The Political Ecology of Cholera in Peru

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Abstract

In an increasingly globalized world, the rise of epidemics is especially troubling and has been the subject of much research. It is common for the ill to become pathologized and for these epidemics to be perceived solely through the lens of poverty and victim-blaming rhetoric. This study will investigate the cholera epidemic that took place in Peru in 1991 and the ways in which it was a product not solely of individual maladaptation, but as a consequence of structurally produced vulnerability. With a specific interest in the role of structural adjustment policies, which have been criticized for negatively impacting societies, I will consider the hypothesis that such programs transformed the environment through which human-environment interaction in Peru transpire. As such, this research will conjoin the fields of disease ecology and political ecology and allow for an investigation into the specific risk factors through which individuals come to contract diseases as well as the processes through which such vulnerability is structurally produced. This case study of Peru will provide an argument for viewing disease through frameworks of both human and political ecology and as such contextualizing epidemics within the broader processes that are responsible for shaping local settings.

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Chapter 1: Introduction

In 1991 a cholera epidemic struck Peru and spread aggressively throughout the nation. Although the epidemic spread onto other neighboring countries, incidence and fatality rates were minimal in comparison to Peru, where over eighty percent of the cases occurred. The onset of the epidemic as well as its severity was unforeseen by the populace as well as the international world—as Peru had not observed a cholera outbreak within the past century. Initial responses to the epidemic focused on the prevalence of poverty within Peru as the leading factor. However, in determining only micro-level factors of disease transmission, larger structural origins were largely ignored. This paper investigates the hypothesis that there were broader societal issues at play that manifested as changes in the human-environment interaction and aided the onset and severity of cholera in Peru.

To suggest that the epidemic is simply a natural result of impoverished lifestyles is to understate the true problems that were present within Peru at the time the epidemic struck. Peru was one of many nations struck by economic crisis during the late 20th century, and as early as 1967 the Peruvian government began an entrenched relationship with the International Monetary Fund (IMF). In order to be eligible for economic relief, various Peruvian administrations were forced to adopt IMF-sponsored neoliberal reforms known as 'structural adjustment programs'. These programs had incredibly stringent conditions and dominated much of Peruvian economic, political, and social aspects throughout the rest of the century (Peabody 1996; Pfeiffer 2010; Veltmeyer 1997). The imposition of structural adjustment programs fundamentally alters the nature of a country's economy, leading to changes in industry, trade, and structure of the workplace. Furthermore, the IMF strictly emphasized austerity measures that often involve the removal of important social services that protect citizens from the negative consequences of

economic restructuring (Peabody 1996; Pfeiffer 2010; Sheahan 1994). The pervasiveness of structural adjustment as a result of Peruvian administrations' conformity to IMF mandates fundamentally impacted the climate within Peru. As described by Paul Farmer, this process of 'structural violence' illustrates how large global mechanisms can come to structure an environment in such a way to produce vulnerability and risk (Farmer 1996). My research aims to analyze the role of structural adjustment programs in influencing such disease vulnerability in Peru.

In order to investigate the emergence of cholera in Peru as a result of external forces, I will utilize the disciplines of both disease ecology as well as political ecology. Disease ecology is vital to understanding the epidemic as it provides insight on the specific interactions between the citizens and their environment that resulted in contraction and transmission of cholera. Melinda Meade's "triangle of human ecology" is especially helpful in understanding the connections between the environment, population, and culture as they determine the health of a population (Draak 2005; Mayer 1996; Meade 1977). However, disease ecology does not provide analysis for the full political, historical, and economic influences associated with Peru through which such connections arose. As such, I will introduce political ecology into this framework in order to provide a more comprehensive view of the epidemic and its origins. In this perspective, cholera in Peru will be investigated as a consequence of risky individual behaviors and lifestyles that were structurally produced by the political-economic system.

Following a review of the literature surrounding structural adjustment, disease vulnerability, and the ecology of health, I will analyze the specific evidence present within Peru. A detailed history of structural adjustment implementation in Peru and its consequences shall be reviewed to investigate the role of institutional upstream factors. To understand the micro-level

determinants of the epidemic I will also portray the specific disease-inducing conditions present at the time. Although these factors are critical to understanding the specific context of the epidemic, popular accounts of cholera too often label the disease as a consequence solely of these micro-level circumstances and thus place blame primarily on impoverished communities. By demonstrating how the macrolevel changes wrought by structural adjustment manipulated factors of disease vulnerability, focus will also be given to the role of institutional processes as influencing the epidemic.

The strengths of both disease ecology and political ecology must be combined in order to understand the complex interplay between local specific factors and their large-scale determinants. Structural forces shape specific environments and constrain individual choices and behaviors to produce a climate ripe with vulnerability and risk. Such research combines these two fields into one method of investigating disease—focusing on the ways in which epidemics are a product of human-environment interactions that are fundamentally structured through broader institutional factors. I hope to discredit the ways in which populations experiencing epidemics become pathologized and instead highlight how disease is wrought by structural vulnerability manifested through distinct changes within a population. The cholera epidemic in Peru will be studied as a combined product of specific environmental and behavioral modifications and the ways in which were breed as a result of structural adjustment and the transformation of the political-economic context.

Chapter 2: Background

The Epidemic

Cholera is an infectious disease that had been eradicated from the continent of South America for over one hundred years prior to the outbreak in Peru. Caused by the bacteria *Vibrio cholerae*, El Tor biotype, cholera leads to severe dehydration and diarrhea, and can kill an adult in as little as eight hours (Jouravlev 2004). As a highly transmittable disease, cholera poses as a serious global health threat and thus efforts to prevent and mitigate outbreaks are extensive.

The exact location and date of the outbreak in Peru is uncertain, as the coastal cities of Chancay, Chimbote, and Piura simultaneously reported numerous cases of gastroentitis (Colwell 1996). On the 23rd of January, however, the Peruvian Health Ministry officially declared a cholera epidemic following the admittance of multiple citizens for cholera-like symptoms in both the Hospital Chancay and Hospital La Caleta in Chimbote (Seas 2000). The proximity of Chancay to Lima facilitated the rapid spread of cholera, covering the entire coast with over 30,000 cases by mid-February. By the end of 1991 Peru recorded 322,562 total cases of cholera. The lack of preparedness coupled with the spread of the disease perpetuated the epidemic until 1994, and concluded with a total of 625,259 cases and nearly 10,000 deaths (Seas 1996; Seas 2000).

Although its origin lay in the coastal regions, the cholera epidemic quickly spread throughout most of Peru. Rural areas mainly dominated by poorer indigenous populations where services are minimal yielded the highest cholera rates throughout Peru. In areas surrounding Iquitos, for instance, the rate of cholera deaths recorded in the summer of 1991 was as high as 13.5%, whereas the national average lay closer to 1% (Seas 1996). Cholera was also rampant in the over-capacity urban areas along the coast, especially among slum-dwellers in such regions.

Once the virus infiltrated Peru, without any barriers to prevent its spread, it wrought havoc on the entire nation.

Critical to the situation surrounding the epidemic was the responsiveness of the government. The paralyzed Ministry of Health had limited supplies with which to treat patients or prevent transmission. Additionally, the discourse surrounding cholera at the time had an equally influential role in shaping the epidemic. In hopes of evading responsibility and having to issue a response, President Fujimori downplayed the significance of the epidemic to quiet public alarm as well as to prevent backlash for Peru's fishing industry. In a gesture suggesting that the epidemic was not a threat, Fujimori, along with the Minister of Fisheries, ate raw fish during a news broadcast. Cholera, however, is a virus that spares none as the Minister learned when he contracted the disease after the event (Rosenburg 1991). The Ministry of Health, in contrast, attempted to provide more education on the epidemic. However, the Minister was highly criticized for such actions by Fujimori and other agencies and thus was influenced to resign. In an interview he portrayed the administration's manipulation as such: "They wanted us to say that Chimbote simply had an outbreak of severe adult diarrhea, of unknown cause, so that nobody would be frightened," (Gall 1992). As the epidemic worsened, Fujimori eventually softened and a public awareness campaign with the slogan 'The Solution to Cholera Is In Your Hands' begun and which placed emphasis on the boiling of water, washing of hands, and avoidance of specific foods (Briggs 1999; Ries 1991; Rosenburg 1991). These actions quickly placed responsibility and blame onto the population and suggested that behavioral modification was the only solution to deterring the epidemic. Although such personal actions are the root cause for specific contractions of cholera, solely focusing on individual determinants discounts any structural origins from which they rose (Briggs 1999).

The last reported case of cholera in Peru prior to this outbreak was in 1867 and did not result in an epidemic (Ries 1992). However, the political, economic, environmental, and societal conditions present in 1991 coalesced creating a perfect storm ripe for an epidemic. Peru represents an interesting case study because although cholera outbreaks occurred in Peru's neighboring countries during 1991, 82% of the total cases during the epidemic were recorded within Peru (Sepulveda 2006). It must be questioned as to why an epidemic arose out of the introduction to cholera when it previously had not, and why one country should be so disproportionately affected.

Economic Crisis in Peru

A detailed analysis of structural adjustment shall later be given as evidence for the specific environment present in Peru; however, a brief understanding of structural adjustment and the economic crisis in Peru is vital to noting their relevance. The economic perils of Peru began as early as the 1950s and truly took hold during the 1970s global economic crisis. As with many Latin American countries, the levels of debt held by Peru skyrocketed and propelled the economy to negative GDP growth (Pastor 1992; Paxson 2005; Sheahan 1994). During this era, neoliberal economic theory became the dominant discourse within international financial institutions. The IMF, in particular, was well known to initiate neoliberal restructuring of indebted countries' economies through 'structural adjustment programs' (Pfeiffer 2010). Placing emphasis on the tenets of stabilization, devaluation, and liberalization these programs had specific conditions for the political-economic institutions of a nation.

