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Dengue Fever in Tegucigalpa, Honduras: Use of the Explanatory Model in a Sample of Urban Neighborhoods to Contextualize and Define Dengue Fever Among Community Participants

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Dengue Fever in Tegucigalpa, Honduras: Use of the Explanatory Model in a Sample of Urban Neighborhoods to Contextualize and Define Dengue Fever Among Community Participants

by

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A thesis submitted in partial fulfillment of the requirements for the degrees of
Master of Arts
Department of Anthropology
College of Arts and Sciences

and

Master of Public Health
Department of Global Health
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Keywords: Folk Illness, Idiom of Distress, Arthropod-Borne Disease, Prevention and Surveillance Campaigns, Slums and Squatter Settlements

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ABSTRACT

This project elucidated the explanatory model of dengue fever held by members of urban communities in Tegucigalpa, Honduras. The study was conducted over a four-month period from May-August of 2011, and it was divided into two stages. The first stage of the project consisted of volunteer participation with dengue fever surveillance brigades in the three communities with the highest incidence of dengue fever during the beginning of 2011. This initial stage employed participant observation as its research method. The second stage was conducted in a different community within Tegucigalpa. The primary research methods employed during the second stage of the project were participant observation, semi-structured questionnaires (n=18), and ethnographic surveys (n=32). The semi-structured questionnaires were conducted in three different low-socioeconomic status neighborhoods within the research community, and the ethnographic surveys were administered in a higher-socioeconomic status neighborhood within the same community. Participant observation was conducted in all four neighborhoods. The conceptions of dengue fever were evaluated across differing socioeconomic statuses and the possibility of a folk characterization of dengue fever was investigated. The study also explored new avenues for prevention and assessed the impact of surveillance and informational campaigns. In significant aspects, the results from this study ran contrary to previous investigations on the topic (Kendall et al 1991); the results indicated that participants had an explanatory model of dengue fever very
similar to the biomedical explanatory model. However, results also indicated that participants had a local-particular, etiological characterization of dengue fever that did not coincide with the biomedical explanatory model of dengue fever. In the latter respect, results were similar to those reported by Kendall et al (1991). Similarly, the participants in this study recognized poor communal cohesion and inadequate/inefficient governmental support or intervention as a prime promoter of dengue fever. The lack of communal cohesion and tension towards governmental authorities in relation to dengue fever has been described by Whiteford (1997). Finally, there were no apparent differences in the explanatory models held by low-socioeconomic status and high-socioeconomic status participants. This study contributes to the fields of anthropology and public health by 1) exploring differences in explanatory models across socio-economic status, 2) discussing local etiologies of dengue fever relating to dirt/filth, and 3) assessing local conceptions of dengue fever within the framework of a folk illness.
CHAPTER ONE:  

Introduction

Introduction

The purpose of this project was to participate in dengue fever prevention activities and to explore the explanatory model of dengue fever within urban neighborhoods of Tegucigalpa, Honduras. Similarly, the project aimed to compare the explanatory model of dengue fever between low socioeconomic status and high socioeconomic status neighborhoods and to ascertain possible differences or similarities. Furthermore, the explanatory model of dengue fever was assessed in comparison to the biomedical explanatory model of dengue fever and with past explanatory models discussed in the literature.

Dengue Fever in Tegucigalpa, Honduras

Dengue fever is an annual epidemic in Honduras and the largest numbers of reported cases are usually registered in Tegucigalpa, the capital city. Dengue fever is a significant drain on human and monetary resources for the Secretariat of Health, the Metropolitan Health Centre (MHC), and the local health centres associated with the MHC. This thesis project was conducted within urban neighborhoods of Tegucigalpa,
Honduras to examine the problem of dengue and dengue fever and is informed by the perspectives of both medical anthropology and public health.

**Goals and Research Questions**

The goals of this project were threefold: 1) Determine the explanatory model of dengue fever within two neighborhoods of urban Tegucigalpa, Honduras, 2) determine the socioeconomic characteristics of dengue fever from the perspective of community members with a focus on social institutions, and 3) observe and participate in public health efforts for the prevention of dengue fever conducted by the *Alonso Suazo* Metropolitan Health Centre and associated branches. The goals and corresponding research questions that guided this project are provided in Table 1.

It is my contention that a focus on the biological reproduction of dengue fever, and not its ultimate social roots, has caused the disease to become a fixture in these urban neighborhoods. The constant, cyclical, and almost continual threat of dengue fever infection has come to represent the vulnerable status of those living in neighborhoods of Tegucigalpa. Dengue fever has found a new manifestation that extends beyond a biological etiology into a socially conceptualized and symbolic one. Following this line of thinking, it is possible to hypothesize that dengue fever might not only be a biological disease but also a manifestation of social discomfort within urban neighborhoods (Fleuriet, 2007; Lock and Schepers-Hughes, 1996; Lock, 1993; Herzfeld, 1986).
I argue that this could be facilitated by the fact that classical dengue fever has symptoms that can be easily confounded and which in a clinical setting are difficult to definitely associate with dengue fever: malaise, bone pain, fatigue, nausea, and pain behind the eyes (Monath, 1994). This sort of conflation between biomedical diagnoses and local taxonomies of illness has been explored by Fleuriet (2007) in relation to low/high blood pressure within a community in Baja California, México. In this case, a condition of stress and social incongruency was diagnosed, with some consistency, as low blood pressure. Although the locale and the conditions differ, the example demonstrates that local illness taxonomies may become subsumed under or integrated into the reigning biomedical paradigm. Of course, the previous example sheds light on the diagnostic differences and rationales of Western biomedical professionals when compared against other *sui generis* health models, but that realization does not preclude the privilege granted to the Western biomedical approach in the final diagnosis. Similarly, I would like to hypothesize an alternate source for dengue fever that takes advantage of current diagnostic criteria but which could be explained by local conceptions of pollution and contagion (Douglas, 1992) held by community participants.
TABLE 1. Guiding Goals and Research Questions.

<table>
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<th>RESEARCH QUESTIONS</th>
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<td>-What symptoms do residents associate with dengue fever? Why?</td>
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<td>-What type of individuals do community residents think get infected with dengue fever more often than others? Why?</td>
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<td>-What are the sources of dengue fever from the participant’s point of view?</td>
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<td>-What is the preferred mode of treatment for participants?</td>
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<td>-Who suffers from dengue fever most frequently?</td>
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<td>-Is self-diagnosis common?</td>
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<td>-What differentiates dengue fever from other diseases?</td>
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<td>-What are the differences if any between the two neighborhoods?</td>
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<td>Determine the socioeconomic determinants of dengue fever from the perspective of community members with a focus on social institutions</td>
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<td>-What community characteristics contribute to or foment the spread of dengue fever?</td>
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<td>-Does institutional response affect the spread of dengue fever? In what way?</td>
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<td>Observe and participate in public health efforts conducted by the Alonso Suazo Metropolitan Health Centre and associated branches for the prevention of dengue fever at the regional and local level</td>
<td>-What are the impediments to the successful implementation of dengue fever prevention efforts?</td>
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**Project Time Frame**

The project was conducted between May 24th and August 12th, 2010, and was divided into two phases. I was fortunate enough to work with the Vectors of Disease Wing of the Alonso Suazo Metropolitan Health Center, which is under the General Directory for Health Surveillance (DGVS). I accompanied surveillance technicians
during the first phase of the project and conducted independent surveys and questionnaires during the second phase of the project.

Caveat

I would like to note that I conducted this project one year after the removal of President Manuel Zelaya Rosales from power (June 28th 2009). Assessments of the events that transpired are varied, with some alleging that Zelaya’s removal from power was a heinous and unwarranted act which constituted a coup d’etat (Santana 2009; Dominguez Ávila, 2009), some that Zelaya’s removal was not only warranted but constitutionally sanctioned (Walsh, 2010), and still others claiming that Zelaya’s removal might have been necessary but still the actions leading to his removal were inexcusably unconstitutional (Cassel, 2009). The legality of the events that led to Zelaya’s removal from power in 2009, and the necessity of it, are under debate and will most likely never benefit from a consensus. However, the repercussions resulting from Zelaya’s removal were definite and egregious for Honduran political stability, social well-being, and financial soundness.

After Zelaya’s removal from power, Honduras was ousted from several international organizations, lost international credibility, and failed to receive international funds that subsidized the economy. Honduras experienced negative growth in 2009 (-2.1%) and an increased inflation rate (8%), which were sustained during 2010 due to the international economic crisis, in spite of open lines of credit (Banco Central de Honduras, 2011). Therefore, the debt of the non-financial public sector almost
quadrupled over the previous year and experienced a marginal reduction in 2010. However, economic indicators for 2011 were favourable (2.8% percent growth) with a reduced inflation rate (6%) and economic outlooks are favourable for 2012 as well (Banco Central de Honduras, 2011).

In summary, the spread of the dengue epidemic during 2010 might have been aggravated by a negative health sector budget. Furthermore, political instability and insecurity might have contributed to a general uneasiness amongst the population that participated in this project, leading to an increased contempt for social institutions and a greater discontent for the built environment.

**Outline of Chapters**

Chapter Two provides background information on dengue fever, dengue fever in Tegucigalpa and the general socioeconomic situation of the city with a focus on low socioeconomic status neighbourhoods. Chapter Three provides a literature review on dengue fever research in anthropology and public health, and presents the theoretical framework used for the execution of this project. Chapter Four presents the methodology utilized in the project. Chapter Five presents the results for both surveys and questionnaires independently, according to particular thematic categories. Chapter Six provides a discussion of the results and their relevance in relation the theoretical framework presented in Chapter Three. Finally, Chapter Seven provides a conclusion and a set of recommendations for the amelioration of dengue fever in Tegucigalpa, Honduras.
Summary

The purpose of this chapter was to provide a brief introduction as to the purpose of this research project, the general theoretical framework, the methods employed, and the timeline under which this project was completed. Similarly, conditions that might have influenced the year in which the research took place and their uniqueness were also addressed. Finally, a general outline was provided for the chapters contained within this thesis.
CHAPTER TWO:

BACKGROUND

Introduction

The purpose of this chapter is to present general information regarding dengue fever infection, transmission, and vector control, as well as to provide more detailed information regarding the status of the Honduran economy and social structure; in so far as they affect the proliferation of the mosquito vector for dengue fever and consequently dengue fever. Furthermore, this chapter will address some dengue fever statistics for Honduras generally and for Tegucigalpa, Honduras specifically. Overall, this chapter serves the function of contextualizing the research setting.

Dengue Fever in Tegucigalpa, Honduras

Dengue fever was first recognized as a problem for Honduras in 1978, and cases erupted sporadically throughout Honduras up to 1994 (Figueroa, 1999), even though other sources report the first epidemics in 1982-1983 (CDC, 1995; CDC, 1983). Since 1994, the vector and the disease have acquired a rather strong foothold and the disease is now considered endemic to the country.
All four serotypes of dengue fever have been found in Honduras and Tegucigalpa, specifically. This raises concern since infection with more than one serotype of dengue is associated with greater likelihood of developing the more lethal dengue hemorrhagic fever (WHO). The most recent outbreaks of dengue fever in Honduras occurred in 2002, 2007, and 2010. The majority of dengue fever cases have been concentrated in Tegucigalpa, comprising between 40-80% of all yearly reported cases (Seccion de Vectores del Hospital Alonzo Suazo, Cuadros Epidemiológicos 2010 [SVHA, 2010]).

**The Dengue Virus and Dengue Fever**

Dengue fever is a mosquito-borne disease that usually manifests in tropical climates (Patz et al 1998). Dengue is spread by a particular type of mosquito, the *Aedes aegypti*, although the *Aedes* species more generally is implicated in its spread. As a matter of fact, there is a growing concern that *Aedes albopictus* might become an important vector for dengue transmission in the Americas and Europe, but the verdict on the gravity of this possibility is still out (Alto et al 2008, Moutailler et al 2009). Regardless, dengue is considered to have become the most important arthropod-borne viral disease of humans (Monath 1994: 2395).

The mosquito is the preferred host, but humans can act as carriers of the virus as well. In simplest form, the “ingestion of viremic blood by mosquitoes and passage to a second susceptible human host” (Monath 1994: 2395) is the best mode of transmission. The original host or niche for dengue virus remains unclear. It has been noted that “mosquitoes generally acquire the virus while feeding on the blood of an infected person”
(WHO 2002), on the other hand it is recognized that, once infected, the female mosquito can transmit the virus during oviposition (egg laying).

The virus itself is even more complicated since there is more than one strain: dengue fever is caused by one of four closely related, but antigenically distinct, virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) of the genus *Flavivirus* (Center for Disease Control 2007). Fortunately, having suffered one strain of the disease provides immunity against that serotype, although it does not provide any significant protection to any of the other three serotypes (WHO 2002). This means that any given individual could suffer from dengue fever up to four times.

**Symptoms of Classical Dengue Fever**

Once a human host is infected, it takes the dengue virus 3-8 days to incubate and for symptoms to begin. Although symptoms vary, dengue fever is characterized by fever, headache, severe malaise, lumbosacral aching, and generalized muscle, joint, or bone pain (Monath 1994: 2395). In Honduras, clinics do not provide any real treatment for dengue fever besides symptom relief. Thus, patients with dengue fever have to traverse the course of the disease armed with ibuprofen (fever reducer), copious ingestion of liquids, and rest.

**Statistics Associated with Dengue Fever in Honduras and Tegucigalpa Specifically**

In cities without modern infrastructure planning and under-funded surveillance programs like Tegucigalpa, the spread of the vector and dengue fever is rampant (Thomas
that the prevalence of dengue fever for 2010 was 62,531 cases with 2,551 cases of
dengue hemorrhagic fever for the whole country, and 32,435 and 1,556 for Tegucigalpa,
respectively. This current figure represents an overwhelming increase in the number of
cases when compared to 2009 (7,547 aggregate) or any prior year, for that matter
(SVHA, 2010). The putative causes for this increase can be attributed to rapid and
uncontrolled urban growth, poor public infrastructure (i.e. lack of stable water provision,
non-existent waste management in some urban neighbourhoods, questionable waste
disposal practices), a particularly severe drought followed by an intense and protracted
rainy season, belated prevention campaigns, and surveillance activities carried out by
under-trained surveillance personnel.

Data show that in 2007 there were 28,638 registered cases of dengue fever for
Honduras and 58% of those cases were reported in the metropolitan area of Tegucigalpa.
For the year of 2006 there were only 7,800 reported cases of dengue fever for Honduras,
2010 correspond with the last years that an epidemic was confirmed for Honduras and fits
with the assessment made by Pan American Health Organization that dengue epidemics
have a cyclical nature with “ever-growing epidemic peaks [are] repeated regularly every
3-5 years. The year 2007 is one of these epidemic years and is expected to be a record-
breaking year with the greatest amount of reporting in the history of dengue over this
whole period” (PAHO: EID Updates, 2007).
The concern at the moment with dengue fever, for local officials, surveillance personnel, and citizens alike, is not only the high number of cases of classical dengue fever when compared to other years, but the possibility that the more dangerous variant of the disease might begin to manifest more frequently: dengue hemorrhagic fever. However, in spite of the high number of cases of dengue fever, the rate of dengue hemorrhagic fever is actually the lowest it has been since 1999 (3.02%). The rate of dengue hemorrhagic fever for 2010 was 4.58%, and between 2000 and 2009 it has oscillated between 5-16% of dengue cases.

**Current State of Dengue Fever and Surveillance in Tegucigalpa, Honduras**

Since 1994, there have been yearly prevention campaigns and the implementation of neighbourhood surveillance brigades in Honduras generally and Tegucigalpa specifically. However, the incidence of dengue fever has continued to rise steadily in Tegucigalpa. The 2010 outbreak presented an additional challenge, since the rate of mortality for dengue fever was particularly high (2.9 per 10,000). Even though knowledge of the disease and best practices may have increased since 1994, the incidence of the disease during epidemic years continues to rise dramatically (Figure 1).

The information presented in Figure 1 shows the increase in incidence during epidemic years and highlights the fact that incidence is low in non-epidemic years. The information presented in Figure 1 is limited to the information that was available during 2010. Figure 2 shows the incidence of dengue fever in Tegucigalpa up to surveillance week 39, showing that the incidence of cases during week 39 was higher in 2010 then they were for the totality of 2007 (Figure 1). This demonstrates the increasing manifestation of the dengue fever within Tegucigalpa during epidemic years.

**Dengue fever surveillance and control in Tegucigalpa, Honduras.** The information for this section was gathered from conversations with surveillance technicians, internal bulletins, and fact sheets available at the Alonso Suazo Metropolitan Health Centre, during May-August of 2010. Additionally, information regarding surveillance methods was observed and collected during the first phase of this research project from May 24th to June 25th 2010. The city of Tegucigalpa is divided into 41 health districts, each with a clinic capable of providing primary care. Additionally, each clinic is equipped with environmental surveillance teams and a vector surveillance unit. The Alonso Suazo Metropolitan Health Center (MHC) coordinates surveillance brigades at the
metropolitan level for Tegucigalpa. The activities carried out by the Alonso Suazo MHC are directed at the neighbourhoods with the highest incidence of dengue fever during the first four months of the year. The surveillance activities coordinated by the Alonso Suazo MHC consist of mobilizing brigades of surveillance technicians to the affected areas to complement the already present vector surveillance workforce.

The technicians are assigned a certain number of houses to inspect on a daily basis, usually around 30-50. Although the preferred and legally mandated number is 20 houses/day, surveillance technicians are rarely assigned that few. The technicians distribute larvicide based on the number of gallons of water that could potentially be stored in a given house (20 grams for every 100 gallons). They also provide basic information regarding the development of the vector, transmission, and best practices for control. If larvae are found in water containers, the water is usually discarded. A separate contingent of technicians also performs residual insecticide spraying in houses that had been previously canvassed. At the same time, whenever a case of dengue fever is reported in a health clinic, the local surveillance technicians mobilize to the urban area associated with the case to conduct water deposit inspections. The technicians also perform residual insecticide spraying in the house were the case originated and in neighbouring houses.

Factors that Contribute to the Spread of Dengue Fever in Honduras: Urbanization, Economy, and Access to Water

Honduras has the second worst income distribution in the world and has gone through a precipitated urbanization. 2.4 million people in Honduras are living in absolute
poverty, and 800,000 are found within an urban area (Canache, 1996). Urban growth in Honduras can best be categorized as unplanned and chaotic, and stems largely from economic inequalities (Cohen, 2004). Thirty percent of the poverty-stricken population in Honduras lives in an urban centre and this population is unable to afford the housing that is otherwise provided by developments in the private sector. Concurrent with this is the fact that cities have been expanding as residential requirements increase, but the economic conditions necessary to adequately sustain the increase in population have not improved (Cohen, 2004).

