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Growing Children:
The Relationship Between Food Insecurity and Child Growth and Development

by

Ernesto Ruiz

A dissertation submitted in partial fulfillment of the requirements for the degree of
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I want to express great gratitude to my family for encouraging and supporting me throughout my studies. Their love was invaluable. Special thanks to my committee for steering me throughout this difficult process. Finally, many thanks to the participants who invited me into their homes and lives.

This dissertation is dedicated to my own son who grows and develops before me. Thank you, Santiago!
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ABSTRACT

This dissertation examined the relationship between food security status and cultural congruence and indicators of child growth and development in a rural mountain town in Costa Rica. Results show that children from food secure households are significantly shorter and shorter-legged than their food insecure counterparts. It is theorized that these findings correspond to low quality diets associated with increasing commodification of food systems in rural Costa Rica. Identity-based mechanisms are discussed as potential factors contributing to the increasing commodification of life through the encroachment of the global market economy.
CHAPTER ONE:
INTRODUCTION

In this dissertation research, I examine the relationship between food security status, cultural consonance—defined as the ability of an individual or household to live up to the shared cultural narrative of a successful lifestyle—and child growth and development outcomes. An in-depth, ethnographic approach served as the starting point for the generation of the research questions explored here. In the summer of 2008, I began working as a research assistant on a NSF-funded (0753017) research project tracking the nutritional and sociodemographic characteristics of 200 households in the Monteverde Zone of Costa Rica. This relatively small area in the Tilaran mountain range of Costa Rica stands as an illustrative case study on the intersection of economic forces related to where the presence of the state diminished drastically while incentives were created for the investment of capital. Small-scale farmers in rural communities were among the social sectors most greatly and negatively impacted by the series of Structural Adjustment Programs that the Costa Rican government had to implement as conditions for World Bank loans (Edelman 1996). Within this economic context, my advisors, Dr. David Himmelgreen and Dr. Nancy Romero-Daza, had been exploring the nutritional consequences of these economic transformations in the Monteverde Zone.

By working with them in order to understand the practical implications of these political-economic forces, I developed an interest in the symbolic portrayal of success, which struck me as being skewed towards the presentation of conspicuous consumption. I also became interested in
the nutritional status of children in the Zone. The present research project was created in an attempt to evaluate child anthropometric data and to further understand and contextualize the ideological matrix and set of practices that informs the presentation of self in the Monteverde Zone.

**Research Design**

A cross-sectional design was implemented to evaluate key anthropometric indicators of growth and development (i.e., height, weight, triceps skinfolds, and mid-upper arm circumference) among children aged 3-7 years. One child per household from a total of 58 households was measured. Additionally, parents completed food security and cultural consonance questionnaires and provided their heights as well as basic socio-demographic information about their household.

The cultural consonance questionnaire was the result of ethnographic and cultural domain exploration research. Free lists inquiring into conceptualizations of successful lifestyles were carried out with 30 informants. From these free lists, indicators of successful lifestyles were selected based on saliency. Twenty-two indicators were then selected for the creation of a ranking questionnaire. This questionnaire was then administered to another sample of 30 informants, who were asked to rank the items under question based on importance as markers of a successful lifestyle. Each respondent was asked to first rank the items according to how they thought members of their community would rank them, and then according to their own estimation of importance.

The results of these ranking questionnaires were analyzed using the Cultural Consensus function in Anthropac. Results demonstrated a high level of agreement across respondents in
terms of the importance of the 22 items making up the list of symbolic markers of a successful lifestyle.

Subsequently, the 22-item questionnaire was administered to 58 households to determine if each household either possessed the items under discussion (e.g., car, smartphone), participated in certain behaviors (e.g., spending time with family, practicing sports) or had access to certain services (had children enrolled in a private school). Positive responses (“yes, we have a car”) resulted in either a score of 1 or 2 (discussed in Chapter 5), while negative responses resulted in a 0. This allowed for a continuous score ranging from 0-1 to be assigned to each household, with 1 representing complete cultural consonance (lifestyle consistent with narrative concerning a success) and 0 representing the opposite. Brief, open-ended interviews with parents were also conducted in order to elicit narratives about the experience of raising children in the Monteverde Zone.

Food security was evaluated using the Household Food Insecurity Access Scale, a cross-culturally validated instrument that was adapted to the local context through standard piloting techniques. This instrument categorizes households as being food secure or mildly, moderately or severely insecure based on the frequency of occurrence of certain scenarios. Together, the food security and cultural consonance classifications formed the predictive variables with child anthropometric indicators acting as the dependent variables.

**Results**

Food security was found to be positively and significantly associated with cultural consonance. Overall the study’s sample children are short, relatively short-legged, and heavy when compared to World Health Organization (WHO) reference data. Furthermore, children
from food secure and culturally consonant households were found to present significantly worse indicators of growth and development than their food insecure and culturally dissonant counterparts.

Parental narratives reveal strong concerns about the state of infrastructural development concerning recreation, health care, education and transportation in the Monteverde Zone. This suite of factors is believed to stand in the way of a more holistic development that parents want for their children. Parents view infrastructural limitations as constraints that restrict their children’s abilities to negotiate within a competitive, globalizing society.