The pinnacle of Peru's structural adjustment was reached around 1990 under the newly elected Albert Fujimori. Fujimori's lack of a solution for the Peruvian economy was quickly rectified by a plan presented by IMF executives. These experts drafted an economic stabilization

package with the promise that obedience would improve the deteriorated relationship with the IMF and reclaim Peru's loan eligibility (Chossudovsky 1992; Stokes 1997). The economic troubles within Peru as well as the strength of the international financial institutions in the political sphere, led to the imposition of Fujishocks that drastically impacted every aspect of Peruvian society. These 'Fujishocks' narrowly focused on the economy of Peru and ignored the consequences for citizens' livelihoods that resulted (Lustig 1995). Illustrating the ideology behind such programs, Milton Friedman said the following in regards to Peru's structural adjustment: "The Peruvian economy is very sick suffering from the virus fiscal deficit, when you are sick you must take strong medicine, there is no other way," (Chossudovsky 1992). Such rhetoric demonstrates the perspective of the political-economic sphere in regards to structural adjustment within Peru and how it could become so entrenched into the institutional agenda. The manipulation of the political-economic climate within Peru through adjustment programs is critical in understanding how such policies may have structurally produced vulnerability within the nation.

Review of Literature

As discussed, this paper will focus on the epidemic as a product of both individual maladaptations as well as the ways in which human-environment interaction was structurally shaped. Prior to presenting the case-specific evidence within Peru's epidemic, it is important to note common theories of disease vulnerability as well as of consequences to structural adjustment programs. Similar factors presented as key to disease contraction are also found to be consequences of structural adjustment, which should be noted is not of coincidence. To assess the responsibility of specific conditions within the population, I shall review common theories of

disease susceptibility and transmission. Furthermore, the discourse surrounding implications of structural adjustment will supplement the evidence from Peru, suggesting that Peru's structurally produced vulnerability were in fact a product of adjustment programs.

Service Provision

The provision of various public services has been studied in both analyses of disease as well as of structural adjustment. In regards to epidemics, literature has focused on both the necessity of proper infrastructure and service provision in establishing an environment capable of preventing disease, as well as how citizens' relationship with such provisions influence disease-inducing behaviors. It has been suggested in various research that deteriorated water systems diminish the ability of populations to obtain clean water through the following mechanisms: sources of contamination; decreased reliability of water provision; insecure storage of water; and insufficient treatment or chlorination (Budds 2003; Panisset 2000; Tickner 2005; World Bank 1989). In regards to rates of cholera, multiple studies illustrate that outbreaks are significantly higher for individuals who obtain water from improper sources or store water for greater periods of time (Tickner 2005; Swerdlow 1992; Lores 1991). Deteriorating sanitation systems are another trigger for waterborne diseases, as it is much more likely for water contamination to occur in an area where there is inadequate sanitation infrastructure (Panisset 2000; Seas 2009; Swerdlow 1992). The role of medical treatment has also been critical to studies of disease. The accessibility of health care is an important feature of structural vulnerability to disease and also translates to the usage of preventive behaviors.

Correspondingly, the impact of structural adjustment on such services has not gone unnoticed. In conjunction with neoliberal philosophy, IMF policies support the notion that in

order to reduce debt governments must reduce their levels of spending (Jayarajah 1996; World Bank 1989). Peabody found that neoliberal reforms have a direct effect on the ability of health care systems to operate as employment and supplies dwindle through budgetary cuts (1996). Supplementing such research is the literature suggesting that the frequent privatization of these services results in economically unattainable health care for large segments of a population. (Brunelli 2007; Laurell 2000; Mwabu 1996). As such, increased prices of health services can lead to significant declines in the consumption of healthcare (Jayarajah 1996; Laurell 2000). Similarly, the implications of privatizing water have a direct relationship to rates of water consumption from improper sources. Most commonly, when rates increase and service provision deteriorates, populations purchase water from trucks or illegally tap into infrastructure (Labonte 2009; Swerdlow 1992). The literature presented suggests that structural adjustment has profound implications on the provision of clean water, sanitation, and health care by the state and thus that the environment within which citizens live become increasingly vulnerable to disease as people are forced into riskier situations.

Urban Growth

Another critical factor relating to both studies of disease epidemiology and structural adjustment consequences is the process of urbanization. In studying disease transmission, disease ecologists focus on the geographical spread of epidemics and thus the role of migration. Without urban migration, the introduction of a disease would remain relatively isolated. However, the combination of an inflicted population and increased urbanization leads to greater exposure of the disease throughout the entire population (Meade 1977; Panisset 2000). The interactions amongst urban residents are also more frequent and in more direct contact, thus creating a

situation in which disease is easily transmitted (Davis 2006; McGranahan 2003; Joralemon 2006; Reiff 1991). Furthermore, various conditions present in urban environment are also highly conducive to disease, including: crowded living, excessive waste, and substandard housing. Rapid urbanization produces such conditions at a magnified intensity through slum development and is illustrated by what Mike Davis titles 'slum ecology' (2006). Davis' argument provides a useful connection between the disease aspects of urban living as well as the ways in which they are structurally produced through global processes. According to Davis, urbanization is a direct result of market liberalization and agricultural reforms that deceptively lead masses of people to urban areas in search for employment. As such, "rapid urban growth in the context of structural adjustment…has been an inevitable recipe for the mass production of slums," which Davis notes are "disaster-vulnerable settlements," (2006, p.17). Furthermore, vast literature has studied the strain of bourgeoning populations on service provision, which has already been noted as an important feature in epidemics (McGranahan 2003; Tauxe 1992; Wolford 1991). Urbanization is thus a commonly discussed effect of adjustment programs and has been shown to have important structural ramifications for the environment under which human-environment interactions take place and where disease may infiltrate.

Poverty

A final discourse dominant in both disease ecology as well as structural adjustment analysis is increasing rates of poverty. Poverty is widely discussed in literature surrounding epidemics as primarily a factor to behavioral 'downstream' determinants. The discourse present is that disease may be an inherent outcome of an impoverished lifestyle. Impoverished citizens face numerous obstacles that generate higher rates of disease than commonly present amongst

other segments of a population (Hong 2000; Glewwe 1991; Panisset 2000). This correlation is a persistent phenomenon as the poor are more likely to take part in risk-inducing behaviors, live in more vulnerable environments, and be physically weaker. Literature suggests that poor citizens may simply not have the resources necessary to purchase basic necessities such as proper housing, clean water, and adequate food requirements. While poverty clearly leads to specific changes in the relationship between individuals and their environment, within the literature of structural violence is the belief that broader forces—such as structural adjustment—produce such constraints. While impoverished citizens may have higher rates of water storage, malnutrition, and other disease-conducive attributes, these are commonly a product of the social environment within which poverty resides. For instance, there is a positive relationship between poverty and inaccessibility of clean drinking water as well as inferior sanitation provisions: both of which are necessary requirements in order to kill pathogens (Glewwe 1993; Hong 2000**;** Joralemon 2006; "Peru" 1992; Panisset 2000). In addition, once contaminated or exhibiting symptoms, impoverished citizens have fewer resources available for disease treatment. The link between access to affordable health care and wealth has been shown to be a significantly positive relationship, especially in nations where health care is not universal or even subsidized (Mwabu 1996; Webb 2002).

The impacts of poverty on disease susceptibility coincide with the impacts of structural adjustment on standard of living. A common rhetoric within structural adjustment literature is the notion that the shock of the programs may have unintended consequences on socioeconomic status. Within the policies of trade liberalization in particular, literature has noted associative relationships to declines in income and employment, coupled with increases in the cost of living for citizens as well (Glewwe 1998; Laurell 2000; Pfeiffer 2010). The literature on such declines

is widely varied based on the nation and degree of neoliberal adherence; however, the impact can be quite significant (Briggs 1999; Brunelli 2007; Jayarajah 1996). As such, analysis of structural adjustment suggests that affected populations become relatively more impoverished due to declines in income and consumption. Finally, as suggested above, structural factors relating to adjustment may lead to decreased access to necessities for poorer populations. Structural vulnerability resulting from adjustment programs is manifested in the insecure human-environment interactions experienced by impoverished citizens, which cause them to act disproportionately in risk-inducing ways.

Implications for Research

In outlining current theories on disease vulnerability and structural adjustment, I have aimed to provide a baseline for which the Peruvian case may be measured. In presenting the cholera epidemic I will use these frameworks to provide evidence of disease hazards as well as structural adjustment consequences within Peru. In order to substantiate my theory that structural adjustment played a central role in the cholera epidemic, I will use discussed literature to find an association between adjustment programs, heightened vulnerability, and factors of disease contraction.

Chapter 3: A Methodology of Political Ecology

To investigate the cholera epidemic in Peru I will utilize the frameworks of disease ecology and political ecology. Disease ecology with be essential in analyzing the epidemic from an epidemiological perspective, noting how citizens came to contract cholera and how the virus spread throughout the nation. However, in conjunction with the theory of structural violence, the factors present within disease ecology may be shaped as a product of structural adjustment. Paul Farmer's exploration of this framework focuses on the role of broad structural mechanisms that influence environments in such a way to produce risk and suffering for populations. To investigate a correlation between structural adjustment programs and the epidemic, I will draw upon this theory to suggest that these policies created an environment ripe for an epidemic by constructing vulnerability within the population, thus and how such vulnerabilities were manifested as changes within the human-environment interaction. An introduction to disease ecology will be provided to understand these specific human-environment relationships while a synthesis of political ecology will also be presented to demonstrate the role of the political-economic context in producing these relationships. I will conclude with the precise methodology to be applied in this Peruvian case analysis.

Disease Ecology

Modern disease ecology was introduced around the 1950s, when May, credited as the founder of this discipline, suggested that it is both human activity and natural conditions that lead to the onset of disease (Draak 2005; Mayer 1996; Meade 1977). The acknowledgement of an outside influence illustrated that disease in a population is not inherent, but brought about through environmental stimuli, thus determining the importance of "human-environment

interaction as a progenitor of disease" (Mayer 1996). Expanding on the works of May, Hunter, and others in the field, Melinda Meade's triangle of human ecology reinforced the notion of disease as an environmental construct. Referenced by many within disease ecology, Meade's triangle focuses on the interaction between three specific vertices: habitat, population, and behavior (Draak 2005; Meade 1977; Sepulveda 2006). The key characteristic within disease ecology has been the emphasis on human culture, and thus behavior, as a driver of disease. As health risks present, due to disequilibrium, human ecologists define disease as a product of maladaptation by the population (Gray 2005; Paul 1985; Wiley 1992).

