms as serious, they choose to treat the illness at home initially.

PART III – DISCUSSION

The initial research began with the focus group discussions and participant observation in the health posts in Penipe. The focus group discussions were useful in generating new information, increasing the list of terms used to describe illnesses and treatments, and establishing rapport with the research subjects. The discovery for example of the ethnomedical classification system of hot coughs versus cold coughs, generated new areas of inquiry in the semi-structured questionnaire, and additionally, led to fruitful discussions concerning herbal remedies. The information generated by the focus group discussions was an excellent starting point to narrow the field of inquiry for the development of the semi-structured questionnaire. Without the experience of talking to the mother respondents in a semi-informal manner, the semi-structured questionnaire exercise would not have been very productive, nor accurate. Such an experience lends credence to the earlier assertion that epidemiological or medical studies informed by an ethnographic component lead to more meaningful research results (Dunn and Janes 1986; Weiss 1988).

By spending time in the waiting rooms of both CEBYCAM and SCS Penipe, the researcher was able to take notes on the surroundings, such as all the posters and paintings adorning the walls, to gauge the relative experience of waiting. At SCS Penipe, the experience of waiting was improved through painting the interior with vibrant colors, adding plants, making various health information brochures and pamphlets available, offering water and tea, and

having a television with educational videos to entertain the waiting public. All of these improvements were made during the course of the research. In contrast, at CEBYCAM, the same row of chairs and lack of stimulation for the waiting public continued throughout the research period. While there were some educational posters and pictures, the clients did not appear to take an interest. Both at SCS Matus and PS Palictahua, the waiting hall was very barren and uninviting. These venues are prime locations for displaying health promotion messages, but they remain underutilized.

In the in-depth interviews with the healthcare professionals, doctors, nurses and other healthcare workers mentioned diarrhea, stomach parasites, and respiratory illnesses as the primary health problems in the region with poverty as the underlying cause. When compared to the focus group discussions with mother respondents, there was agreement on this point; however, the mothers had suggestions for how to improve their situation through reinstating government food programs. As for barriers to seeking timely treatment, some nurses commented that the hours of the clinics were restrictive, and the people would seek care more readily if the hours were extended. This sentiment was echoed in the focus group discussions with mother respondents; however, the mothers' primary identified barrier for seeking medical care was the cost of medications. While the healthcare workers perceived the primary barriers to care as economic, in the sense that mothers did not want to leave their fields and treated most respiratory ailments in their children at home, in the mothers' opinion, the expenses of visiting the health posts were prohibitive because of the

costs of bus fares and medicines. These identified barriers are echoed in ethnographic studies of ARIs in other developing countries in Latin America, the Middle East, and Asia (Gove and Pelto 1994; Hudelson 1994; Mull and Mull 1994; Nichter 1994; Stewart, et al. 1994; Hudelson, et al. 1995; McNee, et al. 1995).

There was a general consensus among the healthcare workers that the government clinics needed to expand their staff, add infrastructure, expand their hours of operation, and better reach out to the community to inform them of the medical services offered. For example, throughout the whole county, there were inadequate facilities for women to bear children. In the same vein, there was a consensus among mother informants from the focus groups that the government clinics needed to extend their hours, reach out to the public to educate them on vital health issues, and expand the services that they offered. Nevertheless, the mothers maintained a very positive view towards the health clinics, especially CEBYCAM, for the monetary support they offered to poor families.

The epidemiological data collected from the Chimborazo Ministry of Health suggested that after 2001, there continued to be a variation in outpatient consultation rates for ARIs in under-fives in Penipe County. This finding suggests a rise in risk factors for the at-risk population, causing a doubling in rates from 2002 to 2003; moreover, the result contradicted nurses' assumptions that the people of Penipe had become accustomed to inhaling volcanic ash, and outpatient rates for respiratory infections had stabilized. While the rates did fall again to average levels in 2004, in 2003 rates were comparable to the year

following the first volcanic eruption in late 1999 (Whiteford and Tobin 2002). The collection of epidemiological data was useful to compare the number of cases collected between the various health centers in Penipe County. According to the statistician at the Ministry of Health, CEBYCAM would often underreport its outpatient consultations, or miss reporting deadlines; however, the researcher was unable to corroborate this information. Nevertheless, the possibility remains that the number of cases reported for Penipe is an underestimation of the true number of ARI outpatient consultations.

The combination of qualitative and quantitative data collection and analysis techniques enabled the researcher to gain a greater understanding of childhood ARIs in Penipe County than would the utilization of one method alone. Because of the inconclusive results of some of the quantitative statistical procedures, results from the focus group discussions and in-depth interviews aided in the corroboration of research hypotheses and assumptions. For example, while one cannot conclusively assert from the statistical tests that low SES is the key variable determining the choice of home-based rather than medical care for severe ARIs, because of an overall lack of knowledge irrespective of SES, there is evidence from the qualitative findings in both the semi-structured questionnaires and focus group discussions that lack of economic capital was the primary reason for delaying appropriate health care-seeking in the case of childhood ARIs. Moreover, from the qualitative findings, it was apparent that caregivers who had experience with children with pneumonia were more likely to identify the signs of rapid breathing and indrawn chest as

serious and deserving of a doctor's visit on the semi-structured questionnaire compared to those who did not. This result parallels findings of a case-control study on ARI symptom recognition in Pakistan (Mull, et al. 1994). Moreover, consistent with the findings of Mull, et al. (1994), this research found that chest indrawing was not as well recognized as rapid breathing, perhaps since chest indrawing is a late stage of pneumonia and can be a relatively uncommon clinical symptom.

Since this is an ethnographic study, qualitative rather than quantitative methods are given more emphasis. The qualitative findings suggest that other factors besides simple symptom recognition are important determinants for seeking medical care. For example, time and money are two factors which could determine whether a caregiver is able to bring a child to the doctor. One of the criticisms of the focused ethnographic study (FES) technique for studying ARIs was that it placed too much emphasis on the cognitive dimension of illness recognition without attending to the social context (Nichter and Nichter 1994). Moreover, since FES is a rapid study technique, it is not possible to conduct a more in-depth study which can identify the structural factors which impede timely health care-seeking behavior. Gove and Pelto (1994) have defended FES that its purpose is not to investigate these larger structural constraints such as poverty but to describe and discover the ethnomedical illness categories that most closely correlate with biomedical categories in order to assist ARI programs.

This research concurs with Gove and Pelto (1994) that the major purpose

of the ethnographic project is to foster collaboration between anthropologists and healthcare practitioners in order to formulate more effective health communication, which is possible during clinician visits. Nurses and doctors need to ensure that the correct regimen of prescribed antibiotics is employed to treat ARIs in order to limit inappropriate use of these medications which may lead to antibiotic resistance. Specific recommendations for health promotion strategies are discussed later in the concluding chapter.

Where this research has gone beyond a FES approach is to identify the modifiable risk factors that could contribute to higher respiratory illness frequencies and delay in timely biomedical treatment seeking. For example, this research found that poor housing was an important factor for both increased respiratory illness problems in children and lack of timely health care-seeking. Because homes with dirt floors were associated with using wood fuel for cooking, the result was greater indoor air pollution, and consequently, children would be more likely to suffer from respiratory infections. Therefore, a public health intervention would be to not only ensure that houses have well insulated roofs, but also cement floors rather than dirt floors, which are easier to keep clean from dirt and ash. Another modifiable risk factor includes improving nutrition, by incorporating more fruits and vegetables into the diet.

Finally, the ethnographic findings of this research suggest that the research subjects are aware of the larger structural factors that limit their choices related to health care. In the focus group discussions, mothers pointed to the stress of poverty and limited food supply as negatively affecting their family's

health. In the mothers' view, it was the responsibility of the government to provide them with food and economic assistance because their communities were the victims of an ongoing natural hazard. They continued to suffer the health consequences of ash fall, and it was their view that the government was responsible for improving their situation.