The above factors force the underserved majority of the urban population to inhabit areas that are of no particular developmental interest to the private sector: “Planning is done spontaneously by individuals…in [unincorporated] squatter [settlements]. It follows an anti-urban pattern of dispersed development” (Angotti, 1996:27). In the case of Honduras, this often explains the presence of marginal neighbourhoods on the banks of rivers that run through Tegucigalpa or on the sides of the several mountains that surround it. An added factor to this mode of settlement is the, at times complete, depravation of basic social services and neglect from social institutions that serve these communities (Satterthwaite, 2003).

Schreiber (2000) argues that the lack of an appropriate urban infrastructure is the main contributor to the presence of Aedes aegypti, the vector for dengue fever. The inhabitants of unincorporated urban settlements are continually plagued by material and physical conditions that expose them to a number of diseases, including dengue fever.
This has three implications for the spread of dengue fever within marginal
neighbourhoods: 1) garbage and other refuse material that can harbour water are allowed
to linger in the communities because there is no adequate method of disposal or any such
service provided by the state, 2) inadequate drainage systems within the communities
provides another potential breeding ground for the mosquito and 3) inadequate water
provisions force the inhabitants of these communities to collect water in vessels
(Satterthwaite, 2003; Schreiber, 2000).

conducted a study that focused on adequate water access for residents of four Central
American cities; one of these cities was Tegucigalpa, Honduras. The basic intention of
this research was to determine the “water-coping” strategies most used within the city’s
marginal neighbourhoods. The study found “much higher water prices facing non-tap
households, and much lower water consumption of non-tap compared to tap households”
(166). This suggests that non-tap households are more likely to store water and use it
sparingly because of the high price.

The research indicates this is especially true of marginal neighbourhoods found in
Tegucigalpa (Ortiz 2010). It is disconcerting that the data not only reveal a greater
likelihood of water storage among marginal neighbourhoods, but that its cost almost
guarantees a greater chance of this water being stored for a prolonged period of time;
therefore more prone to act as a breeding ground for the Aedes aegypti mosquito.
Unfortunately, these conditions have not changed, and as of 2010, marginal
neighbourhoods continue to receive an inadequate amount of water with only 70% receiving a constant water supply (Ortiz, 2010).

**Obstacles, challenges, and failures.** Milton Terris (1998) notes that the Latin American health care system has been characterized by a neo-liberal approach (15) that has systematically refrained from spending on health services as structural adjustment programs have become increasingly implemented in the region, a reform policy he identifies as a “Reagan-Thatcher ideology…current in the industrial nations [now] being exported to the developing countries by the World Bank and the International Monetary Fund” (1991: 370). In relation to the Honduran situation, Carlos Arteaga (2004) notes that “the sustained advancement of deterioration of the socioeconomic conditions […] and the imposition of a neo-liberal economic model have caused the Health System and Social Security to fall prey to this collective decay” (111). Arteaga (2004) further recognizes that the Honduran health care system does not benefit those who need it the most and that its current condition will continue to contribute greatly to social and environmental degradation of Honduras.

The Pan American Health Organization recently published a document that outlines the health situation in Honduras, the perceived drawbacks, failures, and the potential for improvement: The Strategy for Technical Cooperation PAHO/WHO-Honduras 2006-2010 (PAHO 2007). The document highlights the dismal condition of the Honduran state and its population, primarily its designation as a Hyper Indebted Poor Country (HIPC) with $5,000 million in debt. This is accompanied by the fact that “two-
thirds of the population lives in conditions of poverty and half of these are living in extreme poverty” (PAHO 2007; 3). The same document recognizes that the major health concern in Honduras for the “economically active population of both genders are vector transmitted diseases such as dengue fever” (PAHO 2007; 5). Furthermore, social violence has increased in major cities, pointing to a rising socio-political instability accompanied by rising corruption and embezzlement of health funds.

**Political stability, corruption, violence, and security.** This is a point of importance that relates not only to Manuel Zelaya’s removal from office in June of 2009, but to his presidency as well. During the Zelaya administration, there were several scandals related to the health sector. Eventually, the Pan American Health Organization severed ties with the Secretariat of Health due to corruption in the Secretariat and its associated branches (Alonso Miralda, Assistant Head of Vector Management for the Metropolitan Area, personal communication May 2010). After Zelaya’s removal from power in June of 2009, public and administrative attention were diverted from key sectors like health and the usual surveillance campaigns were halted because of the social and political turmoil. Surveillance technicians at the metropolitan health centre confirmed that both these aspects contributed to the 2010 dengue outbreak (Delmer Asdrúbal and Antonia Díaz, Vector Management Specialists for the Metropolitan Area, personal communication May 2010).
Summary

The above information indicates that the spread of dengue fever within Tegucigalpa and Honduras more broadly, can rightfully be attributed to underfunding, inadequate prevention campaigns, and political instability. At the same time, prevention campaigns have been carried out on a yearly basis for over two decades, and the Vector’s wing of the Metropolitan Health Center invests a considerable amount of human, material, and financial resources to placating the spread of dengue fever.

Honduras, like other Latin American and Southeast Asian countries, is locked in a struggle to control mosquito proliferation, increase local understanding of the disease, and increase knowledge of socioeconomic and socioenvironmental conditions that foment the spread of dengue fever, through academic research. As a result, this research project is informed by some of that resulting research within both anthropology and public health and is presented in the next chapter. The literature presentation is further complemented with literature on the theoretical framework that served to shape and guide the study contained herein.
CHAPTER THREE:
LITERATURE REVIEW

Introduction
This chapter will provide a review of the literature addressed for this project both from the perspective of public health as well as from the perspective of medical anthropology. The public health literature will be addressed firstly. Then I will move on to discuss the anthropological literature that informed this study, since it provides the theoretical spinal cord for the research conducted. In essence, this chapter will address the dengue research that has been conducted within both disciplines and which was considered relevant to this project.

Research on Dengue
Public health research on dengue concentrates mostly on the biological presence of the virus (Patz et al 1998; Monath 2004; James 1996), source reduction strategies to combat the disease by eliminating vector breeding sites, and so-called Integrated Vector Management (Atkinson 2010; Kittayapong et al 2006). However, these studies rarely take into account the local structural conditions and community relations that affect or impede effective vector management, and even when they do, fail to give a detailed or even satisfying portrayal (Gurtler et al 2009). Regardless of intellectual depth, there is a line of
research within public health which explores the effectiveness of public prevention campaigns and that attempts to flesh out generalized social factors which might be responsible for isolated successes or failures. Since this line of questioning and research is rather straight forward, I will address it first and then move on to the anthropological aspects of this research project.

Within anthropology, research on dengue has focused on implementation of dengue and dengue fever prevention plans (Kendall 1998), factors affecting community participation in vector control campaigns (Yasumaro et al 1998; Whiteford 1997; Coreil et al 1997), and local knowledge of dengue regarding vectors, life cycles, transmission, and symptoms (Kendall et al 1991). Most notable and relevant for the purposes of the research contained herein are the studies conducted by Whiteford (1997), Coreil et al (1997), and Kendall et al (1991).

Factors that Affect Knowledge of Dengue Fever and Prevention Strategies

Some biomedical and public health literature discusses the impact that socioeconomic status and education have on dengue knowledge (Itrat et al 2008, Syed et al 2010), others address the impact of dengue knowledge on prevention practices (Koenraadt et al 2006, van Benthem et al 2002), and still others relate the presence of dengue awareness programs in schools with the level of dengue knowledge and consequently the level of dengue prevention practices within dengue afflicted communities (van Benthem 2002 et al, Winch et al 2002).
Syed et al (2010) appropriately point out that dengue knowledge in Pakistan might be related to high socioeconomic status since televised campaigns are the preferred method of awareness promotion. Needless to say, television ownership was directly related to economic status and therefore spatial diffusion of dengue awareness campaigns was limited; socioeconomic status affected dengue knowledge because of accessibility to promotional tools. On the other hand, van Benthem (2002) and Winch et al (2002) have acknowledged that school-based prevention programs are the most effective intervention and promotion strategies for dengue containment. However, the school campaigns discussed by van Benthem (2002) and Winch et al (2002) were limited to communities in which dengue was considered a problem: low socioeconomic status communities.

The common element in these studies is the observed differential knowledge between individuals in terms of socioeconomic status, which suggests that prevention campaigns should be tailored for specific groups and made available through diverse media to ensure effective diffusion. At the same time, it assumes that one group of individuals will be at a disadvantage for information and that this disadvantage will not only have a direct impact on the practice of dengue prevention schemes, but also be determined by socioeconomic status. This precept is perfectly reasonable, but to my knowledge has not been addressed in Tegucigalpa, Honduras, in spite of the sustained presence of prevention campaigns (Figueroa 1999).
Dengue Fever and Medical Anthropology

Whiteford (1997) was concerned with developing a model of community-state interaction based on the notions low income communities in the Dominican Republic had about the spread of dengue fever and the prime causal factors. While developing this model, Whiteford identified that the community’s main handicaps in dealing with dengue were mostly structural factors, specifically an inadequate supply of water and the lack of appropriate refuse collection services. However, community residents that participated in the study consistently referred to the lack of communal unity and poor interaction with health officials or *mala union mala union* (Whiteford 1997: 203), as prime factor contributing to the spread of dengue fever within their community. The community members held governmental structures and authorities accountable for the spread of dengue fever during the epidemic season (Whiteford 1997; Coreil et al 1997). As a matter of fact, the community residents were able to describe and demonstrate their individual efforts to curtail the spread of the mosquito vector and were quick to address the lack of involvement on behalf of elected officials to provide a reliable water supply and frequent trash removal services.

Whiteford (1997) and Coreil et al (1997) encountered a low income population that was well informed about dengue fever and that was also critical of public authorities and the provision of public services. Kendall et al (1991), on the other hand, describe a community that was mostly unaware of the causes attributed to dengue fever or even the symptoms associated with the disease. Their study is even more compelling because it took place in the North of Honduras using a fairly comprehensive survey about dengue...
fever in the city of Progreso during the late 1980’s. During this period, the city of Progreso was what the researchers termed a fairly new urbanization and a prime locale to investigate knowledge of dengue fever, since it could very easily become a source of dengue fever vector spread (Personal communication Fernando Cruz 2010).

Kendall et al (1991) conducted 60 in-depth interviews concerning mosquito reproduction, viral transmission, symptoms associated with dengue fever, and necessary treatments. The interviews uncovered that the respondents were mostly unaware of the mosquito reproductive cycle or even that dengue fever was a viral disease transmitted by a mosquito vector. Similarly, the respondents were unable to provide a standardized clinical frame, as determined by consensus analysis, that could be associated with dengue fever and they were also unable to elicit necessary treatment modalities or treatment options for individuals suffering from dengue fever. All in all, Kendall et al (1991) encountered a disheartening and uninspiring picture for dengue fever and vector control in Northern Honduras during the late 1980s.

The study exposed an uninformed and unprepared populace in Northern Honduras, but there were additional insights in the study, three of which are of particular interest to the current study. First, although the participants were unable to consistently elicit a clinical frame associated with dengue fever, the respondents did allude to a syndrome; this is curious, given the fact that not even the WHO (2009) can provide a consistent definition for the clinical frame of dengue fever and urges practitioners to focus on varied syndromes. Second, the respondents were more likely to relate the spread
of dengue fever with the presence of filth and environmental contaminants than with the
presence of mosquito vector breeding sites. Finally, Kendall et al (1991) noted that the
single most concerning factor potentially contributing to dengue vector spread was the
lack of a reliable potable water source for the population of an incipient urbanization.
More contemporary Honduran experts would be inclined to agree that a reliable water
supply remains both elusive and unlikely for major urban centers in Honduras; Ortiz
(2010) would probably add that this is only the case for inhabitants of low income
neighbourhoods within Tegucigalpa and San Pedro Sula, the two major cities in
Honduras.

**Arthur Kleinman, Explanatory Models, and Medical Anthropology**

As evidenced above, the research describes dengue fever in a practical, material
way, but because of theoretical focus does not take into account either the ambiguous
popular definition of dengue or its relation to socially abstract factors, which could point
to a local illness category. In this regard, having this information available and
determining whether individuals in low income communities are suffering from dengue
fever or from an illness with a similar manifestation could improve the interactions
between patients and local practitioners in the clinical setting, as well as between
community members and vector surveillance technicians (Kleinman 1980). Hence, with
the use of Arthur Kleinman’s (1980) explanatory model, this study attempts to
demonstrate that the participants in this study had knowledge of dengue fever prevention,
symptoms, and treatments and that these did not conflict with the biomedical models
espoused in Tegucigalpa, Honduras.
Kleinman (1980) developed the explanatory model approach with the explicit intention of improving communication between practitioners of newly introduced western medical models and patients more familiar with traditional medical approaches during the clinical encounter. More precisely, the model was intended to harmonize the theoretical orientations of medical systems that focused on the psychobiosocial functioning of the healthy body with medical systems that focused solely on the biological aspect of health. The former is more closely related to the manifestation of illness, whereas the latter is ultimately concerned with disease or the clear biological alteration of expected bodily states; put another way, it explores traditional/alternative medical systems vs biomedical systems.

The application of the explanatory model was initially intended to take place within the clinical setting since this was the space where symbolic, social, and physical realities combined, and illness/disease episodes could be more clearly articulated by the patient and therefore understood in a significant way by the practitioner (Kleinman 1980:42-45). However, the model could easily be applied in non-clinical settings if the theoretical underpinnings of the approach were shifted from the socially introspective, interpersonal encounter validated by the social institution of medicine that Kleinman (1980:105) posits, to encounters with socially informed individuals in a general sense validated by the fact that society in itself is an institution. In this case, Douglas’s (1992) discussion of the individual body and the body politic can be applied, and such an approach is presented below under the subheading “Society, the Individual, and
Pollution”. It should be noted that the symbolic study of disease could just as easily take place outside of the clinical space for Kleinman, as well (1980:72).

Converting the research space to the non-clinical setting is further mediated by the fact that the explanatory model is an eight-part questionnaire that addresses information that will be consistent across individuals if indeed there is a shared model for the particular illness in question: 1) etiology, 2) time and mode of onset of symptoms, 3) pathophysiology, 4) course of sickness, and 5) treatments (Kleinman 1980:105). The simplicity of the explanatory model makes it versatile, but its greatest strength lies in the fact that the categories contained in the questionnaire allow for a great deal of elaboration on behalf of the participant.

Indeed, the explanatory model has been used outside of the clinical setting to explore treatment-seeking behaviours among patients with chronic diseases (Mshana et al 2008), shared models of common infectious disease among lay and professional practitioners (Baer et al 2008), the intricacies and nuances of folk illnesses and the confounding effect it can have on adequate treatment regimens (Baer et al 1998), shared models of chronic infectious disease (HIV/AIDS) across samples of practitioners and community members (Baer et al 2004), and even lay justifications of radon radioactive therapy (Erickson 2007).

The studies conducted by Baer et al (2008, 2004, 1998) are particularly useful because they directly discuss the degree of shared knowledge between practitioners and
patients and the manner in which this can affect communication and eventual treatment. At the same time, the studies expose that in some instances (Baer et al, 2004) the degree of shared knowledge between individuals and practitioners is greater than would be expected, thus highlighting that the ineffectiveness of treatment and intervention cannot be attributed solely to faulty information but rather faulty communication. Furthermore, Baer et al (1998) make the case that it might be necessary to appropriate local explanatory models of disease, especially when related to folk illnesses, to dispense timely and effective interventions and treatments in a manner that coincides with already operating frameworks instead working against them.

**Folk illnesses.** The term “folk illnesses” refers to any sociosyncratic circumscription of disease etiologies and symptoms that are at times particular to given regions or urban locales (Nichter 1987; Rebhun 1994) or that are generalized throughout the majority of a continent, as is the case with *susto* or *nervios* in Latin America (Weller et al 2008; Guarnaccia 2003). Folk illnesses can have ambiguous symptomatologies and, usually, have non-biomedical etiologies (McCombie 1987); therefore fail to incite cosmopolitan (read biomedical) appeal, interest, or description (Nichter 1981). At the same time, an actual biological disease can receive a folk illness categorization if the population is unaware of the actual causes of the disease and develops a *sui generis* explanation for it (e.g., Kyasanur Forest Disease, Nichter 1987) or the population mistakenly, yet consistently, relates a pastiche of clinical symptomatologies with a particular biological disease (the “flu”, McCombie 1987). The theoretical importance of discussing folk illnesses lies in the conceptual paradigm it affords to define the
somatization of psychological states. Folk illnesses, then, are the physical manifestation of a discomfort or discontent caused by the social environment and one which is physically expressed. Furthermore, the patient or sufferer is unable to manipulate the social and physical environment ensuring that the source of discomfort remains unaltered further impacting the ability of the patient to regulate the physical manifestation of symptoms that are expressed during somatization. However, this does not mean that folk illnesses are nebulous and unknowable; on the contrary, they are not only recognizable but also differentiable (Weller et al 2008; Guarnaccia 2003), thereby indicating that from the point of view of the community of interest these illnesses have structured models of occurrence and causation.

**Idioms of distress.** The discussion of folk illnesses gives way to the discussion of “idioms of distress”. The term “idioms of distress”, as used by Nichter (1981), refers to any instance in which individuals use culturally mediated, symbolic expressions to manifest anxiety, alienation, or depression without recurring to explicit expressions of either. Furthermore, “idioms of distress” can be manifested through social acts (i.e. refusal to observe host rules of decorum for particular guests) or through the physical expression of psychosocial symptoms (i.e. susto, somatization). Thus, certain folk illnesses can be “idioms of distress”. Mirowsky and Ross (1986) contend that within this framework distress can be manifested in three forms: malaise, anxiety and depression. For the purposes of this research, malaise takes center stage since it is associated by these authors with “lethargy, weakness, headaches […]” (24), conditions which are similar to some of the symptoms related to dengue fever.
Society, the Individual, and Pollution

For continuing discussion, it useful to clarify the manner in which Kleinman’s (1980) original model was slightly manipulated without affecting its utility. Similarly, the reasons for hypothesizing the presence of a folk illness in the research setting will be expounded on. For the former, the relation between social processes, physical realities, and the socially embedded individual will be brought to light, to justify the use of Kleinman’s explanatory model outside of the clinical setting. For the latter the presence of “dirt” and pollution will be discussed, to elucidate an association between ideas of contagion, disease, and illness manifestation.