The results of this research suggest that the recent and current form of economic development in Costa Rica generally, and in the Monteverde Zone specifically, is one that privileges the consumption of processed foods and other mass produced markers of identity. This trend towards a greater market-based way of life is reflected in both the cultural narratives expressed by informants, as well as by the relationship between food security and cultural consonance. Furthermore, in a context of economic insecurity and elevated costs of living, it seems as if choices about what to consume (broadly) negatively impact health outcomes. The prevailing mode of life can be characterized as one that is conducive to ill health, as a result of what critical theorists may call “false consciousness.”

**Structure of the Argument**

The most important topical areas related to the research questions of this dissertation deal with characteristics of food (in)secure households (e.g., health outcomes, socio-economic traits) (Chapter 2), and patterns of child growth and development and the underlying biological theory
that accounts for these patterns (Chapter 3). Chapters 2 and 3 lay the groundwork for the importance of studying food insecurity and child growth and development.

Much like the work of my advisors, I approached this study with a lens focused on the unequal distribution of resources—material and symbolic. That is, this research places a strong premium on the role that inequalities may have in shaping human health outcomes and cultural narratives. The theoretical and methodological roots of this approach are developed in greater detail in Chapter 4 of this dissertation. Theoretically, these issues are framed according to perspectives that examine the role that the distribution of resources plays in shaping bio-cultural outcomes. One side of this discussion—the relationship between access to resources (e.g., food and health care) and health outcomes—is straightforward in its “materialism.” Another side—the relationship between resource production, distribution and consumption on the one hand and the practice of cultural narratives and identities on the other—is more complex. This complexity results in large part because of the semiotic nature of human identity as well as the semiotic underpinnings of the language we use to understand and discuss these issues. Thus, a large part of the theoretical work of this dissertation deals with making the case for how market-based lifestyles act to heighten distinctions among people through the introduction of more lenses through which we classify each other as a result of the ways in which identities are now consumed and deployed. This theoretical work entails a phenomenological discussion of the way we express and are “impressed” by symbols in our never ending dance of identity construction and manifestation. While theoretically abstract, I view this discussion as an important step in advancing potential mechanisms through which psycho-social factors may be seen to become embodied. It is an attempt to advance our understanding on the ontological status of being human and to break the dichotomy implied by the term “biocultural.” Because of the phenomenological
character of this theorizing, I have chosen to include most of this discussion in Chapter 7 given that I use ethnographic examples to draw out the theoretical observations.

Attention to the distribution of resources entails attention to history. Thus, this study’s findings are presented alongside a discussion of the recent political-economic history of Costa Rica (see Chapter 5). While the data collected and analyzed for this discussion deal with the “today,” as it were, the fact that Costa Rica has been experiencing greater economic liberalization since the 1980s bears directly upon the market-based processes documented ethnographically. This is one argument for a historical contextualization, however brief, of the current political-economic environment of Costa Rica. Another argument stems from the material at hand: biology. Biological outcomes are necessarily diachronic and are thus intimately tied to the history of a given population.

This dissertation concludes by discussing the strengths and weaknesses of the study, offering suggestions for future research, and providing a set of recommendations that may help improve the health status of future children in the Monteverde Zone (Chapter 8). Methodological and theoretical contributions of this research are discussed in light of the state of food security scholarship and biocultural anthropology.
CHAPTER TWO:
FOOD SECURITY AND MALNUTRITION

In this chapter, I present a thorough review of the anthropological and nutrition literature on malnutrition and food insecurity. I begin by introducing the concept of food insecurity and proceed by discussing the measurement of food insecurity. Discussing the operationalization of food insecurity will help clarify what is meant by this complex set of experiences. From here, common patterns that have been identified as being characteristic of households experiencing food insecurity are presented. Among the patterns discussed are body composition, dietary diversity, coping strategies (including buffering), and risk factors associated with food insecurity. Next, I examine the relationship between illness and food security status as described in the literature. This discussion is followed by a more micro-analysis of malnutrition and immunology that examines the role that various micronutrients have on immune function and by an examination of the epigenetic impact that the intrauterine and early environment may have on the immunological and overall developmental trajectory of humans. Paying attention to the epigenetic mechanisms that shape human metabolic pathways is particularly important in studies such as this one given that they may account for the distribution of biological variation that are the outcome variables of biocultural research.
**Food Insecurity**

The WHO defines food security as a situation “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life” (1996). Barret (2002) has identified three different ways in which food insecurity has been conceptualized, each associated with particular measurement tools and strategies to combat the problem. During the 1974 World Food Conference, food insecurity was viewed as occurring as a result of insufficient and unstable food production. Under this conceptualization, satellite images of cultivated fields, agricultural output data, and GDP were indicators used to estimate food security status. It later became apparent that although food production and availability are necessary conditions for food security, they do not guarantee food security in and of themselves—as can be seen in wealthy countries with surplus food production and food insecure people.