CHAPTER EIGHT: CONCLUSION, RECOMMENDATIONS, AND CONTRIBUTIONS OF RESEARCH

PART I – CONCLUSION

In the final analysis, the people of Penipe are marginalized by the larger society of Ecuador. Due to the eruption of Mount Tungurahua, 12 bridges were destroyed, connecting Bilbao Parish with the rest of Penipe County, and connecting Riobamba with the popular tourist town of Baños. The closing of this road has had negative economic consequences for Penipe County. Only this year has survey work finally begun, five years later, to reconstruct these bridges and reestablish the road infrastructure. Many county residents believe that since Penipe has a small population of merely 6,485, making up a mere 1.6 percent of the population of Chimborazo Province (403,362), their voices are not heard by national government authorities whose job it is to repair the infrastructure damaged by natural disasters, since the votes of the people of Penipe could be considered inconsequential. The researcher witnessed one event where the former President Lucio Gutierrez was scheduled to make a stop in his helicopter in the county during the congressional elections, but cancelled his appearance and sent a local party candidate in his place. One of the major issues in these

elections was the reconstruction of the roads and bridges in the county. A bridge is an important symbol for connecting people and places. When bridges are precarious, there is a feeling of insecurity and dread when crossing, a feeling the researcher experienced on one trip from Bilbao Parish.



Figure 22: Bridge in Bilbao Parish

From the critical biocultural perspective, overall negative health outcomes for people from Penipe can be linked to structural factors relating to Penipe's peripheral place in the regional and national economy and to its slow recovery from the 1999 disaster caused by Mount Tungurahua. In the course of fieldwork, the researcher continued to hear complaints from residents who still had not had their roofs replaced. Another common complaint was the lack of employment and business opportunities, which relates not only to local but to national

economic crises. Those with the necessary means to leave Penipe, either in the form of economic resources or social support, usually left town to find opportunities elsewhere, while those unable to leave remained. Abandoned houses in Penipe remained unoccupied five years later, only to be revisited during the annual festivities of the Patron Saint Francis. Nevertheless, with the assistance of Italian funding through CEBYCAM, new enterprises were showing signs of life, such as a milk-processing plant and a canned meat factory. Despite the national government's inadequate response to Penipe's needs, international donors, foreign governments, and NGOs took the initiative and collaborated with local institutions in order to further Penipe's development goals, which had been sidetracked following the 1999 eruption of Mount Tungurahua.

This research has contributed to the knowledge of the ethnomedicine of ARIs and health care-seeking behaviors in a marginalized, mestizo population in Andean Ecuador. In particular, the ethnomedical research added to the knowledge of beliefs concerning hot and cold coughs, an ethnomedical classification system which crosses ethnic boundaries, between mestizo and indigenous people (McKee 1987). According to McKee (1987:1147), a Hispanically-imported belief in a humoral theory of disease has become intertwined in the Ecuadorian Andes with indigenous conceptions of hotness and coldness and has developed a folk taxonomy for common childhood illnesses like diarrhea. Of the respondents surveyed in the questionnaire, 64 percent had knowledge of the ethnomedical classification system of hot/cold coughs and were familiar with the accepted remedies to employ for each. Female caregivers

attended to both hot and cold coughs with home-based remedies, even though they considered cold coughs to be potentially serious illnesses. The caregiver respondents reported 69 different types of herbal remedies to treat common illnesses at home, and if they did not have these herbs growing in their own gardens, they usually had a neighbor who did. The caregivers reported that many of the herbs they used were effective in treating various types of coughs and colds and saved them the time and expense of seeking a doctor's help based on their responses to the questionnaires. Moreover, since the eruption of Mount Tungurahua, the general populace became more aware of particular pharmaceutical drugs according to area physicians, and this was reflected in the questionnaires which found 60 different types of over-the-counter and prescription medicines in people's homes. One nurse in Matus noted that after the eruption of Mount Tungurahua, there were numerous talks given to community members by the Ministry of Public Health, the Civil Defense force, and the Red Cross on the dangers of volcanic ash to health. Some members of the community understood the importance of using antibiotics for some types of infections and had also bought into the concept of vitamins to address potential nutritional deficiencies in their children. This greater awareness of the uses of particular medications was largely due to the collaborative efforts of the public and private health centers in Penipe County, as well as other governmental and non-governmental entities, in response to the hazard of volcanic ash from Mount Tungurahua.

Like other Andean ethnomedical studies by Bastien (1987), Finerman

(1987), Crandon-Malmud (1983, 1989), and McKee (1987, 2003), this research found a combination of strategies in the treatment of childhood illnesses. Given particular hypothetical groups of illness symptoms, mothers were reluctant to choose between treating a child at home and seeking a medical doctor because health care for each illness symptom was contingent on a multitude of factors. Some of these factors included whether the child had a low or high fever (not specified in the questionnaire), which home treatments were available, and the day and time of the week when the illness occurred. There were constraining factors placed upon the caregivers when deciding types of treatment which included costs of treatments or medicines, limited hours of the health centers, and work demands. Asking close-ended questions on treatment choice was challenging; however, the results of this line of questioning combined with the qualitative data produced rich ethnographic data.

This research modeled the semi-structured questionnaire on an epidemiologically-based medical history survey with an added section to generate open-ended responses in order to generate cultural categories. The traditional modifiable risk factors found in epidemiological studies of ARIs were not found to be significant for self-reported negative respiratory health outcomes, namely undernutrition, crowding, exposure to air pollutants, and maternal education (Lanata 2004). Moreover, non-modifiable risk factors such as child gender and age were not associated with self-reported negative respiratory health outcomes. However, other risk factors were found to be significant for negative child respiratory health such as poor housing conditions and low

socioeconomic status. This finding parallels other ARI studies in Latin America and Asia (Biswas, et al. 1999; Frost, et al. 2005). Because of study limitations, other important risk factors for ARIs could not be determined, such as breastfeeding rates, low birth weight, and exposure to volcanic ash.

In the final analysis, the qualitative sections of the questionnaires generated more useful explanations for mother's health care-seeking behavior and identification of ethnomedical signs than the close-ended sections of the questionnaire aimed at eliciting biomedical risk factors for ARIs. The standard epidemiological risk factors for ARIs in the literature which include crowding, number of children, gender, education, nutrition, and exposure to environmental pollutants such as smoke were not found to be significant risk factors for respiratory infections in this study (Graham 2001). Of course, these health outcomes were self-reported, rather than clinically observed symptoms; nevertheless, the data did not support this finding. For the past 25 years, there has been a strong tradition in social epidemiology of using self-reported health as valid indicators (Berkman and Breslow 1983; Berkman and Syme 1979). From this research, the two identified risk factors for both respiratory infections and delayed health care-seeking were low SES and lack of health education. Health education is necessary to teach mothers how to identify the signs of serious respiratory infections and to properly use antibiotics. The study concurs with the conclusion of Douglas (1990), who found that increased access to medical care combined with maternal education to improve health literacy should result in improved child health outcomes.

While low SES and lack of health education contribute to the likelihood of childhood respiratory infections, the illness should be viewed in the larger context of political-economic factors, which impinge upon the health of the population. Because the experience of health or illness depends on people's relative position within the social fabric, a mother's decision to seek medical care for her child is not a solitary one, but one that affects the whole family and is contingent upon a number of interlocking factors, such as the child's gender, time during the harvest, and access to money. While the final decision to seek medical care resides with the mother in this case, she is not alone in the process that leads to such decision-making. Treatment choice is a reflection of not only the mother's beliefs and predilections, but of family and friends also (Rubel and Hass 1990). She has to take into account the time she might lose from agricultural work, and how much money she will have to spend on transportation and medications in order to treat her child. While some doctors and nurses perceived that mothers delayed treatment for their children, the mothers themselves asserted that they would seek medical attention promptly and regularly as a preventive measure. This response bias was difficult to measure; however, the discrepancy between reported and actual behavior was corroborated by repeated health professional's testimonials of delayed health care-seeking for ARIs as well as health statistics for the region, which indicate a high incidence of ARIs, indicating that the healthcare workers had many cases of childhood ARIs on which to base their negative opinions.