The construction of the social ideology, moral paradigm or cultural group as presented by Douglas (1992) does not differ from the basic construct commonly espoused within anthropology: the individual, the group, and the environment are a triad that composes society. The difference with Douglas’ (1992) approach is both the degree and the manner in which the individual is influenced by the moral paradigm and the ultimate purpose of the moral paradigm, as well. For Douglas (1992), the moral paradigm is only relevant and current in so far as it can continue to exert control within a group or provide an acceptable framework for the explanation of phenomena within and around a group. In essence, the purpose of the moral paradigm is to bring order to a chaotic universe and to regulate the interactions of the individual with society and the environment by providing guidelines. The guidelines become self-evident to group members as they are enacted and assumed to be natural fixtures of the social world in which an individual resides. These guidelines are reaffirmed through their continued use by individuals within a group, and
their continued existence is contingent upon their ability to regulate contemporaneous phenomena and to establish meaningful patterns that coincide with previous experience and actions.

According to Douglas (1992) the ultimate need to bring order to the social realm is predicated on the fact that the physical and social universe is chaotic. In this sense, chaos simply implies a lack of patterning and therefore only exists because a particular mode of thought has not been brought to bear or to impact the perceived formlessness: there is no order. Order is tantamount to the prosperity of a system, and, in turn, unordered matter becomes an obstruction, or what Douglas refers to as “dirt”—and dirt contributes to chaos. Dirt is integral to any serious disquisition of a social system, in so much as it represents an antipode from which analysis of a system can begin: “Where there is dirt there is a system. Dirt is the by-product of a systematic ordering and classification of matter” (Douglas, 1992:35).

**The moral paradigm and the individual.** The unique feature of Douglas’s (1992) approach is the postulate that the individual is unable to separate actions or phenomena in the surrounding environment from their impact on society and therefore on the self. There is an unequivocal relation between the conduct of activities at the individual level and the visible repercussions on society and the environment, and vice versa. Douglas (1992) attributes this to an inability of the individual and the social group of concern to differentiate between society and the self. In other words, one is inextricably linked to the other and discussions on the individual reflect conceptions of
the higher social order and in turn expositions of the higher social order inevitably relate to the individual and immediate environment: society is inherent in the self, and the self is inherent in society.

This relation of concepts is useful because it dictates that any discussion of the social environment is in a way a discussion of the self within the social structure. Therefore, the inverse also holds true, any discussion of the self and the realm of the self (i.e. the physical body and individual ideology) is by an associative property a commentary on the society itself:

“The self is not clearly separated as an agent. The extent and limits of its autonomy are not defined. So the universe is part of the self in a complementary sense seen from the angle of the individual’s idea [...]” (Douglas 1992:83)

This principle of society/self relational discourse is referred to as “embodiment” (Scheper-Hughes and Lock, 1987), or as the process through which the individual internalizes social phenomena and later represents them through the use of the body as a metaphor.

Pollution. Finally, the presence of dirt within a system, or rather the presence of elements that cannot be adequately explained or justified by the existing moral paradigm and which cannot be integrated into the system in a satisfactory manner, harbours an impending possibility of unravelling the systems itself. This end result arises from the realization that a moral paradigm is a hermetic construct and that any breach can ultimately lead to saturation with disharmonized elements. The break with synchrony is
the product of the presence of pollution within the system manifested through disharmony and instigated by “dirt”. Thus, dirt and the resulting disorder are conditions that are to be avoided and that, when present, can affect the manner in which individuals relate to their surrounding environment, to others, and to themselves.

Following Douglas (1992), “dirt” figures heavily in discussions of pollution across societies and discussion about “dirt” are about everything but dirt. Previous research in Tegucigalpa has made it clear that members of low income communities, squatter settlements, or marginal neighbourhoods saw themselves as unable to manipulate the external physical events, which put them in direct contact with a perceived source of bodily pollution (Hasemann, N.d.), mainly the lack of order and “dirt”. In this case, social processes gave way to the presence of undesirable environmental conditions which could later be articulated through references to bodily states.

This approach can be injected into Kleinman’s (1980) explanatory model for three reasons: a) it outlines a pattern of interaction between the individual, local group, and society at large, b) it provides a socially relevant and visible outlet through which individuals can manifest discomfort or tension with the social environment, and c) it articulates a self-informing nexus between the individual, social practices, and social reality (Scheper-Hughes and Lock, 1987). In essence, it by-passes the need for conducting research in the clinical setting by reaffirming the notion that non-clinical settings are thoroughly imbued with conscious discussions of the body and bodily states.
by exploiting their relation to the social environment. The concepts developed above serve as the framework for this paper.

Summary

This chapter sought to address literature relevant to this project with origins in public health and medical anthropology. The public health literature included in this study was limited to a line of research which has studied the effectiveness of dengue prevention campaigns in countries with epidemic dengue fever problems. The medical anthropology literature addressed was more broad and extensive including current dengue fever research, folk illnesses, models for exploring disease and illness, and phenomenological theory as it could relate to dengue fever in Tegucigalpa, Honduras. The focus on the anthropological literature was predicated by the theoretical perspective used to inform this study.
CHAPTER FOUR:

METHODOLOGY

Introduction

The present project was conducted in two separate stages. The first stage of the project was strictly limited to participant observation and was conducted between May 24th 2010 and June 25th 2010. The second stage of the project involved participant observation as well as the administration of 18 semi-structured questionnaires and 32 semi-structured surveys. The second stage was conducted between July 19th 2010 and August 12th 2010. Table 2 lists the Tegucigalpa communities in which each project stage was carried out.

TABLE 2. Communities Included During each Stage of the Project.

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<thead>
<tr>
<th>Stage</th>
<th>Community</th>
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<tr>
<td>Stage 1</td>
<td>1) Villa Nueva</td>
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<tr>
<td></td>
<td>2) Los Pinos</td>
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<tr>
<td></td>
<td>3) Nueva Suyapa</td>
</tr>
<tr>
<td>Stage 2</td>
<td>1) Monterrey</td>
</tr>
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Stage One

My primary involvement with the surveillance technicians during this stage of the project was as a volunteer. My involvement as a volunteer during this stage of the project
allowed me to participate in the prevention efforts carried out by the regional health authorities and to observe directly the neighbourhoods or communities that were most affected during the beginning of the dengue epidemic of 2010 in Tegucigalpa, Honduras. The prevention efforts that were coordinated from the Vectors of Disease Unit in the Metropolitan Health Centre specifically targeted the communities with the highest number of reported cases of dengue fever during the first four months of the year (Villa Nueva, Los Pinos, and Nueva Suyapa). The Alonso Suazo Vectors Unit begins these prevention brigades in May and continues to carry them out until late October or early November, depending both on the severity of the epidemic and the available resources. During these six to seven months, the Alonso Suazo Vectors Unit canvasses all of the communities within the metropolitan area, moving from the communities with the highest number of cases of dengue fever to those with the lowest number. One of the requirements for moving on to the next community on the list is to canvass the current community in its entirety. Canvassing the community entails visiting each residence and surveying all possible breeding sites for the dengue mosquito vector, *Aedes aegypti*. The surveillance technicians also engage with the respective residents and provide information about dengue fever and vector spread, although the main purpose of the surveillance brigades is to distribute Temephos, a commercial larvicide, as needed and to gather information that will later be used to compile Breteau and dwelling larval presence indices.

During the month I participated in the volunteer efforts, I accompanied the Vectors of Disease Unit to three different communities from 7:00 am to 2:00 pm over the
course of three weeks. Two of these communities, Villa Nueva and Los Pinos, were outside of the physical limits of Tegucigalpa but were within the expanding urban sphere of the city. The final community I visited with the Vectors of Disease Unit was Nueva Suyapa, located within Tegucigalpa city limits.

The Vectors of Disease unit only deployed brigades during the weekdays and I spent approximately one week at each community. The last week I volunteered with the Vectors of Disease Unit in the Alonso Suazo, the union leaders staged a general strike to request an increase in work benefits, hazard pay, provision of work-related equipment, and a salary raise. During this week, the dengue prevention brigades did not mobilize, but I was able to observe the union meetings and discussions.

No data collection beyond participant observation was carried out during the first stage of the project. Although I was sanctioned by the Director of the Metropolitan Health Center and the Director of the Vectors of Disease Unit to conduct the research (both individuals reviewed a translated copy of my research proposal), the project had not yet been approved by the Institutional Review Board (IRB) at the University of South Florida. The IRB did not approve the project until the final week I was at the Alonso Suazo, which unfortunately coincided with the beginning of the strike. Thus, any information garnered during the first three weeks of this investigation is informal in nature and will be used to contextualize my knowledge base of the dengue epidemic in Tegucigalpa during the development of the second stage of this project.
Stage Two

The second stage of this project was conducted in a community within Tegucigalpa that was not part of the participant observation phase. The community was suggested by the Director of the Vectors of Disease Unit in the Alonso Suazo MHC and is referred to as Monterrey. In reality, Monterrey was the designation given the regional health district which comprised more neighbourhoods than those actually considered to be part of Monterrey proper. The community was suggested by the Director for three reasons: first, he considered it to be relatively safe; second, it had a relatively high number of cases of dengue fever; and finally, it could be accessed and exited with relative ease using the public transportation system available in Tegucigalpa, since it is located near a main thoroughfare.

I was advised by several individuals at the Monterrey health centre that it would be best for me to have an escort during the interview process. The suggestion arose from the concern that the neighbourhoods around the health centre were notably hostile to people who did not live in the community. For this reason, the first two days that I conducted questionnaires (first six questionnaires), I administered the questionnaires in the neighbourhoods where my key informant at the health centre was working for the day.

It should be noted that for the purposes of this thesis, “community” and “neighbourhood” are considered distinct demographic designations. “Community” is used to refer to the regional health districts that contain the neighbourhoods; as such,
“neighbourhoods” is used to refer to smaller residential conglomerates contained within the communities but considered separate from other residential conglomerates. Thus, the names of the communities as they were used by the Vectors of Disease Unit at the Alonso Suazo MHC, and as they are used here, refer to all of the metropolitan neighbourhoods that are under the supervision of one particular health centre. In the case of Monterrey, the local health centre is located in the Monterrey neighbourhood, but the health centre provides services to and monitors 27 different neighbourhoods ranging in size from 24 to over 900 houses, per 2004 data. The maps are currently being revised and several informants at the Monterrey health centre noted that the communities had grown considerably over the last six years.

During the first week of Stage 2 of this project, I volunteered in the dengue prevention efforts being carried out by the Monterrey health centre. The reason for participating in the prevention efforts was twofold. First, I wanted to observe whether the prevention practices espoused by the Vectors of Disease Unit at the Alonso Suazo MHC were carried out according to protocols set forth by the Vectors unit of the local health centre. Second, I was interested in seeing if the communities under the Monterrey health centre shared any similarities with the communities in which I had volunteered during the first stage of the project.

The data for second stage of this research project was gathered through the administration of 18 questionnaires and 32 surveys. The questionnaires were administered in three different neighbourhoods or colonias within the Monterrey
community: Monterrey, Las Vegas, and Comunidad Social. The majority of the questionnaires were administered in the latter neighbourhood. An additional two questionnaires were administered to health professionals. The surveys were administered in a single neighbourhood known as Roma y Vega, adjacent to Comunidad Social (Table 3). These methods are described in more detail below and a map of the neighbourhoods and communities included during both stages of this research are presented in relation to the rest of the urban core in Figure 1.

TABLE 3. Instrument used during the Second Stage of the Project by Neighbourhood

<table>
<thead>
<tr>
<th>Instrument Used</th>
<th>Neighbourhood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires</td>
<td>1) La Vega</td>
</tr>
<tr>
<td></td>
<td>2) Monterrey</td>
</tr>
<tr>
<td></td>
<td>3) Comunidad Social</td>
</tr>
<tr>
<td>Surveys</td>
<td>1) Roma y Vega</td>
</tr>
</tbody>
</table>

**Questionnaires**

During the second and most of the third week, I conducted 18 semi-structured questionnaires in three different communities under the auspice of the Monterrey health centre. Two additional questionnaires were administered to health professionals residing or working in Monterrey. The final questionnaire administered in Comunidad Social was ultimately removed from the sample, because the participant did not answer most of the questions. Thus, a total of 19 questionnaires were included in the final analysis. Convenience and systematic sampling were used to select the questionnaire participants (Boslaugh and Watters 2008:134-136). The first six questionnaires were conducted in
houses selected by a surveillance technician employed at the Monterrey health centre (i.e. convenience sampling). The last 12 questionnaire participants were selected using neighbourhood maps available at the Monterrey health centre. For the last 12 questionnaires, I arbitrarily designated the house within Comunidad Social closest to the health centre as house number one, and selected every third house for participation in the questionnaire (i.e. systematic sampling). If I was unable find participants at a selected house I selected the neighboring house to conduct the questionnaire.

The questionnaires consisted of 37 open-ended questions and took anywhere from 30 minutes to one hour and 20 minutes to administer. They were devised to address particular themes based on the principles of the explanatory model of disease put forth by Kleinman (1980; 2006): What is the source of the disease? What are the symptoms of the disease? How can the disease be treated? What is the name of the disease? These principles were formulated by Kleinman to uncover folk nosologies of illness and disease and to improve interactions between patients and health care providers by facilitating a shared understanding of the illness episode. Along with these principles, I was also interested in knowing who was most affected by dengue fever and if the respondents associated dengue fever with a particular type of individual.

The questionnaires also attempted to get at the issues of “Can other diseases be confused/conflated with dengue?” and “What is dengue fever?” from an emic, local perspective. However, the questions were not asked directly, but instead dispersed throughout the questionnaire. In some instances, the questions were also repeated with
different wording to ensure that the participant had understood, and answered, the question as it was intended. For example, the participants were first asked to list the symptoms for dengue fever, later the participants were asked to list the symptoms necessary to establish a self-diagnosis of dengue fever, and finally the symptoms through which dengue fever could be recognized in others.

The questions were formulated to encourage people to speak about what they associated with dengue fever and its causes in relation to the above mentioned principles. Since there is no agreed upon method to find or describe psychosomatic illnesses that could be the result of environmental stress, it seemed appropriate to first determine whether or not there was a condition that could be described separately from dengue fever but which was nominally identified as dengue fever. If the condition did exist, the second objective was to determine the particularities that would characterize it.

This slight alteration to the “traditional” version of the Kleinman explanatory model was warranted since the disease being investigated was already known and part of the interest of the investigation was to determine whether or not the participants related dengue fever to other more common or well-known diseases. Secondly, the explanatory model was not used within a clinical setting, although it should be noted that for the purposes of this research Kleinman’s explanatory model was expanded beyond the typical clinical considerations to take into account the socio-political and environmental factors that are thought to contribute to the spread of dengue fever. This latter concern will be addressed in two separate subheadings in the Results chapter: Perspectives on
Dengue Fever Spread in Tegucigalpa and Governmental Intervention, and Alternate Etiology and Determinants of Dengue Fever.

Additionally, although the explanatory model was devised by Kleinman to facilitate the clinical encounter, in this case the model was applied outside of the clinical setting to coincide with both practical and ethical concerns. On the ethical level, having clinical information was not necessary to understanding a local description of the disease based on respondent’s knowledge and claims; therefore, clinical presence during research would have been unduly invasive. On the practical side of things, requesting clinical presence in Honduras would have required a different human subjects procedure both at the University of South Florida and in Honduras. Given the time constraints, it did not seem feasible to explore this option.

The first six questionnaires were administered in two different neighbourhoods (Las Vegas and Monterrey). The houses were selected for participation through convenience and systematic sampling. The last 12 questionnaires were administered in a single neighbourhood that was within walking distance from the health centre. In total, six questionnaires were administered in Las Vegas and Monterrey and 12 were administered in Comunidad Social.

The last neighbourhood, Comunidad Social, was seven blocks away from the health centre. According to the census figures provided by the health centre, there were 80 houses in Comunidad Social, and it was a low income community directly next a low-
middle income community. Furthermore, Comunidad Social was located next to a river bank. This is significant because squatter neighbourhoods in Tegucigalpa are commonly located next to or on river banks, since the land does not have any commercial value and it allows low-income individuals to satisfy their residential needs (Cohen 2004, Angotti 1996). Furthermore, it is recognized that these neighbourhoods have an inadequate provision of basic social services (Nauges and Strand 2007, Satterthwaite 2003), and the lack of these services predisposes individuals within these neighbourhoods to suffer from a host of infectious diseases (Satterthwaite 2003), dengue fever among them (Schreiber 2001). For these reasons, Comunidad Social was considered exemplary of other low-income neighbourhoods in Tegucigalpa that are most commonly and more severely affected by dengue fever, and as such a logical choice for a research site.
FIGURE 3. Map of Tegucigalpa with Communities and Neighbourhoods Highlighted (Map provided by the MHC Vectors Unit)
In Comunidad Social, I began counting from the first house in the community that was closest to the health centre. I administered the questionnaires for six days from 8:30 am to 12:00 pm, a total of 40 houses were visited, successfully enlisting participants at 19. The same questionnaire was also administered to two health professionals (a general practitioner and the Head Nurse Practitioner in the Monterrey health centre). Their responses were later compared to those supplied by the neighbourhood participants to determine if there was a significant difference between the informal/popular conceptions of dengue fever and the official biomedical/etiological description of the same disease.

The number of participants selected for the questionnaires within the neighbourhoods was dependent on two things: 1) time allotted to conduct questionnaires during a given visit with the surveillance technician from Monterrey (first six questionnaires), and 2) exhausting the population of possible participants in Comunidad Social (last 12 questionnaires). The medical practitioners that were selected for participation was dependent on one single issue: willingness to participate. Unfortunately, I was only able to enlist the participation of two medical practitioners.

**Surveys**

All of the surveys were conducted in a higher-income neighborhood adjacent to Comunidad Social. Based on the information obtained from the questionnaires, a semi-structured survey was constructed. The surveys were open-ended, consisted of 45 questions, and had an approximate duration of 20 minutes. The survey was administered to determine if the opinions elicited through the questionnaires from members of the
three low-income neighborhoods were similar to the opinions of members from a wealthier adjacent neighbourhood: Roma y Vega. The surveys included questions geared towards the four principles discussed earlier and also probed about recurring themes that arose during the administration of the questionnaires (i.e. dengue as a biblical plague, weak immune system as a reason for acquiring infection, possibility of confusing dengue fever with other diseases, fear/paranoia as a possible reason for confusing other diseases with dengue fever).

Survey participants were selected through systematic sampling. Since Comunidad Social and Roma y Vega were adjacent neighbourhoods, I selected the house closest to Comunidad Social in Roma y Vega as the point of origin. Then using a random number generator I selected every \( i \)th house as designated by the random number selection. The number of individuals sampled was based on the possibility of attaining a normal distribution within the sample but was also determined by number of surveys already conducted upon returning to the point of origin.

A total of 32 surveys were conducted over a period of five days, averaging six surveys per day. The surveys were conducted between 9:00 am and 3:00 pm. I visited a total of 42 houses and successfully enlisted participants in 32. Since the surveys were conducted in a single neighbourhood, I began selecting houses for participation wherever I had stopped the previous day. Although 32 surveys were conducted, only 30 surveys were included in the final data set. Two surveys were removed from the data set because
they were missing important data (i.e. I did not ask certain questions contained in the survey or never received a response).

