

THESIS

HUMAN HEALTH IN WESTERN SERENGETI: USING THREE
METHODOLOGIES TO BETTER UNDERSTAND THE INTERACTIONS AND
IMPACTS OF CONSERVATION, CULTURE, AND POVERTY

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WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR SUPERVISION BY LINDA M. KNAPP ENTITLED HUMAN HEALTH IN WESTERN SERENGETI: USING THREE METHODOLOGIES TO BETTER UNDERSTAND THE INTERACTIONS AND IMPACTS OF CONSERVATION, CULTURE, AND POVERTY BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS.

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ABSTRACT OF THESIS

HUMAN HEALTH IN WESTERN SERENGETI: USING THREE METHODOLOGIES TO BETTER UNDERSTAND THE INTERACTIONS AND IMPACTS OF CONSERVATION, CULTURE, AND POVERTY

Set in the famous ecosystem of one of the world's largest wildlife migrations, this anthropological research was conducted (in 2004-2007) in villages adjacent to Serengeti National Park. Using several different methodologies (nutritional analyses, archival data collection, and qualitative semi-structured interviews), this study seeks to answer the question: what is the health status of western Serengeti people? Particularly important is the emergence of three key themes: conservation, culture, and poverty and how each are correlated to various health indicators in this study. Overall, the combined methods demonstrate that western Serengeti people have relatively poor health (compared to the rest of rural Tanzanians) and simple (low-protein) diets, a fact that is significantly correlated to low socio-economic status. The role of conservation upon human health is still somewhat unclear as nutritional data do not indicate an immediate negative correlation, yet interviewees' perceptions are that wildlife are harmful to their food security and well-being.

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Chapter 1
Introducing the Study of Human Health in Western Serengeti
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1. Introduction

On the western fringes of Serengeti National Park lives hundreds of thousands of people known singularly in academic and scientific circles for being the most harmful threat to the famous ecosystem's population of migrating ungulates. Indeed, these people have been poachers in the past and some still are to this day, but there are also many other facets to their lives that have not been studied, recorded, and told.

In the fall of 2005, I found myself working as a field assistant for my husband's ecology Ph.D. project in this remote corner of Tanzania, East Africa. We lived in the middle of Serengeti National Park and worked throughout the week outside the protected area. Daily, we trudged through villages that many would consider the embodiment of quintessential Africa—grass-roofed huts, barefoot children and chickens running around the dusty paths between hand-hoed gardens, beautiful open blue skies, and a paucity of amenities like electricity, running water, or plumbing. Even roads that our university's land-rover could handle were often hard to find. As we interviewed villagers day after day about their lives, asking them questions about how they make a living and what types of encounters they have with the nearby wildlife (among many other topics), I quickly began to see how complex their lives truly are. Even before I decided to embark on my own graduate school journey in anthropology, I realized that the unidimensional picture that is often painted of these people as solely poachers is incomplete. Thus, my purpose began to unfold—namely, I sought to discover another piece of the puzzle so that eventually a more nuanced and holistic understanding of western Serengeti people could be found.

2. Research Question

While there is so much more that could be studied and written about these people, my focus is primarily upon their health. The overarching question of my study is this: what *is* the health status of western Serengeti people (as measured by their nutritional status and morbidity/mortality patterns)? More specific sub-questions include: How does their state of health compare to the rest of rural Tanzania? What health patterns emerge within the study population—are certain ethnic groups or genders or occupations—linked to greater amounts of illness than others? How do western Serengeti people cope under the constraints of poor household-level (or individual) health? How do individual women view health and illness through their own experiences? And finally, as I will describe in more detail below, what linkages exist between human health in western Serengeti and the issues of conservation, culture, and socio-economic status?

3. Definitions and Emergent Themes

The term *health* is often considered to mean simply the absence of disease, yet this definition does not suffice for my study. At the 101st session of the World Health Organization's (WHO) Executive Board in Geneva (1998), a resolution was passed in which health was redefined as a dynamic state of complete physical, mental, spiritual and social well-being and not merely the absence of disease or infirmity. This definition is more in-line with my theoretical framework (which will be described later); although, my research was not able to cover every facet of this more holistic definition. Thus I will study health more in terms of the physical and mental state of well-being, as well as some of the social aspects. I measure health in this thesis through several means including:

nutritional status, morbidity and mortality rates, and qualitative descriptions about a wide array of health issues based on my female respondents' experiences.

Three key themes emerge within this broad topic of the health of western Serengeti people. First, it can not be denied that the unique ecological setting that these people live in plays some role in the patterns of disease that they face. My husband's work placed us in the midst of the prestigious crowd of Serengeti scientists who have for decades monitored the dynamics of Serengeti's lions, cheetahs, hyenas, ungulates, and other species as well as general ecosystem dynamics. Interacting with these researchers and the literature surrounding global conservation issues, a mounting pressure arose within me to better understand the dynamics between Serengeti's people and the protected areas. More specifically, I sought to examine a few of the links between conservation agendas and poverty levels.

Biodiversity conservation (or just *conservation*) is defined as "the conservation of wildlife, nature or living wild resources" (Roe 2008: 493). The term *conservation* also implies a loss of natural resource use for local people (Sherbinin 2008). In the conservation literature there is a heated debate surrounding the links between conservation policy and poverty. The central questions are: do protected areas exacerbate or alleviate poverty? And, conversely, does development (or the eradication of poverty) lead to increased or decreased protection of wildlife and intact ecosystems? A corollary question gets at the heart of conservation's purpose: does conservation exist to serve humans, only an elite group of humans, or only non-human species?

Many scholars (Roe 2008, Wilkie 2006, Upton et al. 2008, Sanderson and Redford 2004, Sherbinin 2008, Warpole and Wilder 2008, etc.) have summarized this debate

much more thoroughly than I will attempt here. Basically, I mention this issue because my study is situated squarely in the middle of it. However, my goal is not to take either side. I do not seek to prove any causality between conservation agendas and human poverty levels (or poor health). Yet I can not deny that people and protected areas influence each other. As Schlerl (2004:3) writes, protected areas are not “islands,” impervious to the whims of the social, cultural or economic contexts, nor can the “resilience of the poor” be strengthened without stewardship of natural resources (Schlerle 2004: 16). Therefore, it is safe to say that the story of the humans of the Greater Serengeti Ecosystem (GSE) is linked to the broader debate about conservation and poverty.

While I will attempt to be as neutral as possible in describing the health status of the people in my study, I do seek to untangle some of the linkages between the conservation areas and human health. Once again, I will not prove causality—as if I can determine that conservation agendas alone exacerbate or alleviate human illness or if conservation benefits outweigh costs for the local people—but I am able to better understand some of the complexities of the human-ecological system by examining the emergent correlations between the protected area and certain health indicators. Sherbinin (2008) conducts somewhat similar analyses by examining how infant mortality rates compare among people near protected areas and those in the same country who are not near protected areas. His point is that if infant mortality rates are consistently lower near protected areas, then perhaps health and poverty rates are worse due in part to conservation. While my study does not do this exactly, I too will look at patterns of disease within western Serengeti and compare them to data from around rural Tanzania to

see if there are linkages between Serengeti's conservation agenda and people's well-being. Also, another means by which to measure the affects of conservation on western Serengeti households is simply to analyze my findings along spatial gradients. That is, households closest to the protected areas should be more impacted by conservation than those further away. This is how I will primarily attempt to examine links between conservation and health—to look at health indicators along the spatial gradient as well as to look at patterns of health (mostly nutritional) between households that have experienced loss (of crops or domestic animals) due to wildlife.

The second key emergent theme of my study involves the role of culture in shaping western Serengeti health dynamics. As an anthropologist, I am trained to keep the concept of culture at the center of my research. One scholar (Brown 1997: 122) describes culture as “the single most important ‘orienting concept’ in anthropology.” Brown (1997:123) goes on to define culture in broad terms as “the learned patterns of thought and behavior characteristic of a social group.” He further specifies that culture encompasses:

...material factors—like economic systems and patterns of socioeconomic organization—as well as important non-material factors in human activities—like ideas, beliefs, and values. To a large extent, culture provides the behavioral and interpretive ‘software’ that people use to organize their experiences and make them meaningful. Culture provides both the habitual behaviors and the common sense ideas and values that people use on a daily basis; as such, cultural knowledge and expectations are ‘taken for granted’ from the actor’s point of view (Brown 1997: 123).

The various layers of culture, both material and ideological, are constantly changing. Usually these changes are, in the evolutionary sense of the term, adaptive. This implies that they increase the likelihood of survival and successful reproduction. Some cultural changes diminish the social group’s ability to survive (both individually

and collectively) and thus could be considered maladaptive (Brown 1997). In the case of Brown's (1997) work, he showed that historical changes in cultural factors (economic, social, and ideological) have shaped societies' abilities to control the spread of malaria. On the other hand, Gruenbaum's (1996) discussion of female circumcision in Sudan would argue against ever making such criticisms or using such a judgment-laden term as 'maladaptive.'

Throughout my own fieldwork I wrestled with these concepts of whether culture could be considered a negative force in shaping the lives and experiences of western Serengeti people. Perhaps the most jarring of my experiences is when I interviewed a Serengeti District Council health official who oversaw the Reproductive and Children's Health Department. This health worker seemed to be an extremely caring and compassionate persona and she certainly had devoted much of her life to trying to improve the well-being of women and children in western Serengeti. Yet I was taken aback when, during our interview, she blatantly blamed the culture of western Serengeti's people for much of the suffering they experience. After asking her what the main health problems in her district are, she launched into an explanation about the rampant spread of malaria in western Serengeti. She cogently contended that, "Money is not the problem for these people. It is their culture." She went on to explain that the people in this area are aware of the causes of malaria and how to prevent it; she believes they are simply unwilling to change their behavior to do anything about it. For example, she said that many households own several hundred cattle but simply will not sell any to purchase malaria prophylaxis such as mosquito nets or insect repellent. "They fully understand the causes or reasons behind malaria, but they don't do anything about it," she insisted.

This experience certainly affected my overall outlook on my research. I went from thinking that the leading determinant of western Serengeti health is the deleterious effects of conservation agendas, to then being troubled by the fact that people's own values and behaviors are what influence their well-being. My current view is much more multi-dimensional than it was when I was in the field. The workings-out of these issues will be seen throughout the course of this thesis. Ultimately, I realized that cultural forces would always be central to my analyses. Moreover, I would need to redefine my understanding of culture by looking at new theoretical paradigms and then reassessing my data. These theories will be addressed throughout various sections of this chapter and those to follow.

Third, is the emergent theme of poverty. I understand the term *poverty* to mean a lack of “income...civil and political rights, assets and services; i.e. the opposite to the constituents of human well-being as defined by the Millennium Ecosystem Assessment (2005)” (Roe 2008: 493). Poverty will be a recurrent theme of this story about GSE people since poverty is intrinsically linked to poor health. We cannot study health or poverty without acknowledging the complexity of causality between these two. Anthropologist and public health workers often debate if poverty causes poor health or vice versa. I acknowledge that “causality almost certainly runs in both directions—generating a mutually reinforcing vicious or virtuous cycle” (Leon and Walt 2001: 6). As I will explain in greater detail throughout this chapter, the data do indeed reveal the overall low socio-economic status of GSE people as manifested by their poor nutritional status and patterns of morbidity and mortality. To analyze the effects of socioeconomic status, I will use the following variables: assets (livestock and land ownership), education

(both male and female), occupation, and income and link these to various health indicators.

In summary, my overarching question is to ask: what is the state of health for western Serengeti households? Each emergent theme—conservation, culture, and poverty—provides a series of sub-questions. Each theme will be analyzed to understand what connections there are between these variables and certain health indicators (nutritional data, morbidity/mortality data, and qualitative data on women’s experiences of health and illness). What I have come to realize through the gathering, analyzing, and presenting of this research is that no one factor alone (whether it be socioeconomic status or conservation or culture) can be blamed for the state of health in western Serengeti. Certainly each contributes towards and is impacted by disease patterns, but the interactions between these variables (and many more which I can not address here) are intertwined in a complex manner. These concepts will be discussed more fully after I present my theoretical framework and conceptual model.

4. Theoretical background

Anthropological theory provides “the tools anthropologists use to give meaning to their data” (McGee and Warms 2004:1). Often without our being aware of it, theory shapes the questions we ask, the types of methodologies we use, the analysis we do and the conclusions we make as anthropologists. Furthermore, theory helps us to understand others, their culture(s), ourselves, and even our understanding of our behavior towards others and other cultures (McGee and Warms 2004). On a very basic level, I must admit that the dominant view of most anthropologists throughout the 19th and early 20th centuries called positivism, is tempting to embrace. Positivism holds that objective

conclusions can be made about other cultures if adequate data are gathered and proper use of the scientific method are used. However, I have come to realize that my own experiences, knowledge, beliefs, and prejudices certainly shape the perspectives I have of others and their cultures. Even my aforementioned desire to expose more about western Serengeti people than their notoriety as “poachers” is part of my bias (though I believe it is a worthy one.) I can not tell my entire life story or share all the experiences that shape how I view anthropology, other cultures, or even myself, but I will attempt to elucidate the theoretical position from which my study is based upon.

4.1 Biocultural Theory

As a socio-cultural anthropologist who is examining the factors influencing the health of a certain population, my research demands an interdisciplinary theoretical framework. The biocultural approach is just that needed theory. As its name alludes, biocultural theory is a bridging of diverse, yet complementary ideas from biological and cultural anthropology (Leatherman 1996). This theoretical linkage of sub-disciplines is a harkening back to the holistic roots of anthropology as described by Eric Wolf (1982). Beginning in the late 19th century most academic disciplines were fractured and specialized. Political science was separated from economics, which was separated from anthropology and sociology (Wolf 1982). This specialization—even between the sub-disciplines of anthropology—lead to what Goodman and Leatherman (2001) coin “a virtual chasm.” As biocultural theory emerged just after the mid-point of the 20th century it acted as a bridge to reconnect these fractured subdisciplines of biological and cultural anthropology.

Biocultural theory finds its roots in the evolutionary concept of adaptation, or *fitness*. Thomas (2001) explains that the adaptation concept provides the theoretical core to biological anthropology as a whole. Early biocultural studies examined how particular human populations were able to adapt to certain environmental stressors such as high altitude, extreme cold, or under-nutrition. Ecological anthropologists (e.g., Leslie White, Roy Rappaport, and R. Brooke Thomas), who were interested in the tracking and quantifying of energy flows in human-ecological systems, were also critical in shaping the concept of adaptation and in linking the more scientific and humanistic sub-disciplines of anthropology (Leatherman 2005). Thus, in addition to evolution, ecology came to play a significant role in biocultural theory. Defined most simply, ecology is the study of the relationship between species and their environment (Huss-Ashmore 2000). Biocultural anthropologists—who were influenced by ecological anthropologists like White, Rappaport, and Thomas—realized that behavioral, social, and cultural factors, not just physiological or genetic changes, are part of human adaptability. Therefore, under this new theory, cultural and biological ideas were united under the common pursuit of understanding how the human species is “so adept at adjusting to change” (Thomas 2001: 49).

In addition to the conjoining of evolutionary, ecological, and adaptation theories, political economy also impacts biocultural theory. Political economists in the early 1980s critiqued biocultural theory for ignoring three key issues: 1) how large-scale, exogenous processes affect local environments, 2) how local-level structural inequalities shape exposure to stress and adaptive capacity to this stress, and 3) how human agency influences the environment (Leatherman 2005, Leatherman 1996). Rather than shirk

such critiques, biocultural theorists in the 1980s-1990s simply integrated political economy into their paradigm.

Political economy dominated social theory in Western thought until the middle of the 19th century when sociology, political science, economics and anthropology went their separate ways, as mentioned above (Wolf 1982). Political economy asserts “that the world of humankind constitutes a manifold, a totality of interconnected processes” (Wolf 1982: 4.) At the heart of this theory is the goal of understanding what laws influence the production of wealth and what roles social class and political states play in this generation of wealth (Wolf 1982: 20). The chief concern of political economy is to understand distributions of power—which influence poverty, access to resources, control of labor, and control of production (Leatherman 1996).

Biocultural theory in recent years continues to be shaped by the emergence of new theories (not just political economy). For example, psychosocial, cognitive, and post-modern approaches are now also being integrated into biocultural theory (Goodman and Leatherman 2001). The latter and more interpretive, (as well as Foucaultian) approaches emphasize that access to power and resources are usually driven by a control of knowledge (Goodman and Leatherman 2001). In their study of Turkana women’s perceptions, emotional expressions, and physiological evidence of stress, Pike and Williams’ (2006) hold that integrating psychosocial and political economic frameworks into models of human adaptability “offers the opportunity to refine an evolutionarily informed biocultural research agenda in ways that reflect the lived experiences of people in diverse circumstances” (2006: 738). After reflecting on my fieldwork and particularly the qualitative interviews with women in western Serengeti that I conducted,

I began to realize that what some of my work centered upon was this more experiential-based research. Essentially, as I mentioned above, the embodiment paradigm—or phenomenology¹—legitimizes the study of the human body and the experiences of people as the very site of culture (not separate from it). As Csordas (2002: 87) writes, “the body is a productive starting point for analyzing culture and self.” This theory will be explained in more depth in chapter four; however, it is important to mention that biocultural theorists are realizing that the incorporation of other paradigms into their framework is important for truly understanding the interactions of human biology and culture.

Overall, it is this aforementioned integrative nature of the biocultural approach that fits best with my research. In addition, five key characteristics of biocultural theory lend themselves perfectly to my study. First, multiple scales (e.g., global, regional, national, and local) are examined to understand human biology. In western Serengeti, the factors influencing human health occur at multiple spatial or temporal scales. For example, multiple spatial scales of influence include Global Environmental Change (GEC), heightened global and national conservation policies, the shifting of national economic policies (such as the period of Tanzanian socialization during the 1970s-80s), as well as local cultural changes such as fluctuations in bride wealth costs, intermarriage, and access to roads or markets . In addition to these spatial scales, temporal scales vary for factors influencing the health of Western Serengeti peoples. Some factors are chronic (or ongoing) drivers, while others are sudden and short-lived perturbations.

A second key characteristic of biocultural theory is the emphasis upon the role of social relations in influencing human health. These social relations include more than

¹ I will explain more fully what phenomenology means in chapter four of this thesis.

socioeconomic status but also include modes of production, land tenure, and the influence of capitalist markets (Leatherman 2005). Third, analysis of local histories is critical to understanding social relations—including social inequality (Goodman and Leatherman 2001). The unique events within the local history of western Serengeti will be described with more detail in following sections of this paper. A fourth key characteristic of biocultural theory is the importance of human agency in reducing vulnerability. As I will discuss below, some cultural adaptations of western Serengeti people actually increase their resilience in times of health crisis. Lastly, the physical experiences, perception, ideology, and cognition of both the researcher and the groups being studied play an important role in understanding human health. My work reveals not only my own experiences and biases but it reveals that culture itself is lived, acted, and felt in the daily experiences of women, children, and men in western Serengeti.

These five characteristics of the new biocultural synthesis (described in Goodman and Leatherman 2001), have varying degrees of importance in my study. In summary, it is important to note that a biocultural framework allows me to assess the multiple forces, acting at different spatial and temporal scales, which influence the health of western Serengeti populations.

4.2. Medical Anthropology

Biocultural theory is one of many theoretical frameworks used within the sub-field of medical anthropology. This branch of cultural anthropology focuses primarily on the study of health and illness within a context of the larger cultural or societal setting in which health is embedded (Kwiatkowski, Medical Anthropology Class Lecture 2007). Central to this sub-field is the idea that health, illness, and biomedicine are all subject to,

and created by culture. Even western biomedicine which so many elevate for its “scientific” status is not neutral or objective but yet another cultural construction. One scholar writes, “Western institutions, like international health agencies, have their own cultures characterized by particular economic constraints, social organizations and belief systems” (Brown 1997: 124). In his famous work “The Birth of the Clinic” Michel Foucault (1994) peels back the layers of history showing how political and social movements influenced the forming of the modern medical system. Foucault’s work has gone on to influence countless other scholars who now are concerned with understanding how access to knowledge and power relations create and perpetuate hegemonic forces within and across cultures—including our western biomedical system.

I mention these issues briefly here for two reasons: 1) to recognize that my theoretical framework—bioculturalism—is one of many theories used by medical anthropologists, and 2) to acknowledge that some of the biomedical data I draw from in my thesis work is subject to biases, agenda, and human error. Though I do use certain biomedical indicators such as morbidity and mortality data (gathered from Tanzanian public health centers) to measure the health of western Serengeti people, I also acknowledge that these data can be inadvertently inaccurate or intentionally skewed to help certain social and political-economic agendas. Moreover, the data do not represent a complete picture of health in western Serengeti since they can not deal with individual experiences of illness or interpret the relations of power that exist between classes.

4.3. Culturalism

While biocultural theory provides the overarching framework for this study, the types of analysis that I have done also pertain to another theoretical concept which I must

explain. This concept is known as *culturalism* and is defined as “the intellectual figure that reduces culture to mere essence and that makes culture an ultimate interpretation of human behavior” Didier Fassin (2001:302). In the context of medical anthropology, culturalism blames a group’s “primitive” or “deviant” cultural beliefs for their refusal to conform to biomedical standards. In Fassin’s (2001) chapter he uses the example of Quechuan women in Ecuador who hesitate to make the grueling trek to a hospital to give birth. In these places, the peasant women are often harshly mistreated by the *mestizo* health workers. Yet the Ecuadorean obstetricians view the Quechua as stubborn and ignorant for their “backward” behavior of home-birth. Likewise, Fassin describes the disapproval immigrant African women living in Paris receive when they do not prevent themselves from getting pregnant despite being aware of their HIV-positive status. In both cases, Fassin explains, the victims of disease are blamed for their own suffering. Culturalism over-emphasizes the role of culture to the point that socio-economic or socio-political explanations are overlooked. Similarly, Paul Farmer (1999: 149) describes how certain myths (such as “unruly sexuality”) often hide the underlying effect of social inequalities on HIV and AIDS distributions around the world. Using examples of AIDS patients in rural Haiti and New York City, Farmer states that anthropologists (or biomedical practitioners) often place too much focus on human agency. Individuals who are poor and marginalized, he writes, are actually constrained in their choices and behavior by other issues beyond just their cultural beliefs. International health officials and some medical professionals have blamed “non-compliance” for the pervasiveness of multiple drug-resistant strains of tuberculosis around the world (Farmer 1999). Farmer contradicts their arguments and shows how patients’ beliefs or attitudes are the least of

many concerns when it comes to treating or eradicating tuberculosis. He states, “our experience in Haiti suggests that, even more unfortunately, the term [compliant] exaggerates patient agency, suggesting that all patients possess the ability to comply—or to refuse to comply—with anti-tuberculosis therapies” (Farmer 1999:226). Rather, it is patients’ inability to access medical care or health officials’ inability to provide steady services and proper medicines that influences the persistence of tuberculosis. Stated even more harshly in a different book, Farmer refers to these problems as “structural violence” (Farmer 2003:255).

In summary, culturalism errs in what Fassin (2001: 302) calls a process of “cultural over-determination.” Culturalism ignores more ultimate causes for human behavior and disease patterns amongst the poor and marginalized. “The precarity of their situations—socially, economically, and legally—is often a stronger, more immediate determinant of their behavior than their supposed beliefs” (Fassin 2001: 310). Furthermore, culturalism does not allow for a critical analysis of health workers or health systems and how these variables influence patients’ behavior or beliefs. In essence, with a culturalist perspective, culture is isolated from the socio-political context which shapes it. On the flip side of this approach is the political-economy of health, which helps to understand how the broader social environment influences illness behavior, illness narratives, and client-provider interactions (Pylypa 2007).

4.4. Conceptual Model

The underlying purpose of my conceptual model is to allow us to better understand the determinants of health in western Serengeti by dividing them into two

main categories—structural and immediate. This basic idea comes from many sources (e.g., Gregory et al. 2005, Zurek 2006, Misselhorn 2005, et al.) but actual terminology is taken from the WHO’s Commission on Social Determinants of Health (CSDH) conceptual model. Their model is much more complex and is an “action-oriented framework” geared toward intervention strategies that would create more equitable patterns of health around the world today (CSDH 2007: 15). I borrow the CSDH terminology to demonstrate that certain forces influencing the health of GSE people are more chronic and they *indirectly* impact the health of GSE people. These “structural determinants”—such as political, economic, or conservation policies and ecosystem services—can make households more vulnerable² to perturbations that do *directly* impact their health. The direct forces are called “immediate determinants”. They include more obvious factors such as sudden disease outbreaks or access (and lack thereof) to health services. Yet I also suggest that other factors such as socioeconomic status (income, assets, occupation, and education), livelihood strategies, household demographics, or village level or even intra-household power relations (such as gender, age, ethnicity, etc.) are also immediate determinants of overall household-level health.

I must acknowledge that some of the immediate determinants more directly impact health than others and that all of these factors (within and between each of the determinant categories) are constantly interacting and influencing each other³. In other

² I use the term vulnerability to mean what Leatherman (2005: 51) defines as the locally and historically-specific combination of: 1) risk of exposure to stress, 2) risk of inadequate capacities to cope with this stress, and 3) risk of severe consequences from stress, crisis, or shock. Households which experience the greatest risk to all three criteria are the most vulnerable.

³ The CSDH framework places socioeconomic position, social class, gender, ethnicity, education, occupation, and income all under the structural determinants section and only material circumstances (living and working conditions, food availability, etc.) and behavioral, biological and psychosocial factors under the immediate determinants of health. Ultimately I agree with their framework, but I am trying to

words, the system is far more complex than our model suggests. Despite such complexities, we still try to distinguish structural from immediate determinants simply to better understand the linkages between the conservation area and GSE peoples' health.

The concept of culture also receives special attention in my model because I am

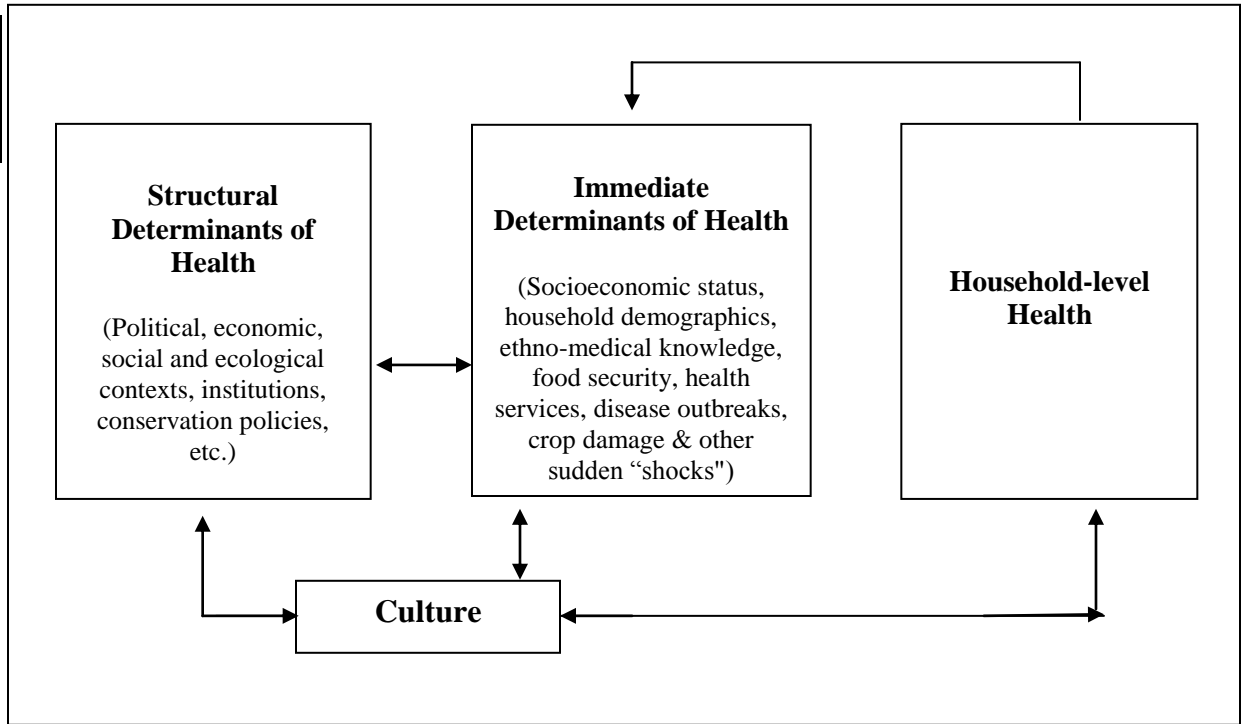


Figure 1.1. Conceptual Model

attempting to demonstrate that culture shapes both the large-scale, structural determinants as well as the immediate drivers of health. As explained in my section on biocultural theory above, political economy asserts that social or cultural forces influence macro global forces such as the penetration of capitalist markets, political regimes, conservation agendas, or even national-level health policies. Yet culture also acts upon (and occurs) on a local community level or even an individual level. As I will explain in more depth

show how the broader political, economic, social, and ecological contexts make households in the GSE more vulnerable to these (what I call immediate) other factors.

in chapter four, every disease itself is laden with cultural meaning as individuals experience them and interpret them. My conceptual model does little to represent the complexities of this embodiment approach. Thus, once again, I must clarify that it is impossible to represent the complexities of culture, but I hope to show through this model that my research seeks to untangle the ways in which cultural forces can occur and influence both the large-scale structural determinants and the micro-level immediate determinants of health in western Serengeti

5. Dynamics of the social-ecological system

Before discussing my research methodologies, it is important to examine how the literature describes the people I have worked with. In addition, since I am using a biocultural framework, it is important to mention the ecological context of the study area as well. The people in this study are highly dependent on the landscape for their livelihoods; therefore it is necessary to understand the geophysical environment in which they live. This is where I will begin my literature review.

The Greater Serengeti Ecosystem (GSE) encompasses 25,000 km² of grassy plains, woodlands, volcanic highlands, and meandering rivers spread across northern Tanzania and Kenya. The ecosystem is defined by what is called “the migration”—an annual movement of wildebeest (*Connochaetes taurinus*), zebra (*Equus burchelli*), Thomson’s gazelle (*Gazella thomsoni*), and eland (*Taurotragus oryx*)—whose whereabouts are driven (mainly) by variability in rainfall. These dynamics, allow the GSE to lay claim to the largest assemblage of migrating ungulates and also the “one of

the highest concentrations of large predators” (such as hyena, lion, leopard, cheetah, and many other smaller carnivores) in the world (Sinclair 1995:7).

The GSE is divided into three types of land-use areas (Norton-Griffiths 1995): 1) formal conservation areas including the Maasai Mara National Reserve in Kenya (1,672 km²), Serengeti National Park (14,763 km²), and the Maswa, Ikorongo, and Grumeti Game Reserves in which the protection of wildlife is preeminent; 2) multiple land-use areas including the Ngorongoro Conservation Area (8,288 km²), Loliondo Game Controlled Area, and Ikoma Open Area—all of which seek to meet the needs of both the resident humans and wildlife; and 3) rangeland and agricultural areas that are under a variety of (mostly formal) land tenure systems. In these latter areas, the interests of the village, group ranch, or individual humans overrides all else. In all three of these land-use categories, both resident and migratory wildlife populations can be found (Norton-Griffiths 1995).

According to Sinclair (1995), the GSE maintains a relatively constant mean monthly maximum temperature of 27-28° C. A rainfall gradient stretches across the GSE from the arid southeastern plains (500mm/year) to the more mesic northwestern corner (1,200 mm/year). The GSE experiences bimodal wet seasons during October-November and March-April. Analysis of climate change predictions and SNP rainfall data over the past 50 years reveals that wet season rainfall will continue to decrease in the ensuing years (as the Indian Ocean’s temperatures rise) while dry season rains will increase in the GSE. The impacts of climate change will certainly affect GSE food web dynamics, surface water, grassland vs. woodland distribution, livestock and wildlife numbers, and human livelihood strategies (Ritchie 2008).

Rainfall ultimately affects the vegetative production and migratory movements in the GSE. Yet stochastic events (such as fire) and spatial and temporal heterogeneity in geology, soils, climate, and vegetation are also determining factors of GSE dynamics (Sinclair 1995). On the dry and treeless eastern plains, soils are highly saline and alkaline due to volcanic activity in previous millennia. Heading north and west into the Serengeti woodlands, GSE soils become deeper and less alkaline (Sinclair 1995). In certain areas, “hot spots” of nutrient-rich soils lead to increased densities of resident ungulates (McNaughton and Banyikwa 1995). Overall, it is the fluctuations in the wildebeest population that impacts the rest of the system; hence why they are considered the “keystone species” of the GSE (Sinclair 1995).

In addition to its wealth of biodiversity, the GSE contains a rich cultural heritage. Important prehistoric human remains were discovered in its southeast regions of Olduvai Gorge and Laetoli. North of Kenya’s Maasai Mara National Reserve and east of Tanzania’s SNP, pastoral Maasai live within and along the boundaries of the GSE, while various agro-pastoralists, agriculturalists, horticulturalists, and hunter-gatherers encompass its western and southern boundaries. Centuries and even millennia of sustainable human-natural interactions have occurred in the Greater Serengeti Ecosystem (Homewood and Rogers 1991), but these socio-ecological dynamics have become increasingly complex as conservation policy has come to alter indigenous ways of life (Homewood and Rogers 1991) and as human population growth explodes around the boundaries of the protected area (Campbell and Hofer 1995).

Historian Jan Shetler, from Goshen College (IN), is one (of a few scholars) who has done extensive research on the very western Serengeti human populations that I also

am studying. Using linguistic analyses, Shetler writes (1998) that Bantu-speaking farmers moved into the western Serengeti area around 500 A.D. These farmers peacefully gained access to the productive land from Southern Cushitic or Eastern Sahelian-speaking hunters already living in the area. Around the same time, Mara Southern- Nilotic herders also migrated into the region and shared their livestock-keeping skills with the farmers. Peaceful intermarriage occurred between some ethnic groups while the Cushitic hunters were slowly pushed into marginal lands. The Bantu-speakers began to dominate the region by 1000 A.D. (Shetler 1998).

Today the presence of these communities is still evident in western Serengeti. The Bantu agriculturalists and agro-pastoralists include such ethnic groups as the Kuria, Natta, Sukuma, Ikizu, Sizaki, Isenye, Ngurime, and Ikoma. The descendents of the Nilotic pastoralists are the Tatoga (living mostly in Bunda district and the Lake Eyasi Basin) while the Cushitic descendents (Iraqw) are only rarely found in western Serengeti all together but live further south in Tanzania. Each of these groups influenced one another through the sharing of cultural practices and inter-marriage (Shetler 2000).

Western Serengeti people as a whole today are primarily smallholder agropastoralists who diversify their assets between several staple crops and livestock. Loibooki (1997) explains that average farm plots sizes are 2.5 ha. and cassava, maize, millet, sorghum, and beans are the chief subsistence crops. The impacts of Colonialism are still felt today as the production of cotton is the chief cash crop in the area (Emerton and Mfunda 1999). Some non-farm employment is also available in the area through the tourism or conservation industries. Other means of livelihood diversification are utilized including hunting (E. Knapp 2009).

As I alluded to already, it is western Serengeti people that are credited for being the source of the majority of illegal bushmeat hunting in the GSE (Arcese et al. 1995, Campbell and Hofer 1995). In most of the ecological literature, these people are hardly recognized as anything more than “poachers” with no legitimate claim to the resources of the GSE (Shetler 2007). While some literature on western Serengeti people exists (e.g., Birley 1982, Campbell and Hofer 1995, Emerton and Mfunda 1999, Fleisher 2000, Galvin et al. 2008, Loibooki et al. 2002, Malcom 1953, Meertens 1996, Shetler 1998, Thompson 1997, Tobisson 1986,), there is much less written about these people than there is written about the wildlife or ecological dynamics of the world-famous Serengeti ecosystem. In addition, some of the literature listed above only explores minor aspects of these people’s lives in conjunction with hunting while other ethnographic data is simply outdated.

6. Literature Review of the major forces of change in Western Serengeti since the 1880s

From the scant amount of literature that *is* available about the culture and lives of western Serengeti people, a key theme emerges—namely, that change is constantly occurring within this human-ecological system. We can not fully understand Western Serengeti people or their health without discussing in more depth some of the large-scale exogenous forces of change they have experienced throughout time. In the following paragraphs I will briefly examine the impacts of intertribal warfare, Colonialism, Tanzanian socialism, and global conservation agendas.