This descriptive case study was modest in its goals of identifying possible

risk factors for delayed health care-seeking and negative child respiratory health outcomes, and studying ethnomedical systems of respiratory infections in rural Ecuador. Like any other part in the world, coughs and colds are frequent maladies in children, and people have adapted to treat such common ailments at home because it is both more cost-effective and less time-consuming than consulting a doctor or nurse. The problem arises when mothers mistakenly identify serious lower respiratory infections as regular coughs and colds that can be treated at home. The primary finding of this study, which is widespread across the literature on ARIs, is that mothers lack the knowledge to identify the two primary signs of ARIs, rapid breathing and indrawn chest (Mull, et al., 1994). This result parallels the findings of Nichter (1994) for India and the Philippines. Since antibiotics to treat lower respiratory infections cost between two to three dollars, serious complications from ARIs are preventable and unnecessary. However, mothers who had had their children become sick with pneumonia were familiar with the signs. The question then becomes, why did these mothers not share this knowledge with others about this very serious disease? Because childhood deaths from the disease fortunately were rare, perhaps, the seriousness of the disease had not been conveyed to others. The answer relates to people's social networks and lines of communication. One way to improve people's access to health information had been initiated by CEBYCAM with health education classes in the community given by the doctors, but there was no curriculum for respiratory infections. The subject matter focused on first aid and family planning and was limited to families receiving assistance from

CEBYCAM.

While the research identified poor recognition of severe ARI signs as a health risk for young children, when asked, some caregivers identified structural inequalities and ecological factors as the primary causes for poor health outcomes. These factors included lack of employment and educational opportunities, rising consumer prices, weak infrastructure of irrigation and roads, corrupt politicians, unsafe drinking water, and frequent ash fall which damaged their homes, crops, and livestock.

This dissertation began with Ecuadorian history, explored the culture of ethnomedicine, and ends with politics. As the distinguished anthropologist William Roseberry wrote, “even at their most esoteric, anthropological ideas about culture involve a series of (often unstated) ideas about history, capitalism, the state, political action” (Roseberry 1989:231). While the residents of Penipe are not involved in organized protests against injustice, their political action takes another form. By aligning themselves with CEBYCAM and forming producer cooperatives in order to further their development goals, they have kept one foot forward, in spite of the uneven hand that they have been dealt by political entities and geological forces.

PART II – RECOMMENDATIONS

Both the quantitative and qualitative results demonstrated that the people of Penipe County need more health information and education in order to make timely health care decisions when their children are suffering from respiratory infections. The Ministry of Public Health has prepared a colorful brochure illustrating ARI symptoms and appropriate prevention measures. However, the introduction of this pamphlet in the government health centers has not been accompanied by any organized health campaign or public health education strategy. General recommendations for preventing ARIs involve public health education efforts which focus on better nutrition, hygiene, immunization coverage, and proper use of medications, especially antibiotics, to control this deadly disease. The specific recommendations of this study indicate that public health messages regarding ARIs be informed by ethnomedical knowledge of hot and cold coughs as well as appropriate home remedies for treating mild upper respiratory infections. In addition, such education efforts need to include targeted messages to help caregivers recognize the severe signs of lower respiratory infections and use appropriate home remedies such as cold compresses and increasing the ingestion of liquids. Further, borrowing from social marketing principles, messages should be targeted to the audience of mothers of low SES, identified in the study as the population at risk. Moreover, health centers need to adhere more closely to regular hours of operation, extend evening hours, and increase staff capacity. Such extended hours would also

provide more opportunity for health education in the health centers.

The people of Penipe have become highly resilient to the negative effects of ash from the active volcano, Mount Tungurahua, yet despite this adaptation, the vulnerable members of the population are still experiencing negative health outcomes due to undernutrition, poverty, and exposure to environmental contaminants such as dust and smoke. Through a focused, concerted health campaign, great strides against the negative effects of ARIs can be achieved. A health campaign should foster community participation. There is already a group of 10 to 15 women who meet monthly at SCS Penipe to discuss women's health issues and empowerment. If the women's group were to address the ARI problem in partnership with local doctors and nurses, and create "buzz" about the topic, this could be a first step in planning a health promotion strategy that would involve peer education, educational sessions led by doctors, nurses, and community leaders, radio advertisements (there is a local radio station in Penipe), and distribution of pamphlets and flyers.

In conjunction with a health promotion campaign, the ethnographic literature has shown that training peer educators or CHWs to teach caregivers to recognize the signs of ARI and teach proper case management has met with success, strengthening the case for addressing the problem of childhood ARIs with low-cost educational strategies (Pandey, et al. 1991; Kelly, et al. 2001). Presently, there is only one community health worker in Penipe, the part-time nurse from the Department of Children and Families, and she works primarily in the urban area of the town of Penipe only. Training a group of CHWs in the

community to disseminate ARI educational information would help to decrease cases of untreated severe pneumonia.

Proper treatment and care of childhood ARIs requires the following: (1) early detection of rapid or labored breathing and indrawn chest at the household level; (2) timely maternal health care-seeking behaviors for children displaying these signs; (3) access to health care facilities with proper case management practices in place; (4) appropriate use of antibiotics; and (5) cultural sensitivity to ethnomedical illness categories and culturally appropriate health communication (Herman, et al. 1994). In this research, the main problem was not underutilization of biomedical health services because of a preference for traditional health practitioners; rather, the primary barrier was recognition of the seriousness of lower respiratory infections. Consequently, a health promotion program employing a social marketing approach should target mothers, especially younger mothers, to identify and appreciate the identifiable symptoms of rapid or labored breathing and indrawn chest as signs of lower respiratory infections that require consultation with a healthcare professional (Kotler, et al. 2002). Targeted efforts to the harder to reach rural population in the hills, beyond the main towns and hamlets of Penipe, should be a priority to improve the overall public health of the inhabitants. The targeting of high-risk segments using a social marketing strategy examines perceived benefits, barriers, and costs in order to design a culturally appropriate health promotion program in order to change behavior, known as the product, in social marketing terms.

The methodology of this study was designed using the concept of

triangulation, which combined quantitative and qualitative data gathered through a combination of research methods. Given budget constraints, this was determined to be a valid method of determining the research outcome. The research concludes that caregivers should be educated on the recognition of the signs of lower respiratory infections in young children. Based on the study results, the following summary recommendations are offered: (1) initiate a public health campaign sensitive to ethnomedical conceptions of health and illness to warn of the signs of serious lower respiratory infections and to seek a doctor immediately as well as to recognize less serious upper respiratory infections which can be treated at home; (2) lobby provincial health authorities to adhere to regular hours of operation, expand clinic hours and increase staff; (3) establish policies for disbursement of antibiotics and ensure that patients follow prescribed regimens; and (4) negotiate with bus companies to offer reduced fares when women are bringing their sick children to healthcare facilities.

PART III – CONTRIBUTIONS TO APPLIED ANTHROPOLOGY AND PUBLIC HEALTH

The combination of applied anthropology and public health in this research produced findings with relevance to both disciplines. For applied anthropology, the combination of ethnographic research and quantitative survey techniques produced data that could be used for the purpose of a health development project, using culturally-sensitive education materials by peer health educators to improve maternal recognition of severe respiratory signs. In contrast with a public health approach, which focuses on disease control and prevention, an applied anthropology participatory research project emphasizes the importance of culture in applying research findings to address community health issues.