**Note on Questionnaires and Surveys**

The questionnaire and survey used were drafted separately. The questionnaire most closely resembles a semi-structured ethnographic interview (Schensul et al 1999:153-156), but falls short of technically being one since it was drafted before the research period began. However, the rationale that informed the construction of the questionnaire was based on previous literature produced on the topic and previous research conducted in similar neighborhoods within Tegucigalpa, Honduras (Hasemann N.d).

The survey, in turn, was drafted based on the results obtained from the questionnaire and per suggestions stemming from the literature (Schensul et al 1999). The main difference between the survey and the questionnaire is that the survey sought to address specific domains of interest highlighted as important by the participants during the questionnaire process. To this effect, the survey was employed as a targeted or directed protocol to uncover more information on particular topics broached during the questionnaire process, and for comparative purposes across neighborhoods.

Finally, the questionnaires and surveys were applied to two discrete samples. The questionnaires were applied in three low-income neighborhoods in Monterrey, whereas the surveys were applied in one single higher-income neighborhood within Monterrey.
The exclusive application of questionnaire and surveys sought to address two issues: 1) the similarities or differences in dengue fever and vector knowledge between neighborhoods of differing socioeconomic status, and 2) the similarities or differences between neighborhoods in regards to the explanatory model employed to characterize dengue fever in neighborhoods with differing socioeconomic status.

**Additional note on surveys and questionnaires.** Since socioeconomic status is an important variable in this study, it is necessary to mention in which way socioeconomic status was determined for comparative purposes. Initially, socioeconomic status was assessed by residential appearance and the presence of basic infrastructure. However, upon analysis of the data it became apparent that the only significant difference between survey and questionnaire participants was educational attainment. In this respect, educational attainment was higher in what had already been identified as the higher socioeconomic status community. This finding is relevant because studies in Latin America have determined that highest educational attainment is a meaningful indicator of socioeconomic status (Marchesi, Alvaro 2000) and that highest educational attainment is a reliable predictor of social class (OCDE 2011:129-132). That is to say, the study results, which will be presented below, validated the preliminary assumption about socioeconomic status used during the second stage of this project.

**Participant Observation**

Participant Observation (Schensul et al 1999) was conducted during both stages of this Project. The purpose of the participant observation was to gather first-hand, detailed,
and objective impressions of the field sites. This was done mainly for comparative purposes between neighborhoods and to produce an ethnographic description of the low-income urban neighborhoods in which, according to document supplied by the Alonso Suazo MHC, clinical reports of dengue fever were most common during 2010. At the same time, the participant observation yielded insights into the characteristics of the neighborhoods which made dengue fever prevalent, and into the activities conducted by both surveillance personnel and community members which either fomented or stifled mosquito reproduction.

The participant observation consisted of participation in field activities with surveillance technicians and observation of the neighborhood setting, attitudes of residents and surveillance technicians alike, and activities conducted by the surveillance technicians within the neighborhoods. Furthermore, I took notes when permissible and upon returning home, either after leaving the field sites or the Alonso Suazo MHC, I would expand on the notes and write-up detailed recollections of the day’s activities and observations using Microsoft Word processor. I did this everyday I went out to the field.

Data Analysis

The data analysis method utilized for the questionnaires and surveys consisted of content analysis. The information from the questionnaires and surveys was systematically inspected for themes and recurrent ideas. This analysis took place in two separate stages. The first stage consisted of an initial analysis of questionnaires to compile the semi-structured surveys used during the second phase of the research project. During this
initial analysis stage, the data were inspected for salient themes and the questions for the survey were developed to inquire further into issues considered to be important by the questionnaire participants.

The second and final stage consisted of a more in-depth and thorough analysis of both the questionnaire and survey data. The data for the instruments was entered separately into a word processor and the data was reviewed for themes. The themes were coded and all the relevant data fragments were compiled under an exclusive theme. The most pertinent and succinct quotes from each main theme were then extracted to serve as product examples of the research.

Finally, numerical and ordinal data available from both the questionnaires and surveys were accessed into an Excel database and later analyzed using SPSS 10 statistical software. The statistical analysis of the data was limited to non-parametric tests, given the sample size limitations and the ordinal and nominal nature of the variables collected. The data was also used to compile graphs and charts where appropriate and permissible.

The data produced by the participant observation component of the project was also systematically analyzed. Given the ultimate length of the recorded field observations, I analyzed the resulting data manually following the suggestions provided by Schnesul et al (1999). To analyze the data I read over the material several times and selected certain themes that were relevant to presence of dengue fever in all research sites: 1) the physical state of the neighborhoods in which the research was conducted, 2)
the activities of the surveillance technicians, and 3) the general difficulties associated with dengue fever prevention in the research sites.

Summary

The research for this project was conducted in two stages and carried out within four different urban communities in Tegucigalpa, Honduras. During the execution of this project three different methods were used: participant observation, questionnaires, and surveys. The participant observation was ongoing for the duration of the entire project, but the questionnaires and the surveys were included only in the second stage. Furthermore, the surveys and the questionnaires were administered to exclusive groups within the Monterrey Community; the questionnaires were administered in low-socioeconomic status households and the surveys were administered in higher socioeconomic status households. All house holds were within the Monterrey community and the results from the questionnaires were used to inform the elaboration of the surveys, and the distinction between the surveys and questionnaires was maintained for comparative purposes.
CHAPTER FIVE: 
RESULTS

Introduction

This chapter will present the results obtained from the participant observation and from the administration of the questionnaires and the surveys. The results obtained using the participant observation methodology will be discussed first, in order to provide an appropriate background and to further contextualize the results that were obtained from the questionnaires and the surveys. The questionnaires and the surveys will then be discussed jointly for comparative purposes; taking into consideration that the questionnaires and the surveys were administered in neighborhoods with differing socioeconomic status.

The discussion of the results obtained from the participant observation corresponds to the most common themes that arose during analysis and which were relevant to all study locales during the two stages of the project. Additionally, the results obtained from the questionnaires and the surveys will presented and divided according to the questions employed in Kleinman’s explanatory model. At the same time, the results will move beyond Kleinman’s model to discuss social and structural elements both the questionnaire and survey participants considered relevant and meaningful to the spread of
dengue fever. Finally, an alternate etiology of dengue fever broached by both the questionnaire and survey participants will be presented.

**Participant Observation**

The resulting data from the participant observation component of the study will be discussed first in order to provide an ethnographic description of the second stage research site and to contextualize it socioeconomically within Tegucigalpa, Honduras. The data will be presented addressing three separate themes that impacted the effectiveness of dengue fever prevention campaigns directly and which depict the challenges and difficulties associated with dengue fever prevention within low-income neighborhoods of Tegucigalpa, Honduras. The analysis presented here for the data produced through participant observation will be comprised of the observations made during the first and second stage of the project. It should be noted that the field notes are the result of my personal, albeit educated and hopefully objective, impression of the neighborhoods and surveillance activities. Although, I labored to remain as objective and descriptive as possible, my own interests and immediate goals might have served as a bias and made me focus on some aspects more than others.

**Physical State of Neighborhoods.** A common and recurrent observation in my field notes was the physical state of the neighborhoods and the available infrastructure for the provision of basic services (i.e. water, electricity, and waste removal), and the most notable or striking fact was the physical appearance of the communities. Although, it did depend on the specific area of the community in which you happened to be located, as a
general rule, there was less visible infrastructure the farther you were from the main thoroughfare. For example, in Los Pinos, Villa Nueva, and some parts of Monterrey the only paved asphalt roads were the streets which led into the communities. The corollary or side streets were unpaved dirt and in some areas the streets were only accessible to foot traffic, and in others the once existent road network had disappeared due to mud slides: a frequent occurrence in these neighborhoods during the Honduran rainy season.

In regards to basic water and electricity infrastructure the communities appeared to be well supplied. That is to say, that there were electricity mains throughout the neighborhoods and that most houses had cables leading from the electric line poles to the houses; although not all had electric current meters. In terms of water provision, every house I entered reported to have internal plumbing and to receive potable water. However, what stands out is the fact that water provision was infrequent during the rainy season (every 5-7 days) and almost absent during the dry season (every 14 days). The lack of frequent potable water service forced individual homes to store water for extended periods of time, which increased the presence of the mosquito larva, albeit for different reasons. During the dry season prolonged storing of water increases the probability of mosquito oviposition, whereas during the rainy season, the more frequent collection of untreated rain water increases the likelihood that the mosquito eggs will successfully hatch in the water containers.

The infrastructural condition of the neighborhoods also led to an abundant collection of refuse material in certain areas of the neighborhoods. Since, the
neighborhoods, for the most part, lacked paved streets, trash collection and removal trucks were unable to reach the houses to gather garbage; in response, the municipality situated dumpsters at the entrances of most of these neighborhoods. However, even if individuals made the effort to take their trash out to the dump sites, the garbage collection trucks only visited the collection sites once a week. During this time, vast amounts of refuse collected at the neighborhood dump sites, and, especially in the rainy season, this only increased the possible mosquito vector spawning pools given the vast quantities of plastic and biodegradable waste that could collect water.

**Prevention Activities (Surveillance Technicians and Residents).** The second recurrent domain was the nature of the activities conducted by the surveillance technicians for dengue fever prevention. Every individual health centre in Tegucigalpa has a vector surveillance department that functions independently for the majority of the year, although they continually report weekly incidence of various vector related diseases back to the *Alonso Suazo* MHC. During the epidemic season, roughly from the beginning of May to the end of September (Hasemann N.d), the *Alonso Suazo* MHC vector surveillance department pools technical personnel from several health centres in Tegucigalpa and orchestrates targeted community missions for mosquito breeding control. The brigades usually begin in the neighborhoods with the highest incidence of dengue fever during the first four months of the year and gradually progress to neighborhoods with less reported cases of dengue fever; eventually conducting interventions in every single community within Tegucigalpa.
The main purpose of the brigades was to distribute Abate in compound form (a 20 gram bag of sand with 1% temephos, a larvicide), in every single house within the community. Concomitantly, surveillance technicians were expected to deliver basic information about dengue fever and Aedes spp mosquito breeding habits, and, although, community residents always granted surveillance technicians access into their homes, rarely, were surveillance technicians able to dispense all required information due to time constraints and house quotas. At the same time, the community residents either did not have the time or appeared only interested in receiving the Abate, which they have come to expect and always requested from the surveillance technicians when these were sighted.

In regards to quotas, the surveillance technicians were admonished several times by their superiors that they were failing to meet the necessary performance standards: 1) adequate Abate distribution, and 2) providing information on mosquito breeding. However, surveillance technicians were strongly encouraged to visit a minimum of 50 houses in a period of 4-4 ½ hours; additionally, technicians were expected to remain a minimum of 10 minutes in each house to ensure adequate performance of both tasks. Unfortunately, most of the times these visits were individual efforts due to personnel constraints and community density, which made it very difficult to accomplish one of these tasks, and virtually impossible to try and accomplish both given time constraints. It should be noted, that an average visit to a house, just to distribute Abate, took between 5-7 minutes.
Needless to say, the technicians were forced to rush through their assigned houses dispensing the minimum amount of information possible, while also distributing Abate. Regardless, in the houses which I visited, while shadowing a surveillance technician and also by myself during the first stage of the project performing the same duties, the residents were more interested in receiving the Abate than anything else and did not dispose of the time to attend to the surveillance technicians recommendations, did not consider them relevant to their situation, stated to be aware of the information but unable to avoid in-house mosquito breeding due to water constraints, or invariably blamed their neighbors or the state of the neighborhood for the mosquito problem.

**General Difficulties Associated with Dengue Fever Prevention.** The third recurrent domain within the field notes was the general difficulties and obstacles associated with dengue prevention within Tegucigalpa. This domain was further divided into two subdomains: 1) Security and 2) supplies, pay and resources. The two subdomains will be addressed separately; both subdomains relate to issues that the surveillance technicians commented on continuously and which they recognized made their jobs difficult and at times perilous. At the same time, these are issues which affected the provision of services and prevention activities within Tegucigalpa as a whole, and which community residents and surveillance technicians continued to regard as relevant during the second stage of this project.

**Security.** Security was the most concerning issue for most of the surveillance technicians, and, at times, for me as well. The majority of surveillance technicians I
spoke with claimed to have felt comfortable and safe laboring within the neighborhoods under the auspice of their respective health centers; people knew who they were because of their job and they were, more often than not, part of the same community. However, during the joint missions (described above, see Prevention Activities), the surveillance technicians had to work in neighborhoods in which they were unknown and to which they did not belong.

To address the above concern, the Honduran equivalent of the Marines and the Navy provided support in the form of armed escorts, which made some surveillance technicians feel more at ease. However, some technicians preferred not to make use of the armed escorts since they thought it made them more visible targets and because sometimes community members were uneasy with the presence of the armed personnel; this was a minority of the surveillance technicians.

The main problem with the support provided by the armed forces was that, at least during the 2010 prevention campaign, it was not consistent and it was short lived. This created an additional challenge, since the surveillance technicians were devoid of military and even local support during the missions, and also because the activities were carried out individually; making the surveillance technicians an easy target for assault and robbery, both of which took place. However, only two of these events took place, but the surveillance technicians did consider that they had taken place because they were easy targets, exposed, and ultimately lacking basic security provisions.
The residents held similar views about their neighborhoods, and since it was difficult to approach problematic neighbors, did think that it was not possible to maintain an orderly community free of mosquito breeding grounds per health center recommendations. For the most part, the residents commented that they were afraid of doing so, since their own safety was at risk. Therefore, the residents saw themselves as unable to carry out recommendations provided by the health center surveillance technicians, because they either did not see themselves as having the authority to enforce codes within their neighborhoods or did not think they had the necessary protection to do so. The lack of governmental involvement to remedy this situation also colored the community residents perspective of both their communities and government inefficiency and despondency.

**Supplies, pay, and resources.** Supplies, pay, and resources were issues continually brought up by the surveillance technicians, and, as a matter of fact, composed the base of their demands during a two week strike staged in mid-June. The strike was organized by surveillance technician’s health workers union (SYTRAMEDIS). The strike generally requested an improvement in salaries, inclusion of clauses within their contracts that recognized the dangerous conditions potentially faced in their professions, the provision of work supplies (i.e. boots), and an increase in the amount of the health budget set aside for dengue prevention activities.

The last issue resonated more broadly across Tegucigalpa and was manifest during the second stage of the project. As mentioned before, the bulk of the operations
conducted by the surveillance technicians for dengue prevention consist of the delivery of Abate to community residents. However, budgetary constraints and poor fiscal management (Delmer Asdrubal and Antonio Diaz, personal communication June 2010), led to an Abate shortage, which delayed the further execution of preventive missions which in turn led to a temporary halt in the prevention activities carried out at the local level. This latter condition contributed to community participant’s evaluation of Government performance, since virtually everyone knew that there was no Abate.

**Questionnaires and Surveys**

The results from the questionnaires will be discussed by addressing the major themes that were elicited during the analysis. The questionnaires elicited 17 relevant themes. These can be grouped under four major conceptual categories that in part correspond to Arthur Kleinman’s explanatory model of disease (1980; 2006). The themes will be discussed under the respective heading and by noting to what degree the opinions were shared by the participants. The theme in itself will be further exemplified and related to the participants through the use of quotes as necessary. The themes that arose in the questionnaires will be compared to the data and quotes obtained from the surveys. The quotes that are used throughout this chapter will be further contextualized by providing both the sex, age, occupation, and years of formal education of the participant that supplied the relevant information. The demographic information will be contained in abbreviated form in parenthesis after the quotes (e.g. 30-f-13-Accountant, for 30 year old female with 13 years of formal education working as an accountant).
General demographic information: questionnaires and surveys. The questionnaires were administered to 19 participants; 17 to community residents and two to health professionals. The health professionals were the head nurse at the local health centre and a general practitioner with a private practice residing in the neighbourhood where the surveys were conducted. There were a total of 14 female participants and 3 male participants (Figure 4), excluding the health professionals. Men were usually present in the neighbourhoods during the time the questionnaires and surveys were conducted, but women were more likely to agree to participate. On average, the participants were 39 years old with a range of 18-64 years of age. 14 of the participants had children and, on average, the participants had 3.5 children. The range of children was between 0-8 children. Two of the female participants and one of the male participants did not have children. The participants had lived within the neighbourhoods in which they were interviewed an average of 12 years, and as whole had lived in their respective neighbourhoods between a few weeks to 30 years. Finally, the questionnaire participants had received an average of 6 years of education, with a range in years of education between 0-18 years.
The surveys were administered to 32 participants in Roma y Vega, but only 30 were included in the final analysis\(^1\). There were six male participants and 24 female participants (Figure 4). The average age of the survey participants was 37 years, with a range of 21-81 years. The survey participants had an average of 10 years of formal school education, with a range of 0-20 years. The survey participants received more years of formal schooling than questionnaire participants (Table 4). In fact, a Mann-Whitney U test verified that the only significant difference between the questionnaire and survey participants was the amount of years they received formal education (Mann-Whitney U: 82.5, p: 0.00, n = 46).

\(^1\) Two surveys were carried out on separate days and they were removed because they were incomplete. The survey was lengthy and I unwittingly glossed over the same section of the survey in both cases. Fortunately, the aforementioned oversight was limited.
TABLE 4. Highest level of formal schooling completed by participants in relation to the instrument used

<table>
<thead>
<tr>
<th>Highest Level of Formal Schooling Completed</th>
<th>Instrument</th>
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<tr>
<td></td>
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<td>Questionnaires</td>
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<tr>
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</tr>
<tr>
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<td>4</td>
</tr>
<tr>
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</tbody>
</table>

There was no significant difference between the ages of the participants in relation to the instrument used (Mann-Whitney U: 239.5, p: 0.824, n = 46). Similarly, there was no significant difference in the distribution of sex between the participants in relation to the instrument used (Mann-Whitney U: 272, p: 0.561, n = 46). There was no significant difference between the sex the participants and the years of formal schooling received (Mann-Whitney U: 173.5, p: 0.865, n = 46). Finally, there was no significant relation between the age of the participants and the years of formal schooling they had received (Spearman rho: 0.74, p: 0.623, df = 44).

Thematic Categories In Relation to the Explanatory Model of Disease

**Source of dengue fever.** The first category that will be discussed is the source of dengue fever. Four themes can be grouped under this category: description/definition of dengue fever, etiology of dengue fever, determinants of dengue fever, and mosquito
reproduction. This category addresses both the biological and environmental causes for dengue fever that the participants considered relevant.