The 1880s was a particularly tumultuous period for western Serengeti people as disease outbreaks ravaged the livestock and human populations and as pastoral Maasai

warriors invaded their territory in search of new lands and more livestock to confiscate. One of the ethnic groups in this area, the Ikoma, incorporated aspects of this turbulent period into their tribal origin stories. In both my interviews and in data gathered by Shetler (1998), the Ikoma claim that their ancestors came from Sonjo territory—80 miles due east of Serengeti District and just south of the Kenyan border. The Ikoma say that they are “of the same womb” as the Sonjo (a tribe much further East) even though archaeological and linguistic evidence disagrees (Shetler 1998). Shetler explains that these discrepancies between oral tradition and history may be part of a means to cope with and understand the past in which smallpox, inter-tribal warfare, famine, and Rinderpest disturbed traditional ways of life. By 1850, the *Serenget* Maasai encroached on grazing lands and raided the few livestock herds that the Ikoma and their sister tribes had. Many western Serengeti peoples fled their homes, which only resulted in increased bush encroachment and the concomitant spread of African Sleeping Sickness (via tsetse flies). The tumult of the late 1800s caused the Ikoma to move west—away from the danger of invading Maasai. Such migration could easily have been translated in the oral tradition as a move from Sonjo (Shetler 1998). Shetler writes, “Sonjo as a place of ‘origin’ does not refer to bloodlines or even ethnicity but rather as a way for western Serengeti peoples to orient and reposition themselves more centrally in a Maasai dominated world” (1998: 16). We can certainly conclude from this oral tradition and the history of disease and warfare in the late 1800s, that patterns of health and illness were greatly changed by outside forces.

In addition to the changes brought on by Maasai invasions in the 1800s, Colonialism also impacted livelihood strategies and health in western Serengeti. Colonial

influence began in western Serengeti as early as 1890 when the Germans gained control of East Africa. In 1905, the Germans began requiring western Serengeti populations to pay taxes in the form of money and crops (Kjekshus 1977). In addition, throughout both German and British Colonial rule, Sukuma and Kuria groups were forced to grow cotton (and later maize), a practice which conflicted with their traditional farming schedules (Drangert 1993, Fleisher 2000). The biggest change brought by Colonialism was that it integrated western Serengeti peoples into a formal market system (Fleisher 2000). People in western Serengeti initially resisted these changes. To avoid being forced into migrant labor and the market system, the Ikoma—a hunter-gatherer group—traded wild game products (such as wildebeest tails or tanned skins) to the Sukuma people, a strong agricultural group (Shetler 2000). Another ethnic group, the Kuria, strongly resisted Colonial impositions to grow cash crops such as sisal, peanuts, sesame, groundnuts, and cotton (Fleisher 2000). Up until Colonial rule, the Kuria had purely been a “cattle people.” After World War II, the British made it compulsory for certain cash crops (mainly cotton) to be grown (Shetler 2007). Eventually even the Kuria adopted these politically-enforced agricultural changes and now embrace diversified livelihood strategies (Knapp, E.J. 2009). Overall, it is noteworthy that western Serengeti people *did* resist the market economy and the political pressure to grow cash crops since neither of these enterprises were considered profitable (Shetler 2007). It was not until right before Tanzanian Independence (1961) that cotton became a major cash crop in the region; some people even continue to resist planting it today (Shetler 2007).

Whether embracing the market economy and planting cash crops or not, western Serengeti villagers are impacted by these exogenous forces of economic change. As

other people seek to generate cash, systems of social reciprocity have disintegrated. Fleisher (2000) explains how the penetration of the market economy has altered traditional patterns for building social capital. Young men who once sought out the help of their fathers, uncles, and other relatives in order to give cattle for bride wealth—thereby strengthening social bonds and creating new opportunities for future reciprocity—now pay their bride’s family in cash. The exchange of cash means that young men migrate to urban areas in order to seek formal employment and earn cash incomes. This new system does not strengthen the bonds between family members, villagers, and friends. Also, with rural-to-urban migration, disease transmission increases and epidemiological shifts occur (especially for HIV/AIDS). Furthermore, by growing cash crops (especially cotton), families shift their labor toward producing non-nutritive commodities. That is, though they may generate some cash for themselves, the expenditure required for tending to cotton fields diverts the families’ energy away from the planting and harvesting of necessary foods. These examples demonstrate the lasting impacts of Colonialism upon the livelihood strategies and health of western Serengeti people.

A third type of exogenous change occurred during the 1970s-1980s when the Tanzanian government, under the leadership of former President Julius Nyerere, initiated a nation-wide system of socialism under the heading of “Ujamaa”—or familyhood. Under this new regime, dispersed households were forced to relocate into centralized villages. Hyden (1980) states that this transformation was hailed as the largest resettlement effort in the history of Africa. In addition, individuals were forced to work on collectivized farms. One of the goals of this initiative was to be able to provide better

services, such as schools, clinics, wells, and agricultural equipment, to rural areas. In 1973, the Mara Region (in which Serengeti District is located) was among the first to launch “the operation” of relocating households (Tobisson 1980). Initially these initiatives were to be integrated voluntarily. However, when few rural dwellers opted to move and work collectively, the government made the changes mandatory and used more harmful and coercive techniques (such as the burning of homesteads) to get people to move. Extreme food shortages, partially due to drought, coincided with these political changes during 1972-75 (Tobisson 1980). One (of many) problems with Ujamaa was that it led to a breakdown of traditional ecological knowledge. The resettlement program created a loss of site-specific environmental knowledge; this was especially true in an area of such ecological heterogeneity of resources such as western Serengeti. Increases in land intensification around rapidly developed communal settlements led to soil erosion and environmental degradation (Lawi 2007). In total, the changes of Ujamaa reeked havoc on the lives of western Serengeti people. In many of our interviews, villagers recounted to us the tales of being forced to move during this time and the struggles of crop failure and food shortages.

Finally, the global conservation agenda also impacts the lives of western Serengeti people. The first protected area in this ecosystem was established in 1929 with a small game reserve in what is now central Serengeti National Park (Perkin 1997). It was not until 1951 that Serengeti National Park (SNP) was officially established. Once again, villages were relocated and restrictions were placed on both the eastern-dwelling Maasai pastoralists and the western agro-pastoralists. No longer was hunting allowed in the park, nor could water and firewood extraction occur within the protected areas.

Furthermore, livestock could not be grazed on these important traditional lands and planting of crops within the park boundaries was considered illegal. Due to these restrictions and the anti-poaching efforts of the early 1970s, mutual enmity and a subculture of resistance still impacts interactions between park officials and the surrounding communities (Shetler 2007). While humans are blamed for considerable off-take of wildlife populations through illegal hunting, so also the wildlife impact human well-being. Elephant crop damage, livestock off-take by carnivores, and even accrued loss of human life occurs in villages along the park boundary (Kauzeni and Kiwasila 1994; Emerton and Mfunda 1999; Knapp, E.J. 2009). One woman interviewed during my research recalled how her four year-old son was eaten by a hyena as he returned home on foot one evening from playing at a friend's house. Only remnants of his skull were found. Other families recounted how their entire year's worth of crops were lost in just one night as elephants raided their gardens. These scenarios depict the devastating impacts that conservation can have upon human livelihoods and health. Despite these tensions, villagers we interviewed still listed many benefits of living near to the national park

7. Literature review of the health of Serengeti people

While most of the research about GSE peoples pertains to their role in extracting natural resources, particularly the off-take of wildlife through illegal poaching (e.g., Campbell and Hofer 1995, Barrett and Arcese 1998, Hofer et al. 2000, Loibooki et al. 2002). Increased attention was given to the well-being of GSE peoples in the 1990s as it became apparent that Maasai on the eastern side of the GSE were not faring well. Several different projects (Homewood and Rogers 1991, McCabe et al. 1992, Potkanski

1997, McCabe 2002, McCabe 2003, Galvin et al. 2002) carried out since then have demonstrated the deteriorating health and livelihoods of these pastoralists due in part to the constraints of biodiversity conservation. More specifically, steadily decreasing human-livestock ratios⁴ throughout the NCA forced Maasai to diversify their livelihood strategies by engaging in small-scale agriculture. When the Ngorongoro Conservation Area Authority (NCAA) restricted this adaptive strategy, nutrition levels plummeted amongst the Maasai. Galvin et al (2002) showed that the nutrition levels of NCA Maasai was significantly lower than the Loliondo Maasai, who were allowed to cultivate. As the cultivation ban was lifted in 1992, levels of malnutrition amongst children under age five in NCA improved significantly (McCabe 2003)⁵. Yet Potkanski (1997) showed that the extent of poverty in the NCA was still so wide-spread that customary mutual assistance programs such as livestock redistribution among clan members had disintegrated. These studies proved that an adaptive management system was needed in which feedbacks between pastoral residents, conservationists, and policy makers would be allowed (McCabe 2003).

Less research has been conducted on the health of people living on the western (versus eastern) reaches of the GSE. Recently, however, Hampson et al. (2008) have studied the impacts of endemic canine rabies on humans in the east *and* west sides of the GSE. They examine the risk factors associated with exposure to rabies and seek to understand why so many human deaths associated with canine rabies still occur when effective vaccines are available (Hampson et al. 2008). Furthermore, Lembo et al. (2008)

⁴ In 1998, 87% of Maasai households in NCA fell below the necessary minimum of 4.5–5 livestock units per capita needed to support subsistence pastoralism (Galvin et al. 2002).

⁵ Of course, there is concern about the ecological impact of farming in the NCA, though Boone et al. (2004) showed (using an adaptation of the SAVANNA model) that the ecosystem is not degraded if there is only a 3% increase of agriculture and human population over the next 15 years.

suggest that high densities of domestic dogs are the primary reservoir for rabies and that vaccination control programs which target domestic dog populations significantly reduce infection rates among humans (and all other species). Finally, nutritional research based on anthropometric data gathered by Savannas Forever Tanzania (SFT) shows that higher rates of stunting occur in children under age five on the eastern side of SNP (in Loliondo and Longido Districts) rather than on the western side (particularly in Bunda and Serengeti Districts) (L.M. Knapp et al, In progress). Apart from these studies, little else exists in the literature about the health of GSE people in Tanzania.

8. Study Site and Methods

The research for this thesis was conducted over two field seasons (September 2004- July 2005, June-September 2007) in three geo-political units (Serengeti, Bunda, and Meatu Districts) adjacent to Serengeti National Park, Tanzania (see *Figure 1.2*). These districts are located west of the Park and therefore the people in this study are referred to as “western Serengeti people.”

My research spawned out of a large-scale, NSF-funded project known as the *Biocomplexity Project* in which a vast array of scientists from around the world sought to collaborate to better understand the GSE. Our component from Colorado State University⁶ was mainly brought onto the project to provide expertise on the human dimensions of the ecosystem. To briefly summarize our work, we sought to understand the lives of western Serengeti people especially in regards to livelihood strategies within the conservation area.

⁶ Namely, Kathleen A. Galvin and Michael E. Coughenour—both of whom were Principal Investigators on the Biocomplexity Project—were highly sought after for their expertise on human-ecological systems in East Africa. They both had contributed significantly to the well-known South Turkana Ecosystem Project (Little and Leslie 1999) (STEP).

8.1 Methods

Apart from this larger project, my own specific methodology can be broken down into three key arenas. Each method and its ensuing results will comprise its own chapter in the subsequent pages of this thesis. First, nutritional data were gathered during in-

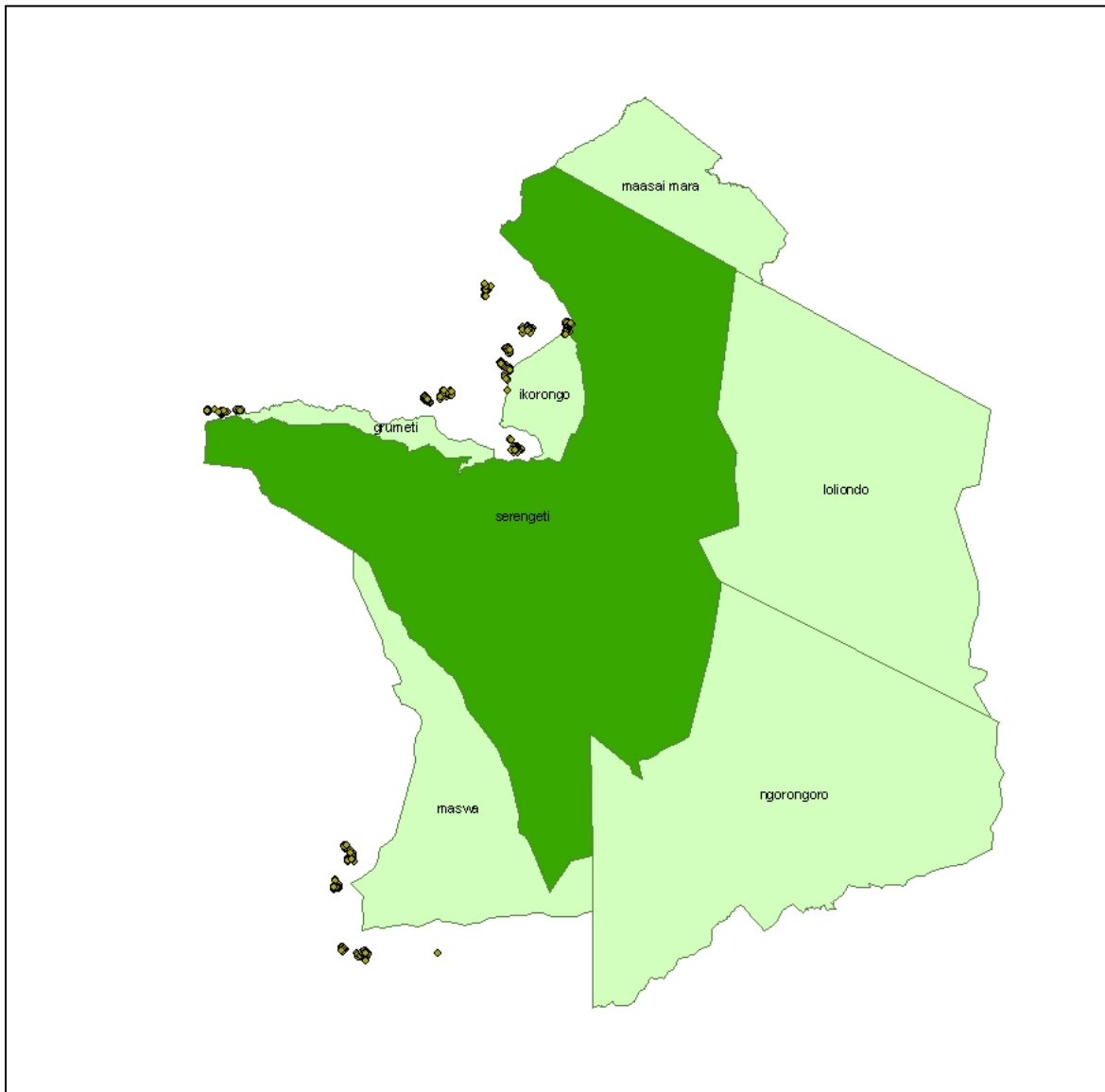


Figure 1.2. Map of Study Site. Dots represent locations of households (n=722) where semi-structured interviews occurred. Map was made using ArcGIS technology by Jacob Jawson and Eli J. Knapp.

depth, structured interviews (usually takes about two hours to complete) with western Serengeti villagers (n=722). The interviewees were either a household-head or their spouse living in Serengeti, Bunda, or Meatu Districts. The interviewee's households were located as close as 0 km from the protected area boundaries to as far as 18 km from the boundary. Non-probability judgement sampling was used to select villages and stratified random sampling was used for household selection (see Bernard 2006 for further explanation of these methods). As well as nutritional data, socio-economic, demographic, perceptions of conservation, and wildlife conflict data were also gathered during each of these structured interviews. The bulk of that data has been analyzed and presented in a recently published dissertation titled *Serengeti People Shall Not Die* (E.J. Knapp 2009). I will draw from those data simply to help explain the context of my nutritional findings. Overall, for both the larger study (by E.J. Knapp) and my nutritional work, fifteen villages and twenty-nine different ethnic groups were surveyed during two field seasons (September 2004- July 2005, June-September 2007). These structured interviews⁷ during both field seasons were conducted in Swahili by a member of our field team—including me, my husband (E.J. Knapp), and three Tanzanian field assistants (J. Masoy, E. Makoye, and E. Washa). The findings from the nutritional data will be discussed in chapter two.

The second method I employed was the collection of archival data from hospitals in Serengeti and Bunda districts, from an HIV/AIDS clinic located in Mugumu (in Serengeti District), as well as biomedical data from the Serengeti District Council's Health Sector (particularly their Reproductive and Child Health Office) also based out of

⁷ See Bernard 2006 for a full explanation of what defines a structured versus semi-structured interview.

the Mugumu hospital, but which serves the whole Serengeti District. The findings from this methodology will be presented in chapter three.

The final methodology I used was also based on interviews with local western Serengeti people, but unlike my nutritional data collection it was much smaller in scope. During my second field season (June-September 2007) I sought to draw from the knowledge and experiences of female respondents (n=36, 8 different ethnicities) from fewer villages (8 in total) who would be willing to answer more in-depth, qualitative questions about their household's health, illness, hygiene, prenatal care, etc.. These interviews were more open-ended in nature than the nutritional surveys and also took at least 2 hours to complete. For this second round of research I used non-probability judgment sampling for village selection and interviewee selection. Also, I occasionally relied on a "snowball method," which means I interviewed villagers or townspeople (and their friends) who I already knew (Bernard 2006). Due to the sensitive nature of these semi-structured interviews, it was easier to use this method and be less concerned with a stratified sample (though I did still try to get an even spatial spread of data points by choosing villages spread around the National Park). Similar to the structured interviews which included my dietary questionnaires, the semi-structured interviews with women were also conducted in Swahili by a member of our field team—including me, my husband (E.J. Knapp), and three Tanzanian field assistants (J. Masoy, E. Makoye, and E. Washa). The findings from these semi-structured interviews with women will be discussed in chapter three.

Official approval for each of these research methodologies was granted by the Tanzania Wildlife Research Institute (TAWIRI), Tanzania's Commission of Science and

Technology (COSTECH), as well as every district office and village chairman for each of the three districts and 15 villages we worked in. The field assistants were introduced at each household by a sub-village chairman and the interviewees gave their verbal consent before interviews were conducted

8.2 Study site

For the structured interviews (n=722) I worked in three geo-political districts—Bunda, Serengeti and Meatu Districts—west of SNP. For the collection of archival data and the conducting of in-depth semi-structured interviews (n=36) I only worked in Bunda and Serengeti Districts.

Meatu District is located on the south-western border of the Maswa Game Reserve in the Shinyanga Region. It covers 8,871 square km of land and has a population of 248,949 with a 3.2% growth rates (as of the 2002 Tanzanian census). There are 71 villages in Meatu District. For Shinyanga region as a whole the rainfall varies between 600 mm (minimum) to 900 mm (minimum) per year with average temperatures at 28 degrees Celsius (Shinyanga Regional Socioeconomic Profile 2007). Furthermore, the amount and distribution of rainfall patterns in this region is highly heterogeneous and unpredictable causing for frequent shortages for domestic uses (Shinyanga Regional Socioeconomic Profile 2007). There are 110 elementary schools and 13 secondary schools.

Bunda and Serengeti Districts are among the five districts of the Mara Region in Northern Tanzania just below the border with Kenya (see *Figure 1.2*). Based on data from the Bunda District Hospital, annual rainfall ranges between 900mm to 1,300 mm. As with the rest of the Serengeti Ecosystem, the villages in this area experience bimodal

rainy seasons from about October to December and again from February through April. Temperatures in Bunda district ranged from 17 °C in June-October and 31 °C between January-March in 2006.

Serengeti District is located in the northwestern “notch” of the GSE just west of the Ikorongo Game Reserve. It encompasses 10,373 square km (although 7,000 km are within the national park leaving only 3,373 as village land) and is made up of 75 villages. The 2002 Tanzania Census recorded 176,609 people in Serengeti District and an annual population increase of 3.3%. Serengeti District has one hospital (located in Mugumu town), 2 health stations, and 28 dispensaries. There are 90 elementary schools in the District and none of these schools offer health services. All of the schools do have toilets (outdoor latrines).

Bunda District is located directly north of the Grumeti Game Reserve and the famous *western corridor* of Serengeti National Park. It covers 3,088 square km although 480 sq. km. are part of Serengeti National Park and 200 sq. km are covered by water (Lake Victoria). The population of Bunda district in the 2002 National Census was 258,930 people with a 1.8% annual growth rate. The district has a total of 93 villages, 158 primary schools, one teacher’s college, 27 secondary schools (24 government-owned and 2 privately-owned.) According to data from the Bunda District Hospital, the illiteracy rate in Bunda District is 7.4%.

9. Conclusion

After outlining my research questions, providing definitions for key terms, highlighting emergent themes to look for throughout this thesis, as well as reviewing my

theoretical framework, conceptual model, dynamics of the GSE, literature review of the forces of change in western Serengeti, literature review of the health of western Serengeti people, and the necessary information regarding my study site and methods, it is now time to delve deeper into the actual data that I gathered and their findings. In each of the three ensuing chapters, I will focus on one particular method beginning with the nutritional assessments of western Serengeti people. Throughout all of these chapters, it is important to remember that each method contributes towards answering my question of: what is the health status of western Serengeti people? Woven within each chapter are the emergent themes of conservation, culture, and poverty and how these three forces are correlated to the well-being of western Serengeti people.

CHAPTER 2
Nutritional Analysis of Western Serengeti People

1. Introduction

The collection and analysis of dietary data are important for understanding the health and vulnerability of certain individuals or populations. Savy et al. (2005:703) write that “The scientific community has long been interested in the overall quality of diets, owing to the fact that it is important for each individuals’ health to meet his/her needs for different nutrients through a healthy, varied and balanced diet.” Essentially, diet has a huge impact on human well-being, health and development by affecting the physical capacities of individuals, the ability to fight off infection, cognitive development, reproduction and social capacities (Savy et al. 2005). Indeed, Shahar et al. (2003) cite that the need to understand the long-term effects of diet on the development of chronic diseases has led to the development of multiple dietary assessment methods which can measure past and present nutritional status.

Similar to Shahar et al. (2003), Kigutha (1997) emphasizes the importance of dietary assessment for understanding the increased rates of various chronic diseases in both developing and developed countries. She cites how the World Health Organization’s committee on diet, nutrition and the prevention of chronic disease has recommended that each country develop its own program for monitoring current nutrition levels and promoting better nutrition. Furthermore, Kigutha also explains that “nutritional problems continue to be the basic cause of many diseases that impede progress toward universal good health” (Kigutha 1997: 1168S). Multiple authors conclude that dietary assessment is one of the best methods for measuring nutritional status. Savy et al. (2005) write that food consumption studies are one of the best means for “documenting the type, severity, location, and causes of malnutrition and deprivation” (2005: 1168S) among human populations in food insecure developing countries.

The nutritional, epidemiological, and anthropological literature is flooded with a plethora of methods for assessing food consumption at various levels (individual, household, or population). Kigutha (1997) argues that this diversity in methods is mainly caused by the vast variation in food-related behaviors, which is an outcome of cultural and socioeconomic variability. Therefore, research must match or be culturally-appropriate to these unique environmental differences.

Before describing the methodologies and results from the nutritional assessment of my study, it is important to mention a few general issues regarding all methods of nutritional assessment—especially those carried out in developing countries and, specifically, Africa. Kigutha (1997) highlights the hardship of dietary research by writing, “One of the most difficult, time-consuming, and expensive components of research on the relations among diet, health, and the nutritional status of individuals or groups is the measurement of food intake” (Kigutha 1997: 1172S). She also stresses that it is essential for all researchers and fieldworkers to have gathered considerable background knowledge on the local beliefs and practices regarding food. Research instruments, questionnaires, interviewing processes, and manner of conduct by the outsiders must all be sensitive to the culturally-unique norms of the population being studied. Several researchers (e.g., Kigutha 1997, Rose and Tschirley 2003) emphasize the complexity of dietary assessment in rural sub-Saharan Africa. For example, most meals are consumed from a common household plate which makes individual consumption difficult to measure. In addition (and as is true for any type of research in certain parts of rural Africa), a lack of roads and language barriers makes access to and

communication with certain communities particularly difficult (Rose and Tschirley 2003).

Although there are numerous ways to measure human dietary quality, three main methods are grouped together by Kant (1996). These are: 1) indices based on intakes of nutrients, 2) indices based on consumption of particular food groups, and 3) indices that combine both of the above (Kant 1996). There is some discrepancy regarding which method is most popular. According to Savy et al. (2005) the Diet Quality Index (DQI) which is “based on the American nutritional recommendations” (Savy et al. 2005: 704) is most popular, while Kigutha (1997) states that weighed-food recording and 24-h recalls are the most widely used methods for assessing individual or household level dietary intake. Perhaps the confusion is that these authors are addressing different questions. Diet *quality* is very different from general dietary quantity. However, a discrepancy need not exist over which method is best as the two methods are often complementary of each other. Furthermore, some methods such as dietary recall or weighed-food are able to assess dietary quality and quantity.

Under each main section below I will describe the two types of nutritional (specifically dietary not anthropometric) assessment that I conducted in western Serengeti. This research draws upon two types of methodologies, a 24-hour dietary recall and a food frequency questionnaire, which were both carried out over the span of several years (September 2004 - October 2007). As I mentioned in the previous chapter, the participants for both methodologies of this nutritional research were selected on two different levels. First, non-probability judgment sampling was used to select villages;

and secondly, stratified random sampling was used for individual household selection (Bernard 2006).

For the protein frequency questionnaire I used the data gathered during interviews with 722 individuals in Serengeti, Bunda, and Meat Districts. While the actual protein frequency questionnaire was carried out between an interviewer (myself or one of my field team) and an adult in the household (usually the head of household or his spouse), the overarching question asks: how often does your household consume each of the following protein sources? Thus, this methodology is conclusive for the household level and not the individual level. For the 24-hour dietary recall methodology, I used the data from 421 interviews in Serengeti and Bunda districts. This method was conducted between me (or an interviewer from my field team) and an adult in the household; however, the questions pertain *only* to the respondent's own dietary intake during the previous twenty-four hours and *not* the intake of any other individuals in the household. This approach can be used then to differentiate dietary quality between individuals of different demographic status.

When using either of these methods for my nutritional assessment of western Serengeti people, I do not attempt to measure if households or individuals consume an adequate amount of kilocalories; rather, I seek to understand which households are more likely (relative to the others) to consume more (or less) protein sources. In so doing I am better able to understand some of the linkages between protein intake and various socioeconomic indicators. The decision to analyze dietary quality—i.e., protein—(instead of kilocalorie quantity) was made purely on the basis of what was feasible in

terms of my time-frame for completing my thesis. Future analyses of my data could allow for an assessment of overall quantity of diets in western Serengeti.

2. Protein Frequency Questionnaire

According to Baer et al. (2005), food frequency questionnaires (FFQs) are useful for evaluating the long-term dietary intake of individuals or populations. They provide a “convenient, consistent, and relevant long-term nutritional assessment tool” (Shahar et al. 2003: 855). FFQs are the most commonly used method among epidemiologists for understanding the long-term dietary intake of an individual, and they are relatively inexpensive to conduct (Sudha et al. 2006). This method utilizes a simple questionnaire that asks respondents to report their usual frequency of consumption of particular foods during an explicit time period. While the results from this method can only provide an estimation of an individual’s nutrient intake, the FFQ is able to rank a population in terms of nutritional and risk levels. The construction of a FFQ depends on what nutrient intakes the researcher seeks to measure. In the case of my western Serengeti study, I was mainly interested in the quality of diet and so I focused entirely on protein intake levels for the FFQ. Before constructing a FFQ, researchers need to gather information on the types of foods consumed in the study area (Sudha et al. 2006). For example, to measure dairy intakes in rural Tanzania there is no point in asking respondents how often they consume ice cream since it does not exist in this cultural and environmental context. Some authors (Sudha et al. 2006) suggest using the 24-h dietary recall method to first gather the needed cultural background information before constructing a FFQ.

The following quote from Baer et al. (2005: 135) seems to best summarize the strengths of the FFQ methodology: “Food frequency questionnaires are generally

considered to be the most appropriate method for assessing diet in the context of epidemiological studies. Besides offering practical advantages over more expensive and time-consuming methods, such as 24-hour dietary recalls and food records, FFQs can provide better assessments of usual intake over longer periods of time, such as weeks or month, rather than a single day.”

2.1. Results from the western Serengeti Food Frequency Questionnaire

Households in the GSE use a variety of food sources to try to meet their protein intake requirements. The most commonly reported source of protein for GSE households (those 10 km or less from a protected area boundary) is *dagaa*, a type of local freshwater minnow. These tiny fish (*Rastrineobola argentea*) are dried and consumed whole in prepared soups. They provide an excellent source of protein even though they are often considered a “poor man’s food” (Abila 2003). One of the top three commodities of the Lake Victoria Fishery, *dagaa* supply is now in greater demand from fishmeal and animal feed processors which in turn increases the costs and decreases the availability for local peoples and their diets (Abila 2003). For my main sample of GSE households the mean intake of *dagaa* was about fifteen times per month (15.42/month—or over 3 times per week). This finding is in keeping with other research done in East Africa that demonstrates that *dagaa* is a commonly-consumed protein source for low or middle income earners around Lake Victoria. After *dagaa*, GSE households consume the following protein sources (listed in descending order): beans (mean = 5.86 times/month), other fish such as tilapia (mean = 3.373 times/month), eggs (mean = 2.46 times/month), beef (mean = 2.14 times/month), chicken (mean = 1.92/month), goat/sheep (mean = 1.01

times/month), and bushmeat (mean = 0.44 times/month). I do recognize that these numbers could be highly skewed since some respondents are afraid to report actual bushmeat consumption. During one of our interviews when questions were being asked about how often the family member(s) kill wildebeest, the respondent answered, “Never.” The sub-village chairman who was escorting our field team to different households throughout the day immediately whispered, “He’s afraid, so he’s lying.” Thus, we are very aware that these data are based entirely on what villagers are willing to report and not necessarily on what occurs in reality. Having said that, some households were very willing to discuss their hunting practices or even show us the dried bushmeat that their families’ consume.

2.2. Distance from Protected Areas and Household Protein Consumption

Despite the weaknesses of the data, these findings above are especially interesting when compared to those from the control village. Wilkie et al. (2006) discuss the difficulty of trying to prove with empirical data whether or not conservation agendas or protected areas actually negatively (or positively) affect local people. They state that just because people around parks are poor does not mean that they were not already in this state before the park was established. The authors suggest that one of the most important ways to clearly determine the effects of a protected area on the local people is to compare control households to non-control households. Wilkie et al. (2006) define “control households” as those that do not have any claims on the park resources.

Before commencing fieldwork I was uncertain as to how to arbitrarily decide when villages (or households) should be considered “inside” or “outside” the GSE. The

most obvious deciding factor would be any village through which the wildebeest migration does or does *not* pass. However, this characteristic can vary somewhat from year to year as well. After using my first field season as a sort of pilot study, I were able to ascertain that at least one of the villages in my sample, Rung’abure, did not have any reports of human-wildlife conflict. There were no cases of large mega-fauna disturbing typical village life by raiding crops, killing goats, or harming human beings. Furthermore, this village—which is located 15 km from the protected area boundary—is too far in terms of being able to easily benefit from illegal resource extraction such as rangeland for grazing, poaching firewood or even water⁸. So at least from a human socio-economic perspective, I could assume that this village is a control village, or unaffected negatively and positively by the protected area. After completing my second and final round of fieldwork, my data consistently showed that all households which were 9 km or less from the protected areas did have various kinds of positive and negative interaction with the GSE. Thus, it was confirmed that Rung’abure could be a perfect “laboratory” control. This finding provides an excellent opportunity to compare the protein intakes of households from the control village (Runga’bure) and the non-control villages, as Wilkie et al. (2006) suggest.

I discovered that there are no significant differences in terms of protein intake between the control village and the other villages except for beef and sheep/goat consumption (see Table 2.1). Households in the control village consume greater amounts of beef but less in terms of sheep or goats. In other words, households within the GSE do

⁸ There was one case of household bush meat consumption reported in our dietary recall survey in Rung’abure. However, it is difficult to determine just how far from the GSE bush meat travels. One key informant explained how “middle men” deliver bush meat to urban centers in Tanzania such as Musumo and Mwanza. These places are obviously outside of the Serengeti Ecosystem; therefore, we do not consider one case of bush meat consumption worthy enough to undermine my classification of Rung’abure as a control village. Rather, this highlights the fact that bush meat still travels outside the system. On the other hand, D. Renstch (pers. communication) raised considerable doubt concerning whether Rung’abure could actually be considered a control village.

not seem to be nutritionally worse-off (in terms of protein intake) relative to the households outside the GSE (or, those that are in our control village). Rather, GSE households adapt to the constraints of being close to a protected area by utilizing smaller stock.

Table 2.1. Comparisons of Household Protein Consumption (no. of servings per month) between Households Inside and Outside the Greater Serengeti Ecosystem

	N	Mean Consumption per month	F	p-value
Beef				
GSE Households	658	2.14	8.876	.003
Control Village Hh	50	3.68		
Sheep/Goat				
GSE Households	657	1.01	10.128	.002
Control Village Hh	51	.29		
Chicken				
GSE Households	653	1.92	.932	.335
Control Village Hh	51	1.56		
Bushmeat				
GSE Households	656	.44	.003	.957
Control Village Hh	51	.43		
Beans				
GSE Households	295	5.86	.139	.710
Control Village Hh	11	5.20		
Eggs				
GSE Households	239	2.46	.379	.539
Control Village Hh	51	2.01		
Fish				
GSE Households	304	3.73	.545	.461
Control Village Hh	13	4.96		

For households adjacent to SNP or one of the Reserves, it is easier to meet the browsing needs of small stock (sheep and goats) than it is to provide enough grazing land for larger stock such as cattle. This assumption is based on several types of evidence. For example, my data show that households which own more land also consume more protein (see Table 2.2). Moreover, within the GSE household sample (n=422 roughly), distance from the park boundary is significantly correlated to increased beef intake and

Table 2.2. Correlations between Household Land holdings and Protein Intake

	Pearson R	p-value
*Beef	.127	.001
*Sheep/Goat	.076	.043
*Chicken	.102	.007
Bushmeat	-.039	.295
Beans	-.049	.392
Eggs	.029	.617
Dagaa	-.060	.308
Milk	.197	.001
Fish	-.001	.981

* Only the findings for these two items are statistically significant. Data is based on Food Frequency Questionnaire (n=722)

decreased sheep/goat intake (see Table 2.3). Likewise, a statistically significant correlation (Pearson R=.13, p=.001) exists between owning more cattle and eating more beef.

Therefore, these data suggest that households which consume more beef generally own more land, own more cattle, and also live further from the park. Or, households that are closer to the park have adapted to the constraints placed upon them (e.g., lack of rights to grazing land and lack of markets) by consuming alternate sources of protein. Although only sheep/goat intake increases by statistically significant amounts for households closer to protected areas, other protein sources (such as bushmeat, beans, and eggs) also help meet the nutritional challenges faced by GSE households.

Table 2.3. Correlations between Distance from Protected Area Boundary and Protein Intake (based on Food Frequency Questionnaire, n=422)

	Pearson R	p-value
*Beef	.127	.010
*Sheep/Goat	-.116	.020
Chicken	.023	.652
Bushmeat	-.038	.449
Beans	-.258	.419
Eggs	-.011	.854
Fish	.022	.923

* Only the findings for these two items are statistically significant

2.3. Household Size & Education Levels and Household Protein Intakes

Using Pearson's Bivariate analyses, I have discovered a correlation between increased household size and increased protein intakes. These data were significant for beef consumption (Pearson's $R = 1.26$, $p\text{-value} = .001$), chicken consumption (Pearson's $R = 1.26$, $p\text{-value} = .001$), egg consumption (Pearson's $R = .152$, $p\text{-value} = .010$), dagaa (Pearson's $R = .141$, $p\text{-value} = .017$), fish consumption (Pearson's $R = .118$, $p\text{-value} = .038$), and most significantly—milk consumption (Pearson's $R = .293$, $p\text{-value} < .001$). These findings are counter-intuitive and interesting because they reveal that having a larger family is linked to better health (as measured by protein-intake) for the overall household. My hypothesis is that larger families also mean a larger labor force. With a larger household labor force, agricultural extensification and intensification is possible

Another finding based on the protein frequency questionnaire concerns education levels. The most notable statistically significant discovery using another Pearson's Bivariate analysis is that household protein consumption (beef, chicken, bean, egg, milk, and fish intake) increases when the male head-of-household has received at least a primary education. Furthermore, I found that statistically significant increases in household protein consumption (for just beef and milk) also occur when male head-of-households (labeled as 'husband' in table below) complete their secondary education and when wives from the household(s) receive secondary education. However, primary education alone for the women had essentially no correlation to household protein intake (see Table 2.4 below) and male primary education evidently has a stronger correlation than male secondary education to increase in protein.