By examining the problem of ARIs from the multiple perspectives of the caregiver, epidemiologist, doctor, nurse, social worker, and curandero, the researcher was able to develop a more in-depth understanding of the factors involved in maternal health care treatment decision-making. This research suggests that low socioeconomic status has negative respiratory health outcomes for children, as well as reduces the likelihood of timely health care-seeking behavior. This finding resonates with research in social epidemiology, which examines the effect of social and economic factors on illness outcomes. Moreover, the results of this study add further evidence to support medical anthropology's contribution to understanding the variables influencing health care-seeking behavior in a specific cultural context.

The religious and civic leaders of Penipe are active collaborators with government authorities and international development organizations to improve capacity in agricultural enterprises and health infrastructure. Research studies such as this one may assist local NGOs in Penipe to seek funding for better healthcare facilities. Recently, with Italian funding, CEBYCAM has constructed a respiratory health therapy center which will be headed by a regional pulmonologist and will attract patients from all over the province of Chimborazo. Given the poor respiratory health of area residents, primarily among children and the elderly, there will be a place where professional medical staff can treat their illnesses. Future studies of the respiratory health of children should be pursued in the clinical setting to measure symptom recognition by caregivers, as well as frequency and severity of respiratory illness episodes as recorded by physicians and nurses. The contribution of applied anthropology to this equation is to educate healthcare professionals to recognize ethnomedical signs and symptoms and use the language and idioms appropriate to the people they serve.

This research study is a combination of qualitative and quantitative research with the aim of achieving results of both high validity and reliability. The two parts of the research, the qualitative, pursued through in-depth interviews and focus groups, and the quantitative, gained through semi-structured questionnaires and epidemiological records, informed and complemented each other at different stages of the research endeavor. The researcher's combined

training in anthropology and epidemiology permitted this strategy of interdisciplinary research with positive results. In this research, the qualitative methods provided the cultural dimension that contributed to the quantitative research. Likewise, the quantitative measures indicated patterns of association that informed the tentative qualitative research findings.

The goal of this research has been to contribute to the “anthropology of childhood respiratory infections.” While not established as a subfield, the work by Hudelson (1994), Nichter (1994), Simon, et al. (1997), Stewart, et al. (1994), and Tobin and Whiteford (2002) has brought the social and cultural factors of this illness to the attention of fellow academics and policy makers. Through further interdisciplinary collaboration, general health education intervention efforts may be undertaken with the support of anthropological research to ensure culturally relevant health promotion messages. Finally, anthropological investigations which incorporate epidemiological findings have the potential to contribute to anthropological theory. This research has drawn from the work of other anthropologists to illustrate the association between childhood respiratory illnesses and broader social and cultural forces resulting from income inequality, political marginality, and natural disasters.

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APPENDIX A: ENGLISH VERSION OF SEMI-STRUCTURED QUESTIONNAIRE

ENGLISH guide for Spanish version

INTRODUCTION - Hello, my name is Juan Luque. We are doing a survey in this community with permission from the University of South Florida to learn about children's health. We are looking for the participation of people who have:

- 1) lived in the community for at least 3 years;
- 2) who are between the ages of 18 and 65 years of age;
- 3) who is a mother or caretaker of a child less than 5 years of age; and
- 4) speaks Spanish.

If you or someone in your household meets these requirements, we would very much appreciate any help you could provide us. I will be asking about the health of your child and their experiences with respiratory problems, and your efforts to treat your child. All information you provide will be kept confidential. Your participation is voluntary. There are no foreseeable risks if you agree to participate. If you participate in this study, we have small beauty compacts in exchange for your participation. If you choose not to participate, there are no consequences, and if you decide that you want to end the interview at any time, you may do so and still receive the compensation. The survey will take about 30 minutes to complete. If you have any questions about the research, I will be in the community for six months in CEBYCAM and will be happy to answer any questions you might have. My phone number in Riobamba is 2968-087. This study will interview approximately 260 participants.

DATE: _____

SUBJECT ID NO. _____

- 1) How long have you lived continuously in this community?
 1 = between 3 and 5 years
 2 = 6 to 10 years
 3 = 11 to 15 years
 3 = more than 15 years
- 2) How old are you? _____
- 3) What is your marriage status?
 1 = Single
 2 = Married
 3 = Living Together
 4 = Divorced
 5 = Widow
- 4) How many people including yourself live in your home? _____
- 5) What relationship are the people living with you and what are their ages?
- a) Family Friend
- b) Family Friend
- c) Family Friend
- d) Family Friend
- e) Family Friend
- 6) What is the age of the youngest child living in the home?
 1 = less than 6 months
 2 = 6-17 months
 3 = 18-29 months
 4 = 30 months- < 5 years
- 7) What is the sex of your child?
 1 = Male
 2 = Female
- 8) How many people share his/her bedroom?
 1 = own room
 2 = 1 person
 3 = 2 persons
 4 = 3 or more persons

IF OTHER THAN OWN ROOM:

8A) Does this person or any of those people smoke cigarettes?

1 = Yes

2 = No

8B) Does this child have his/her own bed?

1 = Yes

2 = No, shared with 1

3 = No, shared with 2

4 = No, shared with 3 +

9) How is your home heated?

1 = Coal

2 = Wood

3 = Gas

4 = Not heated

10) What fuel is used most for cooking in your home?

1 = Coal

2 = Wood

3 = Gas

4 = Wood and Gas

5 = Fuel, oil, kerosene

11) Does your child sleep where you cook?

1 = Yes

2 = No

12) Do you have a cat, dog, or bird living in your home?

0 = No (**skip to 13**)

1 = Cat

2 = Dog

3 = Cat and Dog

13) Do the pets enter the home?

1 = Yes

2 = No

These questions pertain mainly to your youngest child's chest. Please answer yes or no if possible. If a question does not appear to be applicable to your child, answer that it "does not apply."

COUGH

14) Does he/she usually have a cough with colds?

1 = Yes

2 = No

15) Does he/she usually have a cough apart from colds?

1 = Yes

2 = No

IF ANSWER IS YES TO 14 OR 15:

15A) Does he/she cough on most days (4 days or more days per week) for as much as 3 months of the year?

1 = Yes

2 = No

8 = Does not apply

15B) For how many years has he/she had this cough?

_____ number of years

8 = Does not apply

CONGESTION AND/OR PHLEGM

16) Does the child usually seem congested in the chest or bring up phlegm with colds? 1 = Yes

2 = No

IF ANSWER IS YES TO 16:

16A) Does this child seem congested or bring up phlegm, sputum, or mucus from his/her chest on most days (4 or more days per week) for as much as 3 months a year?

1 = Yes

2 = No

8 = Does not apply

16B) For how many years has he/she seemed congested or raised phlegm, sputum, or mucus from his/her chest?

_____ number of years
 8 = Does not apply

17) Does this child get attacks of (increased) cough, chest congestion or phlegm lasting for 1 week or more each year?

1 = Yes
 2 = No

IF ANSWER IS YES TO 17:

17A) For how many years?

_____ Number of years
 8 = Does not apply

17B) On average, how many chest colds per year does he/she get?

_____ Avg number per year
 8 = Does not apply

WHEEZING

18) Does this child's chest ever sound wheezy or whistling:

1 = Yes
 2 = No (**Skip to #18**)

18A) When he/she has a cold?

1 = Yes
 2 = No

18B) Occasionally apart from colds?

1 = Yes
 2 = No

18C) Most days or nights?

1 = Yes
 2 = No

IF ANSWER IS YES TO 18B OR 18C:

18D) For how many years has wheezing or whistling in the chest been present?

_____ # of years
 8 = Does not apply

19) Has this child ever had an attack of wheezing that has caused him/her to be short of breath?

1 = Yes

2 = No

IF ANSWER IS YES TO 19:

19A) Has he/she had 2 or more such episodes?

1 = Yes

2 = No

19B) Has he/she ever required medicine or treatment for the attack(s)?

1 = Yes

2 = No

19C) How old was this child when he/she had his/her first such attack?

_____ Number of years

8 = Does not apply

19D) Is or was his/her breathing completely normal between attacks?