The characteristics that have come to define disease ecology are those most notably attacked by its opponents. According to disease ecology, if one factor within a population or its' relationship with its environment is altered the entire system is distorted and can induce disease (Meade 1977). However, to suggest that in the absence of an epidemic the relationship between humans and their environment is reasonably stable is to discount the fluctuating nature of such interactions. Wiley has been especially critical of disease ecologists, noting that "the relationship between an organism and its milieu is anything but static; it is in constant dynamic renegotiation," (1992, p. 230). Many others have argued against the representation of populations as self-contained entities, which undermines the multifaceted ways in which health is determined (Link 1995; McLaughlin 2008; Pederson 1996; Walker 1998). In addition, by assuming a model of equilibrium, disease ecology has been criticized for ignoring the variations within a population.

Another key flaw within disease ecology is the lack of serious regard for historical, political, and economic factors. In assessing Meade's triangle of human ecology, one can see that such factors are largely absent—despite having a significant impact on each of the defined

vertices. As McLaughlin explains, "such a narrow biophysical focus…invariably neglects the social, economic and political factors that shape the finer mosaic of exposure to and impacts from environment threats," (2008, p. 100). In regards to history, many have argued that an epidemic cannot just be analyzed under society's current conditions, as historical phenomena have shaped those conditions. Disease ecology has also been widely criticized for ignoring the role of the political economy, as various factors of human-environment interaction have only limited affect when studied independently. In accordance with the theory of structural risk, such factors are in actuality just ingredients within the "social axes" that are shaped by the political economy (Farmer 1996, p.274). It is thus argued that disease must be studied within the incidental environment, but to note how human-environment interactions are shaped through a nation's political economy and its production of vulnerability (Nef 2003; Morgan 1987, Salehi 2006).

Disease ecology is a useful framework for analyzing how individuals come to contract disease and the methods by which it may be spread. However, without recognizing that such processes may be shaped through processes of structural vulnerability, disease ecologists can be guilty of victim-blaming outcomes. Charles Briggs suggests that epidemiologists within the human ecology field overemphasize the role of behaviors in maladaptation of the human-environment system (Briggs 1999). In drawing attention to these sorts of causal explanations, disease ecologists are liable for framing diseases as solely internal to a population and thus eliminating the possibility that epidemics may be a product of political, economic, and international forces (Briggs 1999; Wiley 1992). As such, the population is held responsible and the structural factors that lead to the conditions within that population are entirely absent (Link 1995). A model of disease ecology in which political, economic, and international factors are

integrated would prevent 'victim-blaming' and draw attention to the structural determinants of disease vulnerability and occurrence (Briggs 1999; Jorgenson 2010; Walker 2005). Borrowing from Farmer, "One must embed individual biography in the larger matrix of culture, history, and political economy," (1996, p. 272).

Political Ecology

To analyze the structural determinants that may be held responsible for producing vulnerability and disease affliction, I will utilize the framework of political ecology. Political ecology arose out of the study of political economy, focusing on the ways in which political and economic institutions shape society and the distribution of resources, and thus ultimately vulnerability (McLaughlin 2008; Salehi 2006, Walker 1998). The political economy is helpful in determining the structures that are responsible for constructing environments and influencing the conditions through which a population interacts with the environment (Craddock 2000; King 2010; Mayer 1996; Nef 2003). In his seminal work, King noted that, "Contemporary conditions that influence disease transmission…were created by national and provincial agencies to facilitate political and economic agendas… and are the outcome of social relationships and power dynamics that have been produced over time," (2010, p. 49). Structural violence is incorporated into the framework of political ecology through its focus on how people's exposure to, and survival of, disease varies greatly within a population. Blaikie and Barnett posit that socio-economic networks shape the relationship between a group and an epidemic (King 2010). Similarly, Krieger and others have utilized the framework of political ecology to illustrate how institutions may "construct vulnerabilities to disease," (2001, p.150; McLafferty 2010).

While political ecology is critical to understanding the overarching origins of epidemics, it is not without major flaws. Political ecologists have been criticized for overemphasizing political economy in such a way that essentially ignores human and ecological considerations. The natural environment is vital to studying the context of particular epidemics, as is the role of individual maladaptations. While disease ecology may place too much emphasis on personal behaviors, political ecology's tendency to ignore such conventions results in a notion of disease as independent of a population, determined solely by external factors (Baer 1986; Craddock 2000; Kalipeni 1998; Morgan 1987; Walker 2005). As such, political ecology is helpful to analyze the structural foundations of vulnerability but must be utilized in conjunction with disease ecology to incorporate the individual behaviors and the human-environment interaction that ultimately beget contraction and transmission of disease.

Methods

In this study, I shall apply the framework of political ecology to demonstrate the vulnerability-producing effects of structural adjustment as well as the ways in which these outcomes ensued changes in the health of the Peruvian population through the framework of disease ecology. Incorporating elements of both disease ecology and political ecology, I will attempt to unite disease factors of both agency and structure: illustrating that the epidemic was a product of the interplay between broad external processes and micro-level social and ecological forces.

To begin with, I will frame the disease environment at the time of the epidemic utilizing Melinda Meade's triangle of human ecology. This methodology will provide insight into the epidemiological context of the epidemic, showing how changes in human-environment

interaction resulted in individuals physically contracting cholera. The three vertices are as follows: culture, environment, and population. Also referred to as 'behavior', culture includes a population's customs and conduct. Culture in this study shall consider behaviors that increase the risk of cholera infliction—such as rates of water storage and boiling of water. Culture will be shown to be shaped by the structural economic constraints and so I will include data on the following: purchasing power, proportion of population impoverished, changes in real wages, consumption of basic necessities, and employment type. Population refers to the biologic status of a people and the factors that determine physical susceptibility to disease. The population vertex will be investigated through nutritional health: rates of malnourishment and caloric consumption. Finally, environment—or habitat—represents the ecological status of an area as well as the role of resource distribution on disease diffusion. In this analysis, the environment shall be considered as factors such as water and sanitation infrastructure and health care provision that established the type of access found within individual households. This vertex will also consider the types of habitats affected populations were subject to, focusing on the role of slum ecology and other aspects of the natural environment that acted as a liaison between individuals and the virus.

As noted, the epidemic cannot be investigated solely within this framework as disease ecology alone focuses too narrowly on micro-level 'downstream' factors that understate the complex nature of the epidemic. By incorporating 'upstream' factors through the introduction of political ecology, this analysis will illustrate that the epidemic was not just an anomalous incidence produced by the specific disease conditions, but instead brought about as a consequence of prolonged vulnerability-producing processes at the political-economic level. While the vertices of Meade's triangle can describe the human-environment interaction, to truly

understand the context within which those interactions and behavioral modifications exist one must consider their links to broader upstream forces. The specific cases of suffering from the cholera epidemic, while occurring at the individual level, are dictated by the context of global forces through which such structural vulnerability is produced (Farmer 1996).

The addition of political ecology will emphasize the role of structural adjustment on the climate of Peru and the programs' role in constructing the risk present in the downstream micro-level factors. Structural adjustment shall be defined as the coordinated stabilization packages signed with the International Monetary Fund and will be assessed through their adherence to neoliberal ideology. Specific factors measured will include: tariff rates, subsidy reductions, consumer price indexes, and government spending on various public programs. The framework of political ecology will analyze the ways in which these factors structurally produced vulnerability within the nation of Peru.

The precise behaviors and environmental conditions accountable for the introduction and spread of cholera, as provided through disease ecology, will thus be studied as products of political-economic transformations, which provided the context for the epidemic to transpire. By employing this method, I hope to analyze the way in which the pursuit of structural adjustment programs influenced broader conditions within Peru and produced a vulnerable climate for the maladaptations within the triangle of human ecology to occur. In uniting these two frameworks, structural adjustment programs may be shown to transform the political economy in such a way as to create the vulnerable context within which human-environment interactions were constrained and disease-inducing behaviors took place.

Chapter 4: Structural Adjustment in Peru

In order to assess the role of structural adjustment within the cholera epidemic, an analysis of the programs initiated as well as their consequences on various sectors of society shall be studied. The history of these programs as well as the relationship between the IMF and Peru are critical in shaping the political-economic context. In conjunction with the literature presented earlier, evidence will be provided that illustrates the role of structural adjustment in producing the structural vulnerability at the time of the epidemic.

Structural Adjustment Implementation

As defined, structural adjustment programs are the stipulations linked to IMF loans that were used as tools to advance the tenets of neoliberalism in debtor countries. Structural adjustment programs vary greatly in reality, but in theory each has the three primary goals of liberalization, privatization, and stabilization in order to alter a nation's economy and advance developmental efforts (Pfeiffer 2010; Veltmeyer 1997). Peru's history with such stabilization measures has been quite dramatic and resulted in the severe restructuring of economic and political components of the country. Although Albert Fujimori is the most renowned Peruvian president for his strict implementation of such policies, the historical context of these programs are important for shaping the economic and political climate within Peru at the time he was inaugurated.

The initial inclination towards orthodox programs occurred in Peru in 1959. Under Prime Minister Pedor Beltran, in conjunction with economic advisors from the International Monetary Fund, efforts at structural adjustment were introduced (Gonzales 1993). The measures taken by Beltran in an effort to restructure the Peruvian economy included reducing public expenditure, liberalizing trade, and promoting foreign investment (Gonzales 1993). Compliant to IMF

recommendations, the stabilization programs implemented were particularly harsh on society. Nearly all government subsidies were eliminated and, despite the resulting increase in the cost of living, real wages were frozen as well. Disregarding public opinion on the stabilization package, the IMF's loan of US $25 million did in fact boost the economy temporarily (Scheetz 1986). However, Beltran's introduction of structural adjustment would begin the process of weakening the state apparatus and shifting focus away from internal needs and responsibility.