Table 2.4. Correlations between Education Levels and Household Protein Intake

	Husband Received Primary Education only		Husband Received Secondary Education		Wife received primary education only		Wife received secondary education	
	Pearson's <i>R</i>	P-value	Pearson's <i>R</i>	P-value	Pearson's <i>R</i>	P-value	Pearson's <i>R</i>	P-value
Beef	.096	.051	.124	.011	.024	.533	.168	<.001
Goat/sheep	.059	.225	-.006	.907	.059	.133	.027	.484
Chicken	.163	<.001	-.088	.073	.021	.596	-.009	.823
Bushmeant	.070	.065	.021	.675	.027	.490	.009	.815
Beans	.209	<.001	.055	.492	.055	.370	.095	.124
Eggs	.336	<.001	.131	.079	.001	.986	.106	.074
Dagaa	.065	.265	.082	.323	.071	.257	-.023	.713
Milk	.251	<.001	.205	.013	-.011	.863	-.043	.495
Fish	.175	.002	.025	.748	.068	.258	.035	.565

Data are based on Food Frequency Questionnaire methodology (n=722). The figures in bold are statistically significant

2.4. Employment and Income Levels and Household Protein Intake

Perhaps the most important discovery from my protein frequency questionnaire is the importance of income and type of employment upon household health. Elsewhere in the nutritional literature (WHO Expert Committee on Physical Status: the Use and Interpretation of Anthropometry 1995) it has been documented that socioeconomic status and nutrition levels are greatly intertwined. Earlier in my attempts to understand this, I ran several regression analyses but found little evidence to support the claim that any variable (such as income, assets, distance from protected area, ethnicity, or education levels) played a more important role than the others in determining protein intake levels for my general sample of GSE households. However, as I began to compare the protein intakes of this main sample (n=658) to two other groups I had interviewed--park employees (n=50) and self-admitted poachers (n=104)—I could clearly see the correlations between income/type of employment and household health. Households that have at least one household member with full-time park employment have a significantly greater income than those (both poachers and non-poachers) without park employment. In addition, self-admitted poachers (those who label themselves as ‘poachers’) have the

lowest levels of income. Therefore, comparing these disparate groups—all of whom live within the same ecosystem—along with their different livelihood strategies and different income levels, provides insight into the complex interactions between poverty, conservation, and health. The findings are particularly insightful because I have never before seen such data or analyses anywhere else in the Serengeti literature.

Using a one-way analysis of variance (ANOVA), the strongest correlation ($F = 458.483, p < .001$) was found when examining bushmeat consumption. As would be expected, self-admitted poachers consume the highest amounts of bushmeat (15.57 times per month) compared to the general sample of non-poachers (0.43 times per month) and park employees (0.62 times per month). Secondly, dagaa—the minnow that acts as a “last-resort” protein source for most Tanzanians—is consumed significantly more frequently by general GSE households (15.42 times per month) rather than by poachers (12.01 times per month) or park employees (5.41 times per month). It seems poachers do not need to eat dagaa as frequently because they are already consuming such regular amounts of bushmeat. Likewise, park employees do not prefer dagaa nor do they *need* it since other more expensive protein options are readily available to them.

In essence, each group has their “staple” protein source. For poachers it is bushmeat while for regular GSE households it is dagaa. Other than these two items, bushmeat and dagaa, park employees regularly consume greater quantities of all the other protein sources. These findings can be viewed in Table 2.5. A particularly significant finding ($F=135.098, p < .001$) is that park employees consume much more beef (11.88 times per month) than poachers (1.42 times per month) and regular GSE households (2.20 times per month). Beef, along with beans, seems to be the preferred source of

Table 2.5. Comparison (ANOVA) of Protein Intake Levels for three groups of Western Serengeti Inhabitants: Main Sample of GSE Households, Self-Admitted Poachers, and Park Employees.

		N	Mean Monthly Intake	F	P
Beef	Main Sample	633	2.20	135.098	<.001
	Poachers	103	1.42		
	Park employees	50	11.88		
Goat/Sheep	Main Sample	632	0.98	.717	.488
	Poachers	104	1.18		
	Park employees	50	1.17		
Chicken	Main Sample	628	1.95	35.450	<.001
	Poachers	104	1.61		
	Park employees	50	5.46		
Bushmeat	Main Sample	631	0.43	458.483	<.001
	Poachers	103	15.57		
	Park employees	50	0.62		
Eggs	Main Sample	215	2.57	25.817	<.001
	Poachers	104	1.55		
	Park employees	50	8.28		
Dagaa	Main Sample	294	15.42	22.197	<.001
	Poachers	103	12.01		
	Park employees	47	5.41		
Milk	Main Sample	295	6.98	4.340	.014
	Poachers	98	9.41		
	Park employees	39	11.87		
Fish	Main Sample	313	3.71	.278	.757
	Poachers	104	3.58		
	Park employees	50	4.32		
Beans	Main Sample	304	5.82	29.694	<.001
	Poachers	104	5.78		
	Park employees	50	13.35		

protein for park employees within the GSE. Thus, regardless of ethnicity, interactions with wildlife, or even distance from the protected area,⁹ protein consumption varies tremendously according to household income levels and park employment. Overall, we

⁹ Many park employees live inside the protected areas while all other villagers have been forced over the years to live outside these boundaries. So distance from protected area boundary is essentially irrelevant in this particular analysis.

can conclude that without engaging in illegal hunting practices to provide bushmeat or without having as much income as park employees to be able to purchase other protein sources, the main sample of GSE households would be the most vulnerable to protein shortages and malnutrition. In most cases these households cope by purchasing dagaa. Perhaps if their households face critically low levels of protein intake they would have to switch to yet another livelihood or food procurement strategy. This could include engaging in illegal activities such as poaching. Or, perhaps they already do consume higher amounts of bushmeat than they are willing to report. Whereas the self-admitted poachers are not fearful to discuss the illegal nature of their livelihood or diet, many of the main sample of GSE households could be withholding critical information.

3. 24-hour Dietary Recall

The 24-h recall is a simple method in which the interviewer asks the respondent to recall and report all the foods and liquids they consumed in the previous day. To illicit this information from my interviewees, I asked them what they ate for breakfast, lunch, and dinner. To help get at milk consumption, I also often prompted them to recall what they drank during the day. After gathering these data, I entered them into Microsoft excel and then transferred them into the Statistical Package for the Social Sciences (SPSS) for my analyses.

In terms of the legitimacy of this methodology, the 24-h dietary recall method fares well in comparison to more direct methods of dietary assessment. For example, Kigutha (1997) compared the results from weighed-food and 24-h recall methods. She found that the two methods varied hardly at all in terms of intakes of energy, protein, fat, vitamin A, thiamine, riboflavin, and niacin among preschool children. These methods

did, however, result in different levels of energy intake for elderly subjects, though the disparity in nutrient intakes from the different methods was not significant. Overall, the conclusion from Kigutha's Kenya study is that the 24-h recall methodology is both easier and cheaper to conduct, yet still reliable. She writes, "The lack of significant differences in intake of all nutrients assessed by the weighed-food method and the recall technique in the two study groups shows that 24-h recalls can produce reliable data, even in rural areas" (Kigutha 1997: 1171S). Still, Kigutha cautions against just using recall data for assessing elderly diets due to their underestimation of certain food consumption levels.

Like all other methods, the 24-h dietary recall has strengths and weaknesses. Savy et al. (2005) note that one of the benefits of a 24-h recall is that it has a greater chance of being accurate as respondents can remember what they ate the day before (versus a whole week of recollection). However, the negative aspect of a 24-h recall is that it does not "reflect the usual intake of an individual, since the lack of variety on a given day does not mean that there is no day-to-day variation. Nevertheless, such proxy indicators are very useful at the scale of the population to monitor progress on the dietary situation or to target interventions to groups who are in need" (Savy et al. 2005: 712). Kigutha (1997) concurs that one individual's diet may vary considerably from day to day. This is especially true in farming communities where the "availability of food is determined by weather conditions" (1997: 1172S). One way to overcome this problem is to repeat 24-h dietary recalls within the same several days (and with the same households) and during different seasons of the year so as to account for diversity in quantity or quality of diets (Savy et al. 2005, Savy et al. 2007, Rose and Tschirley 2003, Kigutha 1997, Yeudall et al. 2005). Another corrective measure is to use complex

computer modeling to more accurately predict the variability within a 24-h recall (Dodd et al. 2006). Then, a more complete range of food consumption practices can be recorded or predicted. I did not attempt to do this in my work.

3.1. Results from 24-hour Dietary Recall in Western Serengeti

My analyses of the dietary recall data will be broken down into two major segments. The first is to simply present the findings for the overall sample. This means that I will explain which of the foodstuffs (free-listed by the 421 people I interviewed) are most commonly consumed by western Serengeti people. Secondly, I will analyze the rates of protein consumption in correlation to various socio-economic variables including: ethnicity, interviewee's self-perceived wealth bracket, distance from protected area, male and female education levels, crop and livestock damage rates, assets (livestock and land), poaching status (self-acknowledged poacher or not), and actual income earnings. I will especially focus on the linkages between these socioeconomic variables and the consumption rates of the top three reported sources of protein (from the 24-hour dietary recall data) among western Serengeti people which are: milk, dagaa (local minnow), and beef.

3.2. Overview of general findings from 24-hour dietary recall

The results from my 24-hour dietary recall data (n=421) show that the mean number of meals consumed per day by the individuals we interviewed was 2.7 meals per day with the most (n=292) having three meals a day. More than a fourth (26.3%) ate only two meals per day with a small number having eaten none at all (.7%) or only once (.5%) per day. As the other analyses below will explain in more detail, western

Serengeti people have extremely simple diets that are potentially lacking in terms of protein, fats, and micronutrients. The vast majority of my sample is simply eating some type of grain (usually in the form of *ugali*) and greens. *Ugali* is the staple food in Tanzania made from a mixture of flour (corn, millet, sorghum, cassava, or some combination thereof) and boiling water until it forms a thick paste-like mound. Nearly ninety-nine percent of the interviewees consumed *ugali* during their previous day (see Table 2.6). The most common type of *ugali* eaten by our sample was a “mixed” variety (with two or more of the grain types mentioned above combined). Thirty-eight percent reported eating a mixed variety while 26% consumed cassava *ugali*, 21.9% consumed corn, followed by sorghum (12.6%) and millet (1.5%). It is important to mention that across Tanzania as a whole, cassava is considered a drought crop or “starvation food” and generally not preferred by Tanzanians. However, in western Serengeti, the unpredictability of rains makes it very common for households to have a constant supply of cassava in their gardens.

In addition to *ugali*, the majority of our sample (72.4%) ate greens¹⁰. In terms of number of times consuming greens per day, the most common response (53.3% of the sample) was twice per day. Interestingly, none of the other vegetables listed by our interviewees (including pumpkin, okra, cabbage, mushroom, onions, tomatoes, and green peppers) was eaten by more than 2% of the population we sampled. Moreover, only four percent of the sample consumed any type of fruit at all during the previous day.

¹⁰ In Swahili the various words for “greens” that interviewees used included: *mchicha*, *sukuma wiki*, *mlenda*, and *mboga ya majani*. The latter is literally translated as “grass soup” while the others refer to a specific type of green. *Mchicha* is the most like spinach while the others are more coarse (somewhat more like kale). Most of these greens grow in the wild although a few are intentionally planted in people’s gardens. In general, the leaves are finely chopped and cooked with water and salt, or oil, onions, and tomatoes (if available).

After ugali and greens, the next most commonly eaten foodstuff is called *uji*, or porridge, which is usually consumed at breakfast. Forty-two percent of individuals interviewed in the 24-hour dietary recall reported consuming *uji* during the previous day. Similar to *ugali*, *uji* can be made from the flour of various grains or tubers (corn, millet, sorghum, cassava, or some combination thereof) and mixed with water. *Uji* differs from *ugali* in that it is much thinner in consistency and is often mixed with sugar and sometimes lemon juice or milk.

While analyzing the dietary recall data, I was particularly interested in the consumption rates of various protein sources. First of all, only about half (54.2%) of my sample reported consuming any type of protein throughout the entire day and only 38.5% reported consuming some type of non-dairy protein. It is important to know that nearly half of the population eats no protein during an average day. Of those that ate protein, the number of times they ate it ranged from one to five times in the previous day, although the mean consumption was 2.1 times per day. For the entire sample (those that did and did not eat protein combined), the mean consumption rate was 1.1 times per day. An inverse relationship exists between those that consume protein and greens (this will be proven in the section below). Respondents (male and female adults) who do not eat protein tend to consume more greens instead.

Only 31.4% of the sample reported drinking milk during the previous day. On average, the individuals we interviewed drank .53 cups per day. After milk, the next most commonly reported source of protein was dagaa (the dried minnows found in local rivers, streams, lakes and ponds) which 19.7% of the sample consumed. Nearly tenpercent (9.7%) consumed beef, while 8.6% consumed beans, and 5.2% consumed

Table 2.6. Percentage of the sample that consumed each of the free-listed foods from the 24-h dietary recall in western Serengeti (n=421).

Food Types	Percentage of interviewees that consumed each food in previous 24-hours
Protein Sources	54.2*
Peanuts	0.2
Beans	8.6
Beef	9.7
Chicken	1.9
Eggs	0.2
Goat	0.5
Bushmeat	0.7
Dagaa (minnow)	19.7
Fish	5.2
Milk	31.4
Grains/Tubers	
Ugali	98.8
Porridge	42.4
Bread, <i>chapatti</i> , or <i>mandazi</i> **	4.5
Cassava	1.4
Potatoes	13.3
Rice	5.7
Fruits/Vegetables	
Fruit	4
Tomatoes	1.7
Onions	1.4
Mushrooms	1.2
Cabbage	1.4
Green peppers	0.2
Okra	1.7
Pumpkin	0.2
Cooking bananas	0.9
Greens	72.4

* Refers to the consumption of any type of protein during the previous 24 hours.

** Chapattis are a type of flat bread (comes from Indian cuisine but has been adopted by East African Bantu cultures, is somewhat similar to a fried tortilla), and a mandazi is deep-fried dough.

regular (non-minnow) fish. The other protein sources (peanuts, chicken, eggs, bushmeat, and goat) were consumed by tiny fractions of the sample which can be seen in *Table 2.6* above. It is interesting to note that of the three households that reported consuming

bushmeat, they were unabashedly proud of their protein source. One female interviewee even brought out her household's hidden stash of giraffe *kimoro* (Swahili term for the dried or smoked section of bushmeat) to show me. My assumption is that higher percentages of households actually consume bushmeat than is reported here due to people's fear surrounding this highly sensitive information. In his dissertation, Rentsch (Dissertation, In progress) deals more specifically with bushmeat consumption rates in western Serengeti. By visiting each of the same households several times throughout the year, Rentsch hopes to uncover more accurate rates of bushmeat consumption that is often difficult to measure due to seasonality (e.g., since more is consumed when the migration passes through certain sections of the ecosystem that are closer to western Serengeti villages) or simply the highly sensitive nature of the data.

3.3. Variation of protein intake between different socio-economic groups

As already mentioned above, I chose to analyze (using Chi-square tests and linear regression analyses) which groups of people within our sample were more likely to consume any type of protein, certain protein sources (milk, beef, and dagaa), as well as greens (which is the inverse of protein). The reason I chose milk, beef, and dagaa is simply because these were the most commonly reported sources of protein for the whole sample. The variables that I will analyze in relation to protein intake are: ethnicity, economic status (measured by respondents' own perceptions of their wealth as well as their actual income amounts), assets (livestock and land), distance from protected area, crop damage and livestock predation by wildlife, poacher status, and male and female education levels. The results from these analyses are presented in Table 2.7.; the

statistically significant findings for each socio-economic variable will be highlighted below.

First, in terms of ethnicity, I broke the main sample down into five different ethnic groups. The four largest ethnic groups I surveyed were the Kuria, Ikoma, Natta, and Sukuma. The other ethnic groups that we sampled I combined into the “other” category. The only statistically significant finding ($X^2 = 11.404$, $df = 2$, $p = .022$) for the ethnicity variable pertained to beef consumption with the members of the Natta tribe being the most likely (18.3%) to consume beef followed by the Kuria (13.76%). Though not statistically significant, a greater percentage of respondents that belonged to the Kuria tribe consumed all (combined) protein types as well as milk than the interviewees from the other ethnic groups.

In terms of the income variable, I analyzed respondents’ income level through two different means. First, I asked them what economic category they considered themselves (or their household) to belong to: poor, average, or wealthy. The only statistically significant ($X^2 = 6.760$, $df = 2$, $p = .034$,) finding here pertains to milk consumption. As would be expected, a greater percentage of the households that identified themselves as wealthy drank milk (43.4%) in the previous 24 hours, compared to the households who identified themselves as average (36.0% drank milk) or those that considered themselves poor (25.3% drank milk). While a similar pattern emerged from the data for the combined protein consumption as well as beef consumption, these findings were not statistically significant.

Secondly, I looked at the actual income earnings for each household¹¹. I discovered that the average income for the entire sample of my 24-hour dietary recall (n=421) was 486,267 Tanzanian shillings (or roughly \$442 based on the conversion rate that year) per year. Having found the average income, I then compared protein intakes between two different income groups: those above and those below this average amount. Of all the findings in this entire section of analyses, this is probably the most important. I say this simply because the results from the Chi-square tests show the strongest correlations between income earnings and milk consumption as well as income and combined protein intake than any other correlations in all my analyses of the correlations between dietary recall and the socio-economic variables. More specifically, actual income earnings significantly impacted the percentage of respondents that consumed milk ($X^2 = 25.483$, $df = 1$, $p < .001$), greens ($X^2 = 10.538$, $df = 1$, $p = .001$), and all combined protein sources ($X^2 = 24.024$, $df = 1$, $p < .001$). Forty-seven percent of individuals with above-average income drank milk while only 22.7% of individuals with below-average income drank milk. Similarly, 70.3% of higher income earners ate protein of any kind while only 45.3% of below average income earners ate any type of protein. As mentioned already, the consumption of greens has an inverse relationship to protein consumption. Thus, a greater percentage of respondents with less income ate greens (77.7%) than those with more income (62.8%).

In addition, to the influence of income upon individual and household level protein consumption, the amount and type of assets owned by each household also influences

¹¹ During the semi-structured interviews (n=722) I asked each respondents how much money they (or anyone in their household) earned from formal employment, informal economic activities (such as brewing beer, seasonal wage labor, selling charcoal, market activities, etc.), selling their crops, selling livestock, and any other means.

Table 2.7. Comparison of protein and vegetable intake between different groups of western Serengeti people (men and women of all ages combined)

		Percent of people from dietary recall (n=421) that consumed each of the following foods				
		Milk	Beef	Dagaa (Minnows)	Greens	Any protein source
Total Sample		31.4	9.7	19.7	72.4	54.2
Interviewee's Ethnicity						
	Kuria	36.9	13.8	22.9	73.1	59.6
	Ikoma	30	5.3	17.5	71.3	52.6
	Natta	35	18.3	16.7	66.7	51.6
	Sukuma	33.3	8.33	12.5	83.3	45.8
	All others	19.6	7.1	26.8	75	53.6
Interviewee's Self-perceived Economic Status						
	Poor	25.3	8.6	19.6	74.16	51.1
	Average	36	11.2	19.2	70.4	56.4
	Wealthy	43.4	12.5	25	75	62.5
Actual Income						
	Below Average	22.7	8.4	19	77.7	45.3
	Above Average	46.9	11.7	21.4	62.8	70.3
Household (Hh) Assets						
	Owns Cows	51.4	14.21	19.28	71.1	67
	Does Not Own Cows	13.2	5.82	20.17	73.42	42.6
	Above Average Land holdings	46.7	12.6	18.5	74.8	65.2
	Below Average Land Holdings	23.7	8.4	20.4	71.1	48.8
Household Distance from Protected Area Boundary						
	< 3 km	33.3	5.5	18.3	78.9	51.4
	3.0 - 5.9 km	29.2	10.8	17.3	64.9	52.4
	6.0+ km	32.8	12.3	25.4	78.5	59
Wildlife Destruction of Household Assets						
	Crop Damage	31.3	9.2	18.7	74.1	53.4
	No Crop Damage	31.7	11	22	68.3	55.9
	Livestock Predation	40.8	11.5	20.3	71.8	61.8
	No Livestock Predation	21.3	7.9	19.2	72.9	45.8
Household Poaching						
	Self-admitted Poacher	38.9	10.5	21.1	68.4	57.9
	Self-denied Poacher	30.1	8.9	19.9	72.4	53.1
Male (head of hh) Education levels						
	No primary education	27.8	10.8	16.2	81.1	40.5
	Some primary education	35.2	12.1	20.9	71.4	61.1
	No secondary education	33.5	10.4	21.6	73.5	58
	Some secondary education	37.8	20	3.3	68.9	60
Female (Spouse) Education Levels						
	No primary education	N/A	N/A	N/A	N/A	N/A
	Some primary education	N/A	N/A	N/A	N/A	N/A
	No secondary education	30.2	9	18.6	74.1	52.3
	Some secondary education	50	22.7	40.9	40.9	86.4

* Items in bold are statistically significant.

dietary intake. Milk consumption and combined protein consumption were both statistically significantly influenced by ownership of cows as well as amount of land owned. Similar to the earned income analyses, I averaged the land holdings for our entire sample and then divided my sample into two categories of land holdings: 1) those above average (with more than 7.95 acres), and 2) those below average (with less than 7.95 acres). Forty-seven percent of those with above average land holdings drank milk while only 23.7% of below average land holders drank milk. Likewise, 65.2% of above average land holders consumed some type of protein while only 48.8% of below average land holders consumed any type of protein. In terms of livestock holdings, a greater percentage of people with cows drank milk (51.4%), consumed beef (14.21%), or consumed any type of protein (67.0%) than those without cows who drank milk (13.24%), consumed beef (5.8%), or consumed any type of protein (42.6%)

In order to better understand the potential linkages between the conservation areas and villagers' health, I analyzed protein intake along several different indicators: 1) each household's distance from the protected area boundary, 2) wildlife damage to household crops and livestock, and 3) poaching status (respondents' own admittance that they hunt wildlife). No statistically significant differences were found among those who said they did or did not hunt. In terms of distance from protected areas, the only statistically significant finding was that a greater percentage of people who lived in the "middle distance" (3-5.9 km) from the protected area did not eat greens. This means that those populations closer (0-2.9 km) and further (> 6 km) from the park do eat greens more regularly. As E.J. Knapp (2009) discusses in his in-depth study of western Serengeti households, this data implies that the households which are somewhat close, but not

completely adjacent to protected areas benefit the most. In other words, they are close enough to receive benefits (such as employment from the park or from tourism jobs) but far enough away to not bear the brunt of wildlife damage. However, and this is somewhat counter-intuitive, protein consumption rates between households that did and did not experience crop damage in the previous year were not significantly different. On the other hand, the households that experienced livestock loss due to wildlife (e.g., hyenas killing goats) still were more likely to drink milk or eat any type of protein than the households that did not experience livestock loss (see Table 2.7 for actual percentages). This simply demonstrates that crop damage has less of an immediate influence¹² on household dietary intake than the owning of key assets (such as livestock) does. I will examine this fact more closely when we discuss the findings of my regression analyses below.

Another significant finding regarding the quality of diet for western Serengeti people pertains to male and female education levels. During our structured interviews (n=422) with household heads or their spouses we asked each interviewee how many years of school they and their spouse(s) had completed. These data were linked to and compared with the dietary recall data. First, it should be noted that more significant findings were found in terms of female education levels and protein intake than male education levels. Secondly, the findings from these analyses demonstrate that education is a completely nuanced variable and that while it does correlate significantly to protein consumption rates, it is not uniform or significant for each gender in the same way or to the same extent. I will first demonstrate how this is true for male education.

¹² There is still a strong likelihood that there could be delayed repercussions from crop damage on household food security. Crop damage from this year would not have an impact until the following year, when those crops should be harvested.

For these analyses I compared the protein intakes of men who had some primary school to those that did not have any primary school. Likewise, I compared protein intakes of the men who had some secondary schooling to those that had none. (Similar breakdowns and analyses were done for women as well). The only significant findings regarding male education levels related to the completion of some primary school and all protein intake ($X^2 = 5.565$, $df = 1$, $p = .018$) as well as the completion of some secondary school and beef intake. For the households in which the father (or male head-of-household) had no primary education, only 40.54% reported consuming any type of protein while 61.08% of the households with a male head who had completed some primary schooling consumed protein. Moreover, only 10.38% of households with a male head who had no secondary education ate beef while 20.00% of households with a male who did have some secondary education consumed beef.

Female secondary education is significantly correlated to the consumption of all the protein sources that I analyzed. Fifty percent of households with a female (or mother) who had some secondary education consumed milk while only 30.17% of households with a female that did not have any secondary education consumed milk in the previous day. Table 2.7 lists the findings for each of the other food sources. Suffice to say that combined protein intakes (86% versus 52%), daga consumption (40.90% versus 18.59%), and beef consumption (22.72% versus 9.04%) all increased with female secondary education while greens consumption decreased (40.90% versus 74.05%). This does mean that secondary education *alone* is the reason that households consume more of the various protein sources; my data simply show that a strong correlation exists. It could

be that female secondary education is simply a characteristic of more wealthy households.

The fact that statistically significant correlations were found for several of our socio-economic variables and protein consumption rates means that it is difficult to determine which of these variables is more significant than the others. Thus, I ran two different linear regression analyses to be able to rank which of the variables is more important than the others. The variables I chose to include in the regression were those that emerged as the most significant from the Chi-square tests. More specifically, in the first linear regression I examined the links between any protein intake (combined sources) and five variables: total income earned during the previous year, total land holdings, female (wife) secondary education, number of cattle, and distance from protected areas. After running this linear regression, the beta-value of each variable (see Table 2.8) reveals that the most significant predictors of general protein consumption are (in order of importance) total income, followed by number of cattle owned, wife's secondary education, total land holdings, and distance from protected area. In a separate analysis using a Pearson's Bivariate Correlation, I also discovered that total income is significantly correlated (Pearson $R = .265$, $p < .001$) with woman's secondary education. What these data demonstrate then is that of all the socioeconomic indicators, it is income and assets (particularly cattle owned) that has the strongest correlation to quality of diet. Likewise, female secondary education levels (which are linked to income) are also significantly correlated to household diet and therefore, household health. Finally, distance from protected areas is the least significant predictor of combined protein intake.

Table 2.8. Linear Regression: Combined Protein Consumption, $R^2 = .087$

Predictors:	Beta-value	p-value
Total Income	.162	.001
Total Land	.081	.094
Wife Secondary Education	.114	.020
Number of cattle	.117	.018
Distance from Park	.055	.254

The second linear regression analyzed the linkages between milk consumption and four variables: total income, total land, wife secondary education, and number of cattle. The results of this analysis are that number of cattle owned is the most significant predictor of milk consumption. This finding is rather intuitive—that without cows it is difficult to get milk and, conversely, that with cows regular milk consumption is possible. Total land owned was the second strongest predictor of milk consumption followed by total income; however, wife secondary education did not predict milk consumption in this linear regression.

Table 2.9. Linear Regression: Milk Consumption, $R^2=.149$

Predictors	Beta value	p-value
Total Income	.148	.003
Total Land Owned	.176	.000
Wife Secondary Education	.064	.173
Number of Cattle Owned	.222	.000

4. Summary and Conclusions

The protein frequency questionnaire demonstrate that GSE households are adapting to the constraints placed upon them (e.g., loss of access to resources in the protected area and inaccessibility to markets) by eating alternative sources of protein than beef. Households closer to the protected areas consume higher amounts of eggs, beans, bushmeat, and shoat. This implies that these people are not necessarily worse-off

nutritionally, but rather that they make choices to appropriately adapt to the constraints placed upon them. Also, households that consume more beef are further from the protected areas, own more land and also own more livestock. Secondly, male (primary and secondary) education and female (secondary especially) education levels also are significantly correlated to increased household protein consumption rates (based on the protein frequency questionnaire). Lastly, as seen by the comparison of protein consumption between three different groups of interviewees (the general sample, self-admitted poachers, and park employees), employment is strongly correlated to amount (and type) of protein consumed. *Dagaa* is the main source of protein for the average western Serengeti household, while bushmeat is the staple protein source for poachers, while park employees consume greater quantities of all other protein sources, particularly beef and beans. These data are important for knowing how to improve people's nutrition and health. Essentially, with formal employment and increased income, western Serengeti people are better able to afford a wider variety of protein sources (as opposed to just *dagaa*) that are not illegal (such as bushmeat).

The dietary recall data reveal that western Serengeti diets are incredibly simple with only a little more than half of our sample (54.2%) consuming protein during the previous day. In general I could argue that the typical diet of western Serengeti people is made up of only grains and vegetables. Ninety-nine percent consumed ugali and 72.4% consumed greens according to their dietary recall interviews. What my analyses are particularly useful for demonstrating is that income, assets, and female education are the most strongly correlated socio-economic variables with improved dietary quality (i.e., higher protein consumption). That is, higher income, increased land holdings and

livestock holdings are all significantly correlated to higher protein intakes. Furthermore, while male education has some significant correlations to improved diets, female secondary education emerged as the strongest predictor of increased protein consumption. All of the indicators used to measure the impacts of conservation upon household health (e.g., crop damage, livestock predation by wildlife, distances from protected areas, and poaching status) did not correlate positively or negatively with dietary quality. The only significant finding regarding dietary intake and conservation pertained to the spatial distribution of households. That is, households within the “middle distance” (3-5.9 km from the protected area boundary) were less likely to consume greens.

In essence, what these data seem to imply is the importance (once again) of income, assets, and education for western Serengeti households and their nutritional well-being. Particularly important is the secondary education of women for improving household dietary intakes. Kapunda (2000: 232) writes that special focus should be placed in Tanzania on improving women’s education because they are often the key to success for improving household-level food security. With education comes more employment or income-earning opportunities for women. Even in western Serengeti where seemingly few jobs are available, educated women were able to find employment in fields such as nursing, teaching, and running small businesses. Kapunda (2000) also proves that female-headed households in rural Tanzania are more likely to be well-nourished since the income of male-headed households is more likely to be spent on cash-crops rather than for buying or growing food.

Lastly, this research (as in keeping with the nutritional literature) confirms the importance of dietary assessment methods in informing policy. Unless researchers are able to produce evidence of the malnutrition of certain populations, policy-makers will have little impetus to improve these peoples' environmental and economic conditions. My dietary recall data certainly demonstrate the simplicity and even inadequacy of western Serengeti diets since nearly half of the population does not recall eating protein in the previous day. If governmental or non-governmental policy-makers and community development organizations seek to address these dietary concerns, it is important to involve the local communities in any mitigation strategy and to focus on the education of local people (as Dettwyler 1993 and Savy et al. 2005 recommend). These suggestions illustrate the practical implications or outcomes of dietary assessment methods for improving the lives of people around the world and particularly in western Serengeti.

Chapter 3
Using Archival Data to Understand Human Health in Western Serengeti

1. Introduction

During my second field season I focused on gathering archival data from various health facilities within western Serengeti. My goal for this method of my study was to gather data that could be compared to other biomedical records for the rest of rural Tanzania so as to analyze whether western Serengeti populations are faring better or worse than the rest of their country.

The places that most interested me (for collecting the archival data in western Serengeti) were the district hospitals since they serve as a collection point for data from not only their own institutions but also the various satellite health stations and dispensaries from around the area. Two district designated hospitals (DDH)—one from Serengeti District and another from Bunda District—did provide data for my study. These include (but are not limited to) such data as out-patient and in-patient diagnoses, infant mortality, under-five mortality, and maternal mortality. In addition, the Serengeti District Council Health Sector with an office in the Mugumu hospital also released a plethora of their archival data to me. Particularly useful is their data from the Reproductive and Child Health (RCH) office which oversees the health of women and children in the district. Finally, in addition to gathering medical records from these hospitals and the Serengeti District RCH, I also gained access to data from the Community Based Health Promotion Program (CBHPP) in Mugumu. This facility is focused primarily on providing services to clients with HIV/AIDS as well as their families and conducting HIV/AIDS education around the District. Before explaining more about each of these data sets below, I will first present some basic background information on what health services are available in Bunda and Serengeti Districts. This

background information came from reports produced by both the Bunda and Serengeti hospitals.

Serengeti District (with its 75 villages, 3,373 sq. km of village land and 187,869 people¹³) is serviced by one hospital owned by the Tanzania Mennonite Church (located in Mugumu Town), two health stations, and thirty-one dispensaries. At the health stations, patients can receive minor operations as well as sleep overnight. An assistant medical officer (AMO) is present at each health station. A dispensary, however, does not provide overnight sleeping services and is only staffed by a clinical officer and nurses. In order to see an AMO, the dispensary staff refers patients to the health stations. Patients can receive vaccines, family planning counsel, and medications at the health stations. Mobile clinics are smaller than dispensaries and they are set up in certain locations about once a month. As reported in the 2007 District RCH report, eight of the health facilities in Serengeti District are under such disrepair that they are in need of constructing new buildings. Other challenges facing the district health department (and reported by them) include inadequate housing for medical staff at the various village health centers, shortage of skilled personnel, and lack of transportation for the disposal of material waste from the hospital to sites outside the town.

Bunda District (with its 93 villages, 258,930 people, and 2,408 square km of village land) has 43 health facilities. These include two hospitals (one—the DDH—owned by the Lutheran Church and another owned by the Roman Catholic church), three health stations, and 32 dispensaries.

¹³ This estimate of the Serengeti District population comes from the official Tanzanian census of 2002.

2. Archival HIV/AIDS Data from the Community Based Health Promotion Program in Serengeti District

As already mentioned above, during my second field season (June-September 2007) I was able to gather archival HIV/AIDS data from a facility and organization called the Community Based Health Promotion Program (CBHPP) in Mugumu, Serengeti District. The major concern of CBHPP is an HIV/AIDS project in which prevention and control of the disease is taught and administered. More specifically, HIV/AIDS patients and their family members receive counseling and testing services, Antiretroviral (ARV) medicines are distributed, and a home-based care program is overseen. CBHPP is supported by several organizations including a faith-based institution called the Mennonite Central Committee (MCC) as well as AMREF/ANGAZA. CBHPP opened its newly renovated facility in Mugumu on December 13, 2006 and since then their hours of service are Monday-Friday 8:00a.m.-6:00p.m. and Saturday from 8.a.m.-noon.

In 2006, 818 people received counseling services at CBHPP. Of these, 20% tested Seropositive for HIV. The home-based care (HBC) program of CBHPP provided care to a total of 250 people living with HIV/AIDS. Of these, 13 were under the age of twelve. Throughout 2006, the CBHPP full-time staff made 666 home-visits to 523 different households. In addition, the HBC volunteer staff located in villages around Serengeti District conducted monthly visits to each of the 250 patients to assess their progress and learn how to better serve them. Part of the goal of the HBC program is simply to teach families that caring for and supporting their HIV-positive family member is a good and culturally-acceptable thing to do. In rural Tanzania many families are afraid they will be ostracized if neighbors find out that they have an HIV-positive family member. Therefore, they often ignore the disease or even ignore the patient (including

failing to bathe, properly feed, or care for them). Thus, HBC staff made bereavement visits to the 33 households which lost a family member. They also attended funerals and assisted with spiritual counseling. The HBC program held support group meetings on a weekly basis in which there was a time of sharing, prayer, eating, and brain-storming or carrying-out of micro-enterprise activities to generate income. On average, 30-40 people attended the support group meetings each week. The attendees also received medications, soap, nutritional flour, sheets, towels, vaseline, toothbrushes, blankets, etc.

In addition to the counseling and testing services provided by the CBHPP center in Mugumu and the village-level HBC program, CBHPP also oversaw the distribution of ARVs in the Serengeti District Hospital. In 2006, a total of 180 clients had been able to start ARV treatments. In addition to receiving these medications, CBHPP volunteers made daily follow-up visits to each client to ensure that they were following the drug adherence procedures.

The CBHPP program also supports 180 registered orphan children around the district. The orphans are placed within households in Serengeti District and they are provided with free health and support services as well as food, mosquito nets, towels, and other basic needs. The CBHPP project also does HIV/AIDS education in the communities and schools of Serengeti District. Their methods include the use of drama and video. A total of 2,098 students were exposed to these teaching sessions in the primary school (grades 5-7) and 5,637 people attended all of the various educational sessions around the district. Lastly, in collaboration with the Heifer Project International, CBHPP oversees a milk goat project in which community members are assisted in being able to purchase goats.

2.1. Background on HIV/AIDS

Acquired immunodeficiency syndrome (AIDS) and the virus that causes it, Human immunodeficiency virus (HIV), together form one of the biggest challenges that Tanzania faces today. All sectors of the Tanzanian society are now being impacted by HIV/AIDS (TDHS 2005). One study¹⁴, the Tanzania HIV/AIDS Indicator Survey 2003-04, estimates that 7% of Tanzanian adults (ages 15-49) are infected with HIV. In Tanzania, Most transmission is through heterosexual contact and awareness of HIV/AIDS is high throughout the country with 99% of all respondents saying that they had heard of the disease (Tanzania Demographic Health Survey—TDHS 2005). While basic awareness of HIV/AIDS seems to be nearly universal, this same study also shows, however, that there is considerable variation in terms of knowledge of HIV/AIDS prevention. Men and women with more education (especially having completed primary school) and in the higher wealth quintiles had more knowledge about HIV/AIDS prevention. Also, young adults in the 15-24 category reported having less knowledge about HIV/AIDS prevention than those older than them. So while basic awareness of the disease is widespread, the knowledge of how to prevent it is not.