**Dengue fever.** The questionnaire participants generally defined dengue fever in relation to the classic symptoms associated with dengue fever: “Well, headache, aching bones, aching spine [...]” (62-f-6-homemaker). The participants did not discuss dengue fever in relation to its perceived origin or other biological processes, but rather on the basis of the consequences resulting from dengue fever infection. In some cases, participants defined dengue not only by its symptoms but also its financial impact: “[...] I know that it comes with a fever, but I do not know how strong it is. To me it is a horrible disease that is not like a common flu but severe and it ends in a lot of [financial] expenses because of [laboratory] tests” (25-f-12-pulperia owner). Dengue fever was not understood as a discrete condition; in other words, it was not characterized by a single symptom but rather by multiple ones, and with consequences extending beyond physical discomfort.

Dengue fever was not clearly defined by either the questionnaire or the survey participants. In spite of this, the majority of the survey respondents noted that most people in their neighbourhoods were afraid of contracting dengue (93%) and that they themselves were also afraid of contracting the disease (80%). The fear of contracting the disease could have been exacerbated by the fact that 90% of survey respondents considered dengue to be a disease that could not be treated at home because it required medical attention (Table 5).
TABLE 5. Survey respondents’ opinion on people’s (neighbors’) fear of infection, personal fear of infection, and home treatment in relation to dengue fever.

<table>
<thead>
<tr>
<th>People (Neighbors) Fear Infection</th>
<th>Personal Fear of Infection</th>
<th>Dengue Can be Treated at Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>30</td>
</tr>
</tbody>
</table>

**Etiology of dengue fever.** The participants were all in agreement that dengue fever was caused by a mosquito vector (16 questionnaire participants and 28 survey participants). In some cases (2 questionnaire participants), the participants were even able to name the mosquito associated with dengue fever: “From the mosquito Aedes aegypti, from its bite”. Furthermore, other participants were even able to define the mosquito by its anatomical peculiarities: “from getting bitten by the mosquito that gives dengue, that long-legged one—I am so afraid of the animal”! (53-f-0-tortilla maker) The participants were all able to identify the vector associated with dengue fever, but in some cases this was done with some skepticism: “Supposedly, it is because of the mosquito, but the thing is that there were mosquitoes before and we have not had this until now [...] But I do not think it is because of the mosquito, because people here get bitten and nothing happens to them. If they say it is because of the mosquito it must be because they have researched something” (30-f-2-homemaker).

**Determinants of dengue fever.** The questionnaire participants were not only able to identify the vector but for the most part (82%) were also able to identify the source of the vector or its breeding sites (see Figure 6, Mosquito Reproduction). However, when
the participants were asked about the factors that contributed to the spread of dengue fever, the presence of breeding pools was only indirectly referenced: “Because of the dirtiness/untidiness of the neighbourhood” (50-f-18-unemployed), “Where one lives does not matter, it depends on cleanliness/orderliness, one’s own habits, and you should never forget about God—he protects us” (25-f-12-pulperia owner), “Because of all the trash they throw, it attracts flies and mosquitoes” (60-f-0-launderer), “I say its because of cleanliness/orderliness [...] if you eat something that is dirty or your house is dirty you are always going to come across disease because dirt has virus” (30-f-2-homemaker). Explanations relating to cleanliness and hygiene were preferred over those that specifically addressed the conditions which allowed the mosquito vector to reproduce.

The participants of both the questionnaire and the surveys solidified the above observation by noting neighbourhoods that were more likely to experience the spread of dengue fever were those that could be classified as dirty (Table 6). Although dirt was commonly defined as the ubiquitous presence of plastic refuse, which can indeed be related to the spread of dengue fever as breeding sites, dirt was also defined by the presence of overflowing latrines and other organic waste, which is not related to the spread of dengue fever. The classification of “dirty neighbourhoods” was provided by questionnaire participants themselves; during the interview process, participants were asked to provide characterizations of neighbourhoods afflicted by dengue fever and the questionnaire participants chose the terminology. Similarly, the survey participants were allowed to use personally generated descriptive categories to describe neighbourhoods in
which dengue was considered a problem and, like questionnaire participants, survey participants favoured the term “dirty”.

TABLE 6. Type of neighbourhood most commonly affected by dengue fever according to questionnaire and survey participants.

<table>
<thead>
<tr>
<th>Type of neighbourhood most commonly affected by dengue fever</th>
<th>Instrument</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surveys</td>
<td>Questionnaires</td>
</tr>
<tr>
<td>Dirty Neighbourhoods</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Marginal Neighbourhoods</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Unkempt Residential Areas</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Everywhere/Anywhere</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>16</td>
</tr>
</tbody>
</table>

It should be noted that “Unkempt Neighbourhoods” strictly referred to neighbourhoods with a proliferation of plastic refuse that could collect water and enable mosquito reproduction, whereas “Dirty Neighbourhoods” was used in reference to areas with an abundance of rotting garbage or dog faeces. Similarly, “Marginal Neighbourhoods” and either of the above noted classifications (i.e. “Dirty”, “Unkempt”) were considered independent categories by the participants, with possible overlap but not mutually inclusive.

The survey participants further related high and medium fear of infection with dengue fever to exposure with dengue outside of their homes (79%). At the same time, the threat posed by dengue fever was considered serious by all survey participants (Table 7). Therefore, the survey participants considered dengue fever a disease with serious consequences but at the same time considered exposure with the vector more likely
outside of their home or in communal spaces that were out of their individual and direct control.

TABLE 7. Survey participants’ perception of risk of infection inside their homes and outside of their homes, and the danger/posed by dengue fever.

<table>
<thead>
<tr>
<th>Risk of infection inside the home</th>
<th>Risk of infection outside of the home</th>
<th>Danger/threat posed by dengue fever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Medium</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>28</td>
</tr>
</tbody>
</table>

**Mosquito reproduction.** The questionnaire participants were able to clearly identify where mosquitoes reproduced (water containers), but the conditions under which they reproduced were not always clearly understood (i.e. clean water as opposed to dirty water): “They reproduce in water, where there is water and when the water is dirty—when the water is not treated. [Mosquitoes] like dirty things; they do not like things that are clean” (25-f-12-pulpería owner). Despite the fact that important environmental conditions were inverted (i.e. filthy water was associated with *A. aegypti* reproduction when in actuality the vector has a marked preference for clear or clean water), the participants did identify water as an indispensable element for perpetuating the mosquito’s life cycle (Figure 6).
FIGURE 5. Necessary environmental conditions for mosquito reproduction identified by survey and questionnaire participants.

Figure 5 presents the compiled information for the questionnaire and survey participants. The questionnaire participants always included water, whereas some of the survey participants considered that only filth (6%) was required for mosquito reproduction to take place. The figure illustrates that although the majority of the respondents might not have been aware of the mosquito’s life cycle, they did recognize that water played an important role. To this effect, the figure displayed above is intended to emphasize the similarities between the survey and questionnaire participants.
Dengue Fever Symptoms

Two themes are considered under this category: symptoms associated with dengue fever and types of individuals associated with dengue fever. The first referent is self explanatory, while the second is included because it was expected that symptoms could be seen to vary according to the individual afflicted with this particular ailment (i.e. male vs female, child vs adult). This assumption was unfounded, but only because there was no definite variation between individuals associated with dengue fever and those that were not. That is to say, participants did not consider dengue fever more likely affect one type of person (e.g. women vs. men) more than others and similarly did not consider that there would be any variation in symptoms, simply stronger manifestations given immune system status and progression of disease. In light of this, this category explores the symptoms of dengue fever and its peculiarities in regards to its distribution throughout the population.

Symptoms associated with dengue fever. Three issues were distinctly apparent when the participants discussed symptoms they associated with dengue fever. The first corresponds to the symptoms typically caused by dengue fever in a general sense. The questionnaire participants (65%) noted that headaches and fevers were present in all dengue fever case (Figure 6, Table 8): “Headaches, chills when it is just starting, and the fever” (37-f-6-homemaker). The second issue is a compound of related factors. Firstly, the symptoms caused by dengue fever are caused by a variety of other infections (see Conflation of Dengue with other Diseases) and therefore there is no definite or precise symptomatology for dengue fever: “[...] the fever can be present with other diseases, just
like the other symptoms” (37-f-6-homemaker). “Sometimes there are other diseases—I started out with a fever and I thought it was dengue but then I realized it was empacho” (40-f-6-homemaker). Secondly, the lack of a definite criterion for dengue fever infection made it possible for individuals to make an association between the disease and the symptoms without confirming the diagnosis within a clinical setting: “Well, I have heard of a bunch of people that have dengue but I have not seen them and here people just get a fever and they say it is dengue—because they do not go to the doctor, so they do not for sure” (33-f-6-tortilla Maker).

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2 Empacho is commonly used to refer to indigestion (Membreño 1982:75), however a more accurate and technically adequate description of this ailment would be “an interruption of gastrointestinal movements that provokes indigestion caused by [alimentary] excess, the consumption of indigestible, insufficiently cooked food which can provoke an alteration of the digestive tract […] the patient presents an abdominal tumeration, (a “small ball”), pain, loss of appetite, nausea, vomit, diarrhea, etc.” (Campos-Navarro 2009:72).
FIGURE 6. Symptoms associated with dengue fever by survey and questionnaire participants.

Figure 6 illustrates that the majority of both the questionnaire and survey participants (71%) recognized that dengue fever was associated with a syndrome, or collection of symptoms. In this regard, survey participants identified a more precise symptomatology to define and identify dengue fever (36%). However, one of the medical professionals interviewed, the doctor with the private practice, acknowledged that, given the panic spurred by the epidemic and the possibility of a viral mutation, dengue diagnoses were now being given based on isolated symptoms rather than syndrome verification. Finally, some of the participants made an association between dengue fever and death. In this case, it is important to point out that the questionnaire only asked for
symptoms that accompanied or typified dengue fever. The participants chose to extend the logical sequence of events to include the ultimate consequence of most untreated and serious diseases: “If it is an advanced case—death. It has a cure with treatment. No, that is a tricky area because I imagine the medicine has an impact but in the end it is only God. Of course, there are also people that just fake it” (24-m-6-fast food employee).

This last quote demonstrates the severity of the threat dengue fever represented for community members, and it suggests that individuals would seek medical attention based on a suspicion of dengue fever. At the same time, the quote suggests some suspicion regarding the actual health status of some people claiming to have dengue. However, this participant was also skeptical of the medical establishment, noting that even some doctors had been accused of misdiagnosing dengue to collect payment for treatment. Ultimately, the point of view of this participant suggested that dengue is difficult to diagnose precisely and that there might actually be a vested interest in misdiagnosis. The suggestion by the participant regarding this kind of malpractice was not independently confirmed.

TABLE 8. Symptoms associated with dengue fever by survey and questionnaire participants.

<table>
<thead>
<tr>
<th>Symptoms associated with dengue fever</th>
<th>Instrument</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Surveys</td>
<td>Questionnaires</td>
<td>Total</td>
</tr>
<tr>
<td>Fever</td>
<td></td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Fever with Headache</td>
<td></td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Headache with Bodyache</td>
<td></td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Headache, Bodyache, and Fever</td>
<td></td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28</td>
<td>17</td>
<td>45</td>
</tr>
</tbody>
</table>
**Individuals associated with dengue fever.** The questionnaire participants were divided among two lines in regards to which individuals were most likely to contract dengue fever. A minority of the participants (21%) stated that the overall status of the immune system contributed to dengue fever infection. The participants that offered this possibility argued that a weak immune system was less capable of effectively combating the disease, ergo, less likely to avoid the manifestation of the disease. In this regard, the immune system could be weakened or strengthened through nutrition or receive an unintended ancillary boost from preventive measures for other diseases: “Yes, there are some who are stronger and others who are weaker, so the weaker ones get [dengue] more often. You get weak when you do not eat” (60-f-0-launderer), “Because they are weak…I think that I did not get it as severely because I was vaccinated against swine flu and my children received the vaccination for rotavirus so they got it less [severely] too” (30-f-2-homemaker).

The majority of individuals that participated in the questionnaires (64%) stated that dengue fever was not associated with a particular type of individual in relation to gender, occupation, age, socioeconomic status or any other demographic characteristic (Table 9): “The mosquitoes do not choose between the poor or the wealthy, if they could choose, I think they would choose the wealthy—but this is happening indiscriminately” (33-f-6-tortilla maker), “[...] Go figure that those lawyers live in [a wealthy suburb] and not in any plain house and both their children got sick. And here, in my shack, just my son [got sick]—it does not matter where you live” (40-f-12- hairdresser). The majority of
the participants in both the questionnaires and the surveys agreed that dengue fever could affect anyone regardless of geographic location or socioeconomic status (Table 9).

TABLE 9. Individuals more commonly affected by dengue fever according to survey and questionnaire participants.

<table>
<thead>
<tr>
<th>Individuals more commonly affected by dengue fever</th>
<th>Instrument</th>
<th>Surveys</th>
<th>Questionnaires</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susceptible Persons (Children/Elderly)</td>
<td></td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Everyone Equally/No Discrimination</td>
<td></td>
<td>22</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>People with Low Resources</td>
<td></td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>26</td>
<td>14</td>
<td>40</td>
</tr>
</tbody>
</table>

94% of questionnaire participants did comment that there was an association between the presence of the disease and overall maintenance of residential living spaces and personal hygiene (Table 10). For example, “there is no specific type [for dengue], if people do not maintain order/cleanliness they can be constant with that dengue [infection]” (37-f-6-homemaker), “[...] some people get sick because they leave everything strewn about. They just do not take care of themselves. They do not go to the health centre” (60-f-0-launderer), “No, there have not been any cases around here. The people that get sick most often are those that do not order/clean their abodes” (51-f-6-homemaker), “Sometimes people do not have a conscience and they keep filth in their homes. They do not clean their water basins and they do not clean/order their yards, that is why they are exposed and they contaminate because the mosquitoes can fly” (40-f-6-homemaker). Although the participants did not relate the disease to particular social type, the participants did relate dengue fever to particular individual habits with a wider social impact.
TABLE 10. Reasons some individuals more commonly affected by dengue fever according to survey and questionnaire participants.

<table>
<thead>
<tr>
<th>Reasons some individuals are more affected by dengue fever</th>
<th>Instrument</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surveys</td>
<td>Questionnaires</td>
</tr>
<tr>
<td>Low Defenses</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Exposed to the Vector</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Dirty People “Puercos”</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Previous Infection with Dengue Fever</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 10 shows that the questionnaire participants were more likely to state that individuals contract dengue fever because of their personal or residential hygiene. The survey participants, on the other hand, were equally likely to attribute dengue infection to a weak immune system, being exposed to the vector, or being dirty. Despite the differences between questionnaire and survey participants, the majority made an association between dengue fever contagion and “dirtiness”.

Treatments for Dengue Fever

This category includes two thematic subheadings: medically sanctioned (clinical) treatment and popularly sanctioned (“folk”) treatments. The medically espoused treatment for dengue fever was generally regarded by the participants as the appropriate course of action, but in some cases having this knowledge came at the expense of foregoing medical attention since it was deemed time consuming and redundant. One of the participants considered visiting the clinic to be unnecessary, since there is no treatment for dengue fever and supportive care was well known and could be provided at home. In spite of this, the majority of the participants did opt to visit the local health
centre for diagnosis and treatment when possible instead of simply receiving treatment at home. The second referent demonstrates that medically sanctioned treatment was not the only option available to participants. Popularly sanctioned treatments or remedies were secondary to the medically sanctioned treatment.

**Medically sanctioned treatments.** The treatments suggested for dengue fever by the participants were not at odds with the treatments suggested by the health professionals working at the local health centre (Table 11). Some participants even commented that visiting the local health centre when dengue was suspected was a waste of time, since the recommended treatment was already widely known. In fact, only 6 (35%) of questionnaire participants mentioned seeking medical attention as part of the dengue fever treatment strategy. The treatment consisted of, “rest, taking a lot of liquid, and acetaminophen. With the hemorrhagic [version of the disease] you have to go to the health clinic. The problem is that one can get up early in the morning but the people that work there let their friends cut in line” (62-f-6-homemaker). Although some participants did not see the need in going to health centre, the majority of the survey participants noted, as is evident in the previous quote, that medical attention is a requisite. Another participant noted, “Well, first you have to go to the doctor, and the one who knows about treatment is the doctor. You cannot start medicating without knowing; afterwards it can be too late” (40-f-6-homemaker). In other words, confirmation and certainty were valued among the majority of the survey and questionnaire participants (70%) because of the severe consequences associated with the disease.
TABLE 11. Treatments suggested by survey and questionnaire participants for people with dengue fever.

<table>
<thead>
<tr>
<th>Treatment suggested by participants for dengue fever</th>
<th>Instrument</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surveys</td>
<td>Questionnaires</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>No Treatment Suggested</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Liquid</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Liquids and Acetaminophen</td>
<td>11</td>
<td>8</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Liquids, Acetaminophen, and Rest</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Liquids and Rest</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>17</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

**Popularly sanctioned treatments.** The participants were well informed about the necessary and customary treatment for dengue fever at the local health centre. At the same time, many suggested alternate treatments. For instance, one participant shared taking “half a pint of [sugar cane liquor] with lime. I squeezed the juice out of five limes—I’m not going to go to the health centre—you only need rest and acetaminophen” (62-f-6-homemaker). Similarly, several questionnaire participants (4) and even one local health professionals suggested drinking coconut water, given its ability to boost platelet levels and prevent haemorrhaging.

**Additional Thematic Categories Considering Social Elements Absent in the Explanatory Model of Disease**

This section includes the results from a line of inquiry that was absent from Kleinman’s original explanatory model of disease (1980; 2006). Although it could be argued that the model tacitly attempts to incorporate the social determinants of disease by
questioning the source of the disease in question, the fact remains that the explanatory model was developed for use within a clinical setting to explore a common ground between biomedical and traditional or folk etiologies. In this sense, wider social processes were not directly addressed within Kleinman’s explanatory model because the relation between the social system and illness is not of ultimate interest but the state of the patient and the patient’s relation to and expression of illness and disease.

Perspectives on the Community and Community Health Problems

The perspectives on the community and community health problems will be limited to the responses from the questionnaire participants, who were directly asked about their opinions regarding their neighbourhood. The following section will include the questionnaire participants’ perspective on their community, perceived communal health problems, and the origins of these health problems.

**Perspective on the community.** The majority of the participants spoke positively about their neighbourhood (83%) in the sense that they stated feeling comfortable where they were: “I feel good [in the neighbourhood] because I do not need anyone. In a different place I would probably feel better, but then you realize that people behave the same everywhere, it does not matter” (50-f-18-unemployed). The main complaint expressed by the participants was that there was no order in the community, and that it was difficult to get both the local residents to participate in sanitation campaigns or the municipality to provide necessary resources to maintain a clean neighbourhood (e.g. there was no waste collection service because the neighbourhood did not have a paved road,
despite the fact that the neighbourhood next to it did receive the service). One participant
even commented that “For starters, we have too much high grass, it is the capital and
there is too much. The garbage truck does not come by here and we have to fend for
ourselves—see where we leave [the garbage]. You know that in those other
neighbourhoods they look down at us because we have wooden houses and they throw
their garbage here. We only get help when [politicians] are campaigning” (33-f-6-tortilla
maker). To further elaborate, the participant was referring to how neighbourhood
residents opted to leave their garbage next to the community centre, where it was later
removed by the neighbourhood betterment committee.