In August of 1967, another standby agreement with the IMF was signed with stipulations emphasizing the formulaic tenets of neoliberalism: reduction of public expenditures, liberalization of markets and stabilization of the economy (Scheetz 1986). A devaluation of the sol was implemented as well as cuts to certain public agencies, including the Ministry of Health. As with previous and future stabilization packages, the IMF programs had negative social implications and resulted in a coup followed by more than a decade of political, societal and economic instability (Sheetz 1986).

With the new government of 1978, led by President Morales Bermudez, came another renewed attempt at structural adjustment. A definitive arrangement was signed with the IMF for approval of a package as well as plans for debt payment (World Bank 1984). Again, the goals of this package featured stricter control of public spending and economic alterations to attract private foreign investment. To undertake measures of privatization, the Peruvian government's provision of various services was reduced and interest rates were raised to promote investment in such sectors. To liberalize the economy, the IMF-sponsored adjustment set about to reduce subsidies and remove trade restrictions. According to documents, this goal was achieved through "injunctions against the introduction of any new import restrictions" (1986, p. 14). Furthermore, in August of 1979, a new law was established in order to drastically lower tariff levels from

averages of 66 percent to 39 percent (World Bank 1982). By the end of the decade, restructuring of the economy was deep under way and, in accordance to the standby agreement signed with the IMF, Peruvian debt payments had resumed. As of 1980, in addition to the austerity measures implemented for government spending, 34% of public expenditures were solely tied to debt repayments—leaving minimal funding for necessary public investment (Wise 1988).

The positive trends in economic growth associated with the 1978 reforms led to the start of the new decade directed by a team of neoliberal supporters under the rule of Fernando Belaunde Terry (Pastor 1992). Finance Minister Manual Ulloa quickly developed a strategy for furthering structural adjustment in Peru and continuing loan repayments to the IMF. Among the measures taken were privatization of numerous state enterprises—over two hundred originally targeted by Ulloa (Wise 1988). In association with these measures, many other state-controlled sectors were forced into budgetary cuts—again including the Ministry of Health. Among other initial promises by Ulloa and Belaunde included removal of further subsidies and reduction in trade barriers in order to illustrate commitment to liberalization. Whereas in 1978 less than forty percent of all imports were freely imported, in 1981 this number has soared to 98% (Pastor 1992). Further liberalization included a decline in subsidized food imports—from $313 million in 1975 to $193 million in 1978 (Scheetz 1986). The dedication by Belaunde and his economic advisors to structural adjustment led to the approval of a new agreement with the IMF in June of 1982. In exchange for 850 million U.S. dollars, Peru was re-committed to a relationship with the IMF and required to further advance structural adjustment efforts. Already implementing such measures, the imposition of increasing austerity measures greatly restricted the government's capacity and impacted the livelihoods of millions of Peruvians (World Bank 1984; Pastor 1992).

The combination of expenditure restrictions and increasing debt repayment led to decreasing provision of services, altering the relationship between the central government and its citizens. Furthermore, during this time per capita income fell by 1.23% annually (Gonzales 1996; Suarez 1987). Despite following structural adjustment conditionality, the IMF became increasingly strict on Peru and led to Belaunde's administration being more loyal to the Fund than to its citizens (Pastor 1992). The result of decades of structural adjustment led to many citizens disillusioned with their government, as standard of living deteriorated and provision of services was largely neglected. All of these conditions led to an ideological break with structural adjustment programs and the neoliberal regime. According to the World Bank, "There is widespread perception that economic liberalization in fact contributed in a major way to Peru's current difficulties and is therefore discredited," (Wise 1988).

As a direct result of disillusionment with structural adjustment, a complete shift in politics occurred with the election of 1985 leading to populist politician Alan Garcia taking power. Garcia's economic team was markedly different from that of previous presidents and featured advisors opposing international financial institutions. As such, Peru again went under fundamental economic changes, but this time in the direction of heterodox inward-looking strategies (Paus 1991, Wise 1988). Blaming the International Monetary Fund for the ailments of Peru, Garcia launched an economic program that rejected the IMF, privatization, and liberalization (Alcazar 2000; Farnsworth 1988; Mesa-Lago 1997; Glewwe 1991). Garcia's administration directly disobeyed contracts with the Fund and nearly ceased payments on Peru's debt. As to be expected, such measures did not bode well with the IMF and in August of 1986, Peru was given the status of "ineligible borrower" by the institution (Pastor 1992, Pop-Eleches 2009). Due to this label, Peru was isolated from global financial capital and suffered when the

World Bank revoked a loan for water and sewage infrastructure (Smith-Nonini 2005). However, the extreme response by the IMF to Peru's attempt at heterodoxy led to a softening of the Garcia administration's stance. By 1987 the Peruvian government was recommitted to honoring loan obligations and loosened its opposition to neoliberal policies. As a result, reductions in public sector spending were introduced, from 30.6% of GDP in 1987 to 19.9% in 1989, as well as price increases on previously subsidized goods (Pastor 1992, Farnsworth 1988). The attempt of the Garcia administration at decreasing dependence from the IMF illustrated the dominance the organization held and ultimately forced the Peruvian government to accept the neoliberal ideologies of the Fund and cease their efforts at improving the societal conditions.

When Albert Fujimori entered into the political scene in 1990, Peru's total external debt was approximately 21 million dollars and Peru's relationship with the IMF had seriously deteriorated, limiting access to loans or debt rescheduling (World Bank 2009). The seriously crippling conditions within Peru led Fujimori to seek the assistance of international financial institutions once again. On June 28th 1990, Fujimori met with Michel Camdessus, then director of the IMF, as well as executives from the World Bank. According to advisors and those close to the administration, Fujimori was essentially given an ultimatum to either accept structural adjustment—thus erasing Peru from the IMF blacklist—or to continue rejecting neoliberalism and be given no support (Stokes 1997). As such, when Fujimori officially became President in July, he adopted the "ready-made" structural adjustment strategy developed by the IMF for Peru—forfeiting the power of the state to provide for its expanding populace (Gonzales 1993, p.56; Chossudovsky 1992). The IMF's prescriptions were to be especially harsh given Garcia's disobedience and Peru quickly implemented the measures in order to gain re-emersion into the

global financial community. In doing so, Gonzales notes that political-economic institutions ultimately prioritized external as opposed to internal adjustment (1993).

The first series of measures were implemented on August 8, 1990 as Fujimori announced a program of subsidy elimination, currency devaluation, and trade liberalization. This program sought to increase government revenues through an alteration of the tax system designed to tax more services and wages. Law 25276 conceded Fujimori with the power to control the tax system almost unilaterally. Granted with this power, Fujimori followed IMF recommendations and began taxing poorer segments of the population, especially those in the informal economy whom had previously been exempt (Gonzales 1993). This tax reform also included increases in the prices of various utilities—leading to a 3,000 percent increase in gasoline prices in August alone (Pastor 1992; Paus 1991). In addition, Peru's long-lasting trade subsidy program, CERTEX, was cut to ten percent, and nearly all agricultural subsidies were eliminated, with a 'sink or swim' effect on local farmers (Davis 2006; Escobal 2005; Paus 1991; Pastor 1992).

The economic reforms instituted in August also emphasized neoliberal tenets of liberalization and privatization. On opening the economy, in addition to removing subsidies, the structural adjustment package reduced tariff levels to 25% universally (Gonzales 1993). Furthermore, the 'rate of effective protection' was lowered from 83% to 24% by the end of 1990 (Sheahan 1994). The sudden removal of protection resulted in competition greater than had previously been known, which led to many firms shutting down. The economy was also globalized by privatization efforts seeking to attract foreign investment. In September of 1991 the Law for Promotion of Private Investment was passed and created an agency to direct privatization as well as to eliminate further barriers to private investment. In addition, another decree was enacted that "guaranteed equal treatment for domestic and foreign investment",

(Alcazar 2000). A restructuring of the labor market was encouraged by the IMF as a tactic to attract foreign business as well. The structural adjustment program implemented in 1990 included modification of employee benefits, weakening of unionization, and greater flexibility in dismissal of workers (Chossudovsky 1992). These measures also included "the prohibition of salary indexations to match increases in the cost of living," (Gonzales 1996). Furthermore, Peru's social security system was modified to reduce retirement and health benefits ("Peru" 1992). The promotion of private participation, as outlined by the IMF, corresponded to substantial transformation of public services. Austerity measures included reducing the budgets for numerous agencies, particularly for the Ministry of Health and the Ministry of Agriculture. Reduced budgets in these departments translated to less capacity as well as a series of necessary lay-offs of employees (Hong 2000; Sheahan 1994). The measures towards structural adjustment were so austere they claimed the moniker of "Fujishocks" and, as will be detailed, had exponential consequences for the nation of Peru.

The relationship of Peruvian administrations with structural adjustment was not a symbiotic relationship. Since Bermudez, Peruvian governments that have enacted stabilization packages have done so out of a necessitous dependence on international financial institutions for loans. The ability of the IMF to impose structural adjustment as a contingency for funds to Peru greatly reduced the Peruvian government's ability to make sovereign policy choices. Furthermore, the IMF held such dominance over these administrations, that anything less than stringent adherence to their philosophies led to revoking of finance and delegitimizing the nation in the international financial community. This can be shown most notably through the relationship between the IMF and Alan Garcia in which Peru was literally blacklisted; however, similar conflicts occurred under other heterodox administrations (Scheetz 1986). The direct

result of any disobedience or deviation from IMF ideology was the enforcement of even stricter stipulations within the next stabilization package. This nearly tyrannical relationship shaped the political climate under which Fujimori was elected and thus the significant austerity of his structural adjustment programs.

Structural Adjustment Consequences

As discussed within the literature of structural adjustment programs, the implications of the structural adjustment packages go far beyond the political and economic sphere. Peru is no exception in this trend: significant transformations were felt within society as a result of the policies instituted and the changing relationship between the government and the citizenry—increasing vulnerability as prospects at a adequate lifestyle became insecure.