In addition to a lack of knowledge about how to prevent the disease, very few Tanzanians across the country as a whole have ever been tested to see if they have the disease. The TDHS (2005) states that only 14% of their respondents had been tested for HIV. In the Mara Region, where my study site is located, the TDHS found that only 9.8% of respondents had ever been tested. Furthermore, very few individuals have ever

¹⁴ The recommended citation for this source (as see in my 'References Section') is: Tanzania Commission for AIDS, National Bureau of Statistics, and ORC Macro (2005).

been counseled regarding the disease. Only 22% of rural women across Tanzania received HIV counseling during their antenatal care.

A lack of knowledge about HIV/AIDS prevention and a lack of counseling regarding HIV is particularly alarming in light of the fact that much of Tanzania is engaged in higher-risk behavior which can easily spread the disease. Higher-risk sexual activity is defined as sex with a non-marital, non-cohabitating partner (TDHS 2005). The TDHS found that 10.6% of men they interviewed between ages 15-49 reported paying someone else for sexual intercourse in the past 12 months. Of these, 59% reported using condoms. On average, men in Tanzania have 5.7 sexual partners in their life. This average varies by education with more educated men having less partners. Forty-four percent of rural Tanzanian men (ages 15-49) interviewed by the DHS also reported being involved in higher-risk sex in the past year, while 19.5% of rural Tanzanian women (ages 15-49) also admitted to this behavior. Thirty-three percent of rural men reported having two or more partners in the last year while only 4% of women reported having two or more partners.

In terms of attitudes about women's rights for negotiating safer sex, the Mara Region was surprisingly more "accommodating" in their opinions than the rest of rural Tanzania. More specifically, when asked whether women are justified in refusing sex or proposing to use a condom with their husband if he is infected with a sexually transmitted infection (STI), a greater proportion of the male and female respondents from the Mara Region answered in favor of the women's rights. 92.7% of rural women thought that a woman was justified to use either of these reasons if her husband had a STI while in the Mara Region a slightly larger proportion of women (93.4%) thought these actions were

justified. Likewise, 96.4% of rural men were supportive of women standing up to their husbands while 98% of the men in Mara Region were also in favor of the women's rights.

2.2 HIV/AIDS in Western Serengeti

The CBHPP data show that the rates of HIV/AIDS in Serengeti District for men and women combined is higher than the national average (of 7%) reported by the Tanzania HIV Indicator Survey 2003-04. In 2003 the CBHPP clinic results for blood tests on non-symptomatic individuals (men and women combined) showed 10.8% of men and women testing positive for HIV while in 2004 the overall percentage had dropped to 8.0%. Similarly, the data I gathered from the Bunda District Hospital show that 9.7% of blood donors (both male and female) in 2006 were HIV-positive. It is surprising that the rates of HIV infection are higher in Serengeti District than the national average. One would think that due to the remote location of the district people would be less prone to contract the disease. However, Mugumu town—the district seat—is a somewhat bustling center of commerce and trade with many employees from SNP or the surrounding game reserves coming to get supplies. Furthermore, many of the families interviewed during my fieldwork reported one or more family member migrating to find full-time employment in other regions (such as urban centers like Mwanza or Arusha). With this kind of influx of outsiders as well as the coming-and-going of family members to find employment, the higher rates of HIV make more sense.¹⁵

¹⁵ Anecdotal evidence from a Kuria informant suggests that the rates of prostitution among Ikoma women are particularly high in Serengeti District because parents do not earn as much from bride-wealth and therefore are more likely to encourage their daughters to enter the sex market. This finding has not been corroborated, however, by any other data.

Based on the archival data I collected from CBHPP, *Table 3.1* demonstrates that the infection rates for women in Serengeti District are consistently higher than those for men, with the greatest discrepancy being during 2003 with 15.0% of women and only 6.3% of men testing positive. My key informant from the CBHPP center, a Canadian nurse with her master's degree in Public Health, attributed these patterns of disease distribution to several factors: the biology of female anatomy (internal sexual organs), poor economic and social status of women, cultural factors (polygamy, widow cleansing, age of women at marriage is much younger than men), and education patterns (women are less educated and therefore less aware about STIs and condoms).

Table 3.1. Results of HIV Blood Screening Among Non-Symptomatic Blood Donors at the CBHPP Facility, Mugumu, Tanzania

	2001 (n=195)		2002 (n=572)		2003 (n=1419)		2004 (n=3347)	
	Percent HIV+	Total Number HIV+	Percent HIV+	Total Number HIV+	Percent HIV+	Total Number HIV+	Percent HIV+	Total Number HIV+
Combined	7.2%	14	5.8%	33	10.8%	154	8.0%	271
Female	7.4%	7	6.8%	18	15.0%	111	10.8	174
Male	7.0%	7	4.9%	15	6.3%	43	5.5%	97

In addition to the uneven distribution of HIV between genders, rates of infection are highest among people ages 15-40. People within these age categories are the most likely to become infected because they are the most sexually active and they have income, money, or jobs that allow them to travel from one place to another. In addition, some of the youngest in this group are less likely to seek early treatment for STIs or less likely to use condoms. Finally, young girls are more prone to contract HIV because their vaginal mucous membrane is immature and more likely to lead to laceration during sexual intercourse. *Figure 3.1* is based on data from the CBHPP blood screenings from

2004. People in the 30-34 age bracket had the highest percentage of HIV infection at 27.3%. Similarly, *Figure 3.2* shows that of the adults who tested positive to HIV at the CBHPP Clinic in 2004, 35% were in a polygamous marriage, 24% were in a monogamous marriage, 17% were widowed, 16% were unmarried, 6% were divorced and 2% were separated.

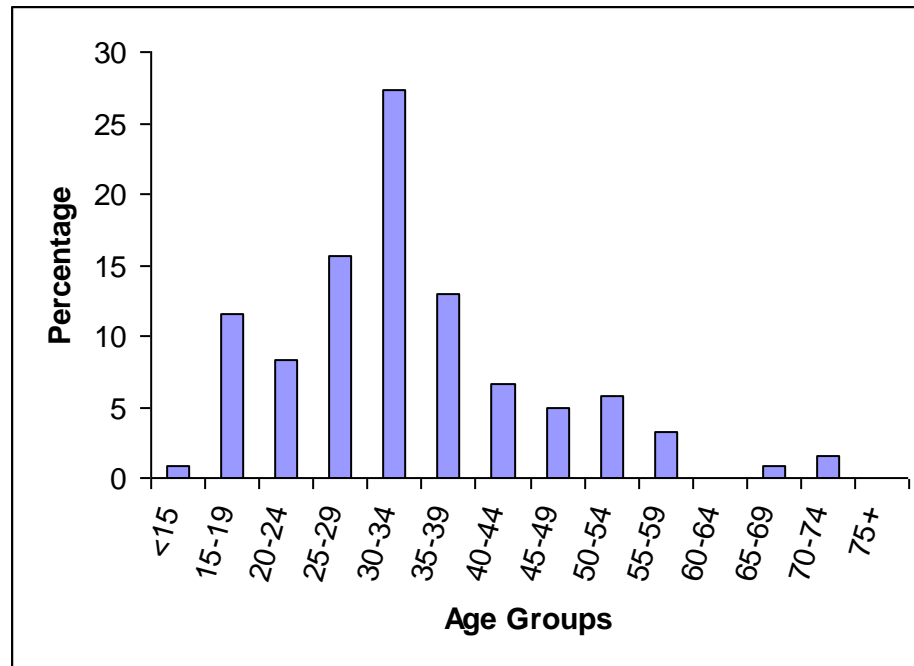


Figure 3.1. Rates of HIV Infection Among Different Age Groups in Serengeti District, Tanzania in 2004. (Data gathered by L.M. Knapp).

The high rates of HIV among married women—those who we might consider as not as likely to engage in higher-risk sex—are somewhat surprising. Yet these findings are in keeping with what the TDHS (2005) found in terms of condom use and other higher-risk behavior. Namely, that only 17% of married (or cohabitating) women in monogamous relationships report using condoms while 38% of non-married women do. I will discuss this in greater detail in the next chapter; however, it is important to mention here that my qualitative, in-depth interviews with women from western Serengeti

corroborate the DHS findings that any method of birth control is rarely used by married women in western Serengeti. Several of my married interviewees reported that their husbands disliked condoms and did not wear them; only two (out of 36) interviewees reported using condoms.

Overall, these data suggest that HIV/AIDS rates are higher in western Serengeti than across the rest of rural Tanzania and that married women are the most vulnerable to contracting the disease.

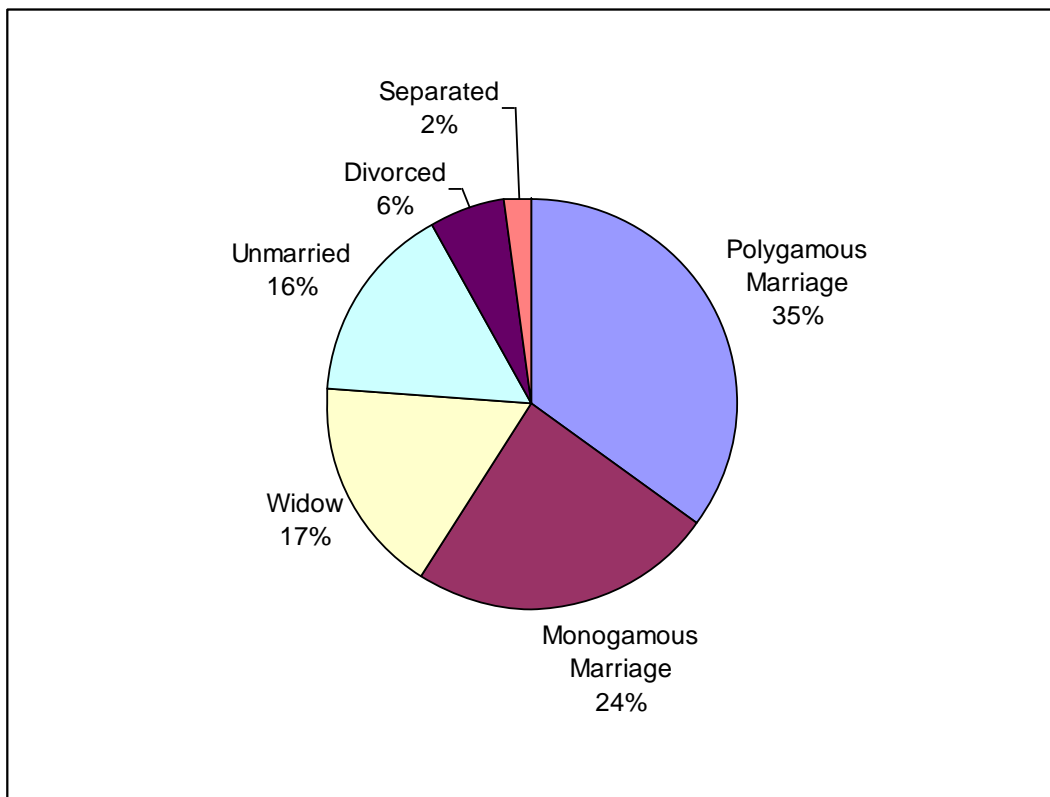


Figure 3.2. Marital Status of HIV/AIDS Patients from the CBHPP Clinic in Mugumu, Tanzania. (Data gathered by L.M. Knapp).

3. Morbidity/Mortality Data

In western Serengeti, infectious disease still dominates the lives of villagers. This indicates the low economic level of the area and is consistent with what the

anthropological, ecological, and health literature describe as the struggle of many undeveloped countries (Inhorn and Brown 1997). I have chosen to focus more in-depth on one infectious disease in particular—that is, malaria. The data I am presenting and analyzing in this portion of the chapter comes from both the archival data (from the Serengeti District Council Health Sector and the Bunda District Hospital) and the semi-structured interviews I conducted with women.

3.1. Malaria and Infectious Diseases

Based on the data I gathered from the Serengeti District Council’s Health Sector, the top ten diseases (based on diagnoses) of all patients who visited the district hospital in Mugumu or any of the District Health Sector’s subsidiary health stations in 2004-2006 were (in descending order): malaria, acute respiratory illness, intestinal worms, urinary track infections, pneumonia, diarrhea, skin infections, eye infections, anemia, and shistosomiasis (see *Figure 3.3*). Malaria alone comprised 59% of all cases seen in the Serengeti District hospital or the various district health centers during 2005. In that same year, within the 32,727 cases of malaria throughout the District, there were 155 fatalities from the disease (see *Figure 3.4*). *Figure 3.9* also demonstrates that malaria is the second most common cause for under-five mortality rates in Serengeti District. Furthermore, the leading cause of under-five mortality—*anemia*—is often caused by repeated exposure to malaria¹⁶ (Holtz and Kachur 2004). Lastly, since all of these data and figures only represent the “lucky” few patients who were able to reach a clinic or the hospital, we can assume that many more patients suffered from malaria and even died without being recognized by biomedical staff.

¹⁶ Repeated exposure to malaria can also lead to malnutrition, retarded cognitive development, and increased vulnerability to other disease in addition to chronic anemia (Holtz and Kachur 2004).

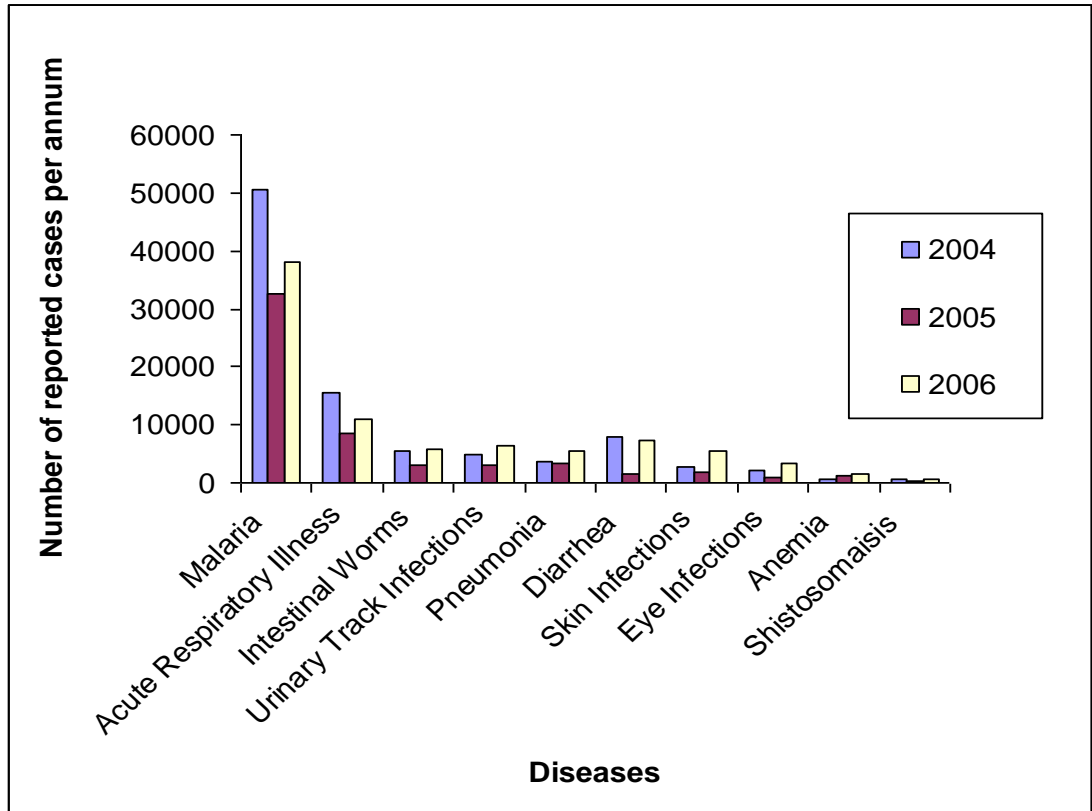


Figure 3.3. Top Ten Reported Diseases for all patients of Serengeti District Health Stations (including the Mugumu Hospital) in 2004-2006; based on data from the Serengeti District Council’s Health Sector. (Data gathered by L.M. Knapp)

Archival data gathered from the Bunda District Designated Hospital corroborate the data from the RCH Department in Serengeti District. Based on hospital out-patient diagnoses in 2006, infectious diseases also dominate morbidity rates in Bunda District. Malaria comprised forty-percent of all cases of diagnosed diseases in patients age five and older in this hospital. The next most common causes of morbidity in those ages five and older were: acute respiratory illness (14%), pneumonia (9%), diarrheal disease (8%), urinary track infections (7%), intestinal worms (6%), pregnancy complications (5%), skin infections (4%), schistosomiasis (4%), and eye infections (3%). These data are presented in Figure 3.4. Under-five morbidity patterns for out-patients in the Bunda Hospital were

quite similar with malaria (40%) and acute respiratory illness (15%) being the leading causes. However the next most common disease was diarrheal disease instead of pneumonia. The rest of the difference can be seen in *Figure 3.4* below. It is also worth noting that there were more outpatient cases (n=123,351) of children under age five than the entire amount of outpatients above age five (n=74,990). This explicitly shows that it is young children who are most at risk for infectious disease.

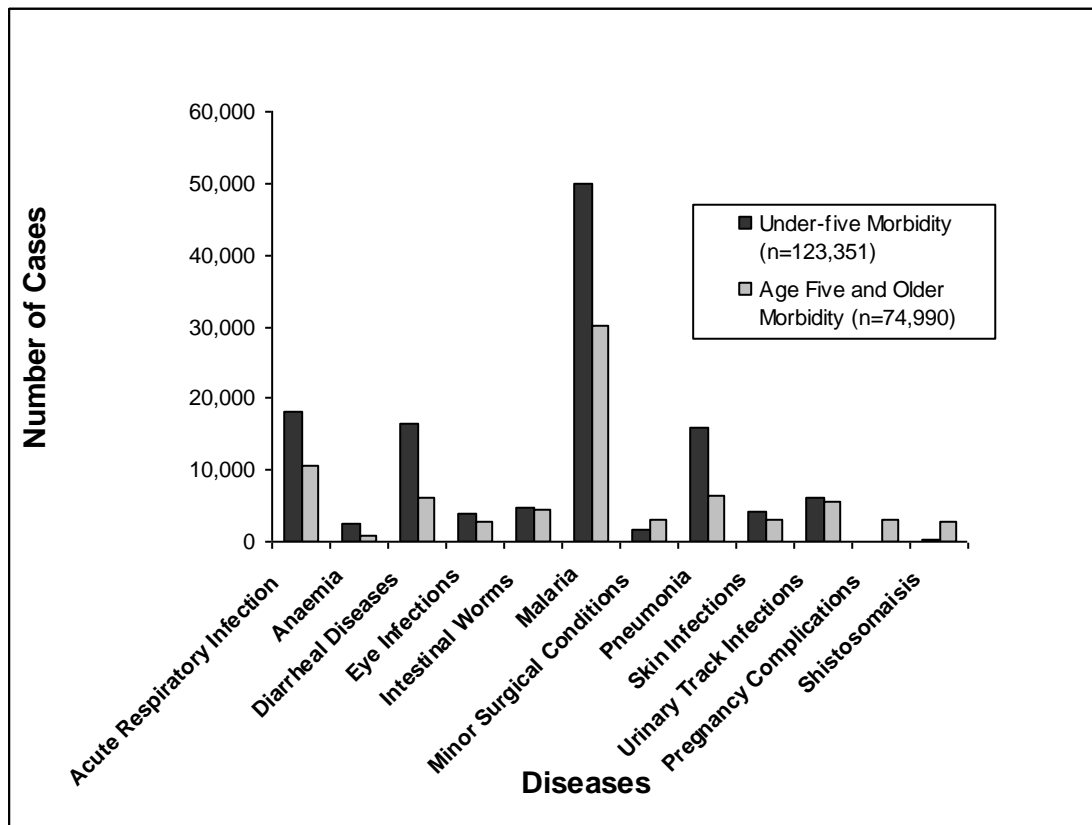


Figure 3.4. Leading Causes of Morbidity in Out-Patient Diagnoses in Bunda Hospital, Tanzania, 2006. (Data gathered by L.M. Knapp).

While morbidity rates of malaria are extremely high, the disease is not as fatal as other infectious diseases can be in western Serengeti. Once again drawing on the archival data I gathered from the Bunda designated district hospital, only 1.5% of under-five patients diagnosed with malaria died because of the disease. Similarly, only 2% of

patients age five and older who had malaria died from the disease. On the other hand, 6% of all children under five who came to the hospital with pneumonia died and 26% of all people age five and older who were diagnosed at the hospital with clinical AIDS died. Despite this, malaria still ranked high in the list of leading causes of mortality among Bunda hospital patients (see Tables 3.2 and 3.3 for full descriptions).

Table 3.2. Leading Causes of Under-five Mortality Among Bunda Hospital Patients, 2006. (Data gathered by L.M. Knapp).

Diagnoses	Number of Admissions	Number of Deaths	Percentage of Deaths
Acute Respiratory Illness	219	13	6
Pneumonia	1295	52	4
Anemia	1480	46	3
Urinary Track Infections	333	6	6.8
Diarrheal Disease	979	17	1.7
Malaria	9463	142	1.5

Table 3.3. Leading Causes of Mortality Among Bunda Hospital Patients Age Five and Older, 2006. (Data gathered by L.M. Knapp).

Diagnoses	Number of Admissions	Number of Deaths	Percentage of Deaths
Pneumonia	1026	30	3
Anemia	368	23	6
Malaria	4473	72	2
Clinical AIDS	193	51	26
Tuberculosis	101	14	14
Complication of Pregnancy	277	12	4

The picture that is presented from these data from both Serengeti and Bunda Districts is that infectious disease—particularly malaria—are plaguing western Serengeti households. Many of the women I interviewed during the qualitative, semi-structured interviews told story after story of cases in which they or their family members had been

sick with malaria. Many of them had children die due to malaria. This is in keeping with the rest of Tanzania. In fact, according to the TDHS (2005: 163), malaria “is a leading cause of morbidity and mortality in Tanzania in both outpatient attendance and inpatient admissions, accounting for around 40 percent of overall outpatient attendances.”

It is well accepted in the anthropological and biomedical literature that developed countries undergo a major shift in the causes of morbidity and mortality during the process of industrialization (Holtz and Kachur 2004). For example, people in developed countries suffer primarily from chronic diseases that are a result of their wealthy lifestyle. These diseases include diabetes, cancer, and cardiovascular disease—all of which increase due to sedentary lifestyles, high alcohol consumption, tobacco use, unhealthy diets, and the ability to afford foods higher in fat content (Yach et al. 2004). In contrast, people in developing nations are traditionally more prone to suffer from infectious diseases¹⁷, though this trend is starting to shift somewhat today (Reid and Thrift 2005). This phenomenon in which nations face decreasing amounts of infectious disease as they develop is known as the *epidemiological transition* (Holtz and Kachur 2004). Infectious disease has played a key role as an agent of natural selection¹⁸ of the human species and as well as a determinant of cultural transformations (Inhorn and Brown 1997).

Human malaria is a disease caused by one of four species of protozoan parasites carried by their hosts, the *Anopheles* mosquitoes. Symptoms include spiking fevers, chills, shakes, body and muscles aches, headache, diarrhea, vomiting, and a cough. The

¹⁷ Inhorn and Brown (1997: 32) define infectious disease as “those caused by biological agents ranging from microscopic, intracellular viruses to large, structurally complex helminthic parasites.”

¹⁸ Certain genotypes can cause resistance to some infections. For example, it has been confirmed that a higher prevalence of the heterozygous condition known as sickle-cell anemia in a population also correlates with lower percentages of deaths from malaria. Researchers have confirmed then that the heterozygous genetic state somehow provides some resistance to this infectious disease (Inhorn and Brown 1997).

Plasmodium falciparum parasite is the most common source of malaria and also the most dangerous. It can lead to cerebral malaria, coma, and death. The most severe cases of malaria occur in individuals who already have a compromised immune system or who have not yet developed immunity to the disease through exposure. Those most vulnerable include children under age five and pregnant women (Holtz and Kachur 2004, TDHS 2005). Malaria is not only a problem in Tanzania but around the world and particularly across sub-Saharan Africa. Every 30 seconds, one child dies from malaria in sub-Saharan Africa (Holtz and Kachur 2004). Other scholars report that of all the known diseases in the world, malaria has killed more people than any other disease (Inhorn and Brown 1997).

Malaria (and most of top diseases listed above) can be relatively easy to control with adequate housing, clean water, sufficient clothing, and decent nutrition (Inhorn and Brown 1997). As Reid and Thrift (2005) explain, the rampant spread of infectious disease in developing countries is due primarily to poverty, poor infrastructure, and limited access to care. Even in the U.S. malaria was a serious problem until aggressive measures were taken beginning in the 1930s and continuing through the next few decades. Ultimately, without increased social developments to improve housing, provide access to medical care and reduce the population of anopheline mosquitoes through large-scale civil engineering projects (such as draining swamps), malaria would still be rampant in the U.S. today. What some scholars are trying to emphasize is that malaria is a problem not just because of lots of mosquitoes (i.e., environment) or because of cultural norms (i.e., human behavior), but that large-scale forces multiply the amounts and the effects of this disease. This idea is best summarized in the following quote:

Just as parasites have evolved drug-resistant genes and mosquitoes have developed resistance to insecticides, larger trends in the global system have allowed this illness to go unchecked. Large water projects, the overuse of pesticides encouraged by export promotion policies, and the commodification of health interventions have all contributed to the re-globalization of malaria. Ultimately, the failure of neo-liberalism to lift millions out of poverty forms the underlying cause of our inability to deal with this disease in the poor countries of the world (Holtz and Kachur 2004: 142-143).

Essentially, Holtz and Kachur (2004) state that the drugs used to treat malaria need to no longer be controlled or tested by profit-seeking corporations. Global markets allow for only those who are financially secure to be able to afford malaria treatments. The poor, or those who suffer most from malaria, end up purchasing ineffective medicines (if any) which only lead to increased drug resistances (Holtz and Kachur 2004). Yet this is just one aspect of how exogenous, macro-level forces shape local disease patterns. In my next chapter I will discuss further the importance of maintaining a political-economy of health perspective.

Having explained this background information about malaria, I will now present more findings regarding the ways that western Serengeti households try to prevent malaria. The data analyzed come from my qualitative interviews and so they could be presented in chapter three with the other findings from the qualitative interviews. However, I have decided to include them here because they coincide nicely with the archival data about malaria rates in Serengeti District.

In terms of malaria prevention, I asked my sample of women from Bunda and Serengeti Districts how many mosquito nets their household owns. The most common response was that the respondent's household owns two nets. In *Figure 3.5* the entire list of responses and the frequency (or percentage) of each response is displayed. The second

most common response was that each respondent's household owns no nets. Thus, the average number of nets per household in Western Serengeti is 2.2 (see *Table 3.4* below). On average, the households I sampled include 9.3 people. This means that on average there are only .25 nets per person. Or, in other words, four people must share every net. While some of my respondents did mention that several children often sleep in one bed together anyway, other respondents reported that even after doing this, several other people in each household usually go without any protection at night from the parasite-carrying mosquitoes. Each family distributes their precious net(s) differently, though most agree that the small children are given the nets first.

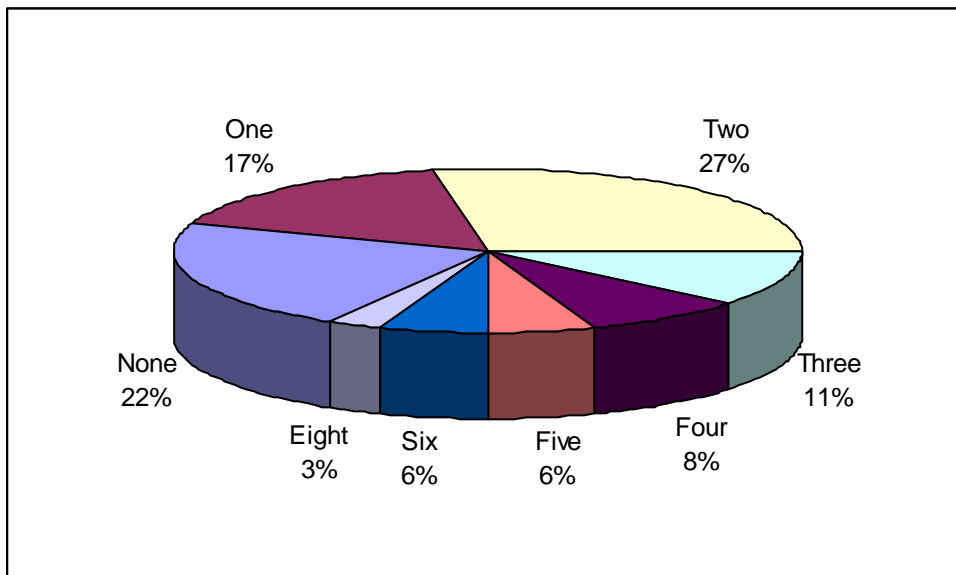


Figure 3.5. Number of Nets Owned by western Serengeti Households (percentages represent the number of interviewees that admitted to having each number of nets). Data from L.M. Knapp Qualitative Interviews.

Interestingly, when I compare my data about mosquito-net ownership to that from the TDHS (2005) data, I find that a greater percentage of western Serengeti households own mosquito nets than the percentage of households sampled in the rest of the Mara

Region, rural Tanzania as a whole, and even urban Tanzania. For example, nearly 78% of western Serengeti households (which I sampled) own at least one net while only 36% of rural Tanzanians own at least one net. These results are quite alarming especially because after spending countless hours in these western Serengeti villages I am struck by the extreme levels of poverty present there. Can it truly be that the western Serengeti households are able to afford more nets than the rest of their rural compatriots? I think part of the reason for the skewed data is due to what I already mentioned in chapter one about the type of sampling method I used. Because of the sensitive nature of these interviews, I often selected women who I already knew and who were willing to talk to me about such personal matters. Therefore, many of them had jobs in a nearby town (Mugumu or Bunda), had a higher income than just the average villager, and were able to afford mosquito nets. However, I think the other main reason for the difference in prevalence of nets could be due to household size. Western Serengeti has high rates of polygamy and thus it also has larger households. Whereas urban households (or in the rest of rural Tanzania households) less nets could simply reflect a smaller number of people who need to sleep under them. This could certainly explain why 61.2% of western Serengeti households have *more* than one net and why only 20.2% of rural Tanzanian households at large have nets. However, household size does not help to explain why a greater percentage of western Serengeti households (compared to the national average) have at least one net. If the women I sampled are an accurate representation of the population in western Serengeti, then it is encouraging to note that the population in western Serengeti is at least faring better than some of their fellow Tanzanian women. Yet as I mentioned above, even this “encouraging” news stills entails

the reality that every net must be shared by four people. Furthermore, after going inside the homes of many of my interviewees and seeing some of their mosquito nets, I realize that the quality of these nets is very poor. Many were riddled with holes and could not have provided much protection from mosquitoes.

Table 3.4. Comparison of Mosquito Net Ownership between Western Serengeti Households (Hh) and the Rest of Tanzania (from TDHS 2005 data).

	Average number of nets per person	Percentage of households with at least one net	Percentage of households with more than one net	Average number of nets per household
Western Serengeti* Hh	0.25	77.9	61.2	2.2
Mara Region Hh	N/A	60.1	36.5	1.2
Rural Tanzania Hh	N/A	36.4	20.2	0.7
Urban Tanzania Hh	N/A	74.1	45.1	1.6

* “Western Serengeti Households” refer to those sampled by L.M. Knapp

Western Serengeti people have come under considerable criticism from some of the District Health Sector workers who I interviewed. One woman in particular, Serengeti District’s Reproductive and Child Health Coordinator, accused people in her district for understanding the underlying cause of malaria but not being willing to do anything about it. As I explained in chapter one, she blamed their culture, not their lack of income as being the reason for not buying mosquito nets. However, a new mosquito net in Tanzania costs at least ten dollars and sometimes fifteen dollars. While this amount may seem low to us in the West, the average annual income of households (n=422) in our sample was \$440 (or \$1.22/day). So the ability to purchase a mosquito net requires spending nearly half of an entire month’s income. Thus, I argue that the lack of adequate numbers of mosquito nets in western Serengeti households is more a result of

a lack of monetary capital rather than a cultural problem (such as stubbornness or placing too much value on dispensable assets such as cattle).

3.2. Maternal Health

Using archival data I collected from the Serengeti District Council's Health Sector Report (2007), maternal mortality ratios (MMR) have greatly fluctuated between 115 maternal deaths/100,000 live births and 174 maternal deaths/100,000 live births during the years 2001-2006. Unfortunately, the trajectory seems to be that more deaths are occurring in recent years (see *Table 3.5*). Similarly, data from the Bunda Hospital show that maternal mortality rates have not improved either as the rate in 2006 is still the same as it was in 2001 (132 deaths/100,000 live births). *Figure 3.6* compares the findings from the two districts. Surprisingly, these maternal mortality ratios are much below the estimates for all of Tanzania (based on the TDHS 2005). For the years 1995-2004, the maternal mortality ratio in Tanzania is estimated as 578 maternal deaths/100,000 live births. Some of the discrepancy could be due to the fact that the DHS data are based on a much different methodology¹⁹ of estimation than are the data from the Serengeti and Bunda District hospitals. The western Serengeti Hospitals simply determine the MMR by dividing the number of maternal deaths during delivery at their health facilities by the total number of live births at their facilities. On the other hand, the DHS method involves first estimating maternal mortality *rates* (notice—not *ratios*) by totaling any deaths of women that occurred during pregnancy, childbirth, or within two months after the birth or termination of pregnancy. This measurement (about 1.1 maternal deaths per 1,000 woman-years of exposure) is already more inclusive of other

¹⁹See pages 260-261 of the DHS (2005) survey for a complete explanation of their methodology for estimating maternal mortality ratios for Tanzania.

deaths besides just those that occurred in actual childbirth. Secondly, the DHS then converts the maternal mortality rate to a maternal mortality ratio by dividing the mortality rate by the general fertility rate for Tanzania (of 0.198). This method is much more complex than that used by the western Serengeti hospitals. Furthermore, the DHS (2005:261) explains that,

Maternal mortality is a difficult indicator to measure because of the large sample sizes required to calculate an accurate estimate. (This is evidenced by the fact that the maternal mortality ratio is expressed per 100,000 live births, demonstrating that it is a relatively rare event.) The maternal mortality estimates are subject to large sampling errors.

Table 3.5. Maternal Mortality Data from Serengeti District Council Health Sector Archival Data. (gathered by L.M. Knapp).

Year	No. of women that gave birth	No. of Live Births*	No. of Maternal Deaths	Maternal Mortality Ratio
2001	8069	8094	12	148/100,000 live births
2002	8524	8553	14	164/100,000 live births
2003	8638	8674	10	115/100,000 live births
2004	8712	8697	10	115/100,000 live births
2005	9004	9174	16	174/100,000 live births
2006	9731	9731	15	154/100,000 live births

* The number of live births is higher than the number of women that gave birth because there were multiple cases (16 in total) of twins being born.

The differences in sampling methodologies for determining the MMR in western Serengeti and the rest of Tanzania make comparisons between the two regions quite difficult. On the one hand, I could argue that western Serengeti women suffer less from pregnancy-related deaths; however, it could also be said that these biomedical data are simply unreliable. Ultimately, I can not determine whether the DHS methodology or the western Serengeti hospitals' methods of estimating MMR are more accurate; not can I compare the findings from each method to one another. This proves what many Critical

Medical Anthropologists would argue is the problem with relying entirely on biomedical data alone.