However, the majority of the participants (55%) mentioned the attitude of
residents rather than the lack of a waste collection service as contributing to the
cleanliness/orderliness of their neighbourhood: “They are dirty/disorderly people,
unlikely to collaborate with the maintenance of the neighbourhood” (37-f-6-homemaker),
“I would describe the neighbourhood by saying we are filthy, because you have to take
care of your own health [...] they have a black heart, they do not care about the health of
others and they are riff raff and throw garbage everywhere” (53-f-0-tortilla maker).
Neighbourhood residents could not be expected to perform basic sanitation efforts to
safeguard their own health; concomitantly residents could not be expected to collaborate
in neighbourhood wide programs.

Community health problems. The participants commented that the greatest
health problem in their community was the desaseo, defined by one community member
(questionnaire participant) as the lack of order, cleanliness, and hygiene: “the desaseo, because everything needs to be clean” (24-f-1-tortilla maker). As result of the lack of cleanliness/orderliness, the neighbourhoods were characterized as filthy and this proximity with filth in itself was the root cause of a variety of diseases, not only dengue: “[...] the puercada [filthiness], people throw their garbage away very close and some people do not clean/order their houses [...] people just litter all the time and there are a lot of diseases in the dirt/filth—not just dengue—many more” (30-f-2-homemaker), “People are filthy. The health department was already here cleaning and we cleaned everything and it still looks like a sty” (53-f-0-tortilla maker). It was clear to the participants that the filth in their neighbourhoods was responsible for the spread of dengue fever. The term desaseo was repeatedly used by the participants to refer to the status of their neighbourhood.

**Origins of health problems.** The participants identified two separate reasons for their current health problem or, rather, the root of the filth present in their neighbourhoods: laziness (67%) and the lack of external sources of control (33%). In the former, maintaining proper neighbourhood cleanliness/order was considered an individual action in an autonomously regulated social sphere: “[...] when I get up I make my bed. I do not leave my clothes lying around either. I am responsible for all of that. It is up to you” (64-m-3-chauffeur), “People do it because they are lazy, just because they do not want to collect their own trash” (25-f-12-pulperia owner), “I think that people are just unclean/disorderly and they do not care about their health or the health of others” (37-f-6-homemaker). Ultimately, this complacent or indifferent attitude demonstrated by
the proverbial other within the neighbourhood was acknowledged as both a character flaw and a defining characteristic: “I say that it is because they do not like to clean/order and they just got used to living that way. But my mom used to say that being poor is not that same thing as being a filthy swine [puerco].” (30-f-2-homemaker).

The second referent, the lack of external sources of control, was considered relevant by the participants for two reasons. First, participants saw themselves as unable to exert any authority over their co-residents: “The neighbours are closed-off, they do not like to pitch in and they do whatever they want” (37-f-6-homemaker), “You can change things if you fine them, maybe that way they heed the advice and stop littering” (53-f-0-tortilla maker). Secondly, if they were to attempt such a feat, residents ran the risk of creating hostilities within the neighbourhood or worse, alienating themselves from the rest of the community: “You can get the health centre to call these people [that litter]. The people at the centre already know them [...] they need to fine them. If one tries to tell them you can make them your enemies, they do not understand that you are doing it for everyone’s sake” (40-f-6-homemaker). Although the participants considered for the most part that avoiding and preventing dengue through cleanliness/orderliness was an individual responsibility, the participants also recognized that in some instances residents needed to be reminded of this.
Perspectives on Dengue Fever Spread in Tegucigalpa and Governmental Intervention

The questionnaire and survey participants were asked to provide insight on the reasons they believed dengue and dengue fever to be a problem in Tegucigalpa and, more importantly, to comment on the reasons for the chronic presence of the disease. During this portion of the data collection, participants were asked to discuss the role and responsibilities of both the “government” and “individuals” in the face of the dengue epidemic. For the purposes of this investigation, “the government” was addressed as a generic and homogenous entity in order to avoid an overly specific profiling of any one institution that could have made participants reticent to respond. Nonetheless, the majority of the participants did address their commentaries to either the Secretariat of Health or the Alcaldia Municipal (Mayor’s Office).

The spread of dengue fever in Tegucigalpa. The questionnaire participants (33%) acknowledged that the presence of dengue fever in Tegucigalpa was a yearly occurrence and that the environmental conditions that enabled the spread of the disease were well known. As one participant noted, “For starters, there is a time of the year when [dengue] emerges, there have always been mosquitoes in big quantities but the citizens do not give it any importance” (50-f-18-unemployed), the same participant goes on to note that “this is not something that should be left to the government and the insecticides that they use are not enough and they are harmful”. The questionnaire participants continued to note that the spread of dengue fever in Tegucigalpa was attributable to the filth or dirtiness of the surrounding environment: “[it is] because of the
uncleanliness/disorder—the trash—just imagine that even egg shells can hold water and that is where the mosquitoes breed [...] and the neighbours just dump and one picks up after them” (25-f-12-pulpería owner). Although the majority of the participants recognized the cyclical nature of dengue fever and its endemic status (22%), others expressed surprise at the severity of the current epidemic and were even incredulous as to its origin: “I had never seen a complication like this one until now. I do not know…if it were because of the trash it would be like this all the time” (27-f-6-homemaker). Overall, there was recognition that dengue fever is almost a fixture in the urban complex, but this was accompanied by a concern over its rampant spread.

**Governmental intervention and dengue fever.** The questionnaire participants (27%) considered governmental interventions to have been ineffectual. As one participant noted, “the government needs to be efficient and appoint people with a level of emotional maturity, [people] that will carry out investigations to see if the public health requirements and needs are being met” (50-f-18-unemployed). Similarly, another participant questioned the expediency and providence of health authorities by noting that “[the Secretariat of Health] is more preoccupied with other matters and they have neglected the population. They already have time scales—they should carry out [prevention activities] earlier” (40-f-6-homemaker). On the other hand, questionnaire participants doubted governmental capabilities to intercede: “The [health] minister is guilty of [the dengue fever spread], but what is he going to do” (64-m-3-chaffeur). Governmental intervention was not considered a real alternative by participants, but they did consider that the brigades carried out by the local health centre to have had a positive
impact on their neighbourhoods’ health status. However, the activities conducted by the health centre were not linked to an overall governmental intervention, but rather the activities of the health centre were acknowledged as effective in spite of poor resource allocation by State-level health authorities.

The survey participants had fewer expectations of governmental intervention efforts or capabilities than did questionnaire participants. The survey participants were asked whether or not governmental authorities could be considered responsible for the state of the dengue fever epidemic (Figure 7). The majority (60%) did not think the government should be considered at fault. One survey participant noted that, “[the government] is not responsible, because this is a plague that is not related to the government, [the government] is the other plague—[dengue] is natural” (56-f-12-seamstress). Although the participants did not think that the government had a pivotal role in avoiding the spread of dengue fever, 36% (11) of survey participants commented that the governmental authorities obviated some of their duties: “Between October and November [of 2009] they forgot to distribute Abate. Just like how they focused on the H1N1, they should have done the same with dengue”, “[dengue fever] cases being notified before the start of the campaigns and no alarm was declared and in the [Manuel Zelaya] administration the health sector was unattended” (54-m-16-auditor).
Twenty-six percent of survey participants (8) responded that the government could not be considered at fault, simply because very little could be expected from the government in general: “They never take responsibility, [government authorities] always blame it on other things like: there was not enough money to buy resources” (21-m-14-medical student). Therefore, the government could not be counted upon to intervene and whenever it did intercede, it was considered a boon. As a result, individual and local intervention was favoured in order to stop the spread of dengue fever, as one survey participant noted, “until [people in power] work out who is to blame it is best to act” (24-f-16-medical student).

**Governmental vs. individual responsibility.** Questionnaire participants (67%) considered neighbourhood residents in particular and city residents in general to be personally responsible for the spread of dengue fever in Tegucigalpa. One questionnaire participant noted that, “No one is going to be on top of you making sure how you are doing. Everyone has to take care of themselves; every one of us has to avoid these...
The individual responsibility to halt the spread of dengue fever was also presented as the individual duty of a conscientious citizen: “Everyone has to be responsible. I have to follow the orders that they give for dengue, if not I am doing my neighbour harm and I am also doing harm to myself” (62-f-6-homemaker). The governmental responsibility was downplayed by questionnaire participants even when it was mentioned indirectly. For example, a participant noted that, “If you do not clean the place where you live—well generally we all have the responsibility—but you have to take care of yourself. The institutions are doing what they can and now we have to make an effort on our part” (29-m-7-mechanic). The sphere of action for the governmental authorities was presented as limited and diffuse.

In the surveys, the above conception of limited government responsibility remained and the individual was singled out as the prime promter of change and cleanliness/orderliness (86%; 26 survey respondents). As one participant noted, “It is neither the authorities nor the government’s responsibility, they are not in charge, they are merely there to assist. They cannot be expected to take care of everyone” (32-m-14-physical education teacher). Similarly, the lack of trust or confidence in the governmental structure was characterized through a perceived tactic of scapegoating, “The government is always going to try to blame the population to take responsibility away from them” (25-f-12-domestic assistant). Ultimately, the entire structure was condemned as callous and complacent: “For [the government] there are more important things than watching people die” (35-f-16-university accountant). The participants of both the questionnaires
and the surveys highlighted a limited role for the government during the dengue epidemic but not necessarily limited responsibility.

The questionnaire and survey participants were asked whom they considered should be held accountable for the presence of dengue fever. The majority of the respondents (47%) stated that the citizens should be considered responsible, and a slightly smaller contingent of the participants (38%) considered that both the citizens and the authorities should be held responsible (Figure 8). In the latter, the role of action and responsibilities for both entities (i.e. citizens and authorities) had differential temporality. This set of participants commented that the government and its related authorities should intervene before and at the start of the epidemic to ensure that citizens are capable of responding during the brunt of the epidemic. Thus, the citizens were given the responsibility of controlling the spread of dengue fever through local prevention efforts, but the government was given the responsibility of supplying necessary materials to carry them out. The respondents noted that joint participation was necessary and possible.
FIGURE 8. Questionnaire and survey participants’ opinion regarding who should be held accountable for the dengue fever epidemic.

Alternate Etiology and Determinants of Dengue Fever

In this section, I will present aspects of participants’ explanatory models that deviated from the biomedical explanatory model of dengue fever. The section is divided into sections on the conflation of dengue fever with other diseases and dengue fever as a supernal corollary. This second aspect is divided in dengue as a biblical plague and divine involvement in the manifestation of dengue fever. The issues are discussed below.

Conflation of dengue fever with other diseases. The two health professionals interviewed agreed that the symptoms that were associated with dengue fever were associated with several other viral infections as well (e.g. intestinal, respiratory, and
parasitic infections). The health professionals commented that, during the yearly dengue epidemic, the preferred diagnosis was dengue fever, and that usually a differential diagnosis was not considered. At the same time, participants recognized (87%) that the symptoms that they associated with dengue fever were not exclusive of dengue fever (Table 12). One questionnaire participant stated that, “[...] there are not any symptoms that are particular to dengue, because when people get a really bad fever they say it is dengue” (62-f-6-homemaker). According to the health professionals, the fixation with dengue fever in the population was also shared by the medical establishment. One of the health professionals even commented that the hyper-focus on dengue fever was possibly causing a misdiagnosis of other diseases. As a result, the health professional considered that some of the reported dengue deaths could actually be attributable to a faulty dengue diagnosis and inadequate treatment.

**TABLE 12.** Questionnaire and survey participants’ opinion of whether or not dengue fever was confused with other diseases based on the symptoms.

<table>
<thead>
<tr>
<th>Are other diseases conflated with dengue fever?</th>
<th>Instrument</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Survey</td>
<td>Questionnaires</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Yes</td>
<td>25</td>
<td>15</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>17</td>
<td>46</td>
</tr>
</tbody>
</table>

The survey participants were asked to list the diseases that could be confused with dengue fever based on symptoms usually associated with dengue fever (i.e. headache, fever and body ache). The survey participants listed several diseases (Figure 9), but for the most part mentioned viral infections and a major parasitic infection that was also
listed by the health professionals interviewed: malaria. One of the questionnaire participants rationalized the conflation of diseases by noting that “Now [dengue] is all you see. I mean, if someone wakes up with a fever they go directly to the health centre thinking that it is dengue and maybe it is [a throat infection]. It happens often because the changing weather pattern makes people get sick more often” (51-f-6-homemaker). This characterization of dengue fever “self-misdiagnosis” was actually considered quite common by the questionnaire participants (52%), although few commented on whether they believed the same “mistake” was being made by the medical establishment.

Concerning “self-misdiagnosis”, the questionnaire participants considered that it took place because of two reasons: alarm/panic (78%) and convenient diagnosis (22%). In relation to the former, the questionnaire participants noted that “[…] Sometimes it could be some other disease but by that point they are already psychologically convinced that it is dengue fever. They hear about it so much that they are predisposed to think that
it is dengue. The truth is there is no way to know” (29-m-7-mechanic). Similarly, another participant noted the panic surrounding dengue fever by relating it to her experience at the health centre: “[…] when I went to the health centre I saw a lot of children that were really sick and I also saw other children that just had a mild fever probably because of some other sort of infection” (40-f-12-hairdresser). The participant noted that all the children that were at the health centre were taken under the pretence that it could be dengue fever.

A small number of the questionnaire participants (22%) commented that people were likely to self-diagnose with dengue fever because it was easy to do and it could help them get out of personal obligations. As one participant noted, “[…] I think it happens often. Maybe that way, in other words, you have to be more serious—the majority of workers do it just so they can call their bosses and tell them that they are sick and so they can claim disability benefits” (24-m-6-fast food employee). In other words, some of the questionnaire participants considered that some people were conveniently employing the hyper-awareness of dengue fever to take some time off work. However, the majority of questionnaire participants considered that the misdiagnosis of dengue fever was a circumstance spurred by a veritable and justifiable panic.

Finally, the survey participants were asked if at the time the surveys were conducted there was a disease of more concern to them than dengue fever. Some of the survey participants noted that there were other more concerning diseases, but the majority of the participants noted that the most concerning disease was dengue fever (Figure 10).
The propensity to diagnosis any given ailment with dengue fever was possibly related to the participants’ conception of dengue fever as a dangerous disease, or as one participant mused, “[...] the problem is that your mind is already blocked, so when you get sick you assume that it is dengue fever without really knowing and with it probably being something else” (40-f-6-homemaker).

Dengue as a Biblical Plague. The questionnaire participants were almost evenly split on whether or not they considered dengue fever a biblical plague or just another natural occurrence (Figure 11). The questionnaire participants’ discussions of dengue as a biblical plague were the most prophetic: “So many things have happened in the world that the bible augured. We have the plague because we have been disobedient of God’s will. Following the Commandments, that could change. Right now it is generalized—we are all suffering for what only some are doing” (29-m-7-mechanic). Some questionnaire participants likened the dengue fever epidemic to an ominous aperture for Rapture, “Everything will pass except the word [of the Lord]—this disease is taking everyone
without discriminating. These plagues are coming and they are the will of God and there is nothing you can do. If we die well...it is welcomed [...]” (40-f-6-homemaker). Other participants considered that it could be trials of faith: “What is written in the Bible is what will take place [...] they say it is going to be the end of the World [...] it could be tests too” (24-m-6-fast food employee). In either case, when participants likened the dengue fever epidemic to a biblical plague it was stated as a well-reasoned truth with a solid foundation, intended not to be alarmist but cautioning.

FIGURE 11. Questionnaire and survey participants’ opinion regarding whether or not dengue fever could be considered a biblical plague.

The survey participants (63%) were more likely to state that dengue fever was a biblical plague than questionnaire participants (53%) (Figure 11). Unlike the
questionnaire participants, survey participants considered it to be an obvious and self-evident fact: “We are Christians and we trust that God will help us [...] Disease, hunger, and war are signs of the coming [of the Lord]” (81-f-16-retired), “The word of God says that if we are believers no plague can come into your dwelling...we are living the last days” (64-f-6-homemaker). The survey participants referred to the Bible as a source of information but also as a collection of predictions and auguries of times to come: “[The government] should take care of the people, we are already living the time that is in the Bible” (32-m-16-physical education teacher). To this effect, the fate of the world had been decided for these participants and even God was a spectator.

It is interesting to note that the proclivity to consider dengue fever as a biblical plague was not dependent on the participants’ knowledge of mosquito reproduction. Table 13 shows that the majority of individuals (67%) that considered dengue fever a biblical plague also stated that water was necessary to complete the mosquito’s reproductive cycle. Hence, the organic mechanisms and processes behind mosquito reproduction were known. The matter in question was not the reason dengue fever were present but rather the reason it was spreading indiscriminately, as described by a questionnaire participant.
TABLE 13. Aggregate table of questionnaire and survey participants showing the amount of individuals that considered dengue fever as a biblical plague stratified by elements considered necessary for mosquito reproduction.

| Elements stated as necessary by participants for mosquito reproduction | Biblical Plague |   |   |
|---|---|---|
|   | No | Yes | Total |
| Water | 12 | 26 | 38 |
| Filth | 1 | 0 | 1 |
| Water and Filth | 1 | 3 | 4 |
| Total | 14 | 29 | 43 |

**God and dengue.** The questionnaire participants were able to speak more at length about the relation between dengue fever and the supernatural. In the questionnaire participants’ riposte, it was implicit that God was not directly responsible for the manifestation of dengue fever. Although God could interfere, and both the questionnaire and the survey participants mostly agreed that faith could prevent dengue fever, and God was not manipulating the events at hand. God was bound to the preordained destiny predicated by the Bible: “We are living difficult times and these epidemics did not use to be like this. It is all written. It is not about God sending them, and these diseases have been around since before” (40-f-6-homemaker). In this sense, God could be asked to intercede but could not be expected to counteract biblical prophecy.

Some of the questionnaire participants also commented that dengue fever served as a call to caution: “God is touching us, arguing with us a little—giving us love taps only” (40-f-12-hairdresser). Dengue fever had an ulterior purpose: it could be used to reprimand. To recapitulate, God was not regarded as truly or fully omnipotent when it
came to plagues but it was suggested that dengue fever could be used as a tool by God. Therefore, God could manipulate a disease to inflict punishment or gently chastise but at the same time was not completely capable of preventing the disease if God so chose too: “[God] is a complement. I am not going to expect him to keep me well. I have to take certain precautions as well. I cannot leave everything up to God. When the mosquitoes get riled up I use my mosquito net when I go to bed” (25-f-12-pulperia owner). Even as a biblical plague, dengue fever was expected to manifest indiscriminately throughout the population.