When considering the impacts of structural adjustment on employment, it is important to consider both the ways in which these policies altered the structure of the workforce as well as individual employment income and benefits. Trade liberalization, as implemented by the various phases of structural adjustment, lead to increased competition and thus forced companies to increase efficiency by any means (Veltmeyer 1997). A central method for lowering costs is the reduction and stagnation of wages. Between 1975 and 1985, during a period under which structural adjustment was implemented with relative adherence, real earnings suffered a 45 percent loss (Hong 2000). Under the Belaunde administration from 1980 until 1985, real wages declined further on average by 35 percent (Pastor 1992). Similarly, in 1990 following 'Fujishocks' real earnings fell by sixty percent in the month of August alone (Chossudovsky 1992). Overall, by the end of 1990 it has been calculated that wage income was less than fifty percent of 1989 incomes and a mere 15 percent of 1987 levels (Paxson 2005; Joralemon 2006).

An official at the Peruvian Central Bank spoke on behalf of this strategy saying, "The easiest public expenditure item to curtail is the wage bill.... it is relatively simple to surprise workers: you can simply postpone and restrict wage increases, reducing real wages," (Gall 1992). The reduction of wages for public employees—71% in 1990—indicates another important consequence for employment. As austerity measures were introduced, governmental agencies were greatly crippled and public sector jobs were no longer a sustainable form of employment (Sheahan 1994). Forced to make serious cutbacks, a program providing "incentives for voluntary withdrawal" led to the release of 50,000 public employees in the first four months of 1991 (Jones 1993). As both public sector employment and private sector employment—through the closing of firms and flexibility of labor markets—became increasingly vulnerable, the proportion of the workforce in standard employment declined. Instead, more Peruvians were looking towards temporary and casual employment, if any at all. By 1978 the proportion of citizens reporting to be unemployed or 'underemployed' was recorded at 68.8% of the workforce (Scheetz 1986). By 1990, this number had reached 82 percent (Gonzales 1993). Overall, the transformation of the workplace through adjustment is one key factor of the structurally produced vulnerability of citizens.

In relation to the standard of living enjoyed by Peruvian citizens, many consequences of structural adjustment effectively lowered this quality. In general, rates of poverty increased dramatically between 1960 and 1990, with few periods of relief. The overall impoverishment is a result of reductions in wages, increases in the price of goods, subsidy removals, and increased taxation. Under Fujimori's structural adjustment implementation, price hikes had devastating implications on relative wealth for the populace. The percentage increases in August of 1990 for gasoline, bread, beans, and flour were, respectively: 3,000%, 1,150%, 1,067%, and 650%

(Chossudovsky 1992). Although these are the most drastic of price increases, the average for real public prices was an increase of 280% (Gonzales 1996). The removal of subsidies, along with liberalization efforts that impacted prices, led to an overall increase in the Consumer Price Index of 397% in August of 1990 (Paus 1991). Water rates, through privatization efforts and shifts away from subsidies, increased by 800% during this same month (Gall 1992). With a rise in the CPI without a corresponding rise in wages, the purchasing power of citizens was greatly constricted. For the total populace, the purchasing power in 1989 was only a quarter of what it was in 1980. As a direct result of Fujimori's structural adjustment program, between its introduction and October of 1991, consumer spending declined 39 percent. In 1990 the World Bank categorized 24% of the population as 'extremely poor': a label given to those who cannot afford "basic food requirements" (Lee 2001). By decreasing the relative and actual wealth of citizens, structural adjustment programs generated a heightened vulnerability within the population as daily necessities became increasingly unattainable.

In addition to outright impoverishment, urbanization had important impacts on living conditions within Peru. As agricultural subsidies were cut and farmers forced to compete in a global market, many agricultural communities faltered. Noting this phenomenon, Davis blames structural adjustment for "devastating rural smallholders by eliminating subsidies and pushing them sink or swim into global commodity markets," (2006, p.153). Without the ability to provide, agricultural workers represented one faction that migrated to larger Peruvian cities. Migration to cities was also common as a result of political violence, as the Shining Path movement became an increasing threat. Finally, private investment that was brought into Peru often centralized in larger urban areas where resources, particularly labor, were bountiful. In 1960 the urban population as a percentage of the total Peruvian population was roughly stable at

forty-three. However under structural adjustment, an annual growth rate of nearly five percent led to this proportion equaling 71% by 1990 (UNDP 1990). These extreme rates of urban population growth led to underdeveloped cities to serve these populations. The inevitable growth in slums that resulted produced added insecurity as urban poverty rates increased from approximately 34% in 1985 to 50% in 1991 (Escobal 2005). The process of urbanization, expedited through adjustment programs, is culpable of generating vulnerabilities for the population and altering the climate of Peru.

In addition to increasing insecurity for the average citizen, structural adjustment programs had a profound impact on public spending and thus the safety nets accessible to the population. During the reforms implemented by Bermudez, gross investment shrunk from the 1975 average of 19.7% of GDP to 14.5% in 1979 (Scheetz 1986). This trend continued under the adjustment imposed by Belaunde, as social program funding was cut twenty percent between 1980 and 1985 (Glewwe 1991). As a result, per capita "public social expenditures" dropped from 40 dollars in 1981 to $14 in 1989 (Webb 1992). Following the structural adjustment shocks of Fujimori, gross public investment for the year 1990 accumulated to only 2.7% of the GDP (Pastor 1992). Especially hurt by these austerity measures were the sectors of health, water, and sanitation, whose investment deteriorated by 69 percent between 1982 and 1992 (Panisset 2000).

Although expenditures on health have traditionally been high in Peru, decades of structural adjustment impacted the ability of public health systems to provide adequate service. While government expenditures on health programs were close to two percent of the total GDP and over six percent of government spending in the mid-1970s, following Bermudez and Belaunde's administrations, these numbers had dropped to 0.6% and 4.5% respectively (Suarez

1987). Fujimori's introduction of structural adjustment in 1990 led to further decreases in health investment, as total health spending hovered at 1.9% of GDP (Jamison 1993). According to the United Nations Development Programme, in 1985 Peru's health expenditure per capita was as low as $11, whereas per capita health expenditures in the United States were calculated near $100 (UNDP 1999). Furthermore, by 1990 with the imposition of Fujishocks, Peru's estimates had been further reduced to $8.3 per capita (Jones 1993). Once a considerable agency, a significant proportion of austerity measures were geared towards budgetary cuts for the Ministry of Health under adjustment packages. Following Beltran's 1959 program, the Ministry of Health's share of the public budget fell from nearly four percent to 2.8%. Similarly, the 1967 structural adjustment agreement called for a further reduction and this proportion fell to 1.7% (Scheetz 1986). Despite its already crippling stature, the agency was not spared from the Fujishocks, and its budget was cut by 60 percent in the end of 1990 alone. The ultimate result was a severely limited Ministry of Health in capacity and service. For example, whereas in 1984 there were approximately 44 physicians per 1,000 Peruvians, in 1990 the ratio had fallen to .6 per 1,000 (Jamison 1993). The budgetary constraints, coupled with universal wage declines, resulted in workers employed by the Ministry earning only forty to seventy dollars a month in August of 1990—despite Peru's established baseline wage of $120 for "minimum requirements," (Wolford 1991). The effect was a strike by health workers from March to July of 1991 and the forced closure of numerous public hospitals (Hong 2000; Paxson 2005; Wolford 1991). In addition to labor ailments, budgetary cuts affected the capacity of provision through inadequate supplies and infrastructure. Also, subsidies and co-payment programs were reduced or eliminated, minimizing access for poorer citizens (Paxson 2005, Peabody 1996).

Declines in public investment and central government spending also had implications for Peru's social security program. Two legislations were passed in November of 1991, in accordance with Fujimori's structural adjustment program, which called for the transformation and increasing privatization of the social security system—Instituto Peruano de Seguridad Social ("Peru" 1992). As a result, whereas social security coverage for the labor-force population was 40 percent in 1985, by 1991 the coverage had declined to 22% (Ewig 2010).

In Peru, despite a bourgeoning population, investment in water and sanitation systems stagnated under decades of structural adjustment. Between 1983 and 1990 central government spending on water and sewerage infrastructure was as low as 0.3% of GNP (Webb 1992). The World Bank estimates that as a result only three kilometers of infrastructure was repaired or replaced in a 6,700-kilometer water system (Alcazar 2000). Water and sanitation service also suffered as SEDAPAL, the primary provider, was inflicted with budgetary cuts. The government had previously greatly subsidized SEDAPAL and government transfers accounted for most of its funding; however, as the government's public investment declined so too did its contributions to the service (Alcazar 2000). In 1990 nearly half of the population went uncovered by SEDAPAL's water system and an even more significant 61% of the population was uncovered by the sewerage system (Webb 1992). Furthermore, the capacity of these systems deteriorated from limited funds and resulted in substandard monitoring and chlorination (Lores 1991; Shandra 2008). Shown through the above examples of water, health, sanitation and social security, as service provision was constrained following implementation of structural adjustment, the population's access to safety nets deteriorated and insecurity arose.

The history of structural adjustment had profound implications on the climate of Peru in 1991. IMF-backed programs weakened the population and the government's effectiveness,

generating increasing vulnerability to any number of external stresses. The consequences on the nature of employment and the relationship between firms and workers greatly increased insecurity and impoverishment. Contributing to this trend are the impacts on purchasing power, greatly hindering the ability of households to afford basic necessities. Structural adjustment also led to a paralysis of the structural support for such vulnerable citizens. Public agencies, as a result of decades of IMF influence, were severely incapacitated and ignored by the time Fujimori had gained office. As such, the population was constrained from access to essential services—such as healthcare, water, and sanitation—that provide a barrier between impoverished living conditions and disease outbreaks.

Chapter 5: Factors of Disease Vulnerability in Peru

In this chapter I will outline the primary features present within the Peruvian population that presented a favorable setting for a cholera epidemic. The aspects considered are the primary microlevel factors that provided an opportunity for disease to be introduced and transmitted at significant rates. These factors of disease transmission are the manifestations of the structurally produced vulnerability that arose from adjustment programs.