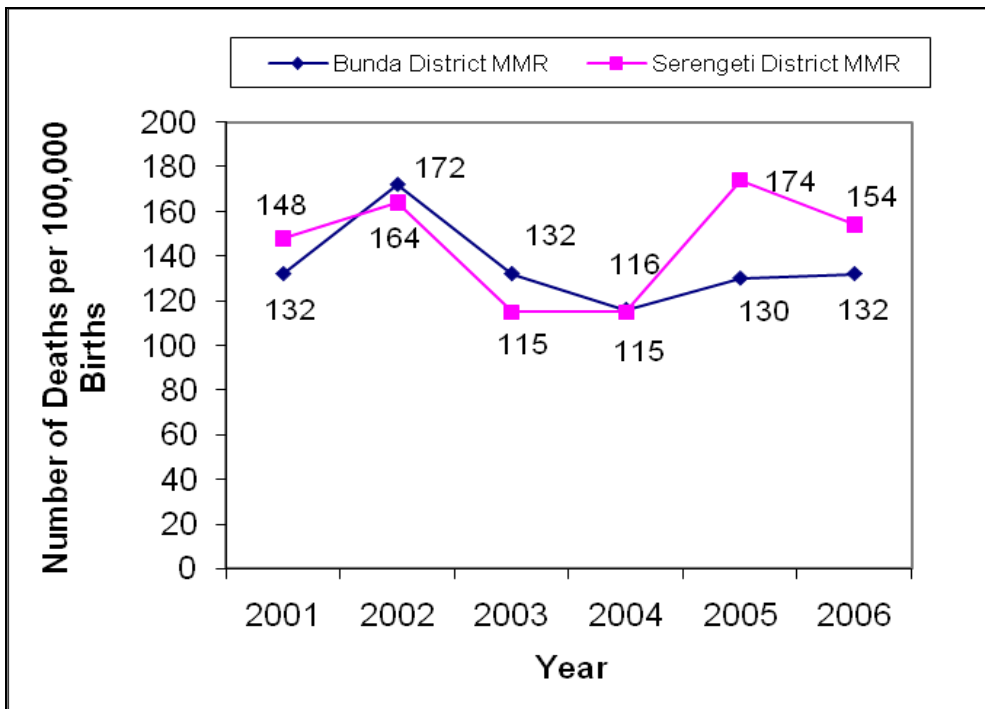


Figure 3.6. Maternal Mortality Ratios in Serengeti and Bunda Districts. Data gathered from Serengeti District Council Health Sector and Bunda Designated Hospital by L.M. Knapp.

Apart from the difficulty in analyzing the MMR data, it is safe for me to argue that throughout time there has been a steady increase of women in western Serengeti giving birth at an established health facility²⁰. Based on data I gathered from the Serengeti District Health Sector RCH (see Figure 3.7), only 27% of women gave birth in a health facility in 2002 the percentage had increased to 46% in 2004. This percentage might seem low compared to Western standards, but the DHS shows that in the five years preceding their survey work (which took place in 2004-05), only 39% of rural Tanzanian women gave birth in a health facility. In the Mara Region, the percentage was even

²⁰ A health facility includes a hospital, clinic, or village health station

lower with only 32% of women giving birth at a health facility. Similarly, when examining the Serengeti District RCH data again, we see that the percentage of women giving birth at home (in the villages) without a trained health professional or local midwife being present is decreasing over time (from 62% in 2002, to 42% in 2003, and 36% in 2004). The TDHS shows that for the five years preceding their survey (2004-05), 32.5% of all deliveries occurred at home with no health professional or even traditional birth attendant present across rural Tanzania. In these cases, the women only had an untrained relative present at best (sometimes no one else was present).

In summary, what I conclude from these maternal health data is that through time women in western Serengeti are receiving better care during childbirth than they used to. The standards in my study site seem to be somewhat comparable to those in the rest of rural Tanzania (see Figure 3.7). Based on the qualitative, semi-structured interviews I did with women, I discovered that more respondents had given birth in the hospital than they had at home. Using an Analysis of Variance (ANOVA), I found that older women (over age 43) were more likely to have given birth to all of their children at home than younger women. Conversely, younger women (below age 33) tended to favor the hospital for the birth of all their children ($F = 3.42$, $df = 1$, $p = .078$). Some of my respondents had experienced both home and hospital deliveries.

Another bit of data that is hopeful in terms of women's health is that the Serengeti District RCH records show that of the women who gave birth in 2004 (both at home and at a health station), 89% came to a dispensary afterwards for a check-up. Of those that came, 91% received a dose of vitamin A. Across sub-Saharan Africa, Vitamin A deficiencies in the diet of pregnant or lactating women is a leading cause of malnutrition

and other health problems (Dettwyler 1994). To see that the District Health Sector is making an effort to improve women’s health in this area is encouraging.

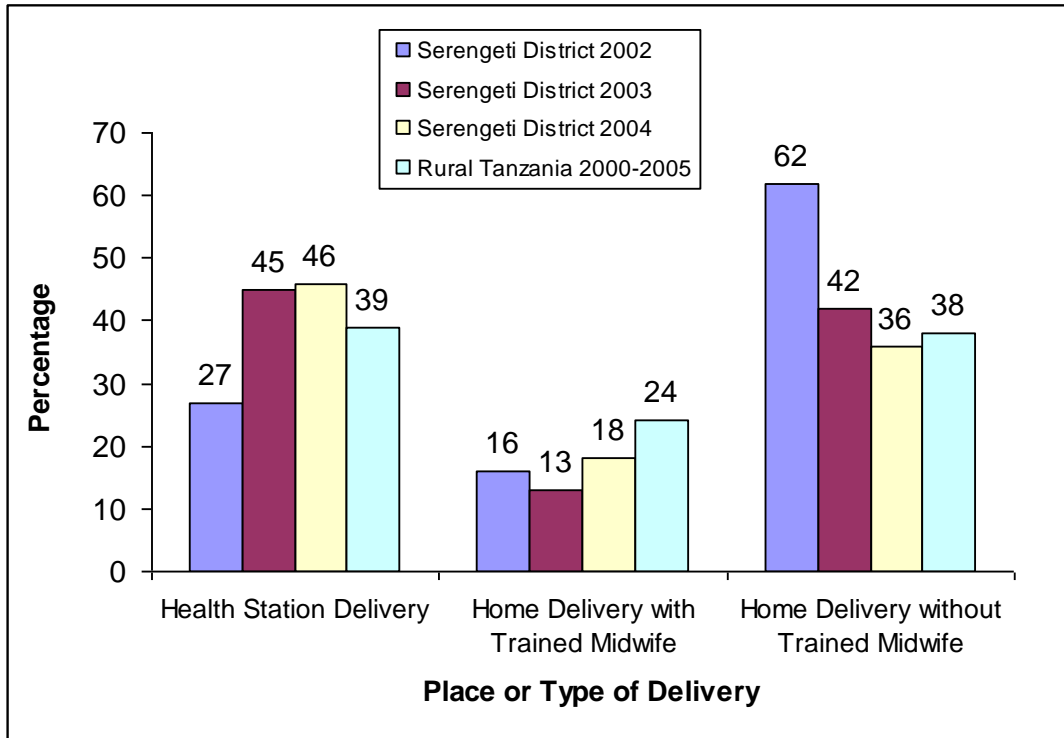


Figure 3.7. Comparison of Maternal Delivery between Serengeti District and Rural Tanzania. Based on data from the Serengeti District RCH 2004 Report and the TDHS (2005). “Health Station Delivery” refers to deliveries at the District hospital or village clinics/dispensaries (staffed by the District RCH). “Home Delivery with Trained Midwife” refers to the presence of a traditional birth attendant, a village health worker, or a trained biomedical birth attendant. Thus, “Home Delivery without Trained Midwife” refers to the presence of a relative or friend with no midwifery training or just the absence of anyone else altogether.

3.3. Children’s Health

Children often bear the brunt of poverty. Likewise, they are usually the most likely to suffer in terms of health within each household. Inpatient morbidity and mortality data from the Bunda District hospital reveal that children under-five are the most vulnerable to infectious disease. For example, in 2006 the sheer volume of children who were admitted to the hospital as in-patients because of malaria was tremendously

higher than the rest of the population who were five or older and also admitted. Of all the inpatients admitted for malaria in the Bunda hospital in 2006, 9,463 were under-five while only 4,473 inpatients were five and older.

According to the Serengeti District RCH Report, neonatal (NN) mortality (death of infants in first 28 days of life) is decreasing steadily. In 2002 there were 72 cases of NN mortality in the Serengeti District while in 2003 it had dropped to 28 neonatal deaths and finally only 22 NN deaths in 2004. The causes of neonatal mortality during these years are listed in Figure 3.8. In 2004 the most common causes were: premature birth (6 cases), low birth weight (5), hypothermia (3), infection/septicemia (2), birth trauma (2), congenital abnormalities (2), and birth asphyxia (2). Causes of under-five mortality in Serengeti District for the years 2002-2004 are listed in Figure 3.9. Similar to the NN mortality rates, the Serengeti RCH (2004) Report states that under-five mortality is improving over time with 396 deaths in 2002, 279 deaths in 2003, and 268 deaths in 2004. The most common causes of under-five mortality are anemia and malaria (see Figure 3.9).

After extrapolating from this mortality data in RCH report, I estimated that the neonatal (NN) mortality rates for Serengeti District were 8.4 deaths/1,000 live births for 2002. This is based on the fact that there were 8,553 live births reported in the district and 72 reported deaths during 2004. However, according to the TDHS (2005), NN mortality rates around the country were much, much higher in the four years preceding their survey (32 deaths/1,000 live births)²¹. Similarly, my extrapolations for under-five

²¹ The DHS NN and under-five mortality data would be averaged based on the years 1999-2003, whereas I calculated it for 2002 for both those indicators.

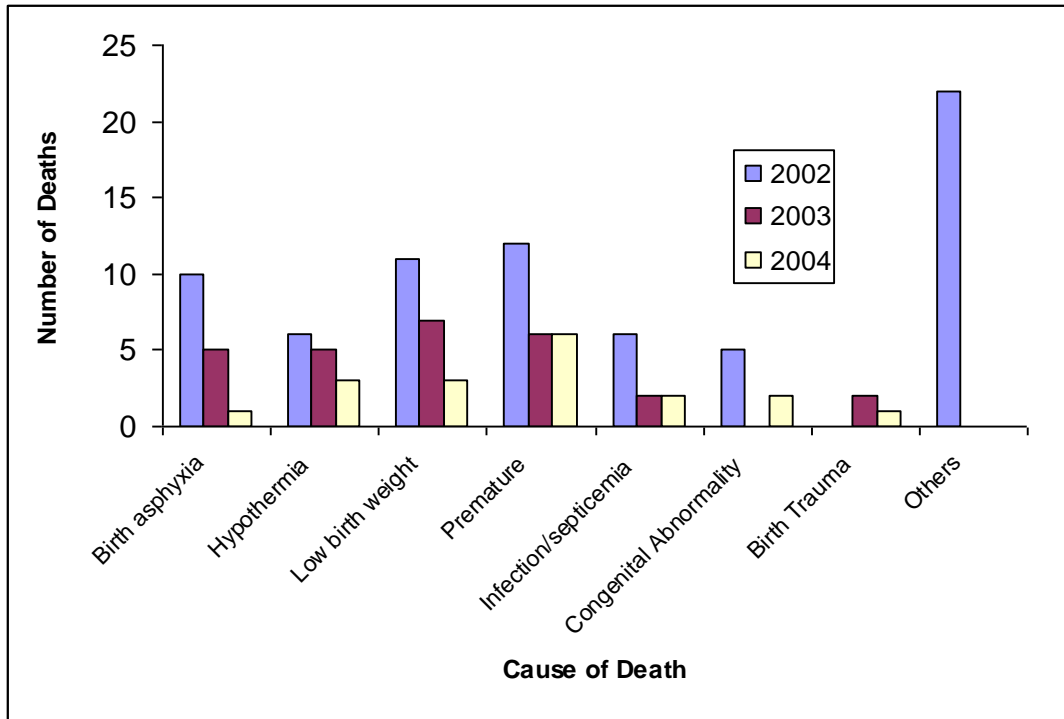


Figure 3.8. Causes of Neonatal (NN) Mortality in Serengeti District, Tanzania. In 2004, there were 22 total NN deaths. (Data gathered by L.M. Knapp.)

mortality²² in 2004 (7 deaths/1,000 live births) are incredibly low compared to the TDHS rates for all of Tanzania (112 deaths/1,000 live births)²³. Certainly this discrepancy could be due in part to the fact that the RCH Report is from 2004 and the DHS data is for 2001-2003. There is strong evidence that all early childhood mortality rates are steadily decreasing (TDHS 2004:124-125); however, it is not likely that this could account for such a drastic discrepancy. Therefore, we have two choices to explain for the differences in these two data sets: either 1) Serengeti District children are incredibly healthy or 2) the

²² Under-five mortality is defined as the probability of dying between birth and fifth birthday.

²³ The DHS also separates early childhood mortality rates according to urban versus rural residence. As expected, in the ten years preceding their survey (2004-05), the urban rates were lower than the rural rates (except for NN mortality). Urban NN mortality was 37 deaths/1,000 live births while rural NN mortality was 33. For infant mortality, the urban rate was 73 deaths/1,000 births and the rural rate was 85 deaths/1,000 births. Lastly, for under-five mortality, the urban rate was 108 deaths/1,000 births while the rural rate was 138 deaths/1,000 live births. The reason I did not compare my data to the rural rates alone is that they were based on a ten-year period (much earlier than our Serengeti District Data were collected) while the DHS data which lumped the urban and rural data together were for the same years 2000-2003 as the Serengeti District Data.

RCH data that I collected and translated are grossly inaccurate. I tend to think the latter. I hypothesize that the RCH data are low simply because many children die at home and their deaths are not reported to the District offices. Furthermore, there is reason for speculation that health records from hospitals across Tanzania are not entirely accurate (Reyburn et al. 2006).

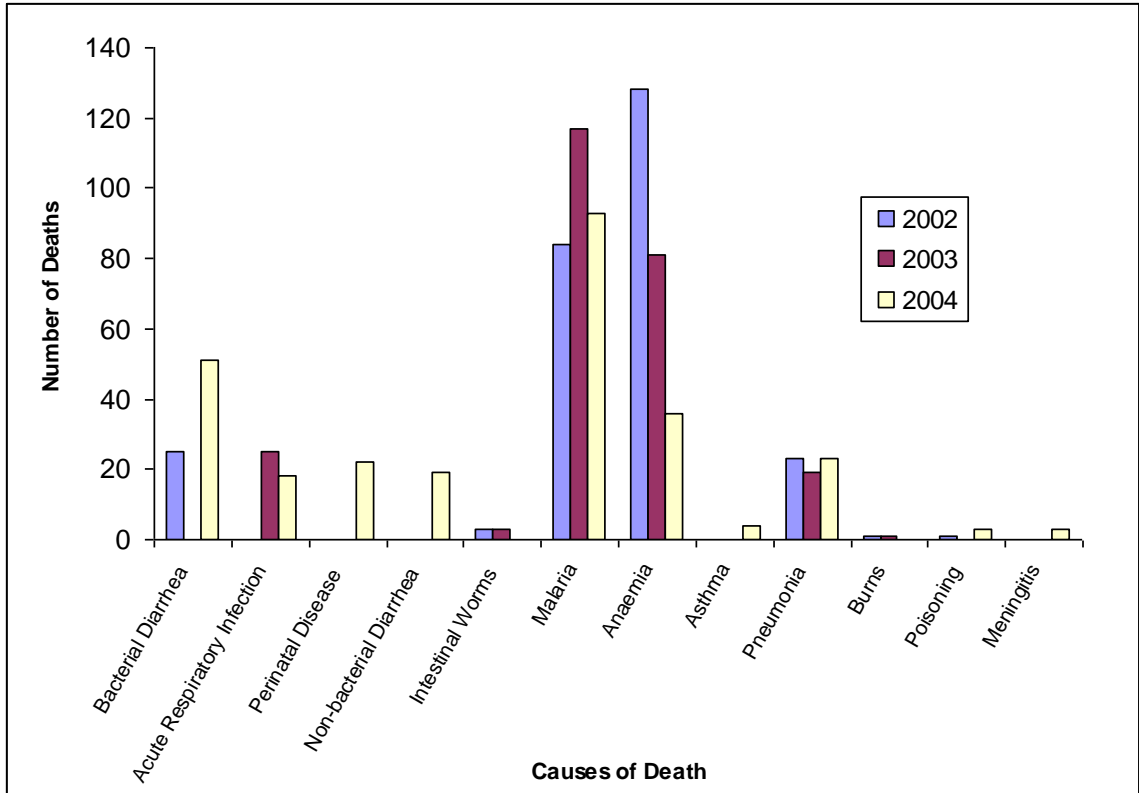


Figure 3.9. Causes of Under-five Mortality in Serengeti District Tanzania, 2002-2004. Total reported cases of under-five mortality in Serengeti District in 2002 equaled 396; for 2003 they equaled 279 and in 2004 they totaled 268. (Data gathered by L.M. Knapp.)

Bunda District’s infant mortality and under-five mortality create a much more realistic picture in keeping with other health indicators from the area (such as high infectious disease rates, MMR, etc.). After discovering these data I am further convinced that the listings from Serengeti District are simply incomplete or inaccurate. Bunda’s

data show that both infant mortality²⁴ and under-five mortality are much worse than the TDHS (2005) records for all of Tanzania during the same time period. *Figure 3.10* depicts Bunda's infant and under-five mortality rates for the years 2001 to 2006. The poor health status of western Serengeti peoples is demonstrated by the fact that infant mortality across Tanzania was 68 deaths/1000 live births in the period of 2000-2004; however, in Bunda the infant mortality rates ranged from 120-140 deaths/1,000 live births during those same years. Likewise, Tanzania as whole had an under-five mortality rate of 112 deaths/1,000 live births in 2000-2004, but Bunda district was much worse with rates ranging from 120-150 deaths/1,000 live births. These data are perhaps some of the most revealing of all that I have discovered. Early childhood mortality rates are considered some of the best indicators for measuring the socioeconomic status and well-being of populations around the world. Therefore, since I have uncovered such high rates of early childhood mortality in western Serengeti—especially as compared to the rest of Tanzania—we can be confident in saying that the quality of health in western Serengeti is very low indeed.

4. Conclusions

When I began my second field season of research in western Serengeti I was encouraged to find that certain archival data were being made available to me. I had envisioned using it as the foundation of my thesis to prove whether or not western Serengeti people were suffering inordinately from the pressures of conservation agendas or not. After analyzing the data and doing more research in the medical anthropology literature, I have realized that biomedical data in and of itself is not immune from the

²⁴ Infant mortality is defined as the probability of dying before the first birthday.

biases of human thought, error, and prejudice. Essentially, what I have come to understand through reading other medical anthropological research is that the biomedical system is a cultural construction just like any other institution such as marriage customs or religious beliefs. Biomedicine is created and shaped by humans and their culture. Thus, it is fallible and often even biased. After reading Molina's (2006) book about the

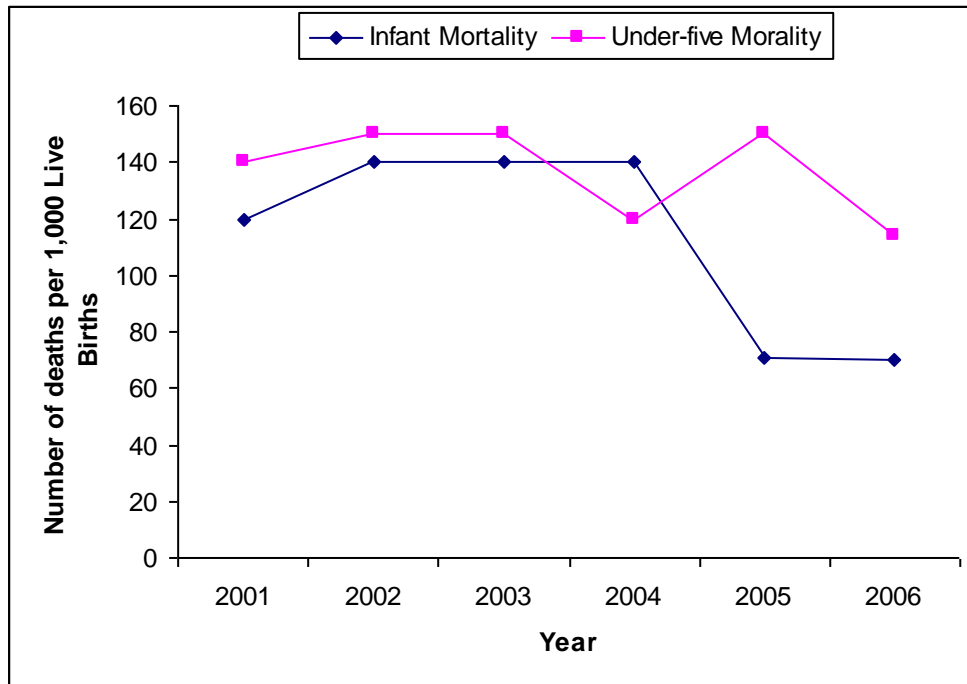


Figure 3.10. Infant and Under-five mortality rates from Bunda District Hospital archival data.

history of the public health department in Los Angeles County, CA, I was struck by how supposedly “altruistic” public health agendas can actually skew data to meet the goals of insidious political (and racial) agendas. Furthermore, the reliability of health statistics from Africa has been called into question by other sources. Messer and Shipton (2002: 233-234) write:

The reasons why reliable statistics on African food and hunger are so hard to produce and so likely to mislead are technical, cultural, and political... Everything from having to estimate figures because of inability to access parts of the

continent (due to poor roads), to corrupt leaders underreporting food production in order to receive more international aid, to even cultural problems in translating terms such as “income” or “families” or “households” can lead to inaccurate data.

Thus, as I present the findings from this section, I want to be sure to acknowledge that even these supposedly scientific or objective data sets represent what certain national and international agencies deem important. These data alone do not tell the whole story of health and illness in western Serengeti.

Having acknowledged the weaknesses of biomedical data, I will briefly summarize that the health status of western Serengeti people as a whole (as measured by the certain indicators presented in this chapter) is not good. Some of the most important findings from the archival data I gathered are that HIV/AIDS rates are higher in western Serengeti (10.8%) than the rest of Tanzania (7%). Furthermore, women in their reproductive years—particularly those in polygamous marriages—are the most vulnerable to HIV/AIDS. Secondly, another major finding of this archival research is that infectious disease is the dominate health problem facing western Serengeti people. More specifically, malaria is the leading cause of morbidity and one of the leading causes of mortality, particularly among small children. Third, western Serengeti households do not have enough income or assets to properly prevent contracting malaria and other infectious diseases even though these preventative measures are relatively easy to get and use. In addition, while general biomedical indicators (such as maternal mortality rates and infant mortality rates) seem to indicate an overall decrease in poor health for mothers and small children, these rates are still generally above national averages for the rest of rural Tanzania. For example, although there were some discrepancies in the archival data between Serengeti and Bunda districts, it appears that neonatal and under-five mortality

rates in western Serengeti are significantly higher than the averages for the rest of rural Tanzania. These data demonstrate the extent of the entrenchment of poverty and infectious disease among western Serengeti people. In addition, though I have not spent considerable time on this topic in this chapter, the unique location of western Serengeti people in relation to the conservation areas makes them even more vulnerable to other endemic diseases such as rabies (Hampson et al. 2008). Bunda Hospital data showed that in 2006 seven patients were admitted for animal bites and one death due to animal bites occurred. There were two admissions for rabies but no deaths. I did not attempt to deal more fully with these types of data since they have already been addressed by other scholars (e.g., Hampson et al. 2008, Lembo et al. 2008). Overall, the picture of health presented by the archival data is that western Serengeti people are suffering from easily-preventable infectious diseases. Thus, I would argue that western Serengeti people's health and lives are deeply embedded in poverty.

Chapter 4
The embodiment of illness in western Serengeti: Using Semi-structured, qualitative interviews with women to understand human health

1. Introduction

As already explained in chapter 1, the final methodology I am using involves semi-structured interviews of women about a wide-variety of issues mostly pertaining to their own health, illness, bodily experiences, perceptions or household routines. In addition, they share stories and information about those in their household who are close to them (usually their children). With this methodology I seek to utilize a more phenomenological approach, or one that is based on the experiences of individuals. Similar to the *paradigm of embodiment*, phenomenology asserts that the human body is “not an *object* to be studied in relation to culture, but is to be considered as the *subject* of culture” (Csordas 2002: 58). Certainly, on occasion, humans reflect on their state of being and in this sense we become “objects to ourselves” (Csordas 2002: 59). Normally though, in every day life, humans carry on in a manner that is non-reflexive, or not thinking about the why and how of everything they do or believe. This is what Bourdieu (1977) calls the concept of *habitus*—or the patterns of thought, behavior, and preference that are embedded in individuals through the internalization of culture. In another of his works, Bourdieu (1990) uses the allegory of a game to explain the paradigm of embodiment. He writes:

The earlier a player enters the game and the less he is aware of the associated learning (the limiting case being, of course, that of someone born into, born with the game), the greater is his ignorance of all that is tacitly granted through his investment in the field and his interest in its very existence and perpetuation and in everything that is played for in it, and his unawareness of the unthought presuppositions that the game produces and endlessly reproduces, thereby reproducing the conditions of its own perpetuation (Bourdieu 1990: 67).

Important to this paradigm then is the disintegration of dualities between mind and body, subject and object. Essentially, the mental or thought-world is not separate

from the biological and material world of each person. As Bourdieu (1990: 73) writes, “What is ‘learned by the body’ is not something that one has, like knowledge that can be brandished, but something that one is.”

This theory legitimizes that individual’s daily habits and their experiences are grounds for cultural analysis. Therefore, as an anthropologist I do not need to consider culture as something outside of or apart from the human body or apart from individuals’ perceptions of illness and health. This approach gives credence to the data presented here about individual experiences of health and within households. One of the most famous stalwarts of embodiment theory, Merleau-Ponty (1962), helps us to see that humans are perpetually apprehending what happens to them; humans see the world through themselves and through their unique experiences and perceptions. In terms of my study of health in western Serengeti, this means that diseases do not just exist by themselves, but they have social meaning and can be studied through the stories or experiences of my respondents.

The most interesting questions from this portion of my research have to do with my interviewees own health and illness histories as well as those of their children or other family members. Some of the questions still had to do with non-health issues such as demographic data, education and religious background, and basic socio-economic status data (including income, assets, occupation, and education.). This information is all linked to the health data and helps provide the backdrop for analyzing and interpreting the health milieu in western Serengeti. Although each interview varied somewhat based on how much each woman was willing to share or which conversational direction she wanted to head in, I was careful to cover at least some questions with each respondent.

These sections of the interview included the following: an illness recall questionnaire, open-ended cognitive questions about the causes of and means of coping with illness in their household and village, fertility prevention, pre- and post-natal care for the interviewee, household hunger histories, household hygiene, malaria prevention, cooking practices, food storage and related problems (such as rats eating stored food), wife battering, female genital mutilation (FGM), and crop selection. Most of these topics will be covered in this chapter, though not all as some relate best to the discussions in the previous chapter and help us interpret the patterns of morbidity and mortality based on archival data from western Serengeti.

So who *are* the women (n=36) I interviewed for this study? They range in age from eighteen to sixty-four. The women in this portion of my study come from eight different ethnic groups (Kuria, Ikoma, Ikizu, Isseye, Sukuma, Zanki, Zangida, and Jita) and eight different villages or towns within Serengeti District (Mugumu, Kisangura, Park Nyigoti, and Robanda) and Bunda District (Kunzungu, Balili, Bukore, and Bunda). The majority were from the Kuria or Ikoma tribes (64%). The mean number of children that each woman has given birth to is 4.5. This amount appears slightly inaccurate (lower than would be expected) because many of the women I had interviewed were very young, still in the midst of their reproductive years, and therefore, could still give birth to more children in the future. For women aged 45 and above (potentially those who have completed their reproductive years), the mean number of children was 7.4. Three-fourths of my respondents were married, 11% were single (never married), another 11% were widowed, and 5.6% were divorced or permanently separated.

The main indicators I used to measure socioeconomic status were education, assets (livestock holdings, number of acres owned, number of houses with a tin roof, number of bicycles), and occupation²⁵. On average (mean) these women each have completed six years of school (primary school is completed after 7 years), though the mode (n=21) for education was seven years of school. One-sixth of the women had never attended any school while 30% had not finished primary school. Only one of my interviewees had any education post-high school and this woman became a nurse. The mean number of acres owned by each household was 1.4. The average monthly expenditures (including yearly school fees, food, medical expenses, clothing, and other minor expenses such as kerosene or matches) for each household was 72,770 Tanzanian shillings (roughly \$72) and the mean number of livestock per household was: 5.5 head of cattle, 4.4 goats, and 6.8 chickens. Most households (mode, n=18) had only houses with grass roofs while the mean number of tin-roof houses owned by each household was 0.86. Similarly, most (mode, n=14) households did not own any bicycles while the mean number of bikes per household was 0.81. Based on their self-identified occupation, nearly three-fourths (73%) of my respondents have no outside employment or business besides their household agricultural activities. These women identified themselves as herders, farmers, or simply *mama nyumbani*—or, a homemaker. Twenty percent identified themselves as a “business woman” selling everything from food, to shoes, or beer in village or town markets. Only 5.6% had full-time, off-farm employment. While only one woman viewed her identity or occupation as “one who sells beer,” six more women admitted in another part of the interview that they earn income from selling home-brewed

²⁵ These indicators used to measure socioeconomic status were chosen because of recommendations from Adler et al. 1999.

beer, an activity that Tanzania's government declared illegal due to the often unsanitary means of production.

In the next sections I will present the findings from each of the main categories of data gathered during these qualitative interviews. Occasionally I will corroborate these results with the data gathered through another of my methodologies—particularly some parallel information from the archival data I collected.

2. Hunger Histories

During my interviews with women in western Serengeti I asked them to recall how often they experienced hunger during the previous month. During the interviews it was often difficult to convey what I meant by “hunger.” Indeed this is a culturally-laden term. Messer and Shipton (2002: 231) write that, “Hunger, strictly speaking, is a subjective sensation, not a biological condition, but the terms is sometimes used synecdochically...to stand for broader complexes of problems that include biological ones.” The authors go on to explain how some people voluntarily embrace hunger for religious reasons—such as fasting during Ramadan in the Muslim faith. Thus, a slightly different definition is needed. Malnutrition—the biological condition in which there is a shortage of calories, protein, enzymes, or essential micro-nutrients (vitamins and minerals)—could be used in this case, though it can occur without the feeling of hunger.

These semantic difficulties for defining the concept of hunger were heightened during my interviews. Some women mistook it to mean the hungry feeling all human beings have before a meal when the body is trying to signal that it is an appropriate time to eat. However, I tried to explain that what I meant was a type of hunger that is more pervasive—one that is not voluntary nor satiable due to an inability to access adequate

quantities (or quality) of food. The definition of hunger that I was referring to during my interviews was translated more literally as a “drought of food” or *ukosefu ya chakula*. Once I was able to convey the meaning behind my question, slightly less than half (47%) of the women reported never having been hungry during the past month. This means that over half (52%) had experienced hunger at least once during the previous month.

Interestingly, increased household assets and monthly expenditures (an indicator of income level) did not correlate with decreased hunger rates. For example, counter-intuitively the women who had experienced hunger in the past month had more livestock and spent more on monthly expenditures than those that were not hungry. However, occupation and education did positively correlate with less hunger. The women that had experienced hunger also had attended on average 2 less years of school (mean = 4.8 years) than the women who were not hungry (mean = 6.9 years). Likewise, the husbands of the hungry contingent had 2 less years of schooling (mean=5.6 years of school) than the husbands of the non-hungry contingent (mean = 7.6 years of school.) These data suggest that male and female education levels are positively correlated with decreased levels of perceived hunger. Secondly, of the women that experienced or perceived to experience hunger, 89% were only engaged in agricultural activities and no formal employment or business. Those that did not perceive to experience hunger were comprised of 47% farmer/herders, 35% business-women, and 12% with formal employment.

When asked about who experiences hunger in their household first, the most common responses were: their children (72%) followed by the elderly (17%). Other studies concur that famine does not affect all people equally, but that children, the elderly

and women are the most negatively affected (Messer and Shipton 2002). After being prompted, many of the women discussed the causes of hunger in their households. I was able to separate their responses into two main categories—natural (or ecological) constraints versus economic constraints. The majority (67%) blamed natural causes while 19% blamed economic problems such as a lack of money to buy enough food, a lack of good farming equipment, lack of enough land to farm, or the increased costs of food. In terms of natural causes of hunger, 36% of all the respondents listed elephant crop damage as hindering their family's food intake followed closely (28%) by weather-related problems (either too much or too little rain). Overall, the respondent's discourse revealed their malcontent with the way that wildlife (from the protected areas) affects the amount of hunger they experience. Throughout both structured (n=722) and semi-structured (n=36) interviews around SNP, it became clear that the main source of frustration among western Serengeti villagers toward the conservation agenda has to do with their loss of crops (hence, a loss of food) without compensation from TANAPA or the Tanzania Wildlife Division.

In summarizing this section on hunger in western Serengeti, it is important to mention that two main schools of thought regarding poverty and famine emerged amongst development workers during the past several decades. The first of these is a Malthusian approach that places blame on an inadequate supply of food (due to environmental factors such as floods, pestilence, drought, or poor soils) for an increasing human population. The second school of thought places blame on anthropogenic forces, especially those at the large scale which render certain people or groups of people unable to access adequate amounts of food due to a lack of entitlements. This “entitlement

failure,” as economist Amartya Sen (1981) calls it, refers to a general lack of rights to many things including good land, health, political power, labor, or favorable conditions of economic exchange. Messer and Shipton (2002) contend that a combination of both approaches (environment and entitlement failure) actually forms the crux of this problem. “Moral, economic, and political causes of hunger and malnutrition exacerbate material ones and are aggravated by them in turn as regimes and companies in charge of ‘resource-poor’ politics see little hope in developing taxable, long-term production and enterprise, and instead opt to extract what material and human resources they control while they are still in power” (Messer and Shipton 2002: 230). These issues will be discussed in more detail in my final chapter, but I simply want to mention them here so as to point out that malnutrition or hunger—even that felt by the women I interviewed in western Serengeti—are often not just a problem of lack of food, but also a result of outside political-economic forces. Even supposedly altruistic development projects can alter livelihood strategies in a way that is harmful to local food supplies. Similarly, in an attempt to reduce their nation’s international debt, some African governments shift focus from producing food to producing cash crops that can be exported (Messer and Shipton 2002). These types of outside forces have occurred in western Serengeti. As Messer and Shipton (2002) explain, Tanzania’s former President Nyrere, though attempting to help his country, actually caused major problems for rural Tanzanians’ production, income and food security when cooperative farms were established. This is just one of many examples of how western Serengeti health (and experiences of hunger in particular) are shaped by exogenous forces.

3. Illness Recall

The illness recall questionnaire was one component of my semi-structured health interview with women (n=36). The point of this qualitative methodology was to discover how much sickness the western Serengeti households perceive they are facing, how they treat these illnesses, and what they perceive the causes of their illnesses to be. My questions differed somewhat from those used in studies elsewhere in Tanzania and around the world (Frederickx 1998, Deolalikar 1995, Decon 1996, etc.) in that we asked if *anyone*—not just the interviewee—in the household was sick during the last month. The format of my interview was such that respondents free-listed their answers (see Bernard 2006 for a complete definition of the methodology). In other words, they were *not* prompted by an interviewer who asked, “Did anyone in your household have malaria?” or, “Did anyone have a fever?” Rather, the interviewee’s responses came entirely from their own experiences, memories, perceptions, and understandings of illness.

Using this methodology, 19.4% of my interviewees reported being ill themselves during the previous month. This is somewhat higher than the results from the rest of rural Tanzania done in a different study. Frederickx (1998) found that 15% of individuals from her sample of rural Tanzanians reported illness or injury during the last 4 weeks prior to the survey. Similar research from around the world showed somewhat similar data to Frederickx’s. Deolalikar (1995) found 11% ill in a survey of illness recall in the previous week, Dercon (1996) found an average of 16% ill in an Ethiopian survey (past 4 weeks), and Lavy and Germain found 36% ill in the last thirty days of their Ghanaian sample.

Of those 15% in Frederickx's Tanzanian survey who reported being ill, 66% sought treatment or care from a western biomedical facility. In rural Ethiopia the result was 55%, for Kenya close to 70%, and for Uganda close to 90% sought treatment (Decon 1996). Using the data from my research, everyone sought some sort of treatment for their individual illnesses, though not all from a biomedical center. These decisions were influenced by cultural norms and economic status. Based on my research, 28% of the women said they could not afford to go to the hospital so they just bought their own treatments at a local store or dispensary. The majority (57%) still went to the nearest hospital for diagnosis and treatment.

Several of the interviewees reported using local indigenous medicine (*dawa ya kinyeji*) or visiting a witchdoctor for their treatment (or for the treatment of their ill household members). These decisions reflect their systems of thinking—particularly, that only traditional healers have the ability to treat certain types of illness. One lady explained that especially for women it is best to go to the “local healers” (i.e., non-biomedical personnel and perhaps a witch doctor) in order to receive natural medicines (*dawa ya porini*). She reported having the following symptoms for nearly a month: whole body aches, cramps, stomach pain, and only three days of menstruation. She felt that only the local witch doctor was capable of treating issues pertaining to the female reproductive system. Another Kuria woman recalled taking her child to get “local medicine” for *surua* (measles). She said her child got this sickness because there was a shortage of the vaccine. The child did get better after about a month of illness. Another Kuria mother sought treatment for her child who had a “regular fever” (*homa za kawaida*). This is interesting because her other child was taken to the hospital for

treatment of what she called “malaria,” implying that a “regular fever” is somehow different. In other words, this woman distinguishes between a regular fever—which must be treated by a local healer—and a malaria fever—which can be treated at the hospital.