**Summary**

In this chapter, I presented the results that were the product of this research. The first part of the chapter addressed the data produced through participant observation in order to contextualize the overall study setting. The second part made use of the questionnaire and survey data, and was divided according to the questions found in the explanatory model of disease (Kleinman 1980; 2006). Furthermore, the questionnaire and survey data were presented as separate products but discussed jointly for comparative purposes. The third part of the chapter discussed social and structural elements which were considered integral to the participants’ understandings and responses to dengue fever, but which were not explicitly addressed by the explanatory model. The final section of this chapter presented an alternate etiology and nosology of dengue fever as related by participants. The next chapter will discuss these findings with a more detailed analysis of the data and its relevance for dengue fever in urban squatter settlements of Tegucigalpa, Honduras.
CHAPTER SIX:

DISCUSSION

Introduction

This chapter will provide a synthesis and analysis of the results presented in the previous chapter. In the following sections, I will discuss the findings by using Kleinman’s explanatory model as a starting point for discussion, followed by a discussion of the results using a phenomenological explanation for the second line etiology of dengue fever favoured by both questionnaire and survey participants in this study and Kendall et al’s (1991). Additionally, since both the questionnaire and survey participants held similar views on dengue fever, the results will be discussed jointly.

Furthermore, the participants in this study associated dengue fever with a particular explanatory model that was not at odds with the one promulgated by the biomedical establishment; the main difference between both models was the manner in which dengue fever was considered to spread. Although the manner in which dengue fever was thought to spread among participants was not germane to the biomedical model, it did relate significantly with the model discussed by Kendall et al (1991) in Northern Honduras during the late 1980’s.
Kleinman’s Explanatory Model and Dengue Fever in Tegucigalpa, Honduras: Etiology, Vector Reproduction, Symptomatology, and Treatments

Kleinman (1980) commented that the inability to harmonize a medical practitioner’s and a patient’s explanatory model of disease invariably results in a lapse of communication between the two, leading to substandard care, and unresolved medical problems. In the case of this study, the explanatory model for dengue fever was explored in a wider social setting. The results garnered from employing Kleinman’s explanatory model were presented in the previous chapter. In this section, I intend to demonstrate the manner in which Kleinman’s explanatory model can be employed to assess the knowledge of a particular infectious disease in a defined population, and the manner in which this information can be employed to evaluate public knowledge and to affect public health practice. In other words, I intend to demonstrate that, although the explanatory model held by participants was for the most part harmonious with the biomedical explanatory model, it conflicted in a significant way that may have implications for practice. Understanding the way it conflicted can help in the development of new strategies for education and disease control.

The participants in this study were able to provide a description of dengue fever along with treatments that were fairly consistent with the clinical frame. There was also some limited indication that survey participants were able to provide a sanctioned biological etiology for dengue fever. The information collected in this study suggests that some of the conditions encountered during the Kendall et al (1991) study (i.e. lack of knowledge about disease transmission, vector reproduction, dengue fever
symptomatology, and treatment) did not exist or were not indicative of Tegucigalpa during the same time period. With some limitations, the results of the current study could be taken as an indication of the *effectiveness* of the yearly dengue prevention campaigns that have been coordinated since 1994 and which have been directed mainly towards low socioeconomic status neighbourhoods (Figueroa 1999). The impact of these campaigns will be assessed by proxy in a discussion of the answers provided by participants as components of their explanatory model.

**Dengue fever etiology: what causes the disease?** The participants of both the surveys and the questionnaires identified that dengue fever was transmitted by a mosquito vector when asked directly. However, when participants were asked about conditions that contributed to the spread of dengue fever, contradictory results emerged, mostly from questionnaire participants (Table 10, p.78). The survey participants (higher socioeconomic status neighbourhood, single neighbourhood) were more likely to associate transmission of dengue fever with exposure to the mosquito vector (7; 22%) than were the questionnaire participants (1; 6%) (lower socioeconomic status neighbourhood, multiple neighbourhoods). However, eight survey participants (25%) associated dengue fever infection with filth and dirt, compared to 15 questionnaire participants (88%), and eight survey participants (25%) who associated dengue fever infection with low immune defenses. As a whole, 17 survey participants (53%) and 32 (68%) participants in total associated dengue fever infection with non-vector related causes.
The results indicate that members of a lower socioeconomic status neighbourhood were more likely to associate dengue fever infection with a non-biologically sanctioned etiology. Similarly, the results suggest that residents of a higher socioeconomic status neighbourhood may have had more biologically accurate information regarding dengue fever transmission, but the information was limited to a subset of the population. The results obtained in this study suggest that some of the perceptions uncovered in the Kendall et al (1991) study hold for Tegucigalpa, Honduras, specifically, the manner of disease transmission or the direct association between exposure with the seropositive mosquito vector and infection with the dengue virus. Although there was a superficial association between the mosquito vector and dengue fever among the participants in this study, the correlation did not translate into the classic model of dengue fever transmission. As was shown in the results, the participants in both communities appeared to favour explanations of disease etiology that included dirt/filth over activities that enabled mosquito reproduction. Furthermore, mosquito reproduction was clearly associated among participants with the presence of pools of water and water collection. Thus, the reproductive cycle of the mosquito was known to participants, and the relation between the mosquito and the disease was also acknowledged, but it was not considered to be the only source of disease or even the most important one.

Dengue fever symptomatology: what are the symptoms of the disease? In regards to signs and symptoms associated with dengue fever (Table 8, p.75), only five respondents (11%) from the combined questionnaire and survey results associated dengue fever with an unaccompanied fever. The remainder of the participants provided a
complex symptomatology for dengue, associating manifestation of the disease with a syndrome. However, survey participants noted more signs and symptoms for a dengue fever diagnosis. Eleven survey participants (39%) noted that dengue fever symptomatology was characterized by the concurrent manifestation of headaches, body aches, and fevers. Inversely, questionnaire participants were more likely to associate dengue fever with the manifestation of two concurrent symptoms: fever with a headache. Eleven questionnaire participants (65%) were within the aforementioned category. This suggests that questionnaire participants might have been more likely to associate signs and symptoms present in the participant or in others with dengue fever infection.

The dengue fever symptomatology offered by participants did not differ from that offered by the medical professionals interviewed using a similar semi-structured questionnaire. The results suggest that participants’ were likely able to recognize the symptoms of dengue fever before attending the local clinic, and recognizing the symptoms could have prompted participants to actually visit the local clinic, since they recognized it should not be treated at home (Table 5, p.67). Ultimately, the participants shared the diagnostic criteria with the medical professionals and were contemplating non-reproducible signs as indicative of infection. However, fevers accompany a great deal of infectious diseases, a fact that was recognized by both the medical professionals and the participants (Figure 9, p.93).

Taking the aforementioned into consideration, it appears evident that a certain degree of uncertainty accompanies a dengue fever diagnosis provided both at the
individual level and at the clinical level. The lack of definitive and specific tests for dengue fever that are locally available at an accessible cost, along with the lack of characteristic signs for mild forms of the disease, contributes to an uncertain diagnosis and further increases the probability of a false-positive. However, the drawbacks of a false-positive diagnosis are relative, since the proposed treatment for classical dengue fever does not prescribe expensive medication or extended and costly hospital stays. At the same time, the 2010 dengue fever epidemic led to a veritable panic which flooded public hospitals and extenuated public health services. With the aforementioned in mind, a false-positive diagnosis not only becomes contextually relevant, but also worrisome in a country were health resources are abundant but abysmally managed (World Bank 2007).

**Dengue fever treatment: what is the treatment for the disease?** Only four survey respondents (8%) were unable to provide a treatment regimen for individuals infected with dengue fever. Inversely, 27 participants (57%) were able to provide a complementary treatment regimen for dengue fever involving drugs, liquids, and rest in three different combinations (Table 11, p.80). The latter is relevant because the medical practitioners interviewed noted that drug treatment for dengue fever is indeed only supportive, and liquids and rest are the preferred mode of treatment. This suggests participants could have been able to self-treat or treat others if they suspected infection with dengue fever. This knowledge could by-pass the need to engage with the medical establishment. Of course, this assumes that participants attributed infection to classical dengue fever and not dengue hemorrhagic fever, which has more defined clinical manifestations.
Although knowledge of treatment could have made it unnecessary for participants affected with dengue fever to visit the local clinic, the participants did also recognize that it should not be treated at home. More importantly, the participants, for the most part, suggested the same treatment regimen for dengue fever as did the medical professionals. This suggests that participants could have self-diagnosed, since they could self-treat. In spite of that, only ten of survey respondents and none of the questionnaire respondents reported a case of dengue fever within their homes, and none of the reported cases was the participant (mostly children). Knowledge of the treatment for dengue fever did not seem to encourage a diagnosis of dengue fever among the participants, and for that matter neither did knowledge of symptoms.

**Mosquito Reproduction: Extension of Disease Causation**

The participants of both the surveys and the questionnaires (39 participants; 80%) associated the reproduction of the mosquito vector for dengue fever with pools of standing water (Figure 5, p.71). In principle, the participants should have been able to stop the spread of the disease by controlling the life cycle of the vector. The Monterrey community did have a lower incidence of dengue fever in 2010 than other communities included during earlier phase of this study. Since, the rate of infection in the Monterrey community was 15.8/100,000, where as in Los Pinos (228.7/100,000), Villa Nueva (49.32/100,000), and Nueva Suyapa (264.44/100,000) that rate was much higher for the same time period (Casos Dengue Clásico 2010; Vectors Wing Alonso Suazo Metropolitan Health Centre), it could be assumed that Monterrey community members
employed proper prevention practices or maybe the application was more consistent. Of course, the sample for this study is too small to make any definitive statements about this relationship.

The above assumption is contradicted by the fact that the rate of dengue fever was much higher in the Monterrey community (25.29/100,000) than in the Villa Nueva and Los Pinos communities during 2009 (0/100,000, and 17.59/100,000 respectively). However, the rate of dengue fever was still very high in Nueva Suyapa (211.55/100,000) during 2009 (Casos Dengue Clásico 2009; Vectors Wing Alonso Suazo Metropolitan Health Centre). Although the rate of infection in Nueva Suyapa appears to have remained constant between 2009 and 2010, the rate in Los Pinos and Villa Nueva obviously did not. It should be noted that the main difference between Los Pinos and Villa Nueva, and Monterrey from 2009-2010, is the availability of piped potable water. The Monterrey community enjoyed frequent water distribution during the study period, whereas the Villa Nueva and Los Pinos communities had not received piped potable water in over one month during the first stage of this study. Thus, the likelihood of storing water for an extended period of time was possibly higher in Villa Nueva and Los Pinos than in Monterrey, contributing to increased presence of the mosquito vector and the increased rate of dengue fever. The importance of adequate water distribution for controlling the spread of several infectious and communicable diseases has been noted before (Stephens 1996).
At the same time, the fact remains that participants from the Monterrey community were knowledgeable of the mosquito reproductive cycle and could have been taking adequate measures to control potential breeding sites. However, as noted earlier, the association of the participants between dengue fever and mosquitoes was not exclusive, which suggests they were probably not employing preventive practices and the reason they were not as exposed to the mosquito vector were conditions out of the control of the participants but still working in favour of the participants. This leads us to explore those conditions the participants did consider important to the spread of the dengue virus and their relevance to dengue control in general.

**Meta-social determinants of dengue fever: where does the disease come from?** In spite of the increase in the incidence of dengue fever, the results from this study suggest that participants are familiar with the reproductive cycle of the vector, are able to recognize the symptoms associated with dengue fever as well as relevant treatments, and that, to a degree, participants associated dengue fever with vector-borne transmission. At the same time, participants recognized that anyone was potentially susceptible to dengue fever and thus did not associate dengue fever infection with any particular social stereotype (Table 9, p.77).

The above elements found in Central Honduras were contrary to the results obtained by Kendall et al (1991), which claimed that participants in Northern Honduras during the late 1980’s were uninformed about mosquito vector reproduction, dengue fever symptoms, and dengue fever treatments. However, in a significant way, other
aspects of the results were similar. Participants in this study repeatedly noted that filth/dirt and “desaseo” were causal factors fomenting the spread of dengue fever in low socioeconomic status neighbourhoods (Table 10, p.78). The association between filth, “desaseo” and dengue fever was more common among questionnaire respondents (low socioeconomic status neighbourhood, multiple neighbourhoods) than among survey respondents (higher socioeconomic status neighbourhood, single neighbourhood). The association between filth/dirt, “desaseo” and dengue fever might have been more common among questionnaire respondents because they were more exposed to conditions that participants related with filth/dirt. However, 25% of survey participants had a similar perspective on dengue fever, suggesting that perceptions relating filth and dirt to dengue fever were also present among higher socioeconomic status participants. The fact that both survey and questionnaire participants were exposed to what can be construed as unsanitary/unhygienic or disorderly environments was not unexpected, since urban settings are increasingly characterized by such conditions (Satterthwaite 2003; Stephens 1996; Harpham 1996). Furthermore, it could be surmised that the extent of the participants’ exposure was jeopardizing participants’ health since survey respondents noted that there was a general and personal fear of infection with dengue fever (Table 5, p.67).

The survey and questionnaire participants both acknowledged that the sanitary and hygienic conditions present in Tegucigalpa influenced the spread of dengue fever. Similarly, the participants recognized that the epidemic presence of dengue fever was a yearly occurrence; a certainty of life in Tegucigalpa that could be directly related to the
presence of filth. As noted above, participants felt that the greatest health problem in their neighbourhoods was the lack of orderliness/cleanliness or “desaseo”, and this was exacerbated by the perceived lack of interest on behalf of other neighbourhood residents to maintain a clean environment where and when possible. This perception also extended to governmental authorities, since they were considered unable to respond in the best interest of the population. Even if the government had acted, the responsibility for the spread of dengue fever was considered an individual one since filth/dirt was individually generated. As a result, there was a general sense that governmental involvement would have had little or no impact on the spread of the disease. To the participants, dengue appears to have been as uncontrollable as the filth/dirt and perhaps to have stemmed from it.

So, even though there appears to have been a difference in certain aspects of the explanatory model of dengue fever between Kendall et al’s (1991) participants and the participants in this study, the ultimate attribution of disease causation was ultimately the same: dirt/filth. This similarity between these aspects of the explanatory models can be explained by employing Mary Douglas’s (1992) discussion of social ambiguities and anomalies that give rise to “dirt” and summarily “pollution”. By employing this framework, social references to “dirt” and “pollution” can be interpreted as meta-commentaries on social processes and conditions. To explore this possibility, I would like to first discuss the results from this study that could contribute to such an explanation.
Before continuing to address the participants association between dengue fever and “filth”, I would like to note that the association between filth and dengue fever is technically erroneous from a biomedical standpoint. The main vector for dengue fever in Latin America is the mosquito *Ae. aegypti* (Monath 1994), and the mosquito has a marked preference for breeding in containers with clear water. In essence, the virus itself should not be present or transmissible if the mosquito vector is not present as well; however, as noted before (Schreiber 2001; Satterthwaite 2007), the mosquito vector is more likely to be found where there is a proliferation of refuse in which water can collect and provide the necessary breeding sites. Regardless, the association between dengue fever and filth was present in this study and it affords a promising avenue for the improvement of dengue fever prevention campaigns.

**Phenomenology and Dengue: Fear of Dengue Fever Contagion**

The explanatory model can make differences evident but does not attempt to explain them. Participants should have been able to satisfactorily identify dengue fever in their households and neighbourhoods and also engage in practices to protect themselves from infection. However, survey participants were generally afraid of becoming infected with dengue fever (24; 80%) and believed “others” were also afraid (26; 87%) (Table 5, p.67). Furthermore, survey participants thought dengue fever posed a serious threat to their health (30; 100%). At the same time, they did not consider themselves to be completely susceptible, since risk of infection was more highly associated with exposure outside of the home as opposed to inside of the home (16; 57% and 7; 23% respectively).
Furthermore, the 7 out of 10 survey participants that reported dengue fever within their home also attributed dengue fever infection to exposure outside of the home.

Survey participants had knowledge of dengue fever and could have conducted activities to prevent dengue fever infection within their homes, but might have seen themselves as unable to regulate their immediate, exterior, physical environment. On the flip side, recognizing the danger associated with the exterior physical world could excuse poor vector control activities within the home, if an episode of dengue fever did in fact present within the home. That is to say, a disease episode would have been related with infection outside of the home since disease presence was associated with the external physical environment and perennial dirt/filth and “desaseo”. The fear of infection was a constant threat for survey participants and unfortunately similar information was not collected from questionnaire participants. Regardless, the similarities across other data presented suggest that this could have been the case for questionnaire participants as well.

Fear of infection outside of the home could be further related with the fact that 18 survey participants (60%) considered governmental authorities at fault for poor performance in preventing the spread of dengue fever (Figure 7, p.88). This was mostly due to the substandard provision of resources and poor surveillance provided by authorities to counteract the dengue fever epidemic, as well as for failing to provide other more essential services such as trash removal. Some of the survey (11; 23%) and questionnaire (6; 35%) participants considered both individual citizens and governmental authorities to be responsible for the spread of dengue fever, but the majority of both
samples (13; 43% and 7; 41%, respectively) thought that individual citizens were responsible for the spread of dengue fever (Figure 8, p.91). It is interesting to note that other citizens were considered responsible and not the citizen (participant) that was being addressed. Once again, infection outside of the home was viewed as beyond the control of the individual respondent, since culpability for presence of the disease rested in the actions of others.

**Conflation of Dengue Fever with other Diseases**

The medical practitioners interviewed for this project listed several diseases that are considered within the differential diagnosis for dengue fever, including a host of respiratory, viral, and parasitic infections. As a matter of fact, both medical practitioners noted that there was a concern in the medical community that other diseases were being inappropriately diagnosed as dengue fever and concomitantly inadequately treated, contributing to mortality and morbidity under dengue fever statistics. Likewise, the majority of survey and questionnaire participants (40; 85%) agreed that dengue fever could be conflated with other diseases (Table 12, p.92), and was probably further associated with a faulty self-diagnosis throughout the community. Like the medical practitioners, survey participants noted that a range of diseases could be conflated with dengue fever based on the symptomatology participants associated with the disease. Only four of the survey participants (13%) did not offer a differential diagnosis for dengue fever, and 16 survey participants (53%) thought that viral infections in general could be conflated with dengue fever.
The wide range of diseases considered within the differential diagnosis of dengue fever by the medical practitioners and as conflated with dengue fever by the survey participants is further evinced by the fact that 21 survey participants (70%) considered dengue fever to be the most concerning disease during the time the research was conducted (Figure 10, p.95). This perception, along with fear of infection in the community due to matters outside of the participants’ control, buttresses the possibility that a dengue fever diagnosis was proffered by both participants and medical practitioners over all other possibilities.