Malnourishment

A key determinant of a population's health that must be considered is its biological status. Malnutrition is an important feature present in populations that seriously undermines community health (Brunelli 2007; Hong 2000). As Meade describes this phenomenon, "A malnourished person is more likely to get sick, and the course of the sickness is more likely to be severe and drawn out," (1977, p.44). This is due to the fact that malnourishment leads to a general weakening of the body and derives the person from necessary protective nutrients (Kalipeni 1998; Webb 1992). The prevalence of malnourishment within Peru was growing prior to the epidemic and escalated in 1990. This is primarily a result of the changes in the consumer price index and the fact that food prices increased seven-fold in the month of August following Fujishock introduction (Gall 1992). Where the proportion of the population labeled as undernourished was 28% in the 1979-1981 period, by 1990-1991 42% of Peruvian citizens were considered to be malnourished (Nef 2003). During the first few months of 1991, and the first few months of the epidemic, malnutrition had reached an even higher rate at 47% (Panisset 2000). Those considered to be malnourished could not satisfy a standardized minimum daily caloric intake. With nearly half of the population unable to meet basic calorie requirements, it is not surprising that 83% of the population received insufficient amounts of protein (Smith-Nonini

2005). The population was further constrained by restrictions to the consumption of both fish and street vendor foods immediately following the outbreak. At the time of the outbreaks, these were two of the most common sources of calories, due to their relative inexpensiveness, especially among the poor. As such, substitutions were made to either more expensive subsistence—resulting in less consumption—or less nutrient-intensive foods (Webb 1992).

Water and Sanitation

Another crucial component to the onset and spread of the epidemic was the role of water and sanitation. The availability of such services, including both the access to and amount of, impacted peoples' behaviors. Constrained behaviors are typically more risk-inducing and include the use of alternate sources, increased storage, and other conservation efforts. While access to water and sanitation is structurally determined by the political-economic context, behavioral modifications are case-specific. However, the combination of these factors led to significant impacts for the susceptibility of the population and the spread of cholera.

In regards to access to services, much of the Peruvian population was constrained. Those in rural areas faced connection problems due to lack of infrastructure whereas Peruvians in urban conglomerates faced the issues associated with slum dwelling and systems serving far beyond their capacity. According to the Pan American Health Organization, as of 1990 a mere 55.2% of the total population, and only 22% of the rural population, were able to access clean drinking water (Lores 1991; Wolford 1991). Some especially poor and isolated areas, such as Huancavelica, reported coverage rates of basic services to be around 12 percent of their population (Suarez 1987). 'Coverage', however, does not equate to full service for all, as connections are rarely stable throughout water systems. For the population that was defined as

covered by the water system, for example, only half were serviced for more than twelve hours a day. Worse still, 28% of the covered population received water less than six hours of the day (Alcazar 2000). In Lima, the richest quartile is able to enjoy water service twenty-four hours a day, usually with the added luxury of in-home service. The poorest quartile, in contrast, are incorporated within the proportion receiving water less than six hours a day, and thus consume a mere two percent of Lima's treated water (Panisset 2000). Within this poorest quartile also represents the 40% of Lima residents with no access to the water system at all (Brooke 1991).

Contributing to insufficient or non-dependable water coverage is the lack of investment in the water infrastructure, leading to deteriorated systems. Illegal connections to water pipes are common and although they may be necessary for some, these siphonages significantly increase the vulnerability of the entire system. Such unauthorized breaks were found prevalent in both the infrastructure of Trujillo as well as in Chimbote and are suggested as probable origins for water contamination (Haranti 1991; Joralemon 2006). Budgetary constraints have also exaggerated such risks through neglect of chlorination and treatment in several systems. A study of forty water systems within the Sierra area found that only two systems properly chlorinated water for effective treatment (Reiff 1991). The combination of poorly monitored systems and various illegal connections provides ample opportunity for infection to enter the water system and spread throughout. A study of Piura's water system during the epidemic illustrated this exact problem: contaminated water entered the system through breaks in the pipeline and, due to insufficient treatment, was distributed throughout the entire system (Ries 1992). Similarly, in the mentioned study of Trujillo, cholera bacteria were found in over 60% of the system sampled (Joralemon 2006).

As a result of access limitations as well as the general decay of the water systems, many

Peruvian citizens were forced to engage in hazardous behaviors. One frequent modification employed is the substitution of at least partially treated municipal water for alternative sources. Informal trucks distributing water circulate throughout urban slums and sell water cisterns to its residents; however, this water is not guaranteed any form of chlorination or quality inspection. A study in the city of Iquitos observed rates of cholera for truck users at 3.14% where for citizens whose source of water was in-home system connection, cholera rates were only 1.97% (Tickner 2005). The disproportionate rate amongst tanker trucks dependents suggests that yielding to this substitution increases one's vulnerability greatly.

In addition to tanker trucks, another primary substitute utilized by those isolated from the central system is the use of wells and untreated freshwater sources. According to a living standards survey conducted by the World Bank in 1991, 26% of the population considered to be "extremely poor" uses a well as their primary source of water (Jones 1993). These figures are even higher in the rural Sierra where 37% of citizens rely on a well (Jones 1993). In Iquitos, a survey illustrated that 33% utilized wells as their primary source while a significant proportion—18%—reported their direct source as untreated water from the nearby river (Tickner 2005). Despite chlorination efforts lagging within the central water system, the proportion of Peruvians drinking water from sources altogether untreated significantly increased the likelihood of cholera transmission.

Another hazardous behavior that was a direct result of water scarcity is increased rates of water storage. The proportion of citizens that reported to have stored water was significantly higher among those who had restricted access to water and were thus forced to necessarily conserve amounts obtained (Swerdlow 1992). Water that is stored, however, is often done so with minimal regulation and in vessels that may be hazardous in themselves—greatly increasing

the likelihood of the cholera bacteria to grow and spread. A study of the water in Trujillo during the epidemic found that presence of *Vibrio cholerae* was much higher in storage vessels than in any other source (Swerdlow 1992).

While the possibility of contamination was already heightened due to lack of safe water, the contribution of sewerage problems exacerbated this susceptibility. Sewerage is a growing issue in Peru as access and treatment is dismal at best. The amount of the total population with access to sanitation in 1990 was approximately 41% of the population, and in rural areas only 17% of the population enjoyed access (Lores 1991; Wolford 1991). In addition, residents of slums, living primarily in sub-standard housing, do not have access to any sanitation and thus dispose of wastes in unregulated manners. In Lima, for instance, over a third of the 1991 population was living unconnected to the sewerage system (Alcazar 2000). One study found that such households accounted for the majority of Lima's cholera rates, illustrating that living without access to sanitation is a primary factor in the likelihood of affliction (Veltmeyer 1997).

With the deterioration of the sewerage system, human waste became a key risk during the epidemic in relation to contamination of water sources. According to some measures, not even ten percent of sewerage water in Peru was properly treated and screened (Seas 2009). According to Seas' study, Lima was dumping sewerage water directly into the ocean and Rimac River—which is also the primary source from which Lima's water springs (Alcazar 2000; Seas 2009). As of 1991, nearly seventy percent of Lima's water was coming from the river, despite the amount of untreated waste dumped (Brooke 1991). Additionally, the agricultural practice of using sewage water as fertilizer was blamed for contaminating many groundwater sources where wells are drawn, and thus igniting the epidemic in rural areas (Joralemon 2006). According to Marita Saldano, a local health worker at the time, "The vegetables people eat in this area are

infected. They are grown on land irrigated by the Chillon River, which has raw sewage dumped into it," (Marx 1991). The reinforcing feedback between the sanitation and water systems is a primary method through which cholera was introduced and transmitted throughout Peru.

Health Services

The role of health care services in Peru played a central role in the increased risk present within Peru as prevention and treatment of cholera was restricted through a deteriorated health system. In the years leading up to the cholera epidemic, public health institutions served less than sixty percent of the Peruvian population (Suarez 1987). By 1991, the situation was even direr, as 5.4 million citizens were living without any access to health services (Panisset 2000). In terms of public expenditure on health services, the poorest 40% of the population received less than 15 percent. The top ten percent of the population by wealth, however, had the advantage of accumulating 45 percent of these expenditures (Webb 1992). Furthermore, in regards to access to health services, over 60 percent of those living under the poverty line lived longer than an hour away from a health a facility. In contrast, over 97 percent of those in the higher income strata lived closer than an hour from medical attention (World Bank 2009). Health insurance, while minimal across the population, was also highly skewed. In the best-served wealthy areas, health insurance coverage was approximately 27%--whereas only 3% of citizens were covered in the worst served areas (Nef 2003).

As the distribution of health care is far from sufficient or equal, it is unsurprising that disparities existed within specific health provisions as well. In 1990 for the overall population, there was an average of .6 physicians per 10,000 people. In Lima, due to the high concentration of medical centers and people, this ratio is greater at 1.1 physicians per 10,000 citizens (Jones

1993**)**. However, this figure distorts the disproportion within Lima: the slum of Comas, home to 1 million residents, contained only one hospital (Marx 1991). The rural and poorer coastal areas face even less favorable physician to citizen ratios, at .3 and .5 per 10,000 respectively (Jones 1993).

Further harshening the situation was the timing of health workers' strikes. Due to cuts in the Ministry of Health's budgets and falling wages, nurses were on strike from March to July of 1991—vulnerable months at the start of the epidemic. As a result, in the month of April all of the state-run hospitals were operating without any nurses (Brooke 1991). The inability of Peruvians to access health services, coupled with the inability of health centers to provide care, thwarted necessary prevention and treatment outreach.