In terms of illness results for the entire household (that I sampled), most of the respondents (n=12) reported having one ill family member during the past month. The next responses in descending order of frequency are: two ill family members (n=9), none (n=8), three ill family members (n=6), and four ill family members (n=1). This means that 78% of all households had at least one ill family member during the previous month. One household reported that a family member died during the previous month. This adult woman had diarrhea and fever and was taken to the hospital. After fourteen days of battling her illness she passed away.

The majority of illnesses in our sample affected children (71% of all reported cases of illness were children) and the vast majority (86%) were taken to a biomedical facility (either a dispensary or hospital) for treatment. The amount of households that sought medical treatment for them or their children is incredibly high considering Frederickx (1998) found only 66% of her respondents (rural Tanzanians) sought treatment or care. I believe this is due in part to the fact that a third of our sampled households are located within a town that has a District hospital. Proximity to a medical facility can have tremendous impact on the decision-making of those with illness.

Another question within my sickness recall questionnaire involved asking the female respondent what *type* of illness each family member had. Combining all the responses (see Figure 4.1), the most common illness within the households was malaria (47% of all cases were perceived to be this). The second most commonly reported illness

(10% of all cases) was referred to as “a fever.” The third most common response (6%) was quite interesting because the respondents could not identify the disease at all. There was no name or even description that they gave. This is especially odd considering that other illnesses were labeled as “headache,” “toothache,” “stomach problem,” “diarrhea,” etc. Similarly, when asked about the causes for all the various types illnesses (including malaria, fever, etc.) the most common answer from my interviewees was, “I don’t know.” Just to clarify, the cause of 49% of all illnesses reported in the Sickness Recall Questionnaire could not be determined by the respondents. Meanwhile the next most common responses for cause of illness were (in descending order): mosquitoes (or a lack of mosquito nets) (33%), dirty water (9%), weather (7%), and returning to work too soon after giving birth (2%). These responses are illustrated in *Figure 4.2*.

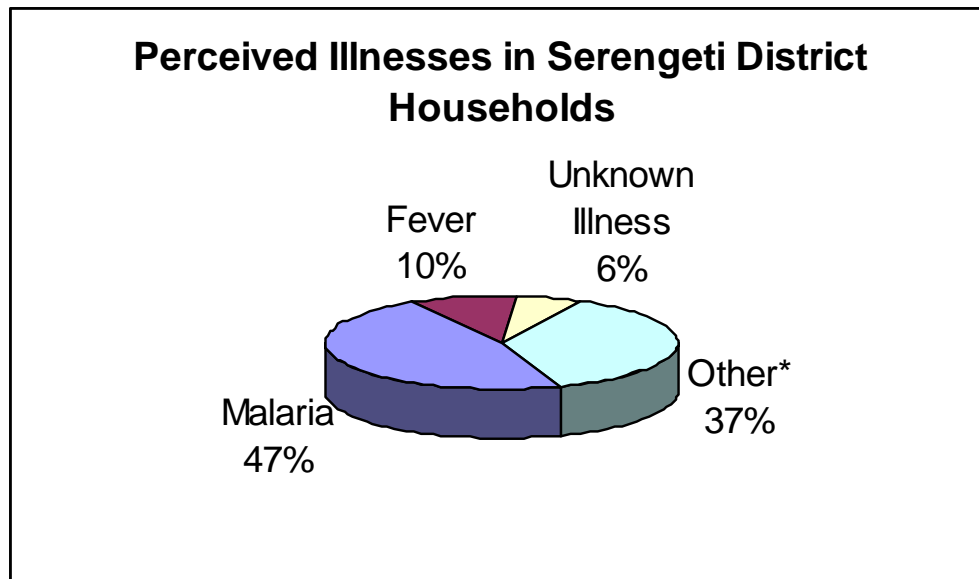


Figure 4.1. Perceived Illnesses in Serengeti District Households. Percentages represent the proportion of respondents who provided each particular, free-listed response. Data came from my Illness Recall Questionnaire (n=36) conducted in Serengeti and Bunda Districts, Tanzania.*‘Other’ category includes: toothache, headache, diarrhea, etc.

In essence, what these sickness recall questions reveal is individuals' awareness of disease and disease pathways. Some (e.g., Frederickx 1998) would argue that these perceptions do not necessarily reveal actual amounts of diseases or actual causes. More specifically, Frederickx (1998) found that self-reported survey data for illness was not exactly the most accurate for determining actual rates of morbidity in rural Tanzania. For example, in her study it was the rich and well-educated respondents who reported more incidence of illness. Other studies (e.g., Strauss and Thomas 1995) also confirm that there is a positive relationship between higher socioeconomic status (wealth and education) and a higher probability of reporting illness (Frederickx 1998). Women in Frederickx' survey also report more sickness than men (there is a 3% higher probability that a woman will report illness than a man). Women are also 8% more likely to seek treatment than men. Education does not seem to have a positive effect on health in rural Tanzanians but wealth does. Using regression analyses, Frederickx (1998) found that being rich means that respondents report more illness, seek more care and seek more care from private providers.

Some health workers or scientists would argue (as does Frederickx) that the methodology I have used here does not necessarily represent *actual* illness but only respondents' *awareness* of illness. However, based on embodiment theory, I would argue that even the latter is a lived experience of suffering making it no less *real* than a confirmed biomedical disease.

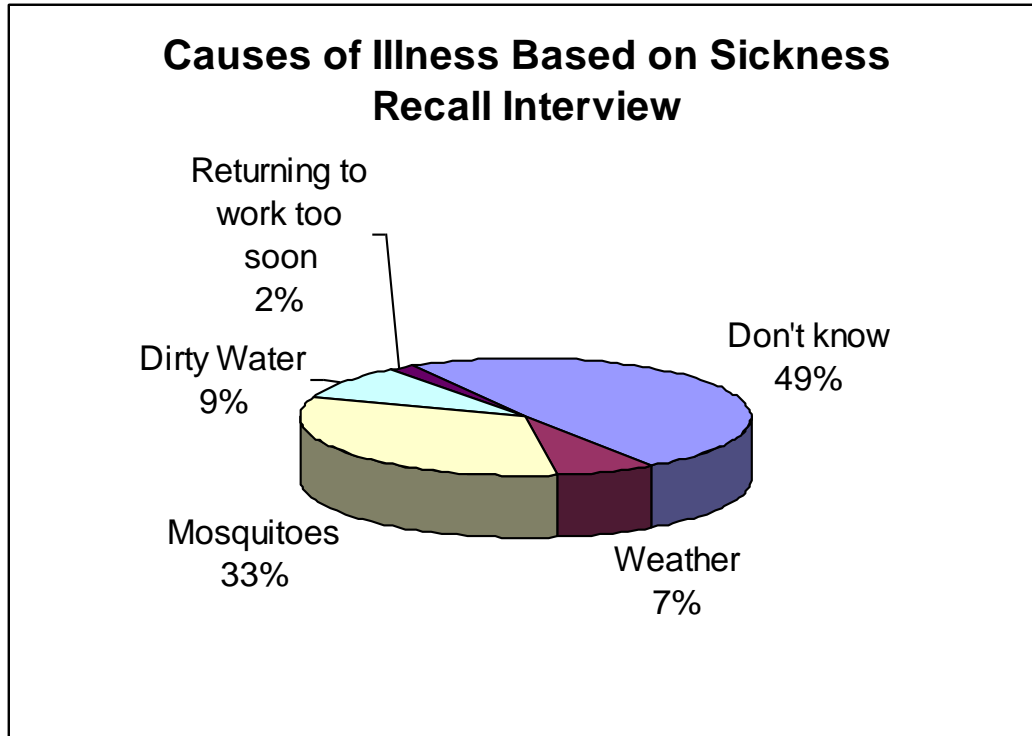


Figure 4.2. Perceived Causes of Illness in Western Serengeti Households. Percentages represent the proportion of respondents who provided each particular, free-listed response. Based on data from L.M. Knapp’s Sickness Recall Questionnaire (n=36) conducted in Serengeti and Bunda Districts, Tanzania.

After completing many sickness recall questionnaires with my female respondents, I repeatedly left the interviews shaking my head in disbelief at the amount of health “knowledge” the respondents were lacking. So many were unsure what illnesses they or their family members were plagued with. Even more were uncertain what was to blame for the maladies they faced. Shockingly, several women recalled how their children died from diseases that they could not identify. One of my interviewees had three of her five children die. The first one became sick with a headache and then became delirious. The woman said that she made no attempts to treat this onset of illness in her child but that he died “suddenly.” While the woman remembered this happening in June of 1994, when she was a mere teenager, she could not remember the year when

her other two children died nor the cause of their deaths. Another interviewee had given birth to ten children and six of them died. During the interview she began to describe the events and situations surrounding the deaths of the first two, but after that she refused to discuss any more. My field assistant, Elias, who conducted this interview recalled that she simply shut-down and would not give any more explanations for the deaths of the other children. Another woman I interviewed had three of her eight children die already. Her children died at very young ages (two were only one year old and the third was three years old). This woman cited such simple causes of death as a fever for two of them and a boil for the final one. Perhaps one of the saddest interviews was with a woman who had lost all three of the children she gave birth to. They all died during infancy (1 month old, one-year old and 4 months old) and the woman did not know the cause(s) of any of their deaths. Two of the three were taken to the hospital for treatment and the third was taken to a local witch doctor. Later on in her interview, I realized how deep her sense of hopelessness was after losing all three of her children. She said, “This is the state of my life. I can not have kids that live.” Her very sense of identity was wrapped up in the fact that she believed she could not have children that lived beyond one year.

On one hand, as an outsider, it is easy to brush away this kind of situation by saying, “Oh, they live in rural Africa; of course they experience a lot of death and don’t know why their kids died.” But putting myself in their situation, I can not imagine losing a child and then not being able to find out what caused their death. Biomedicine is so readily available to us in the West that it is nearly impossible to fathom this kind of inability to access information and healthcare. While some people (drawing on the faulty theory of *Culturalism* explained in chapter 1) could blame the villagers themselves for

their ignorance, I see these patterns as an example of the unavailability of biomedical information and counseling for western Serengeti people. Though proving such a fact is beyond the scope of my data, some might hypothesize that this lack of biomedical understanding represents uneven distributions of power, wealth, and social status across multiple scales.

Based on other data gathered during the qualitative semi-structured interviews, I learned that on average each woman had experienced the death of .97 children. This means that nearly every mother loses at least one of her children during her lifetime. Moreover, in just the last year, six out of my 36 interviewees experienced the death of at least one immediate family member. These data show that women are regularly encountering death. Furthermore, they could be coping with such regular encounters of death by a sort of stoic acceptance and belief in fatalism rather than attempting to understand every facet of every disease or death.

4. Western Serengeti Household Health Routines

Another aspect of my qualitative semi-structured interviews involved asking my female respondents a variety of questions regarding their household routines such as boiling drinking water, food storage, birth control, etc. These topics and findings will be presented below.

4.1. Boiling Drinking Water, Food Storgae, etc.

In terms of daily household activities that influence health, I asked my respondents about their norms surrounding drinking water. Seventy-two percent report boiling their drinking water and on average (minus one extreme outlier) they did it for

twenty-five minutes. Although the majority are drinking safe water, 28% of households still use water that is not boiled and most-likely contaminated. Once again, I could chalk this practice up to ignorance or some cultural maladaptive practice. Yet when I explore deeper in the other data we gathered in structured interviews (n=722), I am reminded that the difficulty of boiling waters lies in the problem of finding fuel. Charcoal in this region is expensive to buy and extremely labor-intensive to make, and no one that we have ever met in western Serengeti owned a gas or electric stove. Thus, western Serengeti people rely on firewood as the main source of their fuel. Interestingly, when asked about the difficulties of collecting water and firewood, more respondents (79%) said that firewood collection is difficult than said that water collection is difficult (50%). During our structured interviews we asked how long it takes to gather or collect each of these. On average, we learned that it takes about 40 minutes to get one bucket of water in the wet season and 1 hour and 40 minutes per bucket in the dry season. Yet firewood collection takes even longer (2-3 hours per trip on average) and there is a risk of arrest for collecting it in protected areas (which many people must do due to the deforestation of woodlands in the village areas). Furthermore, unless alternative sources of fuel are found, soon it will be even more difficult to obtain firewood. One study shows that Tanzania's forests are in danger of being depleted since in 2005 the average household consumed 2 cubic meters of round wood per year per person, or 2.25 million cubic meters (Shinyanga Regional Socio-economic Profile 2007). Thus, this cross-referenced data illustrates that the reason some western Serengeti women do not drink safe water is most likely due to the fact that there are significant limitations on obtaining fuel to heat the water.

Another series of questions I discussed with my respondents involved food storage and problems with rodents inside their homes. Sixty-nine percent of the women interviewed listed having problems with rats. One woman said that they destroy everything in her home—from food, to clothes, to plastic bowls, to even chewing on her own feet and legs at night. Another woman told how the rodents create such a racket in her house at night that she has difficulty sleeping. For those that did not cite problems with rats (31%), many credited their owning a domesticated cat for keeping the rodent population under control. Yet other households with cats still had problems with rats.

The methods of food storage employed by the women I interviewed include: inside a *gala* (outside structure made of sticks) with 34% of interviewees using this method, plastic buckets inside the home (6%), sacks inside the home (54%), and plastic bags inside the house (11%). A few households used more than one of these methods of food storage (hence why the combined percentiles are greater than 100.) There was little variation in storage method between the group that had problems with rats and those that did not. In other words, the proportion from each group that stored food inside in containers, sacks, or bags did not differ. This demonstrates that the traditional food storage method (the *gala*) that is made from local products is just as reliable or useful as those that are dependent on market products (such as the bucket, bags, or sacks.) Also, these data demonstrate the pervasiveness of rats—storage inside or outside the house makes little difference for mitigating their presence and damage. On average, each household lost 3 *debe*²⁶ of stored food in the previous year. Compared to the damage done by elephants, this amount seems relatively insignificant, but for foods such as beans, the loss of this amount is still acutely felt.

²⁶ Each *debe* is a standard bucket size.

4.2. Birth Control, Fertility, and Pre- and Post-natal care

Three-fourths of the women I interviewed do not use any form of birth control. In describing their reasons for the choice that they make, two themes were recurrent in their discourse: 1) fear of the harmful side-effects of birth control, and 2) their husband's disdain for them (or him) using it. The latter is not surprising since women in rural Tanzania are still mostly subservient to their husbands. While Tanzanian society as a whole has been considered somewhat progressive in terms of allowing women in positions of authority such as the parliamentary positions, at the actual household level women are still under the hegemonic forces of male domination (Kapunda 2000). Thus, eleven percent of my interviewees cited that even though they wanted to use birth control, they could not because their husbands would not allow it.

The fears of women are also a major hindrance when it comes to birth control use. One woman said she would not use birth control because, "I will die quickly if I do," while another woman revealed that she believes birth control methods cause cancer. Several of the respondents had tried it at one point and then quit. Referring to her experience with birth control, one respondent reported that she used to get injections every 3 months but then she stopped getting the shots because it caused her "harm" and "problems." She said her stomach hurt and her menstrual cycle changed. Another respondent said that she too stopped using birth control because of the negative side effects. Birth control pills made her feel dizzy and the injections caused too much bleeding. In listening to these stories and the others that I was told, I remember feeling amazed by how these women had no one to talk to about their experiences or anyone who could provide advice. It seems (based on what they said) that little counseling was

provided in terms of preparing them for these side effects or in helping them to choose another method of birth control that could be somewhat less invasive or bothersome.

My qualitative, semi-structured interviews confirm what has already been proven many times, that education can significantly improve maternal and child health by (among other things) lowering fertility rates. More specifically, my interviews revealed that education levels impact how many children each respondent wants to have and then actually does have. After averaging their responses, I learned that my respondents believe that each woman should have six children. Yet when I used a Pearson's Bivariate analysis, I found more variations in their answers. Statistically significant correlations between a woman's education level and the number of children she actually had (p -value $<.001$) as well as between her education level and the number of children she thought a woman should have ($p <.001$) were found. This means that on both the behavioral and cognitive levels education is impacting women's perceptions of the best family size, which in turn can influence the actual health status of children. Ukwuani and Suchindran (2003) confirmed that higher fertility rates also increases child malnutrition rates. With increased family size, children must compete against each other for limited food resources in the family. Children with higher parity were characterized as being more nutritionally deficient (Ukwuani and Suchindran 2003).

Though not statistically significant, I found a link between education levels and a likelihood of using birth control. Respondents who acknowledge using birth control ($n=9$) also have completed more formal education (average of 6 years) than those who said they do not ($n=27$) use birth control (average education of 5 years).

In western Serengeti it seems that the most commonly administered types of birth control are injections, followed by birth control pills. Based on data I gathered from the Bunda District hospital, there were 14,024 women who were registered as having received some form of birth control in Bunda District. The most popular form given was an injection (n=9,072), while 4,940 received pills, and only 12 received IUCD.

In terms of prenatal norms, nearly half (49%) of my sample did not decrease their household workload during pregnancy. Women carry out most of the household labor in western Serengeti villages. In addition to overseeing their children (although this is often handed over to the oldest children), they cook for hours over a smoky fire (usually located inside the house), wash clothes by hand, find and carry heavy firewood, haul buckets of water from long distances away, and tend to their crops in the fields. Of those that did cut back in work during pregnancy, they mentioned stopping the heavy labor of carrying firewood and water and no longer farming in the garden. Some of those that cut back on these types of hard labor did not stop until the 8th month of pregnancy. On average, the women I interviewed explained how they return to their full work-load around the house three months after giving birth.

4.3. Cognitive Questions

Some of the questions I posed to my respondents were very open-ended, or what Bernard (2006) calls “free-listing.” Ultimately, my goal in using these types of questions was to better understand people’s perceptions about health and illness in western Serengeti. Some of these questions included: what helps to make people in your family healthy? What are the major problems that make people in your household sick? What

are the benefits and problems of living in your village? What should be done to make your village a better place to live? Another series of these open-ended questions surrounded how families cope with illness when it affects their household. These questions included: when you or your husband is sick, who helps your family? How do they help? How often do you help out other villagers when their family members are sick? Essentially, this series of questions seeks to understand how western Serengeti people adapt to the constraints they face.

The responses to the question “what makes people in your family healthy” were almost unanimously the same: food. While some women listed fruits, meat, and beans as essential for a healthy life, the majority simply listed the basic food staples of maize, cassava, and sorghum as being the most necessary items for achieving good health. Initially I wondered if this was a sign of ignorance. Perhaps western Serengeti women do not realize the importance of a wide variety of foods that can provide essential macro- and micro-nutrients. Yet after further consideration I have come to the conclusion that these answers simply reflect the fact that many western Serengeti households barely have enough of the basic carbohydrate staples. While considered a “starvation food” or a “drought crop” to urban Tanzanians and certainly to westerners, cassava, sorghum, and millet form the bulk of the diet for these households (see Chapter 2 of this thesis for dietary recall data). Furthermore, even these basic foods are in short supply in many households and thus they are considered a special commodity. Thus, if the basic caloric intake of western Serengeti households was easily being met, perhaps my respondents would have listed other “luxury” foods—such as beans, fruit, milk, etc.—more frequently.

In terms of the question “what are the problems that make people in your household sick,” my respondents were once again quite united in their answers. Most women named mosquitoes or malaria as the chief problem they face in terms of health. This brings us back to the underlying question of: why do they not all buy mosquito nets to prevent the spread of this disease then? The Serengeti District Health Sector’s RCH Coordinator who I interviewed blamed their culture. She said they are just unwilling to sell one cow and then buy all the necessary equipment (bug spray, net, etc.) to prevent the disease in their own home. She said it is not a matter of economic constraint that keeps these people from protecting themselves and their children, but simply a cultural mindset that creates an unwillingness to part with their livestock. However, I am able to prove her wrong on at least one level—that is, most western Serengeti households do *not* own livestock. From my semi-structured interviews I found that the average (mean) household owns 5.5 cows and four sheep/goats. But when I analyzed these data according to mode, I discovered that most households own no cattle, sheep, or goats. Thus, the women I interviewed are actually much poorer than this key informant suggested. Perhaps there are a few stubborn men and women who have plenty of extra livestock and who could afford to but refuse to buy mosquito nets; however, the majority of the women in my sample are aware that mosquitoes are a big problem and they simply do not have the economic means to do anything about it.

When analyzing the responses to the question, “what are the benefits of living in your village or town?” I immediately noticed stark difference between the free-listed answers from villagers versus townspeople. The most common village response was that their location meant they were able to have enough land to farm (plant crops) and herd

their livestock on. Other benefits of the village(s) included: having good neighbors, being able to access social services like schools and clinics, and being able to gain employment through tourism or conservation opportunities. For the latter, people from the village of Robanda were especially keen on the opportunities that arise due to conservation and tourism. At the time of my study, three tourist bush camps were operating within Robanda village land. This source of employment and income provides immediate incentives for the villagers to align their collective goals with conservation policies. By limiting hunting and other resource extraction in their village, these people are aware of the benefits that conservation and tourism can bring in terms of their own economic well-being.

The benefits of living in town (versus villages) as free-listed by my interviewees, had to do with having what some called an “easier” or “good life.” One woman summarized this common sentiment quite succinctly, “In the village, people think we must farm only. They have no idea about education and how else to live. In town we have understanding about life with ease.” This response illuminates some of the divide between rural versus townspeople in Tanzania. Those who do not live in villages seem to look down upon people who do live in villages. As Snyder (2005) discusses, urban-dwelling Tanzanians maintain a sense of “otherness” towards villagers and often assume that they are ignorant or backwards. Other women I interviewed said the benefits of town are, “we learn news early, we understand and can make a good life,” and “we can get our needs met; we can go to the hospital and market and school.” Finally, others listed the benefits of town as better access to various modes of transportation, opportunities to have businesses and buy things easily.

In response to the question, “what are the major problems with where you live?” two categories emerged as dominant during our interviews. These were: water shortages and crop damage by wildlife (see *Figure 4.3*). Once again, these answers were not prompted but interviewees were asked an open-ended question and they supplied the responses. In addition, *Figure 4.4* shows what areas my interviewees consider as important means for improving their villages’ or towns’ living conditions. The most common response was “I don’t know,” followed by “provide more water” or “dig more wells.” The next most common response was, “to help stop elephant crop damage” and “plant more trees.” These two sets of questions (about perceived problems and solutions) highlight the fact that western Serengeti women understand their state of well-being to be negatively impacted by economic constraints (e.g., inability to access clean water) and conservation goals (as demonstrated by repeated conflict with wildlife particularly in regards to destroying their food source).

5. Cultural Behaviors that Affect Health

There are several examples in which cultural norms, values, or institutions have direct impacts on western Serengeti health both at the household and individual level. Some of these norms decrease good health while others improve it. Some cultural institutions which we will discuss below allow for western Serengeti women and their households to cope when they face outbreaks of illness. Particularly important within these topics is the role that gender plays for influencing how individuals experience health and illness, and how they cope with it. In most of my previous analyses in this

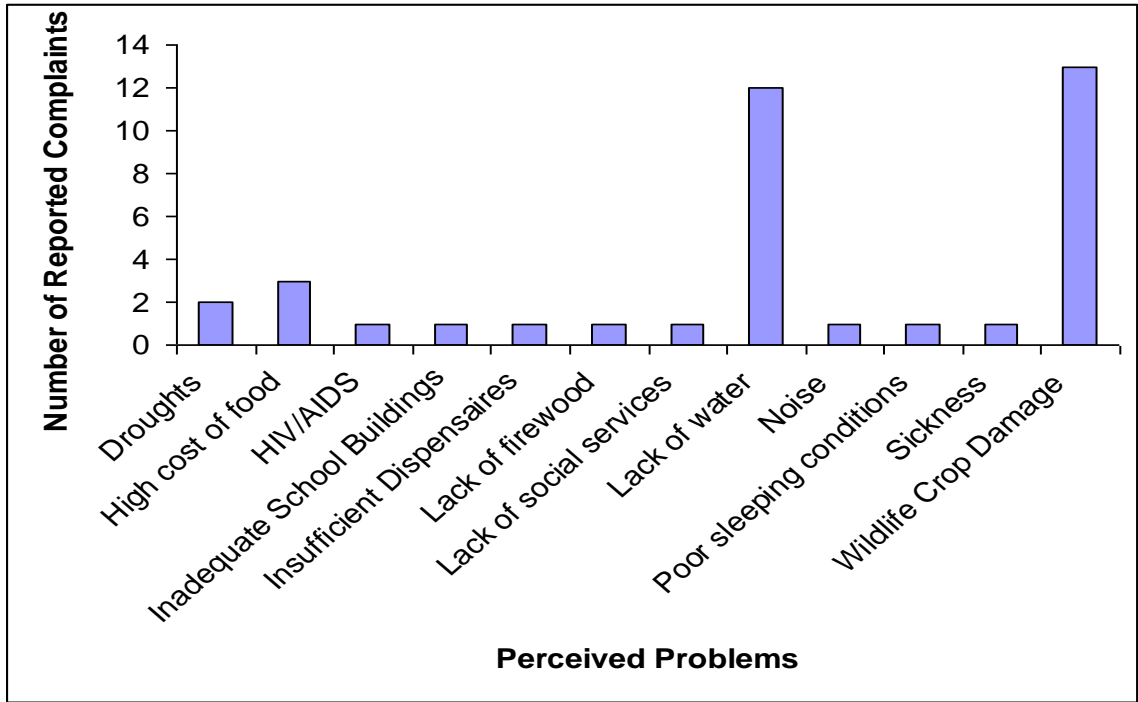


Figure 4.3. Perceived problems with living in western Serengeti villages and towns based on semi-structured interviews with women (n=36).

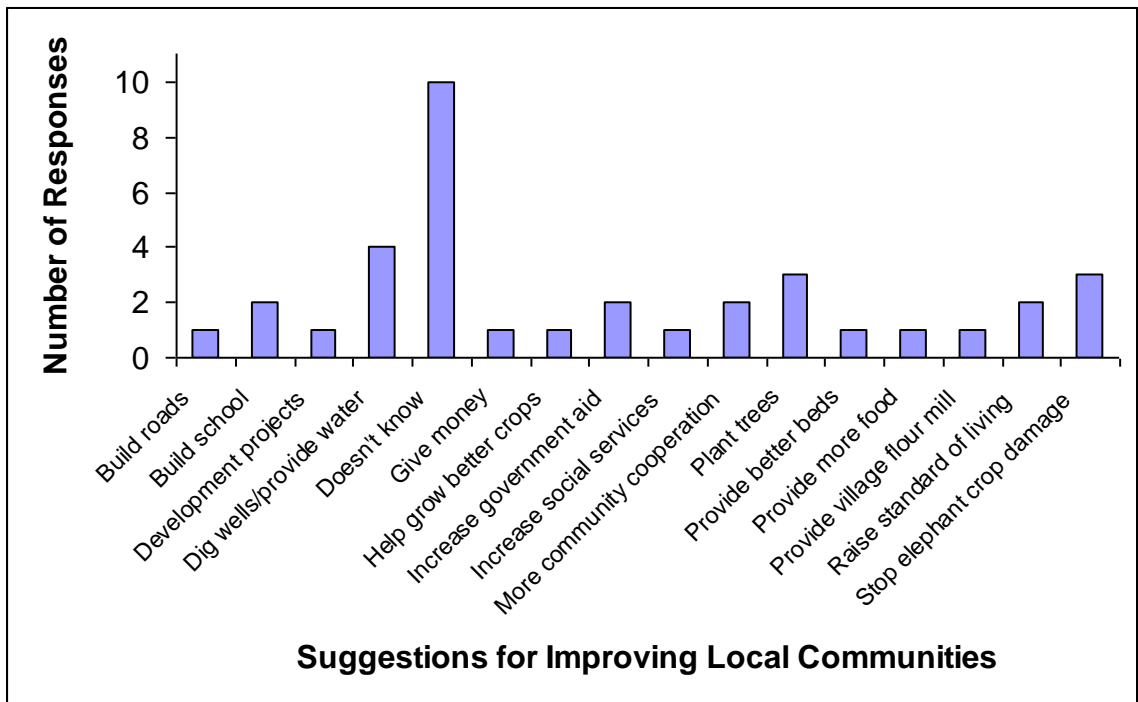


Figure 4.4. Suggestions for how to improve living conditions in western Serengeti villages/towns based on semi-structured interviews with women (n=36).

thesis, I examine health at the household level. This is why my conceptual model only deals with determinants of health at the household level. However, *within* households certain variables (such as gender) greatly affect one's individual identity, perceptions, and patterns of good or ill health. My focus in these next sections will mainly be on the experiences of individual women in being marginalized, abused, or vulnerable to physical suffering.

Though I can not give a complete history of the role of women in Tanzania here, it is worth mentioning that up until the time of independence, Tanzanian women had little power and were not allowed to be involved in wage labor or establish businesses in urban areas (Kapunda 2000). Those that did attempt to establish themselves in some kind of entrepreneurial endeavor tended toward the "fringe activities" (Kapunda 2000: 221) such as selling food, beer brewing and prostitution. Women who were not willing to engage in these illegal activities then played a major role in agricultural inputs yet without an ownership of that land or any say in decision-making regarding what foods were planted, how livestock would be managed, etc. Kapunda writes, "women continued to be disadvantaged for they cultivated land which they did not own" (2000: 221).

After independence, Tanzania's dynamic President Nyrere made a plea for gender equality. Kapunda (2000: 221-222) cites one of Nyrere's speeches:

It is true that women in traditional [Tanzania] society were regarded as having a place in the community which was not only different, but was also to some extent inferior. It is impossible to deny that women did, and still do, more than their fair share of the work in the fields and in the homes. By virtue of their sex they suffered from inequality which had nothing to do with their contribution to the family welfare....If we want our country to make full and quick progress now it is essential that our women live on terms of full equality with their fellow citizens who are men.

Nyrere's push for gender equality did bring more women into governmental or ministerial positions within Tanzania. Yet throughout the 1980s the economic and social situation for most women was still grim with only 20 percent of women finding employment in urban areas and food insecurity among women reaching high levels due to insufficient income. Lack of income was due to lack of employment, which was ultimately due to a lack of education (Kapunda 2000: 222). In rural areas female-headed households had fewer assets and people in their households, as well as smaller areas of land to plant than male-headed households (Kapunda 2000). While more opportunities for education and employment are slowly being made for women in Tanzania today, women are still generally disadvantaged. Studies show that female-headed households tend to be, on average, the most poor and the most vulnerable to food insecurity (Kapunda 2000). I mention these social patterns simply to help "set the stage" for more of my qualitative data that I will present below.

5.1. Wife Battering

In my qualitative interviews I asked some questions that were difficult for the women to answer. One question that was particularly sensitive was: "how often does your husband beat you?" This was usually followed up by "why does your husband beat you?" During several of the interviews, the husband was present and I could not ask these questions. Of those that I could ask (n=25), 56% admitted that they had been beaten by their husband at least once. Most of these women attributed their beatings to some fault of their own. For example, one woman said that she gets beaten "If I make a mistake...if I forget something he tells me to do." Another interviewee reported that the frequency of

her beatings “depends on how often I make mistakes.” Another woman explained that her beatings would occur because of the things she did wrong in the home—such as being late on bringing in the firewood. According to one interviewee, many men use a stick and beat their wives on their back. The frequency of these beatings varied for nearly every respondent. Some said they occurred only once or twice in their whole married life, while others said it is a regular event happening once, twice, and even three times a month. I can not make any overarching statement to interpret or understand these patterns other than to say that within western Serengeti households, a majority of women have experienced some sort of physical abuse. This fact reflects the entrenched social (gender) hierarchies that are common in households across rural Tanzania. Once again, this disturbing reality demonstrates that some aspects of western Serengeti culture is not particularly adaptive or helpful in alleviating health problems.

The TDHS (2005) also analyzed how women’s social status affected their health care. They found that “increased empowerment of women is likely to be associated with increased ability to seek out and use health services to better meet their reproductive health needs” (TDHS 2005: 147). Women who were more empowered were more likely to receive antenatal care and delivery care from a medical professional. One of the three indicators of women’s empowerment involved women’s perceptions of gender roles. More specifically, the DHS measured this indicator by the number of reasons a woman could give for justifying wife beating. The women who affirmed several justifications for wife beatings were less likely to have also received postnatal care than women who only agreed with one or two types of justifications. Thus, we see that the physical abuse women suffer is not only an immediate burden in terms of health, but also symbolic of

the entrenched hegemonic forces of male domination in their culture. These deeply embedded power relations have far-reaching implications for what types of medical care women will seek out and feel they deserve.

5.2. Female Genital Mutilation

Another of the main examples of the persistent influence of culture on health is the case of Female Genital Mutilation (FGM) or Female Genital Cutting (FGC). This practice occurs all across northern sub-Saharan Africa (in at least 25 different countries) and is commonly considered a crucial step in the rites of passage into womanhood for many African societies (TDHS 2005). While the Tanzania Special Provision Act, a 1998 amendment to the penal code, outlawed this practice, FGM is still occurring around Tanzania today (TDHS). A study of the perceptions surrounding FGM in Tanzania shows that greater awareness of FGM (among both men and women) is correlated with living in urban areas, being wealthier, and having more education. However, self-reported knowledge about FGM and actual prevalence levels are not always related (TDHS 2005). While urban women are more aware of FGM, prevalence levels are nearly double in rural areas. The prevalence patterns reflect the variation of ethnic distributions around the country and the varying beliefs and practices of each ethnic group. For example, The Tanzania Demographic Health Survey (data gathered in 2004-05) showed that the Northern and Central zones (Manyara, Dodoma, Arusha, and Singida regions) have the highest prevalence levels of female circumcision with 81% of Manyara District's women being circumcised and 68% of Dodoma Region's women being circumcised.

Similarly, the type of circumcision carried out also depends on cultural beliefs, norms, etc. In the Mara Region where I worked, 38.1% of the women reported being circumcised (TDHS 2005). Of those that were circumcised, 94.1% had experienced a similar type of circumcisions in which they were cut and had flesh removed²⁷. However, in other regions of Tanzania, there were greater percentages of women who were infibulated (TDHS 2005). Culture also influences the age at which circumcision occurs in most women. Twenty-eight percent of women surveyed in 2004-05 in Tanzania said they were circumcised before age one, while the same amount reported being circumcised before age 13. Overall, the TDHS shows that younger women and those from urban areas are more likely to be circumcised before age one than older women or those from rural areas (who tend to be circumcised later—such as around the beginning of adolescence).

The 2004 Serengeti District Reproductive and Child Health Report²⁸ sheds light on this issue for our study area. Of the 13,663 women who were examined in Serengeti District, 6,738 had been circumcised. This means that there is a 49% prevalence rate of FGM in Serengeti District which is significantly higher than the national average of 15% reported in the TDHS (2005). In that report it was acknowledged that the prevalence rates could be low due to underreporting. Data for that survey were based on women's responses and not on actual examinations. It was also found in that study that younger women (age 15-19) were less likely to report being circumcised than their older cohorts. The authors of the TDHS (2005) paper suggest that women could be under-reporting due

²⁷ 91.9% of all rural women in Tanzania have the type of circumcision where they are cut and flesh is removed. Just being cut (without flesh removed) or infibulations is not nearly as common.

²⁸ This report was part of the unpublished archival data I gathered (see chapter three).

to fear (since, as already mentioned, the Tanzanian government has outlawed the practice) or that the custom is simply in decline.

During my qualitative research with women, I was able to ask some open-ended questions regarding FGM. For example, one question I asked was, “Do you circumcise your own daughters?” It is interesting that their responses about their behavior do not match up with the data from the District Health Office (or, the archival data that I collected). Essentially, the district data reports that 49% of all inspected women are circumcised, while the qualitative data I gathered showed that 80%²⁹ of respondents said they have *not* or they will *not* circumcise their daughters³⁰. Of the women who said they did not (or will not circumcise their daughters), their reasons for this decision fell into six main categories. Listed in order of frequency, they are: “because it’s not our culture [anymore]” (n=14), “because it causes health problems for our girls later [when they try to give birth]” (n=5), “the government has outlawed it” (n=5), “because the Bible (or God) says not to” (n=2), and “I simply do not want to” (n=1). Ironically, for those that admitted to having had their daughters circumcised, all five admitted that it was because of their culture or “it’s according to our traditional culture” that they did it.

It is evident that many contradictions exist within the various types of data I gathered. First, the District FGM rates (from the archival RCH data) based on inspection show nearly fifty percent of women being circumcised while my qualitative interviews show an overwhelming majority of women that say their daughters are *not* circumcised.

²⁹ Interestingly, the TDHS asked a very similar question to their interviewees as I did to mine. Of the respondents from across rural Tanzania, 4% had already circumcised a daughter and an additional 2% were planning to have a daughter circumcised. As implied above, in my research I found a combined 10% that did or plan to circumcise their daughters. Therefore, the TDHS rates are slightly lower than those found in my study. The TDSH showed that the proportion of women who did or would circumcise their daughters decreased with education and higher household wealth status.