**Dengue Fever as a Biblical Plague and its Relation to God**

Finally, ten of the questionnaire participants (58%) and 19 of the survey participants (63%) considered dengue fever to be a biblical plague (Figure 11, p.96). The perception of participants in both the questionnaires and the surveys was that dengue fever and the epidemics associated with it could not be prevented or quelled in their entirety. The manner in which participants discussed dengue fever as a biblical plague was possibly not limited to dengue fever, but rather elicited in response to the epidemic disease of the moment. Many infectious diseases and manifestations of them are commonplace in Tegucigalpa, such as diarrheal diseases, dysentery, and hepatitis (Boletin Alerta Semanal 2010, Vectors Wing Alonso Suazo Metropolitan Health Centre; Rheigans 2007). Notable about dengue fever is that it affects individuals across all age ranges and even possibly the same individuals throughout the years, which is decidedly different than the trends for other infectious diseases such as hepatitis A or rotavirus, for which vaccines are available and regularly administered by the local health clinics.
Dengue fever is difficult, if not impossible, to control once the mosquito vector abounds, and this may have influenced participants’ perception of dengue fever as a biblical plague. Furthermore, the questionnaire participants related dengue fever to a biblical plague but the supreme deity in biblical lore was in part incapable of stopping the spread of dengue fever; God was also bound to preordained destiny as much as those affected by it. Dengue fever was also referred to as a moral instrument by some participants, through which God made clear that social conduct was in some form contrary to biblical norm. Like the above elements, relating dengue fever to a biblical plague and with God might not have only made a dengue fever diagnosis more common, but also might have reflected a more general appreciation of the surrounding social and physical environment in which the participants were enmeshed. The participants had a general notion that their neighbourhoods were “polluted” and that it was contributing to their overall health status. I will expound on this latter point below.

**Ambiguities and Anomalies**

Dengue was seen as a problem in unkempt/filthy neighbourhoods. The word that was used was *desaseadas*, and it was used interchangeably to refer to lack of order or cleanliness. In this study, the individual citizen was recognized as the main contributor to that local order and cleanliness even when the local authorities were seen as part of the solution. Thus, individual responsibility was translated as an expectation of proper moral conduct from others within the community and not only as a personal admonishment. Furthermore, the perceived lack of order evoked by references to *desaseo* highlighted that
the participants were in contact with a perceived source of pollution, and one which individual responsibility could not ameliorate. If following Douglas (1992), pollution is taken to arise from disorder within the social system, we can assume that disorder would have been evident in ambiguities and anomalies that contradicted local schemas and that precipitated the presence of “dirt”. Dirt ultimately led to the presence of pollution and the fragmentation of the social system. In this case, there was some evidence to demonstrate the presence of two ambiguities and a possible anomaly within the moral paradigm of the participants: the selective habits of an undiscriminating disease, the impotence of the omnipotent, and the spread of a vector-borne disease without a vector.

**Selective Habits of an Undiscriminating Disease**

Extraneous elements that contribute to pollution can be present in one of two forms: ambiguities or anomalies. Ambiguous elements are not necessarily inimical to the continued existence of the systems, but they do not necessarily mesh smoothly with the established ideology or explanatory universe. In this study, the majority of the sample agreed that dengue does not discriminate (Table 9, p.77) but participants confided (Table 6, p.69) that most cases occurred in “dirty” neighbourhoods (17; 56% of survey participants and 12; 71% of questionnaire participants). A reference to “dirt” might have enabled the social milieu to justify or rationalize the presence of a contradicting condition by normalizing it. Since dengue fever was not selective, but individuals in marginal neighbourhoods seemed to be most affected, the only explanation for the spread of dengue fever was a factor beyond the immediate control of neighbourhood residents: “dirt”.

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It was noted above, and in the last chapter, that the participants considered the lack of orderliness/cleanliness to be the greatest health problem in their neighbourhoods. Furthermore, the participants acknowledged that the presence of filth/dirt resulting from the lack of order stemmed from a lack of responsibility and interest from the local population and not other parties of interest (e.g. governmental authorities). Along with that, the participants recognized that other individuals in their neighbourhoods could not be persuaded to act and thus the conditions they were submitted to within their environment were unlikely to change. Hence, through the presence of dirt/filth, the participants were continually exposed to a disease to which they were already susceptible.

The Impotence of the Omnipotent

Another example in this study came from individuals who noted dengue was a biblical plague that could only be alleviated by turning to God for support. However, they also commented that God was not responsible for the plague and thus could not stop it. In this case, dengue had a problematic classification as both a supernatural disease and at the same time a disease beyond the reaches of an omnipotent power. Dengue then, when conceptualized as biblical plague, became an ambiguous element arising from an internal inconsistency and representative of pollution within the system.
The Spread of a Vector-Borne Disease without a Vector

Anomalies arise from extraneous elements that cannot be integrated into the system in any significant way. In this study, participants recognized that dengue fever was spread by a mosquito vector and that the vector reproduced in water. However, when discussing determinants of the disease, the participants related the spread of dengue fever with dirt/filth but not with conditions that increase the proliferation of the vector. To the participants, the presence of filth/dirt was a more obvious source of disease and exemplary of the neighbourhoods more commonly associated with the disease (Table 6, p.69), which also happen to be marginal neighbourhoods. This anomaly highlighted marginal neighbourhoods as exemplary of environments that breed disease and as egregious neighbourhoods. However, the cases of dengue that were reported by the participants were attributed to infection outside of their neighbourhood and sometimes even outside the community. Thus, not only was their community internally damaged but the boundaries that kept pollution out were collapsing as well.

In this final situation, the anomaly arose from an extraneous element impinging on the boundaries of the system and challenging the core of the system itself. In this case, the extraneous element was clearly transgressing against the boundaries that protected the local space and there was not a satisfactory explanation to justify this course of events. In other words, the spread of dengue fever highlighted the lack of protection and support suffered by the community by noting that dengue fever was not adhering to some presupposed pattern of propagation. Since participants saw themselves as the ones that
could potentially get sick, then it follows that there was a transgression against the system that was being committed against them and not because of them.

The moral paradigm, as evinced by the explanatory model, could have been used to spur others into action or to make evident that a breach experienced at the boundaries of the system resulted directly from a disregard for the lineaments of the system. This provides individuals with a direct referent that can be cited to explain a current condition or to coerce others to change certain behaviours. As Douglas notes, pollution can serve the function of “marshalling social disapproval when it lags” (1992:132). Although this could contribute to communal self-regulation, by monitoring one’s actions as well as those of one’s neighbour through the precept of individual responsibility, participants lamented that it was not possible to enforce such vigilance. As a result, the possibility of practical local action was limited, and the possibility of dengue fever infection increased. Dengue fever infection, properly diagnosed or not, could have been employed by the participants to discuss their views on the state of their neighbourhoods and communities and to provide a critique without doing so directly.

Summary

This chapter offered a discussion of the results obtained in this research project. The data demonstrate that the explanatory model of dengue fever held by participants with differing socioeconomic backgrounds was essentially the same. The data also demonstrate that the explanatory models for dengue fever espoused by the participants in this study differed, in significant ways, from the explanatory model presented by Kendall
et al (1980). Additionally, and perhaps more interestingly, the data indicate that there was an alternate etiology of dengue fever present across the samples. That being said, the data also indicate that an element of the explanatory model presented for these samples is identical to Kendall et al’s (1980) in one important respect: etiology. The next chapter will resituate this discussion within the literature and offer conclusions and recommendations.
CHAPTER SEVEN:
CONCLUSIONS AND RECOMMENDATIONS

Introduction

The following chapter will offer some conclusions stemming from the discussion of the data presented above. Therefore, I will resituate the results obtained from this project within the literature discussed at the outset and will offer some implications for the results obtained, as well as discuss their overall contribution to the existing literature. Finally, I will offer some recommendations for the practice of dengue fever prevention programs in Tegucigalpa, Honduras. To accomplish the aforementioned goals, I will start by discussing the project in regards to the public health literature, then move on to the anthropological literature, and end by providing some recommendations.

Prevention Programs in Public Health

I discussed in the literature review that public health researchers have begun to evaluate the impact of prevention campaigns across social groups with differing social markers or statuses (Itrat et al 2008, Syed et al 2010, Koenraadt et al 2006, van Benthem et al 2002, and Winch et al 2002). It has been discussed that socio-economic status indeed plays a differential role and that individuals with a higher socio-economic status might be more informed than their lower socio-economic status counterparts. Although,
the conclusions appear sensible, the results obtained in this project contradict them. For this study, socio-economic status was defined by visual appearance of residence and presence of infrastructure, and further validated by highest educational attainment (Marchesi 2000; OCDE 2011; also see CHAPTER FIVE).

The results for this project indicate that participants in the low socioeconomic status neighbourhood and in the high socioeconomic status neighbourhood had a similar explanatory model for dengue and dengue fever, and that this explanatory model was very similar to the explanatory model held by medical practitioners. Furthermore, participants in both low and high socioeconomic status neighborhoods shared an alternate etiology of dengue fever, that was not in line with biomedical practice and which relied on Christian dogma.

**Medical Anthropology and this Project**

The use of the explanatory model in this project provided a simple and precise protocol to ascertain and to compare the level of dengue fever knowledge between neighborhoods in a single community. The information gathered with the use of the explanatory model demonstrated that the information shared by participants was similar to that shared by biomedical practice. However, the explanatory model also revealed that participants 1) had a negative impression of social cohesion in their neighborhoods and at times of poor governmental involvement, 2) had a biomedically apt explanatory model for dengue fever, 3) associated dengue fever with filth and “desaseo”, and 4) associated dengue fever with a biblical plague.
On the first point, the results presented are in line with the conclusions offered by Whiteford (1997) and Coreil et al (1997). Mainly, Whiteford (1997:203) discussed the issue of *mala union*, or bad union, and how this affected community member’s ability to coherently and harmoniously address the issue of dengue fever as a community. At the same time, *mala union* reflected the community member’s inability to meaningfully engage with governmental authorities to improve dengue fever prevention practices and to directly intervene within their communities.

On the second point, Kendall et al’s (1991) research in 1990’s Northern Honduras uncovered a dengue fever uninformed population; as it were, a dengue fever naïve population in both the educational and immunological sense. The results presented here indicate that dengue fever knowledge may have improved in Honduras, or that at least the situation in Tegucigalpa during the study period was not as alarming as that encountered by Kendall et al (1991) during the 1990’s. However, in spite of the possible increase in knowledge of dengue fever, the participants in this study still had a hard time firmly associating the mosquito vector with transmission of dengue fever, a situation also encountered by Kendall et al (1990). To this effect, I believe addressing the latter two points mentioned above can help to explain this incomplete alteration in explanatory models.
Folk Illness and Idiom of Distress

The participants in this study associated the presence of dengue fever in their neighborhoods with filth, “desaseo”, and, ultimately, pollution. The association with pollution even made it possible for participants to relate dengue fever with a biblical plague. Relying on Douglas (1992), it was argued that conceptions of filth and “desaseo” could be taken as communal reflections on a social system, and that pollution had less to do with physical contamination and more to do with acts or conditions which affected order within the community. This conception of pollution stemming from disorder, and dengue fever stemming from pollution, provided a conceptual bridge for participants to associate dengue fever with a metaphysical vector (biblical plague) instead of a mosquito vector.

The aforementioned suggests that participants had a sociosyncratic causal interpretation of dengue fever that did not relate to a biological plausibility and that could be related with a folk illness. In fact, the information presented even suggests that dengue fever was employed as an “idiom of distress” (Nichter 1981). The information garnered from participants supports this claim, based on the result that the explanatory model differed in the aspect of dengue fever etiology. Although, the evidence is not as abundant as would be ideal to make the claim for a folk illness, the fact is that the etiology of dengue fever held by participants was substantially different from that managed by biomedical practitioners, and to some extent even the nosology of dengue fever was affected by this.
Regardless, the evidence for an idiom of distress is suitable because the participants viewed the perceived source of disease as more important than contact with the actual vector. Therefore, infection with dengue fever was associated with environmental contagion, and environmental status was recognized as the product of larger social conditions. The perceived source of disease for the participants was the neighbourhood and the community, and by proxy the social system which regulated the neighborhoods and communities.

**Preliminary Conclusions and Recommendations**

Taking the aforementioned into consideration, the results of this study could be attributed to the impact of the prevention campaigns conducted by surveillance technicians. At the same time, the containment and control of dengue fever might not be necessarily related with the level of disease and vector knowledge within the population, but rather with the adequate availability of water and proper refuse collection services. Participants within Tegucigalpa recognized a lack of communal coherence and also a lack of political clout, which further determined their exposure to dengue fever. In the end, participants were well informed about dengue fever, but there was a major discrepancy between the explanatory model shared by participants and biomedical practice as to the cause of dengue fever. This discrepancy could lend itself to consider dengue fever, within the neighborhoods in this study, as fulfilling some of the requirements to be considered a folk illness.
To my knowledge, the partial conception of dengue fever as a folk illness has not been considered elsewhere. To that effect, the contribution of this research project to the literature and to anthropological and public health knowledge was to provide an exploration of that possibility. This information can affect dengue fever prevention campaigns and some recommendations to improve dengue fever prevention campaigns will be provided based on that possibility.

**Recommendations Resulting from Both Phases of the Project**

The recommendations relate to the manner in which surveillance technicians carried out surveillance activities, the way information was provided to community members, and the manner in which local management of dengue fever and mosquito proliferation were conducted, as well as addressing broader concerns for dengue fever management.

**First recommendation: more information should be dispensed on the particulars of viral transmission and how it specifically relates to dengue fever.** The participants in this study had an explanatory model of dengue fever very similar to the one espoused by the biomedical practitioners, and were even able to identify the vector associated by biomedical practitioners with dengue fever transmission. However, the participants association between the mosquito vector and dengue fever transmission was not as firm or as clearly established. To approach this situation, prevention campaigns should begin to address the mechanisms through which viruses spread and, to narrow the scope, perhaps the mechanisms through which arthropod borne viruses spread. The
inability to create an association between the vector and viral transmission could be attributed to a limited understanding of pathogens and a poor conception of essentially abstract realities.

Second recommendation: strengthening communal or neighborhood associations. The lack of overt and explicit channels of social regulation might have made the presence of more subtle and symbolic channels necessary. Participants in this study noted that they were unable to meaningfully engage with other neighborhood residents in order to improve neighborhood conditions. The participants’ inability to regulate their social sphere might have prompted an association between dengue fever and pollution in order to employ moral recriminations and facilitate or enable social regulation and change. Strengthening local social networks may make associations between dengue fever and pollution unnecessary and aid in dispelling this notion.

Third recommendation: explore the extent of the association between dengue fever and pollution. For future studies on dengue fever and pollution it might be interesting and worthwhile to explore the surveillance technicians’ conceptions of dengue fever. Since, the surveillance technicians come from neighborhoods similar to the ones included in this study, they might have similar conceptions of dengue fever as the participants in this study. Their own notions and conceptions of dengue fever might affect the quality and type of information they distribute to community members.
Fourth recommendation: number of houses visited per surveillance technicians on a daily basis. Surveillance technicians operated from 8:00-1:00 pm from Monday to Friday. The surveillance technicians spent an average of one hour gathering supplies and delivering final reports for the day. This left only four hours to canvass houses in the sectors assigned. I was personally assigned between 30-45 houses which I had to complete in the four hour period. On average, this leaves 8 minutes to canvass a house and provide dengue and dengue fever prevention information. The number of houses visited should be reduced and surveillance should begin earlier in the year.

Fifth recommendation: resources available for surveillance technicians to operate. During the first phase of the project there was an Abate shortage, the main larvicide used for dengue fever prevention. The funds made available to surveillance efforts should be operated in a decentralized fund instead of being part of the total financial health resources available.

Sixth recommendation: water management and water provision. Two of the neighbourhoods canvassed in the first phase had a severe water shortage throughout the duration of the project. This contributed to water storage and to an increase in the presence of mosquito breeding sites. The only breeding sites found during the conduction of this project were in these two communities (Los Pinos and Villa Nueva). The water distribution problem was related to a faulty pump at the distribution centre located in one of the communities. The lack of oversight by the municipal water board and the lack of available funds by the local water board prevented the timely and proper fixture of the
pump. Human resources should be devoted in the health sector to monitor water distribution sites under the auspice of public health.

**Seventh recommendation: security and training for surveillance technicians.**

The surveillance technicians I was working with did not canvass houses that could be related to gang activity. The surveillance technicians had military support during the beginning of the surveillance campaigns but it did not last long. The technicians appreciated the support but the armed forces did not consider it a necessity and thus did not consider it necessary to provide continued or even consistent support. This policy should be revised and armed units should be trained specifically to accompany surveillance technicians. Finally, surveillance technicians should be provided yearly training before beginning the surveillance campaigns.

**Eighth recommendation: urban appearance and waste management.** The participants commented heavily on presence of physical waste and the deprecated appearance of the neighbourhoods through a continual referral to dirt/filth. Conditions to improve community appearance could dispel the participants association between dengue fever and filth and encourage participants to consider the biologically valid alternative. Additionally, from public health perspective it only makes sense either way to provide routine and reliable waste management services. As it was noted before, the lack of reliable water provision forces individuals to store water for prolonged periods of time, and waste or refuse can accumulate water during the rainy season, both of which provide viable breeding grounds for the mosquito vector.
Ninth recommendation: increased governmental presence in the affected communities. An increased governmental presence in urban communities through health and education campaigns might improve the participants’ perception of their neighbourhood by increasing participation and interaction between neighbourhood residents. Increased interaction could lead to the creation of a stronger support network within the neighbourhoods and the communities and lessen the perceived lack of communal cohesion, which in turn could lead to the notion of manageable dirt/filth.

Tenth recommendation: improvements in diagnostic criteria and tests. Given the diagnosing dengue fever is, to say the least, problematic, the Honduran health care system should consider investing in research, both in the biochemical and social sciences, to improve tests and to refine diagnostic criteria. The latter could be accomplished by improving available databases and developing sentinel networks to compare possible cases of dengue fever against other social and environmental variables related to dengue fever.

Final Remarks

It is easy to fault a complex system that aims to improve the health condition of hundreds of thousands of individuals. The above remarks are not intended as criticisms, but merely provided as suggestions. The individuals I had the pleasure of working with took pride in their work and performed to the best of their ability. At the same time, the surveillance technicians are both underfunded and under staffed (WHO 2010a); two conditions which act as obstacles to the proper conduction of their duties. Furthermore,
the spread of dengue fever in Tegucigalpa, Honduras, and Honduras in general, is clearly related to the inadequate provision of basic services; from a public health standpoint, any serious attempt to eliminate the disease would have to focus on that issue first.
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