1 = Yes

2 = No

8 = Does not apply

20) Does this child ever get attacks of wheezing after he/she has been playing hard or exercising?

1 = Yes

2 = No

CHEST ILLNESSES

21) During the past 3 years has this child had any chest illness that has kept him/her from his/her usual activities for as much as 3 days?

1 = Yes

2 = No

IF ANSWER IS YES TO 21:

21A) Did he/she bring up more phlegm or seem more congested than usual with any of these illnesses?

1 = Yes

2 = No

8 = Does not apply

21B) How many illnesses like this has he/she had in the past 3 years?

- 1 = < 1 illness per year
- 2 = 1 illness per year
- 3 = 2-5 illnesses per year
- 4 = > 5 illnesses per year
- 8 = Does not apply

21C) How many of these illnesses have lasted for as long as 7 days?

- _____ Number of illnesses
- 8 = Does not apply

22) Was he/she ever been hospitalized for a severe chest illness or chest cold before the age of 2 years?

- 1 = Yes, only once
- 2 = Yes, 2 times
- 3 = Yes, 3 or more times
- 4 = No

23) Did this child have any other severe chest illness or chest cold before the age of 2 years?

- 1 = Yes
- 2 = No

OTHER ILLNESSES

24) Has the child had any of the following illnesses, and if yes, at what age?

24A) Measles or Rubeola

- 1 = Yes
 - 2 = No
- _____ At Age

24B) Sinusitis

- 1 = Yes
 - 2 = No
- _____ At Age

24C) Bronchitis

- 1 = Yes
 - 2 = No
- _____ At Age

24D) Pneumonia
 1 = Yes
 2 = No
_____ At Age

24E) Amygdalitis
 1 = Yes
 2 = No
_____ At Age

24F) Broncopneumonia
 1 = Yes
 2 = No
_____ At Age

25) Has a doctor ever said that this child has asthma?
 1 = Yes
 2 = No

IF ANSWER IS YES TO 25:

25A) At what age did his/her asthma begin?
_____ Age in years

25B) Does he/she still have asthma?
 1 = Yes
 2 = No

25C) Does he/she currently take medicine or treatment for asthma?
 1 = Yes
 2 = No

IF ANSWER IS NO TO 25 B:

25D) At what age did his/her asthma stop?
_____ Age in years

ALLERGIES

26) Has a doctor ever said that this child had an allergic reaction to food or medicine?
 1 = Yes, food only
 2 = Yes, medicine only
 3 = Yes, food & medicine
 4 = No

27) Has a doctor ever said that this child had an allergic reaction to pollen or dust?

1 = Yes

2 = No

28) Has a doctor ever said that this child had an allergic skin reaction to detergents or other chemicals?

1 = Yes

2 = No

29) Did this child ever receive allergy shots?

1 = Yes

2 = No

FAMILY HISTORY

We would like to obtain some information about the parents or guardian living with this child.

30) Does anyone in the household smoke cigarettes?

1 = Yes

2 = No

If yes, specify

31) Please indicate whether the female adult is:

1 = Natural mother

2 = Stepmother

3 = Other

32) What is the highest grade of school completed?

1 = Primary School

2 = Secondary School

3 = Superior

_____ total years

33) What is her present job?

34) How long have you had this job?

USE OF HEALTH RESOURCES

Please choose which types of provider you seeks for the following childhood illnesses and why:

35) Cough and runny nose

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

36) Cough and fever

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

37) Fever and runny nose

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

38) Cough, fever, and runny nose

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

39) Cough and sputum

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

40) Cough, sputum and runny nose

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

41) Rapid breathing

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

42) Indrawn chest

1 = Household remedy 2 = Health clinic 3 = Nothing

Why?

- 43) Rapid breathing and indrawn chest
 1 = Household remedy 2 = Health clinic 3 = Nothing
Why?
-

Please rate the severity of the following symptoms:

- 44) Cough and runny nose
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 45) Cough and fever
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 46) Fever and runny nose
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 47) Cough, fever, and runny nose
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 48) Cough and sputum
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 49) Cough, sputum, runny nose
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 50) Rapid breathing
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 51) Indrawn chest
 1 = not serious 2 = moderate 3 = serious 4 = emergency
- 52) Rapid breathing, indrawn chest
 1 = not serious 2 = moderate 3 = serious 4 = emergency

Description of Chest Indrawing

- 53) Please view this photograph of a child and describe the symptoms you observe
-
-

Please tell me the last time you used each of the following health resources for your child and for what purpose, and what your opinion is of the resource.

54) CEBYCAM Health Clinic

55) Health Subcenter

56) Pharmacist

57) Traditional Healer

58) What is the difference between a cold cough and a hot cough and what are the treatments?

59) Are the children under 5 in your house vaccinated?

1 = Yes

2 = No

INVENTORY OF HOUSEHOLD REMEDIES

60) Record all remedies in household, what is each good for? Where do they come from? What does it cost? When was it last used?

Remedy	Use	Origin	Cost	Last Used

62) Are there certain foods that you withhold from your child when he/she is sick?

HOUSING

We would like to obtain some information about the type of housing.

63) What type of tenant are you?

- 1 = Own
- 2 = Rent
- 3 = Family
- 4 = Other _____

64) How many rooms are in the house?

- 1 = Two
- 2 = Three
- 3 = Four
- 4 = Five or more

64) Where do you get your water to cook and drink?

- 1 = Well
- 2 = Faucet
- 3 = Bottled water
- 4 = Rain
- 5 = Other _____

65) Do you boil the water to drink?

- 1 = Yes
- 2 = No

SOCIOECONOMIC STATUS

66) Answer "yes" if you have any of these things:

- 1 = monthly income _____
- 2 = any appliance
- 3 = > three rooms in home
- 4 = non-dirt floor
- 5 = Brick or block walls
- 6 = land ownership
- 7 = television
- 8 = bicycle
- 9 = > 3 livestock animals

67) What is the main income contribution for the family and from whom?

68) How many family members are economically dependent?

69) Do you receive monetary aid from friends or family outside of Penipe?

- 1 = Yes _____
 2 = No

If the respondent works in agriculture ask:

70) How often do you work in agriculture?

- 1 = permanently
 2 = occasionally
 3 = seasonally

71) The land you work on is:

- 1 = owned
 2 = rented
 3 = belongs to relative
 4 = belongs to employer

Thank you for your time today. All the information you provided is confidential. This information will be used to gain a better understanding of the respiratory sicknesses that are affecting the children in your community. The findings of this study will be related to the appropriate local health authorities.

APPENDIX B: SPANISH VERSION OF SEMI-STRUCTURED QUESTIONNAIRE

INTRODUCCION – Hola, me llamo Juan Luque. Estamos realizando una encuesta en este barrio para un estudio que realiza de la Universidad del Sur de la Florida, a fin de obtener datos sobre la salud de los niños. Buscamos la participación de personas quienes:

- 1) hayan vivido en esta comunidad por 3 años al menos;
- 2) tengan entre 18 y 65 años o más años de edad;
- 3) sean madres de niños menores de cinco años o alguien que los cuida;
- 4) que hablen español.

Si usted o alguien en la casa cumple con estos requisitos, les agradeceríamos mucho cualquier ayuda que puedan prestarnos. Preguntamos sobre la salud de su niño o niña y las experiencias con problemas respiratorios agudos, y sus métodos para sanarles. Todas sus respuestas serán confidenciales. Su participación es voluntario. No hay riesgos si está de acuerdo en participar. Si usted participa en este estudio, tenemos bolsitas de cosméticos como intercambio por su participación. Si elige no participar, no habrá ningún problema, y si elige terminar la entrevista en cualquier momento, puede hacerlo y ya recibe su compensación. La encuesta no será muy larga, dura aproximadamente 30 minutos. Si tiene cualquier pregunta sobre la investigación, voy a estar en esta comunidad en el CEBYCAM por seis meses y puedo dar respuestas a sus preguntas. Puede contactarme también en Riobamba. Mi número de teléfono es 2968-087. Este estudio va a entrevistar aproximadamente a 260 participantes.