³⁰ Two of the respondents did not have any daughters and therefore their answers are not included in the analyses.

A second discrepancy in the data is that culture is invoked as the reason for both refusing and embracing FGM practices. I can only make logical conjectures based on the interviews I have done as to why these contradictions exist. My hypothesis to help explain this discrepancy is two-fold: 1) many of my interviewees were fearful to tell the truth because of the government law prohibiting FGM, and 2) culture is slowly changing—especially amongst younger women (particularly those who live in towns versus villages)³¹. So while adult women who were inspected do have high rates of FGM, perhaps there is less and less of the adolescent women being circumcised today. Furthermore, culture has been the ultimate driver of FGM practices in the past and perhaps it can be (and already is somewhat) the driver for terminating FGM today. The two stories told below help explain more of what I mean by the dualistic role of culture in shaping FGM practices.

One young woman I interviewed from Mugumu town talked a bit more in depth about FGM. She said, “men want a girl who has never been married before.” This is a euphemism for a girl that is still a virgin and circumcised. The interviewee said that circumcision usually occurs when girls are about 14 years old³². She hopes that she will not have to have her daughters circumcised when they reach the proper age, but she said it ultimately depends on what her husband wants. Several other interviewees confirmed that female circumcision depends a lot on the type of men in the area. For example, men in the villages who do not have outside work tend to want girls who are circumcised. However, several of my interviewees said that in the town of Mugumu (or other towns) it

³¹ Other studies in Tanzania show that (while still somewhat uncommon) some women are bringing about culture change through resistance of various norms, such as the rejection of a prearranged marriage (Hodgson 2000).

³² The majority of mothers from the TDHS said they had circumcised their daughters after age five.

is not difficult to get married if you aren't circumcised because the men do not care as much.

The actual process of circumcision is rather gruesome. One Ikoma woman from Park Nyigoti Village said that the actual cutting is done with a razor blade³³. Her mother-in-law is the person in their village that performs the ceremony. She said that it takes place in a room-full of people (about 10 other women watch), though some other circumcision ceremonies take place in the bush. One Kuria key informant told me that unlike the Maasai ceremonies in which an entire age set is circumcised together, girls in Serengeti District³⁴ can decide when and, to some extent, where they are circumcised. This key informant and another female interviewee agreed that many other women stand around and watch when the actual ceremony occurs. The Kuria key informant said that during the circumcision procedure, a girl lies in the spread-eagle position on her back with one person holding her arms above her head and other people holding her legs. Girls are not supposed to cry when they are circumcised because it is “bad behavior.” The informant from Park Nyigoti proudly recalled that she didn't cry when she was circumcised. Interestingly, she said she would have her daughter circumcised when she reaches age six. Most other women who talk about the practice say it occurs when girls are older and “ready for sex.” The Kuria key informant concurred that a girl usually decides herself to be circumcised when she knows she wants to be married. This woman claimed that girls “want to be circumcised because this is how they get respect.” She also explained that the room-full of people who watch the cutting are looking to see if the girl is actually a virgin or not. In the Kuria culture it is important that a girl not have sex until

³³ The Kuria key informant said that various small knives are used in the process of FGM.

³⁴ This key informant was referring to Kuria female circumcision.

she is circumcised. When the circumcision itself occurs, a girl who is not a virgin is supposedly easier to cut than those that are virgins.

While some women reflect on their circumcisions with a sense of pride, others recall the fear and pain involved. An acquaintance of mine from Mugumu explained that her own sister “cried for three days” after her circumcision. The ceremony was carried out in a small house in the bush outside of town. She said the girls have to walk home from this remote place after being circumcised. Her sister is barren today and this informant believes that her barrenness is a result of her sister’s circumcision. My informant also believes that other problems in addition to infertility—such as ongoing sickness or difficulty in childbirth—can be caused by circumcision. When the time came for this woman’s own circumcision as a teenager she ran away from home. She recalled that when she was young, parents in her village tried each year during the December break from school to get their daughters circumcised. Thus, every year she would run away during this time. Once school started the parents did not try to circumcise their daughters because they knew it would mean they would have to miss days of classes. Thus, they would wait until the following year. Eventually, after running away year after year, the woman’s parents gave up on circumcising her. Ultimately, they realized it did not matter since she was able to marry an educated man who was indifferent towards this practice.

These stories illustrate that while cultural beliefs and norms perpetuated FGM for generations, today they seem to be gradually changing and helping slow down circumcision rates in western Serengeti. More specifically, particularly brave female

individuals are rebelling against their cultural systems and are slowly changing the norms that are in place. In a sense, these women are using culture to reverse itself.

5.3. Indigenous Medical Knowledge

Another potentially negative impact of cultural institutions upon human health in Serengeti District surrounds knowledge of how to treat chronic coughs and fevers. The Serengeti District Council Health Sector's Reproductive and Child Health Report (2004) lists 58 deaths of children during that year due to procedures carried out in the villages. The underlying cause of these deaths is when villagers either cut the uvula or pull out the teeth of their children. After reading about these practices in the Report, I was able to interview Mama Mwolo, Serengeti District's Reproductive and Child Health Coordinator, to find out more. She explained that Serengeti District Villagers "believe" (her words, not mine) that to cure a chronic cough or cold, the uvula (located in the back of the throat) needs to be cut. In addition, villagers "believe" that persistent fevers in their children can be cured by pulling out the child's teeth. Both of these practices lead to severe bleeding, infection, or some combination of the two which ultimately results in death. There were 253 reported cases to the District RCH Office of these practices (70 cases of cutting the uvula and 183 cases of pulling out teeth).

5.4. Postive Effects of Culture on Health

While I have discussed several of the ways that culture potentially has negative impacts on the health of western Serengeti people, my research also provides excellent concrete examples of how the cultural norms of western Serengeti are extremely adaptive and positive means for coping with illness as well as political-economic constraints. For

example, every single woman I interviewed no matter what her occupation, education or level of income and assets responded that she breastfed her children. Furthermore, the average duration for breast-feeding each child among my interviewees was 21 months. In many western countries, breast-feeding is considered somewhat taboo in public or if carried on for too long. Though now recognized for being highly beneficial for one's child, some women in the western or developed world still feel self-conscious for breast-feeding at all and particularly past a certain point (such as after the child's first birthday). However, in western Serengeti, women regularly breastfeed in public and until their children were at least eighteen months, if not 2 or 3 years old. This cultural norm in western Serengeti improves the children's ability to survive. In their chapter describing the interactions between malaria and infectious disease, Frisancho and Frisancho (1993) articulate that the longer infants are breastfed (whether full or partially), the greater the chance of infant survival. Unlike other studies in sub-Saharan Africa (e.g., Dettwyler 1994), my data show that even though women are breastfeeding past 18 months on average, they are also introducing solid foods at an appropriate age³⁵. Based on my interviews, the average age for when the women introduced solid food to their infants was at five months. This age is in keeping with the WHO recommendations for exclusive breast-feeding until 4-6 months and then adding some solid foods (WHO 1995).

Another excellent example from my research regarding the positive ways that culture influences health pertains to the role of social capital in providing the necessary means to cope with illness. Pretty (2003:1) defines social capital as the term that "refers to the value of connectedness and trust between people." Usually used in reference to

³⁵ In Dettwyler's (1994) study in Mali, many infants were malnourished due to their mothers' waiting too long to introduce solid foods.

some sort of collective management of natural resources, social capital is also recognized for being one of the key components of sustainable livelihoods since it lowers the costs of working together and facilitates cooperation (Pretty 2003: 1). It includes relations of trust; reciprocity and exchanges; common rules, norms and sanctions; connectedness, networks and groups. During my semi-structured interviews I asked each woman: who helps you during times when you or your husband is sick and how do they help? In response to the first part of that question (see *Figure 4.5*) my respondents' most common answers were that help comes from: their extended family (n=15), their immediate family (n=12), or their neighbors (n=10).

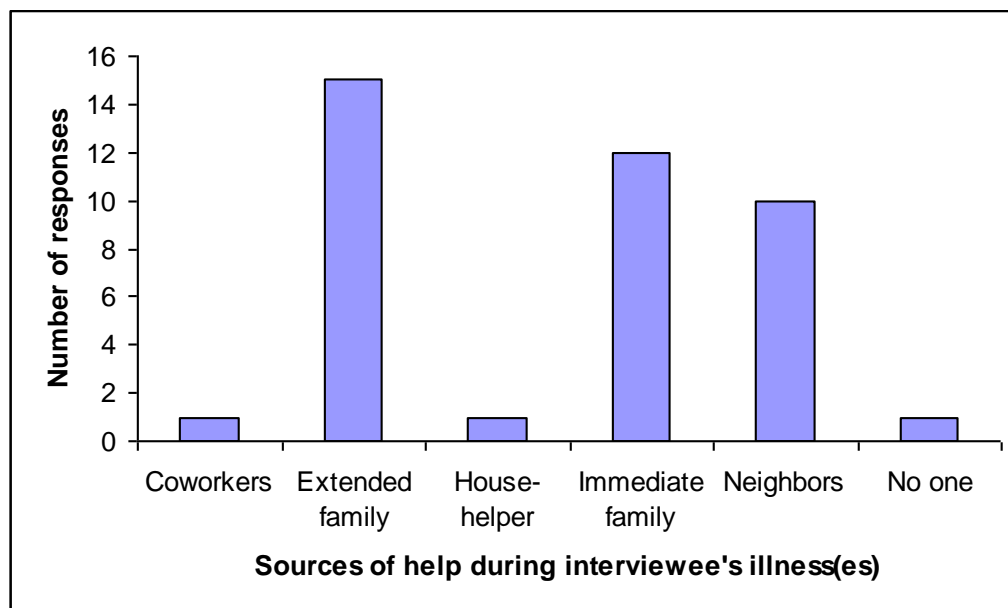


Figure 4.5. Sources of help (social networks) during periods of illness, based on semi-structured interviews with women in western Serengeti (n=36).

The most common types of assistance during these periods of illness were: providing transport to the hospital—usually paying for public transport (n=11), cooking for the interviewee's household (n=10), or giving money for treatment or food (n=8). Yet a wide variety of other responses were listed including collecting water, gathering

firewood, herding livestock, helping to care for the women’s children, cleaning, etc. (see *Figure 4.6* for a complete list).

These methods of assistance are generally reciprocated though not always on a tit-for-tat basis. In other words, those who help may not be the next to fall ill in the community, so “repayment” is often on a delayed basis. The key concept of this coping mechanism is that assistance is given to whoever needs it so that when one’s own family is affected by illness, then social networks can be drawn upon. Most western Serengeti women that I interviewed (67%) report helping others out when they are in need or ill. In fact, when asked about how often they helped others out during their periods of illness the average response was three times per month.

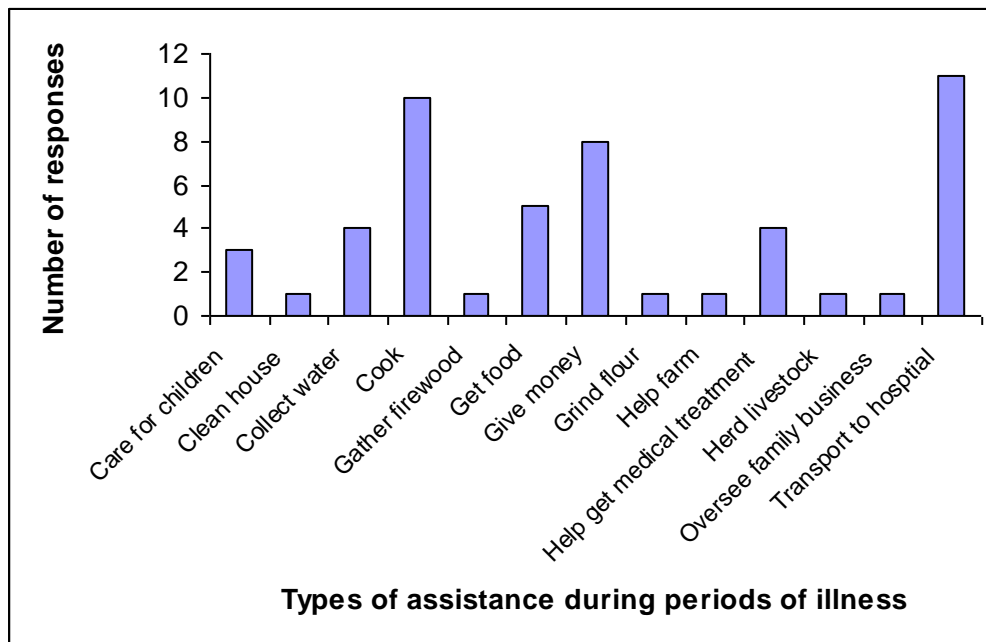


Figure 4.6. Methods of received mutual assistance during periods of illness as reported by women in western Serengeti during semi-structured interviews (n=36).

The extent of these systems of reciprocity were further uncovered during the structured interviews we did among villages in Serengeti, Bunda, and Meatu Districts. These structured interviews (n=722) show that the sharing of remittances³⁶ is a common practice for much more than a third of our interviewees (41%). Of those that acknowledged giving remittances (n=299), the average spent per annum was: \$12 on friends, over \$75 on siblings, \$60 on more distant relatives, \$20 on their children who live away from home, and \$55 on their grandchildren³⁷. Considering how low their average incomes are, this type of generosity is exceptionally alarming. Furthermore, in another of my analyses of the structured interviews (n=722) particularly surrounding the types of monetary gifts given between residents of this region, the number one reason for gift-giving was to assist with medical problems (see *Figure 4.7*).

The Tanzanian practice of remitting money or other goods to family members has been documented already in the anthropological and sociological literature (Creighton 2000). In one study, 78% of all migrants to Tanzania's capital of Dar es Salaam were sending remittances to family members still living in rural villages. On average, migrants remitted 10 % of their monthly income to family members. The proportion of money sent did not increase with higher income levels; in fact, those migrants with the highest income sent proportionally less. However, one of the studies that Creighton (2000) reviews showed correlations between increased education levels and greater proportions

³⁶ Remittances are the sending of money or goods to relatives or friends who live elsewhere. Usually the money or gift is sent from an urban-dweller (with a steady job or income) to a rural-dweller. Though not always, this urban-to-rural movement of money or goods can “maintain rights to village land and membership, meet traditional obligations to support parents, pay towards the support of children who are being cared for in the countryside, invest savings and prepare for retirement. More generally, remittances may be seen as an insurance policy through which individuals maintain bonds with kinsfolk whose support may be needed at some future time” (Creighton 2000: 90).

³⁷ During the interviews, respondents made estimates of their remittances in Tanzanian shillings and these were converted to U.S. dollars based on the following conversion rate: 1,000 TSHS/\$1.00.

of remittances being sent. This demonstrates that assistance to family members or friends is not so much a function of income, wealth, or poverty but more a result of the network of social capital that is being built up or maintained. Furthermore, rural dwellers are just as likely to give as they are to receive from the urban relatives or friends that send remittances. Creighton (2000) highlights that many forms of reciprocity benefit the urban-folk including when rural kin work in their fields for them, provide non-paid ayahs or house-helpers, send foodstuffs from the countryside, or care for extended family members.

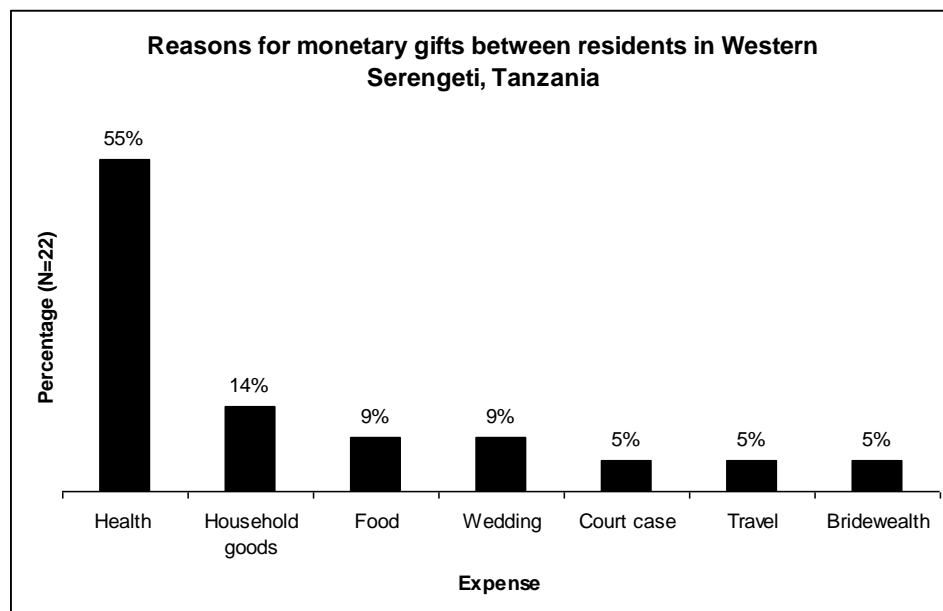


Figure 4.7. Reasons for gift-giving within main sample (n=722) of western Serengeti inhabitants.

Thus, these data (from my research and supported by the previous work in Tanzania at large) effectively demonstrate that western Serengeti people have developed an appropriate means of cultural adaptation to the biological and economic constraints that they face. When a family member is sick and the household cannot afford to pay for a trip to the hospital, not-to-mention the hospital fees and cost of treatments, family and

friends within the household's social network provide the means to cover such expenses. On another level, apart from this monetary provision, social networks can and often do provide labor for households facing shortages from illness. The response of one woman I interviewed sums up the simplistic beauty of this system of reciprocity. When I asked her what the benefit of living in her village was she replied, "This is *my* village. My parents were born here. I was born here. If I move somewhere else it will be hard; but in Robanda if I get problems, people help me."

6. Conclusions

It is difficult to summarize the findings of such a broad and open-ended method as these qualitative interviews that I used. However, in terms of interpreting the overarching story from this method, four themes emerge that are important and necessary to mention. The first is the recurring theme of a lack of biomedical understanding that western Serengeti women have. Whether it pertains to knowing what types of illnesses they or their family members had, what caused the death of their child, or why certain birth control methods have such difficult side-effects, it is apparent that these women are lacking in terms of biomedical counseling. Certainly biomedical information alone is not going to drastically improve the well-being of western Serengeti people, yet a sense of safety, respect, and actually being heard and taught in a non-demeaning way could motivate more women to seek treatment or prevention for various health problems in their family.

A second recurrent theme from this qualitative data is the influential role that culture does play in exacerbating and alleviating the strains of illness for western

Serengeti households. Social capital in the form of social networks is seen as an adaptive means for coping with illness, while other cultural norms (including those of health practitioners) can further harm people. One of these “norms” was so prevalent throughout the interviews that I decided to make it a separate theme in and of itself.

Thus, the third recurrent theme within this method is the important role that social hierarchies play in shaping human health in western Serengeti. Particularly clear is the hierarchy of men over women as seen in the portions of my interviews that deal with wife battering, FGM, and women’s inability to use birth control due to their husband’s wishes. Until hegemonic forces of male domination in Tanzania are altered, it seems that women in western Serengeti will always be prone to certain health problems that accompany high parity rates, physical abuse, and FGM. Other hierarchies in addition to those between genders include the low social status that the elderly and small children have in terms of accessing resources (particularly food) within their village or household.

Finally, the last emergent theme from this method is the concept that the environment (particularly wildlife) greatly shapes the well-being of people in western Serengeti. Repeatedly, my informants complained of the deleterious effects of wildlife in decreasing their food supply or making life in their village difficult.

In the next chapter, I will integrate these four themes with the broader story of western Serengeti human health that was uncovered through the other methods I used in my research. Some of the themes from this chapter will be corroborated by data from previous chapters, while other themes will prove to stand in contrast to findings from other methods. Together, the combined methods help to give the most accurate picture of human health in western Serengeti possible.

Chapter Five
Linking Different Methodologies for the Assessment of Health in Western Serengeti

1. Introduction

In the previous three chapters I seek to answer the question: what is the health status of western Serengeti people? Within each chapter I address this question with a different approach—one that uses nutritional assessment, another that analyzes morbidity and mortality data from biomedical records, and a third that draws from the experiences, perceptions and stories of actual western Serengeti individuals. In this final chapter my goal is to link together the findings from each of the disparate methodologies in order to tell the most accurate story about the health of people in this corner of East Africa.

The overarching conclusion from this research is that western Serengeti people have low-protein diets and relatively poor health (based on high rates of infectious disease and mortality indices); a fact that is intrinsically linked to and exacerbated by poverty. Furthermore, the situation in western Serengeti in which people struggle to survive amidst chronic malnutrition, high rates of infectious disease, and low economic status is a product of social forces at multiple scales. On the micro-level, individuals' preferences (partly determined by cultural values and socio-economic constraints) affect the immediate decisions that are made at the household level. These types of decisions include what sorts of treatment family members seek for a sick patient or what food preferences they have. In addition, the micro level influences the attitudes of indigenous healers or biomedical practitioners towards their patients. In addition to the micro level, forces acting at multiple scales—on community, village, regional, societal, or global levels—are the more ultimate drivers of health and socio-economic status. These forces shape collective action, access to resources, job availability, income levels, access to medical services, and livelihood strategy options. It is evident then that micro, meso, and

macro forces are interacting and even shaping each other. Thus, no individual source—whether it be culture, conservation, or poverty (amongst others)—can be targeted and blamed for the poor health of western Serengeti people since each are interacting with and influencing each other.

In the ensuing paragraphs I will further explain the linkages between macro, meso, and micro causes of poor health; but first I will summarize the findings from each of the separate chapters and methodologies regarding human health in western Serengeti. Then I will discuss the implications of these findings and offer recommendations for how to mitigate health problems in western Serengeti.

2. Nutritional Assessments Results

The nutritional assessments I conducted included a protein frequency questionnaire (in which the interviewees are asked how often they consume certain protein sources during the previous months) and a 24-hour dietary recall (in which the interviewees recall everything they consumed in the previous day). The overarching conclusions from these methods are that 1) direct negative links between the protected areas (or conservation agenda) and dietary quality are not found, 2) that education (especially maternal) is strongly correlated to increased protein intakes, and 3) higher income and increased assets improve diet quality. In the following paragraphs I will explain these conclusions and themes in greater detail.

First, in terms of results from the food frequency questionnaire, interesting patterns of protein consumption emerge when the households are analyzed along a spatial gradient. By utilizing the GPS data points I gathered from each household, I was able to

look for correlations between distance from the protected areas and various protein sources. The findings from this analysis were that households further from the protected areas consume more beef while those closer to the protected areas consume more sheep/goat (shoat). Another statistically significant correlation exists between owning more cattle and eating more beef. Therefore, these data suggest that households which consume more beef also own more cattle and live further from the park. Or, households that are closer to the park have adapted to the constraints placed upon them (e.g., lack of rights to grazing land and lack of markets) by consuming alternate sources of protein.

Secondly, as will be further reinforced by the 24-hour dietary recall data, the protein frequency questionnaire reveals that male and female education levels are significantly correlated with increased protein consumption rates.

Lastly, when comparing three different sample groups within my research (the main sample, self-admitted poachers, and people with specific park employment) I found that income and type of employment are linked to the type of protein that households consume. For example, *dagaa* (a local minnow) is the main source of protein for the average western Serengeti households (main sample), while—as would be expected—bushmeat is the staple protein source for poachers. Finally, people with formal employment and steady income from park-related jobs consume greater amounts of all other protein sources (beef, chicken, eggs, milk, and beans) than the other two sub-populations (who consume primarily *dagaa* or bushmeat).

The findings from the dietary recall data are in keeping with the conclusions from the protein frequency questionnaire data. First, the dietary recall method reveals that diets for western Serengeti households are simple and mostly comprised of grains and

vegetables. Slightly more than half of my sample (54.2%) did recall consuming some form of protein during the previous day. Moreover, my analyses reveal that income, assets (land and livestock holdings), and female education are the socio-economic variables that most strongly correlate with improved dietary quality (i.e., greater protein intakes). To determine which of these factors was the most strongly correlated to protein intake, I conducted a linear regression analysis. I examined the links between any protein intake (combined sources) and five variables: total income earned during the previous year, total land holdings, female (wife) secondary education, number of cattle, and distance from protected areas. The analysis from this test shows that the most significant predictors of general protein consumption are (in order of importance) total income, followed by number of cattle owned, wife's secondary education, total land holdings, and distance from protected area. In a separate analysis using a Pearson's Bivariate Correlation, I also discovered that total income is significantly correlated (Pearson $R = .265$, $p < .001$) with woman's secondary education. What these data demonstrate then is that of all the socioeconomic indicators, it is income and assets (particularly cattle owned) that has the greatest influence upon quality of diet. Likewise, female secondary education levels are also a significant influence upon household diet and therefore, household health.

While these socioeconomic indicators had significant correlations with dietary quality, all of the indicators that I used to measure the indirect impacts of conservation upon household health (these included the crop damage, livestock predation by wildlife, distance from protected areas, and poaching status for each household) did not have any significant correlation (either positive or negative) with dietary quality. The only

significant finding relating to the relationship of conservation and dietary intake (based on the dietary recall data) pertains to the spatial distribution of households. More specifically, households that are between 3 and 5.9 km from the protected area boundary were less likely to consume greens (and thereby more likely to consume a form of protein) than households either closer or further to the protected area boundaries. This implies that there may be some benefit to living in the “middle distance” to the conservation areas (E.J. Knapp 2009). Living further than 5.9 km away eliminates the benefits while being closer than 3 km could involve too much risk of crop destruction from wildlife.

3. Archival Data Results

The morbidity and mortality data from hospital records in Serengeti and Bunda districts suggest that health levels in western Serengeti are generally below those for the rest of Tanzania. I will briefly summarize the findings from these archival data in the paragraphs below.

First, based on data from the HIV/AIDS Clinic (CBHPP) in Mugumu, Serengeti District, HIV rates are higher in Serengeti District than the rest of Tanzania. In 2003, the CBHPP data reveals 10.8% of non-symptomatic individuals who came for testing at the clinic were HIV-positive while in 2004 the percentage had decreased to 8%. The Tanzania HIV Indicator Survey (2003-04) estimates that 7% of all Tanzanian adults (ages 15-49 from around the country) are HIV-positive. Thus, even with the decrease in HIV rates between 2003 and 2004, Serengeti District is still above the national average. Bunda District Hospital Data from 2006 corroborate this finding by showing that 9.7% of

blood donors (both male and female) were HIV-positive. Once again, these rates are higher than the national average of 7%. Among those that have HIV in western Serengeti, women ages 15-40 are most vulnerable to contracting the disease. In 2003, 15% of women who tested at CBHPP were positive while only 6.3% of men were positive. Women in polygamous marriages (35%)³⁸ were the most likely to have HIV followed by those who were in monogamous marriages (24%), those who were widowed (17%), and those who were unmarried (16%).

The morbidity and mortality data gathered from western Serengeti district hospitals reveal that infectious disease dominates the health milieu in western Serengeti. The top ten diseases for patients that attended Serengeti District health station (clinics and hospitals) during 2004-2006 were in order of most common to least common: malaria, acute respiratory infection, intestinal worms, urinary tract infections, pneumonia, diarrhea, skin infections, eye infections, anemia, and schistosomiasis (also known as bilharzia). Malaria alone comprised 59% of all cases seen in Serengeti District hospital (or any of its subsidiary clinics) in 2005. In the Bunda District hospital, patterns of infectious disease are similar to those of Serengeti District with 40% of all out-patient diagnoses in 2006 being malaria, followed by acute respiratory infections (14%), pneumonia (9%), diarrheal disease (8%), urinary track infections (7%), intestinal worms (6%), pregnancy complications (5%), skin infections (4%), schistosomiasis (4%), and eye infections (3%). These high rates of infectious disease (and particularly malaria) reveal that western Serengeti populations are extremely poor since these infectious diseases are relatively easy to prevent if adequate housing and clothing, clean water, good nutrition,

³⁸ This percentage means that of the sample of women who tested positive for HIV, 35% were in polygamous marriages.

and decent medical services are available (Holtz and Kachur, 2004, Reid and Thrift 2005, and Inhorn and Brown 1997). Unfortunately, the situation across Tanzania as a whole is similar (TDHS 2005). The main cause of morbidity and mortality in Tanzania for both in- and out-patient admissions is malaria, which accounts for 40% of all out-patient attendances. However, there is reason to question the abundance of malaria diagnoses that are made across Tanzania. Patient expectations and health workers' presumptive actions lead to the usage of anti-malarial treatments even when results from blood slides and patient symptoms do not confirm the presence of the disease (Reyburn et al. 2006).

Other important findings from the archival data reveal that Maternal Mortality Ratios are much lower in Serengeti and Bunda Districts (according to hospital records) for the years 2001-2006 than they are compared to the TDHS (2005) findings for all of Tanzania during the years 1994-2004. However, comparisons between the country as a whole and just western Serengeti may not be accurate since the methods for estimating MMR in the TDHS (2005) report and the western Serengeti hospitals are very different. Furthermore, as the TDHS report explains, any sort of measurement of MMR is very difficult to accurately calculate since a very large sample size is needed. Thus, I am hesitant to make any comparisons saying that western Serengeti women face less danger of death related to pregnancy than do women in other parts of Tanzania. When looking at the MMR for western Serengeti alone, there is little improvement during the years 2001-2006; the rates fluctuate between 115 maternal deaths/100,000 live births and 174 maternal deaths/100,000 live births in Serengeti District. Likewise, Bunda District Hospital Records reveal little improvement (despite some fluctuations) between 2001 and

2006 in MMR with both years' records showing 132 maternal deaths/100,000 live births. Despite these rather grim findings, the archival and qualitative data do reveal that more women (especially those that are younger) are giving birth at a health facility or with a trained birthing attendant present. These data are in keeping with the findings for the rest of rural Tanzania (TDHS 2005).

Finally, Bunda District Hospital records show that infant mortality rates ranged between 120-140 deaths/1,000 live births during 2000-2004 while the national Tanzanian average during those same years was only 68 deaths/1,000 live births. Similarly, under-five mortality rates in Bunda District during 2000-2004 were also much worse (they ranged from 120-150 deaths /1,000 live births) than the national average (112 deaths/1,000 live births) during the same years. Therefore, it is safe to argue based on these data that western Serengeti people are enduring very difficult health conditions and are also entrenched in endemic poverty.

4. Qualitative Interviews Results

As explained more fully in chapter four, the qualitative data I gathered are part of a phenomenological approach in which the human body—and the experiences and perceptions people have—are considered legitimate grounds for cultural study. In terms of my research specifically, this means that the stories, knowledge, experiences, and memories of women from western Serengeti are the subject for my analysis and study of health. This methodology was based on semi-structured interviews with women and I will highlight some of the key findings of this research below.

First, based on the hunger history questions, I learned that 52% of the interviewees had experienced hunger (due to a shortage of food) at least once during the previous month. While household assets and expenditures did not correlate with hunger levels, higher male and female education levels are positively correlated with decreased levels of perceived hunger. Also of note, when discussing the causes of hunger, the responses of my interviewees could be easily grouped into two main categories: natural (or ecological) causes and economic constraints. The majority (67%) of respondents listed natural causes as being the main source of their hunger; in particular, elephant crop damage was mentioned by 36% of all respondents as being the cause for limiting their households' food intake. This finding is very useful in that it clearly reveals the negative perception that western Serengeti women have towards wildlife especially when it comes to their experiences of hunger or health.

Secondly, during my qualitative interviews with women I carried out an illness recall questionnaire. This methodology asks the woman to recall any illnesses that she or a member of her household experienced during the previous month. The findings were that 19.4% of interviewees reported being ill themselves during the previous month—somewhat higher than the 15% reported by another study in rural Tanzania (Frederickx 1998). In addition, 78% of all interviewees had at least one of their household members experience illness during the previous month. Although explained in more depth in chapter four, it is important to mention that this illness recall data clearly reveal that western Serengeti women lack answers to the questions of what diseases their household members have and what is causing these diseases. For example, when asked about the causes for the illnesses they or their household members experienced during the past

month, most women answered, “I don’t know.” Several women I interviewed never even knew what it was that caused the death of their children. On average, each western Serengeti woman I interviewed had experienced the death of .97 children during her lifetime. Thus, a lack of knowledge about the causes of illness is part of a coping mechanism for dealing with regular encounters of death. However, at the same time, this lack of biomedical knowledge (and subsequently a lack of biomedical care) reveals uneven distribution of power, wealth, and social status in that certain population are not able to receive the same medical care that other populations within their same country or around the world receive.

Another area in which western Serengeti women seem to lack knowledge and power pertains to their fertility. Three-fourths of my interviewees do not use any form of birth control. The women cite two main reasons for their lack of usage of birth control: 1) fear of harmful side-effects and 2) their husband’s restrictions on their choices. The first reason highlights the lack of counseling that western Serengeti women receive pertaining to their health or biomedical treatments. Without adequate access to health professionals who can thoroughly explain the available options for fertility planning as well as the coinciding side-effects, western Serengeti women are left to speculate, worry, and turn aside from methods of birth control. Furthermore, as the second reason listed above implies and as I discuss in chapter four, rural Tanzanian women are still (for the most part) trapped in a social system marked by male dominance (Kapunda 2000). Under such a regime, it is considered shameful and dangerous to go against the will of one’s husband, father, uncles, or male caretakers. Women in western Serengeti would greatly benefit from more freedom to decide how best to care for their bodies.

Furthermore, their decision-making would also benefit from more accessible fertility counseling from health practitioners who are willing to explain in full detail the positive and negative effects of using various birth control methods. Interestingly, my data also clearly demonstrate that increased education levels affected women's perceptions of how many children they should have as well as how many children they actually did have. With higher education levels, women thought that the ideal family size should be smaller and in turn they actually did have fewer children. This clearly demonstrates the importance of female education on shaping the cognitive and behavioral levels of fertility, which in turn affect individual and household level health.

Several key themes emerge from this qualitative data. First is the aforementioned social hierarchy of power which directly influences people's well-being. Children and elderly are low on the power hierarchy as evidenced by the fact that they are often the first to go hungry during food shortages. In addition to the disadvantages of children and the elderly in western Serengeti, women's health is also undermined by the hegemonic forces of male domination—not just in terms of fertility choices (see above), but also in terms of FGM and wife battering. Fifty-six percent of my interviewees admitting to being beaten by their husband at least once during their marriage, while some were beaten as many as a couple of times each month. Though a case can be made for the importance of female circumcision as a social rite of passage (Snyder 2005, Gruenbaum 1996), my qualitative interviews also reveal that many young women fear this event in their lives and attempt to evade it. Furthermore, my interviewees acknowledge that if the preferences of men in their communities change (i.e., that they do not demand to marry only circumcised women) then the practice itself would eventually stop. While the

Serengeti District RCH Report (2004) uncovered a 49% prevalence rate of FGM among inspected women, my interviews also give some hope that women are protesting the practice and some mothers (supposedly) are no longer administering FGM for their daughters. While it is difficult to truly determine if this cultural rite is actually becoming less common or not, what is certain is that power hierarchies between men and women shape the patterns of health for women in western Serengeti.

A second key emergent theme is the obvious fact that poverty—a macro level force—is prevalent. Overall it seems that poverty is a greater driver of health problems in western Serengeti than micro level forces such as cultural preferences or tradition. For example, in terms of drinking potable water, 28% of households I interviewed do not boil their drinking water. Yet after further investigation comparing interviewees (n=722) perceptions of collecting firewood versus water, I conclude that the lack of water-boiling is due primarily to a shortage of fuel-wood rather than cultural “ignorance” or stubbornness. Similarly, most western Serengeti households I interviewed do not own any livestock. This contradicts the opinion of the Serengeti District Health Sector’s RCH coordinator who said that culture is to blame for health problems in western Serengeti (specifically that people are unwilling to sell just one cow to buy a mosquito net and prevent contracting malaria). On the contrary, most of my interviewees easily labeled malaria and mosquitoes as the leading health problem for their household. Moreover, western Serengeti people own more mosquito nets per household than do the rest of rural Tanzanian households (based on the TDHS 2005 survey). Thus, these data demonstrate that western Serengeti people are not just ignorant or stubborn (as the health coordinator suggested) but that they are hindered by economic constraint. She grossly overestimated

that “most households own livestock but are simply unwilling to part with them.” Rather, my data prove that most households do *not* own any livestock.

Another recurrent theme from this qualitative data is the role of the environment in influencing people’s health. In many of the open-ended cognitive questions from my interviews, women repeatedly brought up the way that the natural environment shapes their lives. Positive aspects include having enough land to farm and (for a few respondents) realizing that close proximity to a national park provides job opportunities. But the vast majority of respondents mentioned again and again throughout the interviews that the lack of water and crop damage by wildlife is particularly harmful for their well-being. When asked about how to improve their village life, some of my interviewees’ most common responses were “dig more wells” and “help stop elephant crop damage.” Whether or not the protected areas *actually* harm people’s health or not, the fact that most western Serengeti women (barring those few who mentioned job opportunities as being a perk from the national park) *perceive* the wildlife to be harmful reveals that the relationship between protected areas and people will be strained.