From this observation, it became clear that the distribution of food—and resources more generally—played an important role in food insecurity (Sen 1981). Food insecurity became conceptualized as a complex multidimensional process with varying ingredients of entitlements, such as income, prices, social organization, and social safety nets, playing important roles. Such a transformation in the conceptualization of food insecurity drew more attention to micro-level processes, and shied away from strictly per capita statistics. Methodologically, this entailed the examination of factors such as income, price and anthropometric measurements, which led to the use of standardized survey tools. Finally, the third and current conceptualization food insecurity builds on the second perspective but pays more attention to the ways in which food security and insecurity are experienced and actively managed. The emphasis on the experiential dimension of food insecurity again entails a methodological shift, which in this case has resulted in the application of qualitative research methods to the exploration of commonalities to food
insecurity experiences. Coates et al. (2006:1439S) attribute the current understanding of food insecurity to the work of Radimer and colleagues at Cornell (see Radimer et al. 1990) and to the Community Child Hunger Identification Project.

The qualitative research mentioned previously led to the identification of four domains that are associated with food insecurity: 1) uncertainty or worry about food; 2) food is of inadequate quality; 3) food is of inadequate quantity; and 4) food is acquired through socially unacceptable means. Survey instruments, such as the Radimer/Cornell Scale, or the Household Food Security Survey Measure (HFSSM), that rank individuals on the basis of their responses to questions related to the four domains outlined above have subsequently been created.

Coates et al. (2006) did a meta-analysis of 22 cross-cultural food security studies that used various different survey instruments in order to look for common, cross-cultural elements of the food insecurity process. The authors identified four common domains associated with food insecurity: 1) uncertainty and anxiety about food; 2) inadequate food quality; 3) insufficient food quantity; and 4) acquisition of food through socially unacceptable means. In addition to the four common domains related to food insecurity, the authors identified alienation, hunger and other physiological consequences as common outcomes of food insecurity (Coates et al. 2006:1445S). Similarly, Maxwell et al. (2008) did a meta-analysis of 14 studies on food insecurity in Sub-Saharan Africa and identified reductions in numbers of meals, reductions in portion size, eating less desirable but less expensive foods, prioritizing children in terms of meals, and borrowing food as five core coping behaviors.

As I discuss below, there is a range of variation in terms of the outcomes and experiences associated with food insecurity. This diversity of experiences notwithstanding, the literature on food insecurity reviewed below conforms in a general sense to four core domains associated by
Coates and colleagues and, to a lesser extent, to the coping strategies identified by Maxwell et al. (2008). The greater degree of conformance between the core domains identified by Coates et al. (2006) and the reviewed literature, and the wider range of variation exhibited in coping strategies is to be expected, since the core domains outline general experiences and worries, without specifying how these manifest in concrete scenarios.

It should be noted at this point that several studies examined processes related to “food insufficiency” (Mazur et al. 2003, Kaiser et al. 2004, Casey et al. 2001, Kempson et al. 2003). Mazur and colleagues define food insufficiency as “an inadequate amount of food intake due to lack of money or resources” (2003:1121), as used in the National Health and Nutrition Examination Survey (NHANES), whereas Kaiser et al. (2004) inquire into the desirability of the food in addition to the amount available in the household. Finally, Casey et al. (2001) limit their definition to quantity of food in the household, and Kempson and colleagues (2003) seem to use it interchangeably with food insecurity. For the sake of simplicity, these studies will be treated as if though they relied on food insecurity measures. The following section goes into greater detail on the methodologies used to study food insecurity.

**Qualitative Research of Food Insecurity**

As discussed in the opening sections of this chapter, the conceptualization of food insecurity has undergone various transformations since it initially became a relevant point of inquiry in the eyes of policy makers, NGOs, and multinational organizations during the mid-1970s (Barret 2002). This change in the collective understanding concerning the genesis, experience and possible solutions to food insecurity problems entailed (not surprisingly) a
change in the way in which food insecurity has been measured. To recap very briefly, the methods for measuring food insecurity have gone from:

- A macro-perspective focused on GDP, annual crop production, satellite images of agricultural fields, and other macro-economic indicators, to
- A more micro-perspective focused on local food availability, prices, access to available food, and nutritional outcomes (based on anthropometry). This micro-perspective allowed for the use of standardized surveys to document prevalence rates of food insecurity and associated determinants and outcomes. This then led to
- A similarly micro-focused perspective, which in addition to the factors mentioned in the previous point, paid particular attention to the experiential aspects of food insecurity.

These studies have examined coping strategies of food insecure households, psychosocial dimensions of being food insecure, etc. Both qualitative and quantitative approaches have been used under the third and current conceptualization of food insecurity (Barret 2002).