Social Security

Aiding in the vulnerability of the Peruvian population was the nearly inexistent social security institution. Citizens who are covered under social security were more protected from the external shocks and infection of cholera. According to Suarez's report, those who are insured through the social security system, IPSS, obtain the benefit of five times the healthcare than those who are reliant on the crippling public health system (1987). The social security services provided private options for health care and made medical attention more affordable for those it covered. However, social security primarily covered white-collar wealthy workers in urban centers. As a result, those who were already vulnerable—rural citizens, slum-dwellers, and the unemployed—were not eligible for social security benefits (Suarez 1987).

Poverty

The general impoverishment of the Peruvian population increased the vulnerability of citizens to any number of external shocks, and particularly the cholera epidemic. The manner in

which poverty is associated with health is multifaceted and includes the obstruction of the population from buying necessary goods and services to prevent and minimize cholera transmission.

According to the United Nations, in 1991 an astounding sixty percent of Peru's population was considered to be living in extreme poverty (Marx 1991). Poverty in Lima, while less prominent than in rural and smaller coastal regions, had grown by 11% from the start of the decade—and the imposition of structural adjustment—through the first few months of the epidemic (Panisset 2000). Rates of poverty were compounded by the fall in wages and secure employment. Due to liberalization of the workplace and an overall weak union structure, less than twenty percent of the Peruvian population held "adequate employment" in 1991 (Gonzales 1996).

Additionally, the widespread poverty within Peru was amplified by the deterioration of purchasing power for the average citizen. Prior to the start of the epidemic, during the final years of Garcia's administration, purchasing power was falling most dramatically for poorer segments of the population. The unemployed, for instance, had a purchasing power 65.9% lower in 1990 than their 1985 levels (Rigobon 1993). As citizens' incomes were increasingly insufficient, consumption fell at comparative rates. During this same time period, the poorest quartile of the population suffered cuts in consumption upwards of sixty percent. In food consumption alone, this resulted in 58% reduction in purchased goods (Glewwe 1991). The price distortions that occurred in August of 1991 greatly impacted the relative decline of purchasing power as well. As the price of bread, rice, and other foods escalated by over 1,000%, the ability of citizens to purchase necessary sustenance was inhibited, increasing vulnerability to malnutrition (Panisset 2000). The devastating consequence in relation to malnutrition was the

increased reliance on seafood as the primary form of protein, as seafood was seen to be a major culprit in the transmission of cholera (Webb 1992). Relative impoverishment for other necessities also facilitated the cholera epidemic. Among the poor, kerosene was the key form of fuel employed—90.6% of households within the bottom five percent of the population by income (Glewwe 1991). When the price of kerosene increased by over 3,000% in the month of August 1990 alone, the consumption of kerosene dropped dramatically. As a result, boiling of water, seen as vital in preventing transmission of water vectors, was seemingly absent (Hong 2000, Panisset 2000). Another important consequence of relative impoverishment is the impacts on healthcare: due to the declines in purchasing power during 1990, consumption of health services plummeted by 88% (Gonzales 1996).

Urban Growth

Exacerbating all of the aforementioned issues and creating a favorable climate for disease outbreak and diffusion is the urban dynamic of Peru. This environment, as discussed from the literature, is one that magnifies hazardous living conditions and vulnerability to shocks. The competition for employment is much greater, access to housing and services much lower, and the proximity of people increases biological susceptibility (Davis 2006). The percentage of the Peruvian population that was living in urban areas was 69 as of 1990 (UNDP 1990). The growth of urban population, however, was not linked to an associative growth in urban living standards or infrastructure, and thus urban areas were highly exceeding their capacity. In Lima, the population in 1990 was a staggering 6.5 million people and nearly sixty percent of that population lived in "pueblos jovenes"—the Peruvian classification for urban slum neighborhoods (Alcazar 2000; Joralemon 2006). These squatter settlements were dominant throughout Peru, comprising nearly fifty percent of the total urban population, and thus a third of all Peruvians

(Webb 1992). Along the coast, where cholera first began to take root, 55% of the population was living in poverty in such pueblo jovenes (Panisset 2000). Those living in such areas have limited to no access to basic services necessary for a healthy lifestyle (Lores 1991). For example, whereas 72 percent of the urban population had access to clean water in 1970, the disparity between infrastructure and population growth resulted in access to safe water being available for only 24 percent of urban dwellers in 1990 (Panisset 2000). Another common feature of poor urban citizens is the propensity to be self-employed. As discussed, self-employment is a very risky form of employment that offers no insurance or benefits. In 1990, the real employment rate for urban citizens was only 8.3% (Tapinos 1997). The combination of lack of services, inadequate housing, and absence of any safety net found within urban areas makes urban poverty an extremely hazardous lifestyle—conducive to introduction of disease (Davis 2006). Such slum ecology was vivid in Iquitos, where residents of pueblo jovenes represented sixty percent of all cholera cases (Tickner 2005). The relative ease with which cholera entered into urban coastal areas and spread across Peru illustrates this vulnerability.

Chapter 6: The Political Ecology of Cholera in Peru

In the previous sections I have detailed both the upstream macrolevel transformations present in Peru as well as the specific household-level determinants of cholera. I will now utilize political ecology and Melinda Meade's triangle of human ecology to illustrate how the epidemic was a combined product of these processes. Political ecology emphasizes the ways in which structural adjustment altered the political economy and constructed vulnerability within a weakened state and populace. Disease ecology will focus on the specific human-environment interactions within which such vulnerability manifested that ultimately led to contraction and transmission of cholera throughout Peru.

Structural Adjustment and Environment

Structural adjustment had profound implications for the vertex of environment. Considering both the built and natural environment, factors falling under this label include access to basic services and contamination of the natural environment. The consequences resulting from various structural adjustment programs shaped the role of the state in regards to service provision and affected the relationship between citizens and their environment.

Examples of the most direct consequences of structural adjustment for the epidemic were those to health care. As structural adjustment adherence required reductions in public spending, the health care system within Peru was in general decline throughout the 1980s and was especially crippled following Fujimori's stabilization programs in 1990—directly prior to the epidemic. Following a series of reductions in health investment, by 1990 total health spending was diminished to only 1.9% of GDP (Jamison 1993). Furthermore, the institution of Fujishocks reduced the Ministry of Health's budget by sixty percent that year. The inability of the

government to provide adequate health care as a conditionality of structural adjustment inevitably led to a substandard system without development to match the population growth and coverage responsibility. This effect can be shown by the disproportions in the ratio of physician to citizen, which was increasingly uneven leading up to 1990 and the epidemic (Jamison 1993). The austerity measures introduced through structural adjustment also resulted in the striking of nurses and idle or closed public health facilities. As such, at the beginning of the cholera epidemic citizens received little information regarding health precautions, traveled greater distances to substandard hospitals that were operating without nurses (Marx 1991; Wolford 1991).

In addition to health care, structural adjustment led to reductions in other safety net provisions for its citizens, which are necessary to provide a barrier between vulnerability and disease. Gross public investment for the year of 1990 had been cut to 2.7% of GDP (Pastor 1992). Such investment includes a wide range of services and infrastructure that may help reduce susceptibility to disease. One such example is the modification of social security under a 1990 SAP-influenced decree in which a reduction in health benefits was introduced. Budgetary cuts to the IPSS also led to a further decline in the proportion of Peruvians covered by social security (Ewig 2010).

Additional barriers within the built environment that were unattainable to a significant proportion of Peru include the water and sanitation systems. As shown, much of the population was not connected to water and sewerage infrastructure as of 1990 and 1991. Despite knowledge of the necessity of investment, administrations adhered to the stipulations of structural adjustment imposed by the IMF, focusing solely on external adjustment, and thus slashed public expenditures. In 1990, following the inauguration of Fujimori's measures, central government

spending on water and sewerage infrastructure was as low as 0.3% of GNP despite a bourgeoning population and thus the government was unable to provide clean drinking water and sanitation for its population (Lee 2001; Panisset 2000; Webb 1992). Furthermore, the minimal attention to these systems shaped the natural environment as it increased probability of contamination. Deteriorated water systems were shown to have numerous hazards where unsafe and ill-chlorinated water was present (Swerdlow 1992; Tickner 2005). Without proper sewerage treatment and accessibility, the population was exposed to human waste through contamination of water and food—a likely source for bacterial invasion.

Structural adjustment programs completely transformed the provision of services by the state, and thus molded the environment through which the population resided. As these upstream processes reduced access to necessities such as healthcare and water, the population was subject to riskier lifestyles that ultimately created the specific conditions under which cholera infiltrated Peru. Therefore, the result of structural adjustment was to induce a structural vulnerability within the environment that became manifested as individual citizens were constrained from barriers to the virus.

Structural Adjustment and Culture

In addition to the transformation of the environment through the paralysis of social service provision, structural adjustment programs' damaging consequences for the livelihoods of Peruvian citizens also affected individual actions relating to disease susceptibility. Macrolevel changes to the dynamics of the economy through structural adjustment produced heightened exposure to poverty within the nation, which was translated through microlevel lifestyle modifications. As the population became increasingly poorer, their behaviors were constrained in such a way to minimize preventable manners and instead shift towards riskier actions associated

with disease transmission. These behavioral transformations were principal to cholera taking hold within the population, but were not a result of lack of knowledge or even choice: instead they were succumbed to as vulnerability to impoverishment increased.

The consequences of imposed measures on the institutional factors establishing standard of living were largely negative and resulted in a heightened insecurity in employment and consumption. Structural adjustment programs, as shown primarily through efforts of liberalization, had significant affects on the restructuring of the workplace within Peru and led to employment vulnerability. Unemployment soared as firms were required to be 'lean and mean' and increase efficiency within a liberalized market. Similarly, employment wages and benefits were cut and labor standards deteriorated (Gonzales 1996; Panisset 2000). The subsequent rise in the informal sector led to rates of underemployment at 82% of the workforce in 1990, whereas prior to any significant structural adjustment underemployment had only composed 68% (Gonzales 1993; Sheetz 1986). In addition to structural changes to industries, liberalization and privatization efforts impacted the purchasing power and thus relative impoverishment of citizens. Relaxation of the workforce led to real earning declines upwards of sixty percent in the month following Fujimori's structural adjustment program (Chossudovsky 1992). Furthermore, tax reform led to citizens receiving less of this income directly (Gonzales 1993). Throughout the decades of structural adjustment, and particularly severe under Fujimori, various programs introduced subsidy cuts for basic goods (Scheetz 1986). The effect was a 136% increase in the Consumer Price Index in the month of August 1990 ("Peru" 1992).