The final recurrent theme from this methodology is the role that culture plays in shaping health. Some cultural practices do appear to be maladaptive. These include the hierarchies of male domination prevalent across Tanzania that led to wife beating or female circumcision, and certain indigenous medical knowledge (such as the cutting of the uvula in children to cure a chronic cough). Yet from this qualitative research the most illuminating finding of all is that cultural norms are also extremely adaptive mechanisms for coping with health problems. One example includes the prolonged period of breast-feeding that women in western Serengeti maintain for their infants. Another is

the vast supply of social capital that people draw upon (and invest in) during times of illness. When asked who helps their family during periods of illness, my respondents listed their extended family, their immediate family, or their neighbors. These social networks provided everything from transport to a health station, to giving money, cooking dinner, or performing a host of other household chores. Most of my interviewees (67%) reported helping others out during their times of need; the average response was to help others at least three times per month. Moreover, from the structured interviews (n=722) across Serengeti, Bunda, and Meatu Districts, I discovered that more than a third of our respondents gave remittances during the past year with the number one reason for giving being another person's medical problems. Such systems of reciprocity demonstrate that western Serengeti people have found appropriate cultural means for adapting to the health constraints that they face. This does not mean that they are not still poor or that they do not still face high levels of infectious disease or that medical care is now miraculously adequate; rather, it shows that social capital in the form of delayed reciprocity provides some "insurance" during times of crisis. If a family is strapped for cash but needs to send one of their members to a distant hospital, friends and family provide the means to travel and pay for hospital fees as well as take care of the daily household chores back at home. In so doing, family and friends insure that they too will be helped out when their household faces illness.

5. Discussion: Combining Results from Three Methods

In this section, I organize the discussion of this combined research around the questions outlined in chapter one of this thesis. Those questions are centered on the main

question of: what *is* the health status of western Serengeti people (as measured by their nutritional status, morbidity/mortality patterns, and experiences)? More specific sub-questions include: How does their state of health compare to the rest of rural Tanzania? What health patterns emerge within the study population—are certain ethnic groups or genders or occupations—more linked to vulnerability than others? How do western Serengeti people cope under the constraints of poor household-level (or individual) health? How do individual women view health and illness through their own experiences? And finally, as I will describe in more detail below, what linkages exist between human health in western Serengeti and the issues of conservation, culture, and socio-economic status?

Before discussing my findings as they pertain to these main questions, I need to first mention a few key points. Most importantly, I must acknowledge that no single methodology is able by itself to fully explain the health situation in western Serengeti. Each of the methods I employ presents a different side to the same story. This story depicts how western Serengeti people are affected by the constraints of poor diet, infectious disease, and inadequate medical services—all of which negatively affect their health. At the same time, western Serengeti people are adapting to these constraints and those of their ecological and cultural environment by choosing alternate protein sources (such as local minnows or small stock), by still visiting whatever biomedical facilities or local healers they can access and afford, and by drawing on social capital during times of illness.

While it seems that I equally embrace each methodology that I use, I must also mention that by using biomedical data (for the archival methodology) I am not “selling

out” to the biomedical paradigm. As Inhorn and Brown (1997) write, in order to improve health conditions, medical anthropologists often have to work within the biomedical paradigm. This does not mean that I am not aware of the fact that biomedicine, illness, and health are all socially constructed phenomena and that often the “institutions of biomedicine itself function to maintain social inequalities” (Inhorn and Brown 1997: 54) rather than change them.

5.1. What is the health status of western Serengeti people and how does it compare to the rest of rural Tanzania

In this study *health* is measured by nutritional assessments, the analysis of archival data, as well as by qualitative interviews with women. Each method confirms the overall poor health of western Serengeti people. Diets are low in protein (with nearly half of the sample not reporting the consumption of any protein sources), hospital records reveal that patients are plagued almost entirely with easily-preventable infectious disease, and women perceive themselves and their families’ to be experiencing a high prevalence³⁹ of illness while also not being aware of what causes many of these illnesses.

5.2. What patterns emerge within the population?

As I have already explained, the most vulnerable individuals within western Serengeti are children and the elderly (as seen in the hunger histories and out-patient data from hospital records). Secondly, women are more vulnerable to health problems than men based on the HIV/AIDS data and based on the fact that they experience

³⁹ “High prevalence” is based on the fact that my sample of women reported more illness than did another study conducted in rural Tanzania.

complications from childbearing and childbirth. Women have less access to education, income, and assets making them less able to seek medical care or procure proper foodstuff for healthy nutrition. Finally, as I discussed above, women are susceptible to beatings from their husbands as well as complications from FGM. These difficulties are part of a much larger social hierarchy in which men are considered dominant over women. While Tanzanian women hold public office at every level from the village office to the national parliament, they are still generally considered subordinate to men within the household.

In terms of which households are more vulnerable than others, the nutritional data show that households closer than 3 km from a protected area boundary and households further than 5.9 km from a boundary consume more greens (which implies that they consume less protein)⁴⁰. Households that were further from the protected areas owned and consumed more large stock (cattle) while households that lived closer to the protected areas consumed more small stock (shoat). Otherwise, ethnicity, distance from the protected area, amount of crop damage and livestock predation made little difference on dietary quality. These data are crucial because they demonstrate that negative benefits from the conservation area do not necessarily exist; or at least they do not appear to affect household well-being immediately. I will discuss this idea in more detail below. What contradicts this finding is simply that western Serengeti women still *perceive* the destruction of crops by wildlife to be one of the main problems (particularly in terms of food security) of living in their villages. However, my nutritional assessments do not

⁴⁰ When I say they “consume more greens” it simply means that they reported eating greens more often during the previous 24-hour period than the group of interviewees who live between 3 and 5.9 km from the protected areas. There was a statistically significant negative correlation between consuming greens and consuming protein.

confirm that any negative changes in diet *actually* occur—rather, just that people must adapt by taking on more small stock instead of large stock.

As would be expected, households with lower income and assets have greater risk of poor health. The nutritional data demonstrate this correlation explicitly. These data demonstrate that without improvements in the overall livelihood of people in western Serengeti (particularly increasing women’s education and creating greater income-generating opportunities), western Serengeti people will have a hard time improving their nutrition and overall health. The poorest households with the least income, assets, and education are the most at risk for malnutrition.

5.3 What can we learn about western Serengeti health from a more experiential level?

Interviews with western Serengeti women illuminate the fact that these individuals perceive themselves (and their family members) to be experiencing many health problems and food shortages. This awareness is higher than what another study in rural Tanzania showed (Frederickx 1998). However, the qualitative data also reveal that western Serengeti women are in greater need of biomedical information or counseling to help them understand the causes of their illnesses, treatments, and side-effects. Many women report not knowing why their children died, stopping treatments because of adverse side effects, not knowing what illnesses were causing their problems, not using fertility planning because of their fear, and turning to indigenous healers because they were the only ones who were helpful. In addition, these interviews reemphasize the linkages between the conservation areas and the people living near them. In different

parts of my interview respondents repeatedly told how crop damage by wildlife diminished their food supply and was one of the two most difficult aspects (in addition to water shortages) of living in their village. These western Serengeti women perceive the wildlife to be harmful to their well-being. As long as such perceptions exist, then tensions will linger between the people and the protected areas. As I've written in earlier sections of this chapter, there were many more valuable insights gleaned from the qualitative research (especially pertaining to the role of culture in shaping human health) than I have mentioned in this paragraph. The few I mentioned above stood out as some of the most important findings for this discussion.

5.4. How do western Serengeti people cope under their health constraints?

One of the most important discoveries from the qualitative research I conducted pertains to this theme of coping with health problems. I uncovered that during times of illness western Serengeti people respond to the shortages of labor and cash in their household by drawing on their social networks for assistance. Friends, family, and neighbors respond by doing household chores, caring for children, and giving gifts of food or money for hospital fees when needed. This system of delayed reciprocity makes it possible for households that are poor to be able to get medical help. However, even with such an insurance system in place and even by regularly investing in social capital by helping others, tragedy still does strike many families. This is due partly to the fact that some households are extremely far from any health stations and some families—even with the financial help of their social network—can not afford expensive treatments like a hair-lip surgery or a wheel chair. Every woman I interviewed experienced (on average)

the death of one of her children during her lifetime. Living far from health centers makes it difficult to receive medical help before a child has already progressed too far to be treated. Thus, while social capital is an extremely adaptive means of coping with health problems and socio-economic constraints in western Serengeti, there is still much room for improvement to allow for western Serengeti people to have the proper health care they deserve. Better-supplied health facilities with more medical staff would allow households to have faster, more reliable health care.

5.5. What are the links between health in western Serengeti and conservation, culture, and poverty?

As I explained in chapter one of this thesis, there is no possible means for attributing direct causality for poor health to any one variable. Thus, I will in no way attribute the problems in western Serengeti to any factor alone—whether it is conservation, culture, or poverty. However, this research does shed light on the dynamics between each of the three variables and human health in western Serengeti. .

5.5.1. Conservation

First, in terms of the impacts of conservation upon western Serengeti people's health, it is evident that people in western Serengeti perceive the conservation agenda to directly impact their lives. Many female interviewees mention that the hardest aspect of living in their village and the cause of their food shortages are due to crop damage by wildlife (particularly elephants). On the other hand, the nutritional data show very little correlation between the effects of the conservation agenda upon dietary quality. For

example, each indicator I used to measure the effects of conservation (including distance from the protected area boundaries, amount of crop damage, amount of livestock predation by wildlife, and poacher status of the households) were not significantly correlated to any changes of diet based on the 24-hour dietary recall data. The only significant change noted in the dietary recall data was that households located 3-5.9 km from a protected area boundary consumed less greens⁴¹ than the other households closer and further from the protected areas. This means that such a “middle distance” from a protected area could have the most advantages (e.g., proximity for hunting, job opportunities, plenty of land for farming) and least disadvantages (less crop destruction and livestock predation). The only other finding in terms of health (particularly dietary quality) and conservation agenda pertains to the protein frequency questionnaire. This methodology demonstrates that households further from the protected areas own more cattle and consume more beef while households closer to the protected areas own fewer cattle and consume more goat. This correlation is very revealing because it shows that households in closer proximity to the conservation areas are adapting by utilizing smaller stock and changing their diets so as to still consume enough protein, but simply in a different form.

In conclusion, my qualitative and nutritional data sets seem to present different answers to the same question of how does conservation affect human health in western Serengeti. On the one hand, people perceive the relationship to be negative—that conservation hinders their well-being. Conversely, the nutritional data seem to highlight that humans *can* adapt to the constraints placed on their livelihoods by consuming

⁴¹ Once again, my data reveal an inverse relationship in western Serengeti diets between “greens” and protein sources. A significant negative correlation exists between consuming greens and protein.

alternate sources of protein than more expensive options such as beef or chicken. Likewise, the nutritional data show no difference between the quality of diet for people that experienced direct negative impact from wildlife and those that did not. Part of the difficulty in interpreting these data could be due in part to a delayed effect from crop damage or livestock predation. As E.J. Knapp (2009) suggests, the deleterious “after-shocks” of such a disturbance may not be visible at the household-level until a year or more after the event. For example, while no significant differences are noted in dietary quality between households that did or did not experience crop destruction by wildlife, the delay could be due to the fact that crop damage *this* year actually will harm *next* year’s food supply. To test this hypothesis, longitudinal data would need to be gathered that could compare the dietary quality of households over time and thereby test whether a delayed effect occurs.

In addition to the delay effect mentioned above, even if the conservation agenda is not completely harming people’s well-being, the presence of negative perceptions towards the wildlife or protected areas among local people will perpetuate tensions with the conservation agenda. These perceptions could be built up over time as stories are passed along about the danger that wildlife brings to humans, livestock, or crops. I did interview different people who had experienced the loss of their livestock and even their own child (to a hyena) not just their crops. Perhaps if more western Serengeti people were educated about the benefits of living near a conservation area (such as being able to own larger tracts of land) and that adaptive strategies (such as keeping sheep and goats) can allow them to maintain successful livelihoods despite some of the hardships of living among (or close to) wildlife. Likewise, more attempts could be made by the conservation

area officials to be involved in (not completely in charge of) community development projects, community education programs, or compensatory schemes for households that lose crops or livestock to wildlife.

5.5.2. Culture

There is often a tendency as anthropologists to become so consumed with entering inside the mind or soul of the people we are studying that we can become overly preoccupied with an “emic” perspective (Morsy 1990). That is, by considering “the Other”—the culture or those we are studying—as simply exotic, completely foreign, and closed off from the outside world we miss out on how exogenous (e.g., national, global, local, political, or economic) forces shape the household dynamics. Didier Fassin (2001: 311) explains:

By negating in the Other that which is both universal and diverse, rational and subjective, material and symbolic, and overall considering the Other exclusively in the singular, culturalism refuses the Other access to the status of political being, which by definition is plural. The otherness of culturalistic ideology is therefore both without separate worlds, and without any imaginable reciprocity, since the division between the Same and the Other is necessarily asymmetrical. Attempt must now be made to remedy this neglect of politics without going to the other extreme which would result in abandoning all cultural interpretation. We cannot without impunity throw the baby that is culture out with the bath water that is culturalism.

Thus, in this section I will discuss some of the ways that local patterns of behavior or thinking shape health in western Serengeti but I also am aware of the fact that these cultural norms are not isolated from large-scale outside forces.

As other anthropologists have outlined before (Inhorn and Brown 1997, Dunn 1979) culture can be helpful in alleviating illness or disease as well as hazardous. Throughout human history we see how various diseases—such as cholera in London in

the late nineteenth century, or malaria in different parts of the world including China, and West Africa—have each been affected by local knowledge and behaviors (Inhorn and Brown 1997).⁴² Likewise, my study shows that cultural knowledge and behaviors in western Serengeti can not be considered just “bad” or just “good” for shaping human health. In western Serengeti some of the more hazardous cultural adaptations include wife-beating, FGM, cutting the uvula and pulling the teeth out of small children to cure chronic coughs or fevers, and not boiling drinking water (which is more a function of economic constraint). On the other hand, adaptive strategies which improve human health in western Serengeti include prolonged breast-feeding of infants (usually at least until children reach two years of age) and the use of social capital for coping with the constraints of having an ill household member. There are many other practices in western Serengeti which are very difficult to categorize as either “cultural” or just a function of socio-economics and as either “good” or “bad.” These include such factors as a very simple diet of grains and greens (low in cholesterol and fats but also lacking in protein and micro-nutrients), food storage norms (practical yet prone to rat infestation), livestock-keeping practices (herds are kept within the household compound which allows for easier access to dairy products but also more contamination and spread of disease), low education status especially for women, and distributions of labor (relies on large family size which means more work can be accomplished but also more mouths to feed).

Overall, as other studies have done in the past, my research highlights that culture is simultaneously adaptive and maladaptive in terms of mitigating illness. Furthermore,

⁴² In London, the unhealthy practices of alcohol consumption amongst factor workers augmented the spread of cholera whereas indigenous practices around the world have actually prevented (or treated) malaria infection. For example, regularly consuming large portions of cassava (which contains small amounts of lethal cyanide) in Liberia curtailed the spread of malaria just as *Artemisia* consumption successfully treated the spread of this infectious disease in China (Inhorn and Brown 1997).

my research uncovers some of the ways that the biomedical community in western Serengeti can improve so as to better serve the culture and people there. The attitude of one health officer I interviewed toward her patients as well as the statements made by many of the women I interviewed reveal that western Serengeti people are often blamed for their health problems and fear not only the health workers but also the treatments that they receive at a biomedical facility. This situation is alarming considering that it is so difficult for western Serengeti people to reach a health station nonetheless afford the visit and treatments. Many of my interviewees admitted to being fearful of certain treatments and also to being unaware about the actual causes of various diseases and symptoms. Some women acknowledged that they simply turn to their indigenous healers (many of whom are witch doctors) and their local medicines for treatments instead. These findings are not unusual for rural Tanzania. The Tanzanian TDHS (2005) found that 62% of all their female respondents admitted to having at least one major issue which posed as a big problem in obtaining health care. The main “perceived barriers” (TDHS 2005: 149) were: lack of money (40%), the distance to the health facility (38%), and having to take transport (37%). Yet in addition to these, 14% of the women they interviewed reported that unfriendly providers are a major problem preventing them from getting proper health care.

A second aspect of the biomedical culture that is somewhat harmful to human well-being is the over-assumption by health workers (and patients) across Tanzania that nearly every illness is malaria. In order for antimalarial treatments of the new artemisinin

combination therapy (ACT)⁴³ to be successful, the treatments need to not be overused (Reyburn et al. 2006). After observing outpatients in a district hospital in a highland region of Tanzania over three weeks, Reyburn et al. (2006) found that 20% of all outpatients at the hospital were diagnosed and treated for malaria even though over 90% of these cases did not have malaria. Only 17% of the patients were actually sent for a blood slide (to check for malaria), and of these who were tested in the laboratory, only 6% were found to be malaria-positive. Health workers believed that they could accurately diagnose malaria without laboratory tests being conducted; yet even for the few cases that were tested via blood slides and shown to be negative, the patient were often still treated with ACT anyway. The following quote summarizes this influence of culture upon biomedical diagnoses and treatments:

Our results suggest that malaria slides in clinics may fulfill a social or ritual function. In this study, a slide request was more likely if patients had travelled further (suggesting patient motivation to attend a facility where microscopy was available) although there was no association with socio-economic status suggesting that the cost of the slide does not play a major role. Clearly, for health workers, malaria is a convenient and acceptable label for non-specific illness but little is known about the understanding of malaria that leads to such practice and whether the phenomenon is driven more by patients or health workers (Reyburn et al. 2006: 5).

Other scholars concur that in the malaria-endemic regions of Africa it is probable that a large proportion of avoidable antimalarial treatments are given out (Reyburn et al. 2006). Certainly in high transmission areas it is acceptable to use presumptive diagnoses to prevent the risk of severe malaria, but in areas of low transmission it would be better if health workers and patients themselves would rely more on the results for blood slides for whether or not to prescribe or take anti-malarial treatments. Although my research does

⁴³ ACT actually stands for artemisinin combination treatment. Reyburn et al. (2006) state that it is being used more widely across Africa as the first line of treatment for non-severe malaria. This treatment is not as “cheap or safe” as former antimalarials used in Tanzania (and around Africa).

not cover this broad of an application, work could be done to determine if the areas around the GSE are high, moderate, or low transmission areas for malaria. Omumbo et al. (2002) reveal that the intensity of malaria transmission can be quite accurately predicted today using certain Remote Sensing (RS) indicators (listed in order of predictive value): 1) land surface temperature; 2) rainfall, humidity, and normalized difference vegetation index (NDVI) and 3) altitude. While these indices seem to indicate that much of western Serengeti would be in a high transmission area for malaria, Reyburn et al.'s (2006) research still illuminates the fact that the over-treatment of malaria in Tanzania could actually be preventing the accurate diagnosis and treatment of other illnesses.

In conclusion, this research shows that the cultures of the local people and the biomedical system (including health professionals) simultaneously alleviate and exacerbate human health problems in western Serengeti.

5.5.3. Poverty

In chapter one of this thesis, I referred to *poverty* according to the following definition: “the lack of income...civil and political rights, assets and services” (Roe 2008: 493). In the course of analyzing the findings from my research, I have also come to equate the term *poverty* with the much broader concept known as *socio-economic status*. Ultimately, these terms are slightly different; but here I use *poverty* to represent the larger concept simply because the latter can encompass characteristics of households in western Serengeti that might not normally be included if we just examine *poverty* alone. From henceforth then, I use the terms *poverty* and *socio-economic status* interchangeably.

As multiple scholars note (Sellen 1996, Adler et al. 1999, Bindon and Dressler 1992, Holtz and Kachur 2004, Leon and Walt 2001), socio-economic status is intrinsically linked to the health of people with a duality of causality running between them. The links between socioeconomic status and health are manifest in a gradient pattern and should not be bifurcated along wealthy versus poverty-stricken dichotomies (Adler et al. 1999). Measures of the socioeconomic “gradient” include: 1) economic status, as measured by income; 2) social status as measured by education; and 3) work status, as measured by occupation (Adler et al. 1999). Having acknowledged that gradient, I also must point out that the archival data of this research reveal the pervasiveness of poverty across the *entire* western Serengeti population. This statement is based on the high rates of infectious disease that dominate in and out-patient hospital records as well as infant, neonatal, and under-five mortality rates in western Serengeti. This is not to say that there isn’t the occasional wealthy person living in western Serengeti, but overall the population west of the GSE is poor.⁴⁴ My structured interviews from Serengeti District (n=420) reveal that on average each western Serengeti household has an income of \$1.21 per day.

Returning to more of a “gradient-level analysis” for the western Serengeti population, my measures of socioeconomic status (income, assets, and education) turned out to be the strongest predictors of increased protein intake in the dietary recall methodology. There were many different analyses that I conducted, but repeatedly it was level of income that was the most consistent variable which correlated to increased protein intakes. Similarly, assets (particularly owning more land and owning more cows)

⁴⁴ Granted, the poverty levels of humans east of the GSE are even worse than western Serengeti as based on nutritional status and the lack of decision-making rights the Maasai have within the Ngorongoro Conservation Area, and adjoining conservation areas on the eastern side of the GSE (see Knapp et al. *In progress*, McCabe 2003, McCabe 2002, Galvin et al 2002, Potkanski 1997).

were also significantly correlated with increased protein intakes. The qualitative data corroborate these findings by showing that women's perceptions of health and illness are greatly jaded by their poverty levels. Namely, the fact that western Serengeti women equate "things that make us healthy" with having simple staple foods—cassava, millet, sorghum, and maize—instead of a wider variety of foods such as fish, beef, eggs, or other protein sources and fruits. Likewise, the regular experiences of hunger reported by many of my interviewees reveal the low socio-economic status of the entire region.

After income and assets, my data demonstrate that social status in the form of increased education greatly improves household-level health. In the dietary recall methodology, education levels—particularly those for females (or wives of the head of household) positively improved protein intakes. Using regression analyses, I discovered that at the household-level the strongest predictors of any protein consumption and just milk consumption were (in order of importance): total annual income earned for the household, total land owned by the household, and wife (female) secondary education level. Similar to the dietary recall data, the results from the protein frequency questionnaires reveal significant correlations between increases in education (for both male and female) and increase in beef, chicken, bean, egg, milk, and fish intakes. Lastly, the qualitative data show that with increased education women in western Serengeti gave birth to fewer children and also perceived the ideal family size to be smaller. These data demonstrate that education affects both the cognitive and behavioral levels among western Serengeti women.⁴⁵

⁴⁵I can not ignore the question of whether or not education levels are determined by culture alone or other political-economic factors. On one level, not educating one's child is influenced by culture—e.g., some parents want to marry their daughter off as soon as possible due to customary practice and therefore do not prioritize an education. These customs though have underlying economic incentives—such as the

In addition to the importance of economic and social status, work status also emerged as being strongly correlated to improved diets. The protein frequency questionnaire results uncover significant differences in the type of protein consumed for people within three different employment categories: those with park employment (they consumed the most of all protein sources except *dagaa* and bush meat), the main sample without park employment (consumed the most *dagaa*), and self-admitted poachers (consumed the most bush meat). Although I can not trace type of protein entirely to employment alone, this finding does suggest that people with formal park employment have a greater ability to choose whichever type of protein source they prefer.

In summary, the nutritional assessments and qualitative research I conducted among a sample of western Serengeti people reveal strong linkages between socio-economic status and human health in western Serengeti. However, this finding only leads to an even deeper and harder question--why is poverty so entrenched in western Serengeti in the first place? This question takes us to a place beyond the typical models used in epidemiology or disease causality. It demands that a political economy framework be utilized and that ultimate causes of poor health be understood. Such an approach was used by Turshen (1984) in her study of health in Tanzania nearly thirty years ago. Morsy (1990:39-40) writes about Turshen:

[She] addresses the adverse health consequences of colonial agricultural policies in Tanzania, which emphasized export cash crop production. Focusing on

acquisition of the daughter's bridewealth. Moreover, other factors such as the remote locations of many western Serengeti households also make it difficult to access schools. Some children must hike miles each day to reach their classrooms. If they do arrive, many schools have a shortage of desks, teachers, and basic supplies. More importantly, many households simply can not send their children to school because they can not afford the school fees, uniforms, and books, or they can not afford to lose another important member of the household's labor force. Children are often utilized for carrying water, collecting firewood, herding livestock, and caring for younger siblings. So while not prioritizing the education of one's children could be hindered by a cultural impediment, it is also influenced by political-economic factors.

‘capitalist underdevelopment of the Tanzanian economy,’ she explains that the neglect of food production for local consumption and subsequent malnutrition in women and children left behind were caused by the system of labor migration imposed by colonial authorities.

As this example demonstrates, I can not ignore large-scale often exogenous forces that shape patterns of health and poverty in western Serengeti. This is what Inhorn and Brown (1997:42) call the “macrosociological perspective.” Such forces in western Serengeti include major change (as I explained in chapter one) such as the Maasai invasions of the late 1880s, Colonial take-over and impositions in the late 19th and early 20th century, forced socialization during the 1970s and 1980s, and continued loss of land and rights due to expanding conservation areas throughout the last century and into the new millennium. Each of these exogenous forces brought with it a series of cataclysmic changes that included moving household locations, altering livelihood strategies, changing labor patterns, altering crop selection and food choice, adapting to new market exchange systems, and ultimately jeopardizing the well-being of households and individuals in western Serengeti.

In seeking to understand poverty in western Serengeti, I have been reminded by Barrett and Swallow’s work (2003) that poverty is a global problem (though most extreme in sub-Saharan Africa) and that in order to overcome it we must first learn how to better conceptualize the nature and causality of poverty. These authors differentiate “transitory poverty” (typically found in developed countries when people are able—along with the help of various public or private safety nets—to emerge out from a state of poverty rather quickly) from “chronic or persistent poverty.” The latter is found most often in developing and under-developed countries and is marked by a stronger magnitude and longer duration of poverty. This is certainly the type of poverty that is

present in western Serengeti. Households do not generally move out of a state of poverty quickly (within a year or less). Barret and Swallow (2003: 4) go one step further to redefine the latter term as *fractal poverty traps*—the state in which there is an inability to move beyond the poverty threshold due to a host of forces acting at multiple scales. They write, “The key to understanding the genesis of poverty traps lies in understanding the nature of transitions—or, more importantly, the absence of transitions—between strategies” (Barrett and Swallow 2003: 11-12). What such a definition implies is that poverty analyses can no longer be broken down into a simple micro-macro dichotomy, but that institutions at *all* levels from the individual, through the household and community, and finally up to the national or global scale influence poverty. Thus, poverty traps are considered multi-scalar and interlinked—processes at one level can affect those at another scale.

Barrett and Swallow’s (2003) concept of poverty is based on the idea that strategic options are at the center of human well-being. Having options, or being able to make choices, is what allows people to move beyond poverty. Without the freedom or power or resources (human, natural, social, physical, or financial capital) to make choices, individuals and households are restricted in their ability to move out of the poverty trap. These authors highlight what makes many people particularly susceptible to poverty traps—namely, “vulnerability of livelihoods to shocks beyond the control of the individual decision-maker” (Barret and Swallow 2003: 10). In western Serengeti, certain sudden perturbations to the livelihoods of people greatly alter the choices that they can make. Today, these sorts of shocks include crop damage and livestock predation by wildlife, drought, El Nino events, fire, sudden changes in conservation

agenda (that leads to a loss of land rights or hunting rights), or disease outbreaks (in livestock or people). These “exogenous asset shocks” (Barrett and Swallow 2003:13) are particularly harmful to people without insurance mechanisms in place. Thus, external shocks limit the choices that western Serengeti people can make and then inhibit their ability to transition between strategies of lower productivity to higher productivity.

While much could be reiterated from various scholars about the ultimate causes of poverty acting at various scales, Barrett and Swallow (2003) summarize that macro level causes include the biophysical environment, history-dependent social phenomena, political violence, subjugation of different people groups (such as by colonial governments), urbanization, and changing markets due to the whims of wealthy countries. At the micro level they emphasize that poverty traps are most often due to an inability for individuals or households to engage in livelihood strategies with high economic returns because they lack the means to finance the initial investment costs. What I find most relevant and illuminating in regards to western Serengeti, however, is not the micro or macro level causes of poverty. Rather, it is Barrett and Swallow’s (2003) meso scale analysis that reveals ways to improve well-being in western Serengeti. The frequently over-looked meso scale refers to the intermediary scales between household and nation. These scales are what make certain villages better off than their neighboring villages or certain districts more prosperous than another. These institutional arrangements can include (but are not limited to) ad hoc social networks, common property management groups, formal public offices, and market systems. When coordination exists between the various formal and informal social groups, there is greater chance for improved public goods and services (Barrett and Swallow 2003). An

example of this in western Serengeti is how each village or ward (usually) coordinates the collection of money from villagers and organizes work-days. These days of collective action involve such activities as building additional classrooms for the local primary school and working together to plant the school gardens. In return, the schools are in better shape for the village children and the collective gardens can generate some income to help provide needed supplies for each classroom or pay the school fees. Another example of meso scale institutions in western Serengeti includes the establishment of village-owned safari bush camps adjacent to the National Park. The villagers who are involved in these collectively-owned enterprises see the immediate benefits of setting aside land and refusing to hunt wildlife as they generate income for themselves. In my qualitative interviews with women, some interviewees listed the safari camps (and the income gained from them) as one of the benefits of living in their village. A third example of successful meso scale institutions in western Serengeti include the canine rabies vaccination campaign being coordinated and carried out by District Livestock Officials, the Serengeti Carnivore Disease Project, and various village-level officials around the GSE.

While many meso scale phenomena seem to be successfully operating within western Serengeti, others are lacking. One meso scale phenomenon that is often not seen in western Serengeti is the ability for local people to voice their concerns and be heard by outside institutions—especially those at a higher scale (such as by conservation organizations, Tanzania National Parks (TANAPA), or the regional and national governments.) The following quote explains this concept more fully:

Institutional arrangements that foster greater cooperation within aggregates of individuals, like those that promote communication and coordination, thereby

tend to lead to dynamic equilibria that are less likely to be associated with a poverty trap. Institutional arrangements that coordinate behavior within and between scales are also directly associated with another key dimension of poverty, the ability of individuals or groups to exert influence over phenomena that directly or indirectly affect their lives—in other words, the degree of voicelessness they suffer. The performance of meso-scale institutions may be judged on the basis of their responsiveness to the needs of all their members, their ability to mobilize resources from internal and external (sometimes higher scale) sources, and the efficiency with which they transform assets into goods and services of value to their members (Barrett and Swallow 2003: 21)

In conclusion, poverty appears to be the ultimate driver behind health patterns in western Serengeti. Unfortunately, it is not within the scope of this thesis to be able to study all of the reasons behind the entrenchment of poverty in western Serengeti; however, I have shown that poverty is a result of situations acting out across multiple scales. The findings from my work would not have been possible without a theoretical framework and methodological approach that was multi-disciplinary. By using nutritional, archival, and phenomenological data and by incorporating a political economy of health into my biocultural framework, I have been better able to understand the links between health and conservation, culture, and poverty.

6. Recommendations:

The list of what could be done in western Serengeti to improve the health of the local people could fill the pages of an entire book. Many of the recommendations I suggest are implicit within the previous pages of this thesis. Below I will highlight some of what I consider as important steps for improving health in western Serengeti.

First, a greater initiative should be made for the general education of all children and young people in western Serengeti, but especially for girls and young women. Education can be both a direct and indirect means of improving health. More education is

linked to greater income, which is linked to better nutrition. However, education alone— independent of income—also leads to smaller family size and increased protein intake. Any level on which education can be improved in these districts west of the GSE would be helpful. This means more funding (from the national, regional, or district governments and from TANAPA or outside NGOs) to build more schools, improve those that already exist, provide more teachers, and provide more supplies (desks, chalkboards, books, etc.) is the first step. Furthermore, improved health education to adults around western Serengeti could improve the quality of diets, increase fertility planning, and provide better awareness about the causes, means to prevent, and means to treat various illnesses that are prevalent.

Secondly, the biomedical system in western Serengeti has much room for improvement. Obviously it would be helpful to have better-staffed and better-supplied facilities (with electricity and the needed instruments, medicines, refrigerators, lab equipment, etc.). However, another aspect that is oft-overlooked is the importance of education for biomedical professionals on how to better listen to, treat, teach, and respect their patients. When talking to health officials in western Serengeti (especially those that have lived in urban areas or been raised elsewhere in Tanzania) it is easy to pick up on a certain condescending air that many of them have towards their patients. It is common throughout Tanzania for rural dwellers to maintain a reputation (placed on them by urban or more “modern” Tanzanians and outsiders) of being “backwards” (Snyder 2005). In order to curb the spread of HIV/AIDS, improve nutrition levels, prevent infectious disease, and educate women about safe means of fertility planning, women in western Serengeti need to feel safe and heard. They will not attend biomedical facilities or

believe what they are told about certain medical “knowledge” if health officials treat them in a demeaning or disrespectful manner.

Third, the relationship with the conservation areas presents a challenge in that even though there may not always be an immediate or direct negative effect on peoples’ health, there is still considerable tension between locals and the parks. Other studies have certainly shown that zoonotic disease (Hampson et al. 2008, Lembo et al 2008) are more prevalent because of the proximity of western Serengeti households to wildlife and that crop damage, livestock predation, and even some loss of human life⁴⁶ does directly and negatively impact human health. However, there is also evidence that by living in a remote region close to conservation areas people are better able to own larger areas of land than do those who reside in over-populated regions of Tanzania. Furthermore, there is awareness among the people I studied as to the benefits of employment and income that the tourism industry provides. My research demonstrates that there are possible means of adapting to the constraints of the conservation area (such as by owning and consuming small stock instead of cattle). I believe that despite these trade-offs of living within the GSE, there still exists some responsibility on the part of the conservation organizations (TANAPA, TAWIRI, etc.) to educate people about the benefits of conservation, to give people living adjacent to the protected areas a platform where their voices can be heard, and to compensate them for the times when they do experience direct, immediate, and deleterious results from wildlife. This could mean the formation of some sort of community level insurance system in which people who lose a family member, goat, or crops could at least receive a loan in order to cope with the sudden

⁴⁶ I did not go into the accrued loss of human life due wildlife (elephant, hyena, or lion) since this has been done by other scholars (E.J. Knapp 2009, Packer et al. 2005) in western Serengeti and around other conservation areas in Tanzania.

external shock to their livelihood. Whether the benefits of living near the protected areas outweigh the costs, the people in western Serengeti still deserve to be given a voice; they should at least still be heard.

Finally, while many of the recommendations above already address this issue, my overarching recommendation for improving health in western Serengeti would be to tackle the problem of poverty. Barrett and Swallow (2003) thoroughly address various means of going about this at multiple scales. One of the many important methods they suggest is for governments and donors to provide transition strategies for those caught in poverty traps to be able to accumulate assets (money or goods) so that they can move beyond certain poverty thresholds. For example, some transition strategies they recommend include small-scale irrigation schemes or tree seedling planting projects so that households can increase their productivity and generate more income. On a theoretical level, for any development scheme such as this to be successful, the participatory nature (of local people in the planning, implementing, and monitoring of the project) is essential (Messer and Shipton 2002). Another important recommendation (borrowed from Barrett and Swallow 2003) is that safety nets from uninsured external shocks are important for the reduction of poverty among western Serengeti households. These safety nets (such as micro-loans after a crisis) could be administered at the village or sub-village level, but such systems would perhaps need initial funding from outside donors at the outset (until they could be repaid).

7. Conclusion

Upon reflecting on the research that I have done and in thinking about the ways that health can be improved and poverty be decreased in western Serengeti, I am reminded that perhaps the most important aspect of my study has simply been to create a more nuanced perspective about the people who live in the famous Serengeti Ecosystem. As conservationists, politicians, economists, and people of all sorts of academic or ethical persuasion consider how to manage a dynamic ecosystem filled with all the beauty and heartache that comes when humans and wildlife interact, I am persuaded to tell them to simply hear what the people of western Serengeti have to say. As has often been the case throughout Tanzania's history, initiatives of forced exogenous change have often been more damaging to human well-being than the time-honed indigenous practices already in place. This does not mean that outside help is never needed, but rather that it be appropriate to the culture and natural environment that is already there. The words of Messer and Shipton (2002:242) sum up best the thoughts I have regarding improving poverty and health in western Serengeti: "African ways of living and producing have turned out to be wiser and more productive—and harder and more dangerous to reform—than foreign experts anticipated. The hardest part of intervention remains the listening." My hope is that my work has given voice to the people of western Serengeti. And I hope others are hearing them.

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