One observation is appropriate at this juncture. Some researchers relying on the third and current conceptualization of food insecurity (with its associated methods) apply a macro political economic perspective to understand how local level experiential aspects of food insecurity are shaped by shifts in global political-economic forces. An example of this can be seen in the work of Himmelgreen and colleagues (2006, 2013, In Press), for instance, who in addition to examining the local dynamics that characterize food insecurity in rural Costa Rica, link these processes to larger structural re-alignments in economic and social policies throughout Latin America and elsewhere (Himmelgreen et al. 2012). Thus, while I characterize studies such as these as having a micro-focus, this should be understood as a purely mid-range methodological level. That is, this characterization of “micro” pertains to the bulk of data collected from actual
field work (home visits, interviews, questionnaires, and anthropometry). Clearly researchers can and do collect other data aimed at gauging macro-level forces, including demographic and trade patterns, and information concerning nation or area-specific legislation. This other data, however, is meant to situate the field site within a more fluid global context. Thus, while the bulk of epistemological work is indeed micro, this does not necessarily come at the expense of a more fluid and integrated ontological framework concerning the field site, or the object of investigation. With this brief note, I want to make clear the distinction between micro and macro perspectives at theoretical and methodological levels. Here, given the nature of the research questions being examined, I focus only on the methodological aspects.

**Qualitative Studies of Food Insecurity**

To characterize studies on food insecurity as being of either qualitative or quantitative methodological underpinning can be a false dichotomy, as plenty of studies rely on both quantitative and qualitative approaches in their research (Saha et al. 2008, 2009, 2010, Himmelgreen et al. 2006, 2012). Frequently, the combination of qualitative and quantitative methodologies follows the following pattern: open-ended qualitative research is carried out in order to understand local conceptualizations and experiences related to food insecurity and the food landscape more broadly. This phase of the research is executed among a small sample (around 15-30 participants). Once the in-depth interviews have been collected and analyzed, a locally-relevant quantitative insecurity scale is created and then administered to a larger sample of households (Hadley and Wutich 2009, Hadley et al. 2007, Hadley et al. 2008, Frongillo et al. 2003, Frongillo and Nanama 2006).
Some researchers also include a focus group step in their methodology, before creating the quantitative scale (Maxwell 1996). Another mixed-methods approach is to adapt and administer a previously validated food insecurity scale, and to compliment these data with in-depth qualitative interviews aimed at contextualizing and teasing apart small subtleties that are related to the quantitative patterns (Quandt et al. 2004, Stevens 2010, De Marco et al. 2009). Despite the strong overlap in quantitative and qualitative methodologies, it is still possible to examine the contributions that have stemmed solely from qualitative research (whether by examining the qualitative phases within studies or by considering purely-qualitative projects).

Rose (2010) characterizes food insecurity research since the 1990s as taking two different lines: one with a methodological focus on refining instruments, and the other with an emphasis on understanding the consequences of food insecurity. In both lines of research, qualitative methods have proven indispensable. As stated above, the creation of locally-relevant food insecurity scales depends in large part to the ground-up approach that stems from formative qualitative research.

Arguing for a more nuanced and context-dependent understanding of food insecurity, Renzaho and Mellor (2010) have recently argued that certain coping mechanisms that are traditionally inquired about in food insecurity studies may represent traditional cultural practices of certain groups, and should therefore not be considered as coping strategies to fight food insecurity. They give the example of food sharing as one such traditional practice that may be naively interpreted as a coping mechanism, unless the researchers employ a formative qualitative research strategy within their study. Similarly, these authors problematize the notion of “social acceptability,” which is also inquired about in some instruments when asking about food access issues. Within the context of the U.S., Renzaho and Mellor (2010) wonder whether food stamps
can be considered socially acceptable among certain groups, again, highlighting the importance of situating investigations within a well-grounded socio-cultural milieu. Because of concerns such as these, other authors state that developing their own instruments based on formative qualitative research may be better than simply translating a pre-existing instrument (Frongillo et al. 2003).

Concerning the second thread of research identified by Rose (2010) dealing with the consequences of food insecurity, qualitative research methods have also been of vital importance. Furthermore, the shift towards the third and current conceptualization of food insecurity has been attributed to qualitative research on the experiential aspects of living with food insecurity (Coates et al. 2006), primarily the work of Radimer and colleagues (Radimer et al. 1990). Qualitative research methods continue to be relied on in order to identify coping strategies, psychosocial stressors, and perceived barriers to food security (Kempson et al. 2003, Mammen et al. 2009, Maxwell 1996, Moreno-Black and Guerron-Montero 2005, Quandt et al. 2004, Stevens 2010). An interesting and unique application of qualitative ethnographic methods can be seen in the work of Frongillo and colleagues (Frongillo et al. 1997, Frongillo and Nanama 2006). These researchers have contributed greatly to the methodological and conceptual refinement of food insecurity studies, and have relied on nice triangulation of complimentary methods. Relevant to the present discussion, is their development of what they refer to as a definitive criterion for food security classification (Frongillo et al. 1997).