FECHA: _____

SUBJECT ID NO. _____

- 1) ¿Hace cuánto tiempo que vive sin interrupción en este barrio?
- 1 = de 3 a 5 años
 - 2 = de 6 a 10 años
 - 3 = de 11 a 15 años
 - 4 = más de 15 años
- 2) ¿Qué edad tiene usted? _____ años
- 3) ¿Cuál es su estado civil?
- 1 = Soltero/a
 - 2 = Casado/a
 - 3 = Unión Libre
 - 4 = Divorciado/a
 - 5 = Viudo/a
- 4) ¿Cuántas personas incluyendo Ud. viven en su casa? _____ personas
- 5) ¿Qué parentesco o relación tienen las personas que viven con usted y sus edades?
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
- 6) ¿Cuántos años tienen el niño/a menor en su casa?
- 1 = menos de 6 meses
 - 2 = 6-17 meses
 - 3 = 18-29 meses
 - 4 = 30 meses a 5 años
- 7) ¿Cuál es el género de su niño/a menor?
- 1 = Hombre
 - 2 = Mujer

8) ¿Cuántas personas comparten el dormitorio de su niño/a?

1 = solo él/ella (**skip to #9**)

2 = 1 persona

3 = 2 personas

4 = 3 o más personas

SI NO TIENE SU PROPIO DORMITORIO:

8A) ¿Los que comparten fuman cigarrillos?

1 = Sí

2 = No

8B) ¿Su niño/a tiene su propia cama?

1 = Sí

2 = No, comparte con 1

3 = No, comparte con 2

4 = No, comparte con 3 o +

9) ¿Qué utiliza para abrigar su vivienda?

1 = Carbón

2 = Leña

3 = Gas

4 = No abrigamos

10) ¿Qué utiliza para cocinar los alimentos?

1 = Carbón

2 = Leña

3 = Gas

4 = Leña y gas

5 = Gasolina, keroseno

11) ¿Su niño/a duerme en lo mismo cuarto donde cocina?

1 = Sí

2 = No

12) ¿Tiene mascotas, como gatos, perros, o gallinas en su casa?

0 = No (**skip to #14**)

1 = Gato

2 = Perro

3 = Gatos y perros

4 = Más de un animal

13) ¿Las mascotas entran a la casa?

1 = Sí

2 = No

Estas preguntas se refieren al pecho de su niño/a menor. Por favor, de respuestas con Sí o No si es posible. Si una pregunta no aplica a su niño/a, simplemente da respuesta que “no aplica”.

TOS

14) ¿Normalmente, su niño/a menor tiene tos con gripe ?

1 = Sí ___ veces por año

2 = No

15) ¿Normalmente su niño/a menor tiene tos y no tiene las gripes?

1 = Sí ___ veces por año

2 = No

SI LA RESPUESTA ES SÍ A 14 O 15:

15A) ¿Su niño/a está con tos más de 4 veces por semana por lo menos 3 meses al año?

1 = Sí

2 = No

8 = No aplica

15B) ¿En total, cuántos años su niño/a ha estado con esta tos?

_____ numero de años

8 = No aplica

CONGESTION Y/O FLEMA

16) ¿Cuándo el niño/a está con gripe, elimina la flema, gargajo, o está congestionado el pecho?

1 = Sí

2 = No (**skip to #17**)

SI LA RESPUESTA ES SÍ A 16:

16A) ¿Si su niño/a está congestionado, elimina gargajo o moco de su pecho 4 veces por semana por lo menos 3 meses al año?

1 = Sí

2 = No

8 = No aplica

16B) ¿En total, cuántos años su niño/a estaba congestionado o elimina gargajo o moco de su pecho?

_____ numero de años

8 = No aplica

17) ¿Su niño/a tiene ataques de tos, congestión o flema que dura entre una semana o más cada año?

1 = Sí

2 = No (**skip to #18**)

SI LA RESPUESTA ES SÍ A 17:

17A) ¿En total, cuántos años?

_____ numero de años

8 = No aplica

17B) ¿Generalmente, cuántas gripes o resfriados por año tiene su niño/a?

_____ promedio por año

8 = No aplica

RONCAS O SUENAS

18) ¿El pecho de su niño/a alguna vez ronca o suena?

1 = Sí

2 = No (**skip to #19**)

18A) ¿Cuándo el/ella está con gripe?

1 = Sí

2 = No

18B) ¿Ocasionalmente aparte de las gripes?

1 = Sí

2 = No

18C) ¿La mayoría de los días y noches?

1 = Sí

2 = No

SI LA RESPUESTA ES SÍ A 18B O 18C:

18D) ¿En total, cuántos años el pecho de su niño/a ronca o suena?

_____ # años

8 = No aplica

19) ¿Alguna vez, su niño/a ha tenido ataques de suena el pecho que causó respiración rápida?

1 = Sí

2 = No (**skip to #20**)

SI LA RESPUESTA ES SÍ A 19:

19A) ¿Ha tenido 2 o más de estos episodios por año?

1 = Sí

2 = No

19B) ¿Ha recibido medicamentos o tratamientos por estos ataques?

1 = Sí

2 = No

19C) ¿Cuántos años tenía su niño/a cuando ocurrió su primer ataque?

_____ numero de años

8 = No aplica

19D) ¿En el tiempo entre los ataques, la respiración de su niño/a fue normal?

1 = Sí

2 = No

8 = No aplica

19E) ¿Si le llevó al médico, cuál fue el diagnostico?

20) ¿Cuándo su niño/a está haciendo ejercicio o jugando, alguna vez tiene ataques de siena el pecho?

1 = Sí

2 = No

ENFERMEDADES DEL PECHO

21) ¿Durante los ultimos 3 años su niño/a ha estado con cualquiera enfermedad de pecho que duró más que 3 días e impidió las actividades normales?

1 = Sí

2 = No (**skip to #22**)

SI LA RESPUESTA ES SÍ A 21:

21A) ¿Eliminó más gargajo o flema o parecía más congestionado, que fuera normal con cualquiera de estas enfermedades?

1 = Sí

2 = No

8 = No aplica

21B) ¿Cuántas enfermedades como estos ha tenido en los ultimos 3 años?

1 = < 1 enfermedad por año

2 = 1 enfermedad por año

3 = 2-5 enfermedad por año

4 = > 5 enfermedad por año

8 = No aplica

21C) ¿Cuántas enfermedades como estas duró por 7 días o más?

_____ # de enfermedades

8 = No aplica

22) ¿Fue hospitalizado por una enfermedad grave del pecho o gripe antes de los 2 años?

1 = Sí, una vez

2 = Sí, 2 veces

3 = Sí, ≥ 3 veces

4 = No

23) ¿Su niño/a tenía cualquier otra enfermedad grave del pecho o gripe antes de los 2 años?

1 = Sí

2 = No

OTRAS ENFERMEDADES

24) ¿Su niño/a tenía algunas de las siguientes enfermedades, y sí, a qué edad?

24A) ¿Sarampión o Rubéola?

1 = Sí

2 = No

_____ edad

24B) ¿Sinusitis?

1 = Sí

2 = No

_____ edad

24C) ¿Bronquitis?

1 = Sí

2 = No

_____ edad

24D) ¿Neumonía?

1 = Sí

2 = No

_____ edad

24E) ¿Amigdalitis?

1 = Sí

2 = No

_____ edad

24F) ¿Bronconeumonía?

1 = Sí

2 = No

_____ edad

25) ¿Alguna vez, un médico dijo que su niño/a tenía asma?

1 = Sí

2 = No (**skip to #26**)

SI LA RESPUESTA ES SÍ A 25:

25A) ¿A qué edad empezó su asma?