As a result of these changes to employment and purchasing power, structural adjustment inevitably had downstream effects on spending and consumption. Thus, the structural vulnerability inflicted on citizens' livelihoods by these programs constrained their daily

behaviors and increasing chances of infection. Previously attainable goods such as food, healthcare, and water become much more limited and were often substituted or neglected. Consumer spending declined 39% from the introduction of Fujishocks through October of 1991—during the crux of the epidemic (Lee 2001). With the removal of subsidized energy and the tax levied on kerosene, citizens were forced to reduce expenditures on this basic necessity. As a result, despite public health efforts to encourage the boiling of water for disinfection, for much of the Peruvian population this precaution was out of reach (Smith-Nonini 2005). Furthermore, in conjunction with changes to the built environment, inability to purchase adequate safe drinking water resulted in modifications to water usage. Water was stored more frequently as a result of constrained access and was purchased from less dependent sources, such as tanker trucks (Swerdlow 1992; Tickner 2005). Furthermore, the ability of citizens to practice safe hygienic behaviors to thwart cholera transmission was limited as a result of impoverishment. According to Edgard Necochea, a representative of the Agency of International Development, "When you have to buy water to drink, it is very difficult to think of using water to wash your hands," (Marx 1991).

The vulnerability that was generated through structural adjustment led to many citizens finding themselves in insecure employment with less income and purchasing power. As livelihoods were structurally constrained, the population altered their individual behaviors. Ultimately risk-inducing lifestyles were substituted for the known preventive measures as a byproduct of the structural vulnerability of the populace and created bountiful opportunities for cholera affliction.

Structural Adjustment and Population

The population vertex of Meade's theory focuses on how a citizen may be susceptible to

disease once in contact with the virus. Structural adjustment produced a vulnerability to health crises that was manifested by individual accounts of malnutrition and abjuration of proper healthcare. The physical status of the population weakened through the consequences of structural adjustment and as such increased the probability of biologic susceptibility for Peruvian citizens.

The imposition of structural adjustment programs constructed a vulnerability to food insecurity that was translated into higher rates of malnutrition—thus weakening the physical stature of the population. The reduction in purchasing power severely limited citizens' capability of achieving adequate food consumption, especially for poorer citizens. Price increases that resulted from structural adjustment severely weakened the proportion of the population with appropriate access to food markets. The inability of citizens to purchase basic food sustenance led to a 60% reduction in food consumption as well as a nearly twenty percent drop in consumption of calories per capita during 1990 (Glewwe 1991; Panisset 2000). Subsequent rises in malnutrition spread throughout Peru and resulted in an especially weak population. As discussed previously, a malnourished person has much less resistance to disease and greater likelihood of fatality if inflicted. As such, structural adjustment policies artificially created a food scarcity observed through higher rates of malnutrition and nutrition deficiency amongst the population, increasing biological susceptibility to cholera for individuals.

Chapter 7: Conclusion

Cholera is a virus with no mercy and can kill an adult in as little as eight hours. The manner by which an individual comes into contact with the virus is affected by a variety of maladaptations in the human-environment interaction that are entrenched within a political-economic context. Epidemics are a product of both individual actions as well as the deep structural processes through which they are constrained.

The relationship between Peru and the IMF as well as structural adjustment dominated the political-economic sphere for decades. The tenets of these programs and they ways in which they were enacted in Peru favored external over internal adjustment and created a structural vulnerability for the nation. The ideological indebtedness to structural adjustment resulted in a deteriorating state apparatus as the role of the government within the public realm shrank at the expense of the population. Adding to this phenomenon was the restructuring of the economy in which firms and employers were given priority over individual citizens. As such, these programs eroded secure employment and standards of living while simultaneously removing various social safety nets. While the history of structural adjustment provides a context for the state of the nation at the beginning of 1990, the policies enacted by Fujimori were especially severe and led to an exaggeration of the conditions already present. If the nation of Peru had been structurally weakened by decades of adjustment programs, the population was defenseless following the imposition of Fujishocks. Despite an eroding state system, declining employment, increasing impoverishment and other severities within society, Fujimori enacted the most stringent structural adjustment instituted in Peru's history—if not in the history of these programs.

The consequences of liberalization, privatization, and devaluation completely transformed the structure of the Peruvian economy and government and thus subsequent

alterations in micro-level conditions felt by citizens. By enacting structural adjustment, administrations slowly transformed the workforce within Peru to being increasingly under and self-employed, instigating vulnerability to external stresses. Furthermore increasing labor and wage flexibility and adjustments to subsidies and taxes led to raises in poverty levels and thus insecurity within the populace. Finally, structural adjustment profoundly changed the relationship between the state and its people—ultimately reducing the responsibility of government to provide basic services. Norman Gall describes this trend as the "financial prostration of the public health system," although surely other public sectors were equally as incapacitated (1992). Through adherence to structural adjustment stipulations, the macro context within Peru was transformed and generated structural vulnerabilities that led to alterations in human-environment interactions.

The political economy surrounding structural adjustment also had profound implications for the discourse within institutions and impacted the ways in which the cholera epidemic was treated. The ideology translated by these policies and heavily promoted by the IMF placed utmost importance on economic considerations. As Milton Friedman had said, it was the Peruvian economy that was 'sick', requiring all available resources for its remedy and thus leaving minimal attention to the actual illness present. Fujimori is responsible for perpetuating the epidemic through his stance on the consumption of ceviche, an effort taken solely to prevent harm to the fishing industry with no consideration of the thousands who would contract cholera in response.

The case of Peru illustrates the importance of marrying the frameworks of disease ecology and political ecology. Disease ecology is necessary to illustrate how the virus came into contact with individual citizens and spread throughout the nation. Meade's framework allows an

investigation onto the specific behaviors and risks associated with accounts of cholera. However, disease ecology alone places too much emphasis on such microlevel determinants, ignoring the ways in which these came to be constructed, and thus misrepresents the true context of the epidemic. It is unfair to suggest that drinking contaminated water is solely to be held accountable for the Peruvian cholera epidemic as broader institutional forces control the way in which water becomes contaminated and citizens are exposed to polluted water. As Dr. Hiroshi Nakajima, the Director of the World Health Organization in the 1990s, said of the cholera epidemic, "We know how to control cholera, but the disease can easily get out of control when economic, social and health infrastructures fail," (Gall 1992).

To understand the roots of the epidemic, as opposed to individual accounts of cholera, once must consider the broader upstream factors producing these risk-inducing situations through a framework of political ecology. An analysis of the Peruvian case with contribution from political ecology incorporates the role of the political-economic context—recognizing the structural processes in which vulnerability came to be constructed. For example, while infection of cholera was often found to be a result of increased water storage by households—an example of a behavioral maladaptation within the context of disease ecology—such storage was a product of water scarcity established through structural programs and their institutional consequences.

While decades of structural adjustment weakened the population and the state, Fujishocks were the catalyst that exacerbated this situation. Structural adjustment programs did not simply 'adjust' the economy of Peru, but transformed the very nature of the economy and society. As a result, when a simple treatable virus was introduced in late 1990, the population had exceptional susceptibility to infliction and the state's capabilities at providing any barriers to infection or spread had perished. High-risk behaviors and lifestyles that resulted in contractions of cholera

were shaped through a structural vulnerability consequent of structural adjustment programs in Peru.

Chapter 8: Recommendations

The Peruvian cholera epidemic illustrates how an epidemic may be both a result of micro-level changes in relation to disease ecology as well as greater structural transformations to the political economy. As health becomes an increasingly globalized construct, it is essential to consider diseases as not simply autonomous events in a given location, but instead development that subject to a large number of external forces. Today, more than ever before, it must be understood that health threats are exacerbated by political economic processes that are blind to their social ramifications.

The ways in which diseases are investigated solely as a product of human maladaptation allows for victim-blaming rhetoric in which citizens become pathologized. Although studying disease cannot be complete without noting such individual behaviors, to suggest that the context of such actions are independent of broader structural processes is highly misleading. Similarly, to focus solely on the political economy is to over-exaggerate institutional factors and perceive diseases as independent of their specific populace. Disease must be studied within individual human-environment interactions as well as the structural factors that influence the conditions that shape these relationships. As such, it is important that epidemics be mitigated beyond emphasis on individual modifications, to note how upstream policy effects may be producing the climate through which vulnerability to diseases are manifested.

Crucial to this critique is a recommendation to reconsider the political-economic ramifications of structural adjustment. There has been a recent push to reconsider the social

consequences of structural adjustment programs; however, I believe there is a need to go beyond this and fundamentally shift away from such policies. These programs have a long history of crippling the state apparatus and its ability to provide services as well as its ability to be responsive to its populace. Furthermore, this case shows the dangerous implications of a dependent relationship between global institutions and specific nations. The heavy integration of such institutions into the political-economic context of a nation ultimately reduces its sovereignty and produces an administration that is more loyal to the global financial community than its own citizenry. In accordance with Farmer's theory of structural violence, Pfeiffer notes that, "Structural adjustment's systematic dismantling of public services for health… water, and safety nets is rightly seen as a war on the poor," (2010).

Ultimately my research has led me to make two broad recommendations. First, the study of epidemics must be undertaken within the frameworks of both disease ecology and political ecology. Conjoining these fields allows an investigation into the specific risk factors through which individuals come to contract diseases as well as the processes producing such structurally vulnerability. An analysis of health through this perspective will allow for better understanding and thus prevention of epidemics. My other recommendation is that external adjustment not be prioritized over internal adjustment. Despite claims that economic development will better protect a population, governments are ultimately legitimized by their responsiveness to a populace. Although an economy may be 'sick', devoting full resources and attention to a macroeconomic problem—as shown through structural adjustment—may lead to real life and death consequences for individuals within society.

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