In examining the sensitivity and specificity of various quantitative food insecurity instruments, Frongillo and colleagues developed a definitive criterion of food security classification based on complementary in-depth interviews concerning demographic and food insecurity issues, coping strategies, fruit and vegetable consumption, disordered eating
behaviors, heights, weights, dietary recalls, and household food stores inventory. In sum, the researchers relied on in-depth and detailed characterizations of households and individuals in order to gauge the performance of the food insecurity questionnaires. Having collected all the relevant data, two experienced food insecurity researchers independently reviewed all household information (with the exception of the food insecurity questionnaires) and came to an agreement concerning the classification of 98% of the 193 households investigated. In a more recent application, Frongillo and Nanama (2006) also relied on a researcher collecting detailed and in-depth ethnographic information related to household dynamics, in order to classify households as food secure, moderately secure, or food insecure. This researcher complimented the rest of the research team that was collecting socio-demographic, dietary and anthropometric data, but worked independently from them. Based on the combination of approaches, the authors developed an experience-based food insecurity scale (Frongillo and Nanama 2006). Concerning the reliability of their developed instrument, they found that total household assets, food security score from the scale, and household food stores best predicted the food security classification assigned to household by the researcher independently collecting detailed information on the households. Clearly qualitative research has played an instrumental role in advancing food security research. We now turn to quantitative approaches commonly used in this area of scholarship.

Quantitative Studies of Food Insecurity

As the preceding section made clear, many researchers create context-specific quantitative food insecurity scales based on exploratory qualitative research (Saha et al. 2008), whereas others adapt previously existing insecurity scales to make them appropriate for their

While there is certainly variation between the scales, with some created more for U.S. populations (USDA Household Food Security Survey Module), others having assumptions about the importance of parental buffering of children as food insecurity begins (Radimer/Cornell), and some intended for cross-cultural application (HFIAS), the overall dimensions explored in these

\(^1\) Some authors report using the USDA’s Household Food Security Scale. This is the set of questions contained in the Core Survey Module that can be used to create a continuous measurement of food insecurity severity (Bickel et al. 2000).
questionnaires conforms to the experience of food insecurity as related to reduced access to food of adequate quality and quantity, and the coping strategies employed to mitigate the situation. In reviewing the literature on food insecurity measures, Webb et al. (2006) conclude that all approaches to scale creation—from the more ethnographically informed as seen in the work of Frongillo and colleagues (2003), to the adaptation of previously created scales (Knueppel et al. 2010)—showed agreeable results, lending confidence to the validity of the instruments. Such confidence in the effectiveness of food insecurity scales has been echoed by experienced researchers such as Frongillo et al. (1997), Webb et al. (2006) and Coates et al. (2006). The latter specifically discuss the universal applicability of the HFIAS, stating that 22 cross-cultural studies have shown that the instrument is able to capture the experience of food insecurity across a wide range of socio-cultural diversity. This instrument has also been independently validated by other researchers, with similar positive findings (Maes et al. 2009, Knueppel et al. 2010). However, a recent report by the creators of the HFIAS notes that only three of the nine original questions of this instrument appear to be valid cross-culturally. The three questions represent a sub-scale within the original instrument dealing with hunger and the physical consequences of inadequate food intake, and they form the new Household Hunger Scale (HHS) (Deitchler et al. 2010). The authors note that cultural specificity is sacrificed at the expense of a more universal instrument, and state this shorter instrument can be used in conjunction with other scales, suggesting the Latin American and Caribbean Household Food Security Scale specifically for Latin America. The strength of the HFIAS should therefore be seen in the ability to make it culturally-specific through piloting of the instrument with key informants.
Deitchler et al.’s (2010) findings are intuitive. The three questions that comprise the HSS\(^2\) deal with a complete lack of food or the actual experience of hunger within a household. One need not be a deterministic materialist to acknowledge that the experience of any of the three scenarios which the HSS inquires about will have universal consequences for humans. The questions are purely referential: there either is food in the house or there is not; someone was either hungry or was not. While the conceptualization, rationalization and larger ideational matrix in which these material processes unfold will likely vary from one social setting to another, there is no compelling reason to believe that the referential reporting of the presence or absence of these scenarios should be subject to cross-cultural variation. I acknowledge that there may be cross-cultural variation in the degree to which responding to questions posed by the HSS may be sensitive, but this is not a unique issue to the study of food insecurity. The whole anthropological project is to some extent predicated upon the epistemological assumption that ethnographers will be able to establish decent enough relationships with their informants so as to allow them access to emically-valid responses. The down side of relying solely on the HSS, is that it will likely only distinguish between severely insecure and food secure households.

Besides the use of quantitative instruments to assign households or individuals to certain food security statuses, the use of quantitative methods is frequently employed to characterize households of varying food security statuses along a range of indicators. Among the most commonly used indicators are dietary diversity, measured through 24-hour diet recalls (Mazur et al. 2003, Matheson et al. 2002, Maes et al. 2009, Oldewage-Theron et al. 2006) and food frequency questionnaires (Hadley et al. 2007, Himmelgreen et al. 2006, 2013, Oh and Hong

\(^2\) The questions ask if during the last four weeks: 1) There was no food in the house; 2) Anybody in the household went to sleep hungry, and; 3) Anybody in the household went the whole day without eating.
2003). Concerning the food frequency questionnaires, the reference time period range from the previous seven days (Hadley et al. 2007), the previous month (Oh and Hong 2003), to the previous 12 months (Himmelgreen et al. 2006, 2013).