_____ edad

25B) ¿Su niño/a tiene asma ahora?

1 = Sí

2 = No

25C) ¿Su niño/a toma medicina o tratamientos para su asma ahora?

1 = Sí

2 = No

SI LA RESPUESTA ES NO A 25 B:

25D) ¿A qué edad se sanó del asma?

_____ edad

ALERGIAS

26) ¿Alguna vez, un médico dijo que su niño/a tiene alergias a la comida o medicina?

1 = Sí, comida solamente

2 = Sí, medicamentos solamente

3 = Sí, comida y medicamentos

4 = Sí, pero desconoce la causa

5 = No

27) ¿Alguna vez, un médico dijo que su niño/a tiene alergias al polen o polvo?

1 = Sí

2 = No

28) ¿Alguna vez, un médico dijo que su niño/a tiene alergias a detergentes o químicos?

1 = Sí

2 = No

- 29) ¿Alguna vez, su niño/a recibió inyecciones para las alergias?
 1 = Sí
 2 = No

HISTORIA DE LA FAMILIA

Nos gustaría obtener alguna información sobre los padres que viven con el niño/a.

- 30) ¿Hay alguien en la casa que fuma cigarillos?
 1 = Sí
 2 = No
si Sí, especifica
-

- 31) ¿La mujer que cuida el niño/a es:
 1 = Madre propia
 2 = Madrastra
 3 = Otra _____

- 32) ¿Cuál es su nivel de educación completada?
 1 = Primaria
 2 = Secundaria
 3 = Superior
_____ años en total

- 33) ¿Cuál es su principal ocupación?
-

- 34) ¿Cuánto tiempo ha tenido este trabajo?
-

USO DE RECURSOS DE SALUD

Cuando su hijo/a o familiar se enferma de los pulmones, a donde acude primero:

35) Tos y secreción nasal

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

36) Tos y fiebre

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

37) Fiebre y secreción nasal

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

38) Tos, fiebre y secreción nasal

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

39) Tos y gargajo/flema

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

40) Tos, gargajo/flema y secreción nasal

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

41) Respiración rápida

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

42) Hundimiento de las costillas

1 = Remedios caceros 2 = Médico 3 = Nada

¿Porqué?

- 43) Respiración rápida y hundimiento de las costillas
 1 = Remedios caceros 2 = Médico 3 = Nada
¿Porqué?
-

Por favor, dígame el nivel de severidad de los siguientes signos:

- 44) Tos y secreción nasal
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 45) Tos y fiebre
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 46) Fiebre y secreción nasal
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 47) Tos, fiebre y secreción nasal
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 48) Tos y gargajo/flema
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 49) Tos, flema y secreción nasal
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 50) Respiración rápida
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 51) Hundimiento de las costillas
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
- 52) Respiración rápida y
 1 = no muy serio 2 = moderado 3 = serio 4 = emergencia
hundimiento de las costillas

Descripción de Hundimiento de las Costillas

- 53) Por favor, vea este foto y explícame los signos que observe:
-

Por favor, cuéntame cuando fue la ultima vez que usted usó los siguientes recursos de salud para su niño/a y la razón, y también cuál es su opinión sobre el recurso.

54) CEBYCAM

55) Subcentro de Salud

56) Farmacia

57) Curandero/a

58) ¿Cuál es la diferencia entre tos fria y tos caliente y cuales son los tratamientos?

59) ¿Los niños menos de cinco años son vacunados?

- 1 = Sí
 2 = No

INVENTARIO DE REMEDIOS CACEROS

60) Escriba todos los remedios que tiene en la casa. ¿Cuál es el uso? ¿De donde provienen o adquieren? ¿Cuánto cuestan? ¿Cuándo los usó por última vez?

Remedio	Uso	Origen	Precio	Cuándo

62) ¿Qué comida no le da al niño/a cuando está enfermo?

63) ¿Cuáles son los obstáculos para ver un médico cuando su niño/a está enfermo?

VIVIENDA

Nos gustaría obtener alguna información acerca de su tipo de vivienda..

64) ¿Su casa o tierra es ...?

- 1 = Propia
- 2 = Arrendada
- 3 = Familiar
- 4 = Otro _____

65) ¿Cuántos cuartos existen en esta casa?

- 1 = Uno
- 2 = Dos
- 3 = Tres
- 4 = cuatro o más

66) ¿De donde provienen el agua para beber y cocinar?

- 1 = Pozo
- 2 = Entubada
- 3 = Embotellada
- 4 = Lluvia
- 5 = Otro _____

67) ¿Se hierve el agua para beber?

- 1 = Sí _____
- 2 = No

CONDICION SOCIOECONOMICA

68) Diga "Sí" si tiene cualquiera de las siguientes cosas:

- 1 = salario mensual _____
- 2 = cualquier herramienta
- 3 = > 3 cuartos en la casa
- 4 = piso no hecho de tierra
- 5 = pared de bloques/ladrillo
- 6 = dueño de tierras
- 7 = televisión
- 8 = bicicleta
- 9 = > 3 animales criados

69) ¿Cuál es la principal fuente de sustento para la familia y de quién viene?

70) ¿Cuántos miembros de la familia son dependientes?

71) ¿Recibe dinero de amigos o familiares que viven fuera de Penipe?

- 1 = Sí _____
- 2 = No

Si el participante trabaja en agricultura, se pregunta:

72) ¿Con que frecuencia trabaja usted en la agricultura?

- 1 = permanentemente
- 2 = ocasionalmente
- 3 = por temporada

73) La tierra donde trabaja es:

- 1 = propia
- 2 = arrendada (alquiler)
- 3 = de un familiar
- 4 = empleado
- 5 = al partir

Muchas gracias por su tiempo. Esta información va a ayudar en la comprensión de las IRAs aquí.

APPENDIX C: FOCUS GROUP QUESTIONS

Focus Group Questions

- 1) What are the most serious childhood illnesses around here?
- 2) What are the household remedies?
- 3) Do you use curanderos?
- 4) Do you know the difference between a hot cough and a cold cough?
- 5) What are the types of treatments you use to treat your child?
- 6) How long do you wait to see the doctor when your child is sick?
- 7) What are some of the obstacles to seeking care?
- 8) Do doctors use the same language as you?
- 9) What are some of the reasons that you do not take your child to the doctor?
- 10) What kind of prescriptions does the doctor bring you?
- 11) Have you heard of pneumonia?
- 12) Have you heard of an indrawn chest as a sign of illness?
- 13) Have you heard of rapid breathing as a sign of illness?
- 14) Do you have all the information you need about childhood illness?
- 15) Have you had talks about this kind of information from knowledgeable people?
- 16) Whose job is it to give you these talks?

APPENDIX D: IN-DEPTH DESCRIPTION OF ADMINISTRATION OF
QUESTIONNAIRE

In-depth Description of Administration of Questionnaire

I will not explain each one of the 73 questions with the contingent sub-questions for the whole questionnaire, but I will explain particular questions that involved some interpretation on my part that could contain research bias. In general, the first five pages of the questionnaire were easiest because they involve mostly yes/no answers. Beginning on page five, there are two sections on the use of health resources. These sections were the most difficult for the respondent to understand and answer confidently. The open-ended questions on page six and seven were not difficult for respondents to answer. The last two pages, which included the dietary recall and questions on housing and socioeconomic status were also well understood.

Beginning on page one, question number three asks for marriage status. There was some confusion about married versus living together. Most respondents answered “living together” but when talking about their partner, would use the term, *esposo*, or husband. There were also cases where the woman would answer “single”, but still talked about the father of their child or children. In these cases I assumed they were never married. I did not probe on this question and wrote down what the respondent told me. Questions four and five were related because they asked to list the persons in the household and the total number in the household (including the respondent), and occasionally I would have to correct question number four depending on the answers given in number five. Question number six was self-explanatory. If the child had just turned five years old within the month, I would still include them in the study.