A large portion of food insecurity and malnutrition studies have also examined body composition outcomes of individuals experiencing some degree of food insecurity. This is usually done by taking heights and weights, and computing the age-appropriate body mass index of the study participants (Kaiser et al. 2004, Matheson et al. 2002, Casey et al. 2001, Jyoti et al. 2005); others simply collect weights and compute weight for age z-scores based on standardized reference curves (Rose-Jacobs et al. 2008); and yet others take more complete measures of body composition, such as subscapular and triceps skinfolds and circumferences, in addition to weights and heights (Leonard 1991, Black 2009, Frongillo and Nanama 2006).

Finally, as discussed in greater detail in the following section, there are clear and consistent links between negative health outcomes and food insecurity. In many instances, such inferences are arrived at by comparing body composition status of people from differing food security statuses (Matheson et al. 2002, Kaiser et al. 2004, Eicher-Miller et al. 2009). Other studies, however, also rely on self-perceived (Murray and Chen 1992:482) reports of health status, using retrospective illness recalls for the previous 30 days (Eicher-Miller et al. 2009, Saha et al. 2008), or for an unspecified time frame (Chilton et al. 2009, Cook et al. 2004, Cook et al. 2006, Stuff et al. 2004\(^3\)). As discussed by Murray and Chen (1992), most of these reports on morbidity are of symptoms or impairments, although Racine et al. (2009) also inquire about health service utilization. These methods are subject to limitations such as fluctuations in the

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\(^3\) These researchers relied on the Short Form 12-Item Health Survey, which can be used for the previous 7 or 30 days, but they failed to specify which time frame they used in their publication.
amount of morbidity recalled depending on the recall time frame, respondent bias when an adult responds for other members in their family, or increased reporting of illness as individuals and populations come into greater contact with health service providers (Murray and Chen 1992). Thus, it is important to have other methods to triangulate self-reports of morbidity. Biological anthropologists have strongly contributed to this corpus of research, by studying the distribution of biomarkers of immune activation through field-based, ethnographic research (McDade et al. 2005, McDade et al. 2000, McDade et al. 2008, Sorensen et al. 2009, Sorensen et al. 2006, Nazmi et al. 2009, Panter-Brick et al. 2008, Rutherford et al. 2010, Seeman et al. 2010, Campbell et al. 2003). The following section discusses the framing of food insecurity research from macrosociological perspectives.

**Macro-Analyses of Food Insecurity and Malnutrition**

Several studies approach the issue of food insecurity from large-scale sociological, historical and ecological perspectives. These articles emphasized intersection between structural factors, such as the unequal distribution of resources, and the creation of vulnerability among poor people in terms of acquiring adequate food, water, housing, health care, and educational provision. Maxwell (1999), for instance, relying on case studies of Accra and Kampala, charts the shifts in the patterns of food insecurity and hunger from the 1970s to the 1990s, noting how during the former time periods, food insecurity was characterized by acute periods of shortages experienced by broad segments of society. With the shifting political-economic landscape, in part attributed to the Structural Adjustment Programs (SAPs), Maxwell argues that as of the 1990s urban food insecurity has become a chronic condition of the poor. With the downsizing in social services that accompanied the SAPs, there was a shift in responsibility from the state to
the individual and household, leaving those without adequate resources and safety nets in precarious situations (Maxwell 1999). Peña and Bacallao (2002) echo Maxwell’s concerns over the impact that neoliberal financial policies have had on widening the gap between high and low-income groups, pointing out that poor families use money to buy more energy (calories) with low nutritional quality foods, leading to overweight and obesity. They note that the highest rates of obesity are found among poor segments of society. In a recent study on food insecurity and area-based socio-economic indicators, poverty was identified as a strong and independent predictor of overweight (Drewnowski et al. 2009). Poverty and food insecurity are associated with lower expenditures on food, low fruit and vegetable consumption, and lower quality of diet all around, likely contributing to the greater prevalence of obesity among the poor (Drewnowski and Specter 2004). Furthermore, it is well established that there is an inverse relationship between energy density and costs, and that higher energy density and palatability of sweets are associated with higher energy intakes (Drewnowski and Specter 2004). These factors taken together help explain why poverty and food insecurity have been found to be significantly related to overweight and obesity.

Other factors cited as macro causes of food insecurity (for Sub-Saharan Africa) include low agricultural productivity, lack of agricultural policies, poor infrastructure and high transport costs, lack of appropriate marketing strategies, frequent extreme weather events, high disease burden, lack of social safety nets, and political conflict (Haile 2005). Concerning conflict, Messer and Cohen (2007) cite a 2005 FAO document stating that conflict is the leading cause of hunger worldwide. Armed conflict resulted in declines of mean food production and production growth rates during 1970-1994 in 13 out 14 African countries examined (Messer et al. 1998). Despite the links between conflict and food insecurity, and globalization and food insecurity as
discussed above, after reviewing evidence linking these three areas together, Messer and Cohen (2007) conclude that the relationships are ambiguous, depending highly on the commodities involved in trade (in the case of globalization), the social relations of production, and trade policies.

Various field-based and ethnographically-informed studies examining mid-range impacts of globalization have found a positive association between transitions towards a more market-oriented economy and food insecurity. Case studies include examinations of how the shift towards tourist-based economies have impacted the food security, dietary diversity and body composition status of Mayans in the Yucatan (Daltabuit and Leatherman 1998, Leatherman and Goodman 2005), and of rural Costa Ricans (Himmelgreen et al. 2006; Himmelgreen et al. 2013; Himmelgreen et al. In Press). In all these studies, the researchers apply political-economic perspectives to the study of the food environment, examining the impact that changes in this realm have on the physiological and social wellbeing of their participants.

Ruel and colleagues (2010) draw attention to the current food and fuel crises, noting that these situations will likely continue to affect the nutritional and food security status of the urban poor. Among the factors contributing to the greater vulnerability the urban poor face in relation to these crises, the authors cite: a greater reliance on cash income, limited access to urban agriculture or rural land, greater participation of women in labor force— with attending consequences related to provision of childcare, larger inequality in access to services, and changes in lifestyle and consumption patterns associated with the nutrition transition. It is worth pointing out that the heightened vulnerabilities that Ruel et al. (2010) point out for the urban poor are the same risk factors that populations undergoing transitions from more subsistence-based economic strategies towards a greater reliance on market economies face as well, as noted

The vast majority of the published work reviewed here link food insecurity and poor nutritional outcomes either explicitly with poverty or low-income populations. This is done either through deliberate sampling of low-income populations (De Marco et al. 2009), or by showing that poverty/low income is a predictor of poor outcomes (Drewnowski et al. 2009) or has significant positive associations with food insecurity (Hadley et al. 2007, Cook et al. 2004) and/or overweight and obesity (Eicher-Miller et al. 2009). However, since these studies do not expand their analysis beyond a description or acknowledgement of poverty as being implicated in poor nutritional outcomes, they will be discussed in greater detail below. That is, these studies do not theorize the underlying political-economic forces that place certain populations at greater risk for experiencing poverty and marginalization, and they are mentioned here solely for the purpose of distinguishing them from the more macro-oriented studies reviewed above.

Characteristics of households and individuals experiencing food insecurity

**Body Composition**

A large portion of food insecurity and malnutrition studies examined body composition as an associated variable. Despite variation in the methods used to assess body composition (see Chapter 3), certain consistent patterns are evident in the literature. In their study of low-income Latina women, Kaiser and colleagues (2004) found positive and significant associations between food insecurity and past food insufficiency and obesity; current measures food insufficiency, however, was not significantly associated with obesity. Himmelgreen et al. (2006, 2012) also found positive and significant associations between food insecurity and adult obesity and
overweight, and Daltabuit and Leatherman (1998) have linked dietary delocalization and greater consumption of processed foods with adult obesity. Various studies have found positive and significant associations between risk of overweight and overweight and food insecurity among children (Casey et al. 2001, Casey et al. 2006, Drewnowski et al. 2009, Jyoti et al. 2005, Oh and Hong 2003) and adolescents (Eicher-Miller et al. 2009, Casey et al 2006).

On the other hand, Rose and Bodor (2006) found that children from food insecure households were 20% less likely to be overweight than their food secure counterparts, and Matheson et al. (2002) similarly identified children from food secure households as having significantly higher weights for heights and a greater risk of being overweight than children from food insecure households. In Matheson et al.’s study, lower weight for height among food insecure children was associated with significantly lower meat consumption, compared to children from food secure households. Rose and Bodor (2006) explain that predictors for overweight in their sample were watching TV for more than two hours a day, high birth weight, being Black or Latino, living in a low-income household, and engaging in low physical activity. No data on food frequency consumption were reported, so it is not known if children from food insecure were less likely to be overweight due to caloric restrictions. The following chapter presents a discussion on the potential mechanisms behind the co-occurrence of child obesity and decreased stature.

Dietary Patterns and Food Security Status

Other studies conform to the pattern reported by Matheson et al. (2002) above, where individuals from food insecure households consume less varied and/or lower quality/quantity diets than individuals from food secure households. Again, given the connections between
poverty and low income and food insecurity on the one hand, and reduced spending power and access to quality diets (Drewnowski and Specter 2004, Peña and Bacallao 2002), these findings are to be expected. The reported findings include significantly reduced intake of proteins and calories (Mazur et al. 2003), meat and calories (Matheson et al. 2002), grain-source iron (Eicher-Miller et al. 2009), fruits, carbohydrates and calories (Casey et al. 2001), reduced dietary diversity (Frongillo and Nanama 2006), lowered dietary quality and reduced fat intake (Hadley et al. 2007), and decreased consumption of condiments (Himmelgreen et al. 2006, 2013) among individuals from food insecure households (of varying degrees) in relation to their food secure counterparts.