Otherwise the female caregiver would not qualify for inclusion in the study. There were a few instances where I had to stop the interview at this point because the respondent did not understand my verbal informed consent presentation and thought that they would qualify for the study if they had any young children. Question nine was potentially confusing, because it appeared that the subject population did not have the idea of heating their home, but they answered regardless. This question was closely related to question 10 on cooking. Many respondents however differentiated cooking, where they would use gas if they could afford it, and heating, which was frequently related to wood fires. The rest of the questions in this section were understood.

The next section of the questionnaire deals with the child's chest. Question 14 was understood, but there was some difficulty in explaining question 15 which asked if the child had coughs apart from colds, since the two were very closely related. Question 15A generally required me to repeat the question at least once because of the length of the question. The same problem applied to question 16A. Under the section on Wheezing, if applicable I asked question 18B. I did not have the same difficulty in asking whether the child wheezed apart from colds as I did on the similarly-phrased question 15. Question 18C asks whether the child's chest wheezed most days or nights, but the respondent invariably responded "nights". Under the section on Chest Illnesses, I did not experience any trouble or confusion in eliciting responses.

The next section dealt with childhood diseases. I had to add a category right from the beginning asking about varicella, which was a relatively common

childhood illness. It is somewhat like measles, so initially, when I asked about measles, respondents would answer for example, “no, but he had varicella.” Therefore, I added the question on the questionnaire. Occasionally the respondent would not know what disease their child had had, but once I gave them the list once again, it would jog their memories. Respondents with children with allergies were fairly rare, so I did not have any problems with this section.

The subsequent section deals with family history. Of all the questions where there was a possibility the respondent was not telling the truth, question 30 had the highest probability. Frequently, the respondent would answer that their husband or boyfriend smoked, but the person usually answered for example, “only outside the house, or on weekends when he is drinking”. It is difficult to gauge the accuracy of responses to this question and whether the child was exposed to cigarette smoke. Question 32 did not always produce honest answers either, but there was a check on this question. First I asked what was the highest grade completed. Next I asked how many years of school completed. For example, if a respondent claimed that they finished secondary school but only attended 5 of the 6 required years necessary to graduate, I would have to change the response that they gave me from secondary to primary as the highest level of education attained. In the data analysis, I created a new category of “primary with some secondary education”.

The first two question sets under Health Resources were the most problematic to explain to respondents. From my general observations, the less well-educated set of my respondents did not understand these question sets very

well and tended to give the same response to each question. My question was, of the following list of symptoms, which type of provider would you seek first and why. Many answered for example, “first I treat at the home, and if the illness did not improve, I would seek a doctor.” The second set of questions asked the respondents to rate the severity of the same symptoms on a Likert scale. By comparing the responses to these two set of questions, it was my aim to determine whether for the symptoms the respondents rated as “serious” or “emergency” in the second set of questions, they chose “doctor” as the first recourse, and likewise for symptoms rated as “moderate” or “not serious”, chose home remedy or nothing in the first set of questions. Question 53 provided the respondents with a picture of a baby with an indrawn chest (The Wellcome Trust 2001). Most respondents had not seen this symptom before, and if they had seen something like it, they described it as the result of a fall and broken ribs.

The next section was a set of open-ended questions on the health centers the respondents had used and visited. For the town of Penipe the respondents generally commented on CEBYCAM and the Health Center of Penipe. For the Puela group, the respondents had experiences with the Health Center of Penipe and the Subcenter of Health – Palictagua. For the Matus group, the respondents generally had experiences with the Health Center of Matus. Question 58 probed the ethnomedical knowledge of informants on the difference between hot coughs and cold coughs. If the informant was not familiar with the terms, I wrote on the questionnaire, “does not know”.

Under the section, Household Remedies, I asked the respondent to list all household remedies currently in the home. This generally generated a long list of herbal remedies. Occasionally, the respondent would also have medicines obtained in the pharmacy. I asked respondents to tell me the use of each medicine, its origin, price, and when it was last used.

Question 61 was a 24-hour dietary recall. I showed respondents pictures of vegetables and typical meals to help jog their memories. I used a typical bowl and a cup so that the respondents could tell me portion size. I used the same form to ask them the diet of the child eight days later. Often I would have to probe to determine the exact contents of the soups and other dishes that they were consuming or to clarify what the definition of the food item consisted. I asked respondents to tell me where the food was eaten, the hour of the day, they type of food or beverage, the brand name if applicable, and the quantity. After the diet question, I asked two open-ended questions. The first question asked if there were any foods not given to sick children. The second question I asked was for the respondent to list the obstacles to seeing a doctor when their child was sick. These questions were well understood.

Under the section on Housing, the most confusing question was question 65, on number of rooms in the house. Sometimes people did not know if they should include kitchens or bathrooms as rooms. I told them just to count the number of other rooms. For question 66, people invariably answered that they got their water from the faucet, so this question did not elicit any new information. There was probably recall bias in question 67 because people had trouble

remembering how long they usually boiled water. However, this question was useful because some people replied that they did not boil water at all.

The final section of the questionnaire deals with socioeconomic status. These questions were necessary to place people on a socioeconomic scale depending on whether they answered “yes” or “no” to a list of questions about possessions and income. For the monthly income, I simply asked what their combined total monthly income was (if they had a partner), and then the determination was made later whether their income was above or below average. This section also asked respondents to answer who was the principal breadwinner of the family, how many of the family members were dependents, and whether they received money or assistance from anyone outside their town.

The final section was only asked to respondents who worked in agriculture. There was some confusion about asking whether the respondent worked in agricultural permanently, occasionally, or seasonally. To further gauge economic status for agricultural workers, the final question asked whether the respondent owned, rented, borrowed, or shared the agricultural land she or her partner worked on.

Recoding of variables

At the end of each day, I would keep track of how many questionnaires I had completed and make sure my map was accurate. I also looked over the questionnaires to make sure I did not make any mistakes. I kept a calendar so I knew when I would have to return to do the second dietary recall. It was

important not to do the second dietary recall on the same day as the week as the initial questionnaire.

Once I completed all the questionnaires, I designed a database in Microsoft Access in order to enter the data. I had to code all the variables for the quantitative data. For two questions, I checked more than one box, so I had to create a new response. For example, in question number 10, which asks what you use to cook food, many respondents answered both wood and gas, so I created a new response that was not on the questionnaire, "wood and gas". The same applied to pets (question 12) where I created a new response, "cats and dogs". Question 33 was open-ended, asking for principal occupation, but I modified the responses for ease in data entry into three categories, "housewife", "agriculture" and "other". The same applied to question 71 which asks whether the respondent received outside aid. If they answered "yes", then I coded responses into aid from either "CEBYCAM" or "family". These categories arose from the responses to the questionnaires and were created because the breadth of responses that was expected when the questions were written did not manifest itself in the data. After the data had been successfully entered into MS Access and checked for accuracy, I exported the database into the statistical software program SPSS Release 13.0 for data analysis.

ABOUT THE AUTHOR

John “Juan” Luque attended Wesleyan University and graduated with a B.A. in Cultural Anthropology and earned the distinction of receiving the Mellon Mays Undergraduate Fellowship. His undergraduate thesis was titled “The Black Jaguar: Shamanic Practice and Mythical Imagery.” He continued to pursue graduate studies in cultural anthropology, completing a Master’s degree at Arizona State University. His M.A. thesis was titled, “Power in an Ecuadorian Quichua Foundation: Conservation Planning in Grassroots Development.” He furthered his graduate studies in environmental anthropology and completed another Master’s degree at University of Wisconsin, Madison. Juan transferred to University of South Florida and finished a Master’s in Public Health in Epidemiology while pursuing the doctorate in Applied Anthropology. He has presented his research at numerous professional meetings and conferences both nationally and internationally. Juan currently resides in Tampa, Florida with his wife Marie and enjoys playing soccer and tennis.