Other studies, however, found patterns in the other direction. Oh and Hong (2003), for instance, found that children from food insecure households consumed the greatest amount of nutrients when compared to children from food secure households. The majority of these nutrients, however, came from the consumption of low quality foods. Similarly, Casey et al. (2001) reported children from food insecure households had significantly higher intakes of cholesterol than their food secure counterparts. In both cases, it is clear that the increased consumption on behalf of children from food insecure households corresponds to low quality food items that increase the risk for overweight and obesity, and other chronic metabolic conditions. Finally, Saha et al. (2008) found that rural Bangladeshi mothers from food secure households had better infant feeding practices during months 6-12, but worse for months 3-6. Concerning the latter, mothers from food secure households were more likely to supplement breast feeding with cow milk, fruit juices and other liquids. Thus, it is likely that the food insecure mothers of infants 3-6 months conformed to better infant feeding practices as a result of their reduced access to food. In addition, study respondents consistently report having to
consume low quality foods because of financial constraints. These findings are discussed in the next section dealing with coping strategies and food insecurity.

Coping Strategies of Food Insecure Households

As mentioned previously, various authors have argued for a certain degree of universality concerning food insecurity processes and related experiences (Coates et al. 2006, Maxwell et al. 2008). The following section presents various commonalities in the coping strategies employed by study participants, across a wide range of geographical and socio-cultural landscapes. For instance, dietary reductions undertaken to buffer children against food insecurity by adults in general (Mazur et al. 2003, Bukusuba et al. 2007, Mammen et al. 2009, Maxwell et al. 2008, Quandt et al. 2004), or by mothers (Mammen et al. 2009, Maxwell 1996, Oldewage-Theron et al. 2006, Stevens 2010) are commonly reported in the literature.

Although not directly related to food insecurity, Leonard (1991) reported on dietary intake and anthropometric data in relation to seasonal fluctuations and food availability in Nuñoa, Peru, and found that caloric intakes for all age cohorts were higher during the post-harvest season, with greater differences among adults than children. Post-harvest intakes were at or above predicted levels (based on nutrient and caloric requirements) for all age cohorts, whereas pre-harvest intakes were only adequate for children 12 years and younger. Similarly, the anthropometric indicators for children were “demonstrably better than that of adults, corroborating the results from the dietary data” (Leonard 1991:1130). These results strongly suggest active parental buffering so that their young children did not suffer dietary reductions during the pre-harvest season.
In Leonard’s study, no gendered differences were found for any of the age cohorts. And yet, as Messer reminds us, male-biased investment in resources can be common in patrilineal, patrilocal societies or in situations where males are expected to contribute more to income and family lineage (1997:1676). Consequently, Hadley et al. (2008) examined if there were gender differences in buffering outcomes of food insecurity among Ethiopian adolescents. They found that in severely food insecure households, 41% of girls also experienced insecurity versus only 20% of boys. Further, in a comparison of 351 pairs of boy/girl siblings, 77% of pairs reported the same amount of adolescent insecurity in non-severely insecure households; in severely insecure households, however, close to 40% of girls reported insecurity when their brothers did not. In addition to these differences in who gets buffered, the fact that there are studies in which only the mothers report reducing meals to buffer their children (cited above), whereas there are no reported findings of only fathers taking reductions in their meals, suggests that there are gendered differences at the adult level as well. In some cases, Mother’s sacrifice their own diets in order to feed their husbands who are the primary bread winners (Renzaho and Mellor 2010). Finally, some studies find no evidence of buffering whatsoever (Frongillo and Nanama 2006).


4 Household insecurity and adolescent insecurity were measured separately to allow for comparisons.
2009, Stevens 2010), reducing portion sizes (Bukusuba et al. 2007, Maxwell 1996, Maxwell et al. 2008, Kempson et al. 2003, Oldewage-Theron et al. 2006), not eating for a whole day (Bukusuba et al. 2007, Maxwell 1996), and selling blood, committing crimes with the intent of going to jail to get food there, participating in research studies, and selling food stamps (Kempson et al. 2003). Himmelgreen et al. (2000) found that participating in food assistance programs buffered against food insecurity among their sample, while not participating in such programs presented increased risk for food insecurity.

**Food Insecurity, Health Status and Cognition**

Several studies have linked food insecurity with mental health indicators. Food insecurity has been found to be a predictor of elevated symptoms of depression, anxiety, and posttraumatic stress (Hadley et al. 2008, Hadley and Patil 2008). Other studies have found strong significant and positive associations between food insecurity and depressive symptoms (Hadley and Patil 2006, Gao et al. 2009) and have linked it to mental disorders (Maes et al. 2010) and general mental health (Stuff et al. 2004).

In addition to mental health, food insecurity is also connected to other negative health outcomes. Eicher-Miller et al. (2009) reported that adolescents from food insecure households were 2.95 times more likely to be iron-deficient anemic, compared to their food secure counterparts. Other studies also report food insecurity increasing the risk of negative health outcomes among children (Chilton et al. 2009, Cook et al. 2004, Cook et al. 2006, Racine et al. 2009), and adults (Stuff et al. 2004, Bukusuba et al. 2007, Hadley et al. 2007 Ruiz et al. n.d.). Furthermore, in De Marco et al.’s (2009) qualitative examination of experiences of 25 low-
income and food insecure Oregonians, illness and injury were listed as main contributors to food insecurity.

Other studies have linked food insecurity with decreased cognitive performance among Puerto Rican adults (Gao et al. 2009), impaired academic performance in math and reading among children (Jyoti et al. 2005), overall child developmental risk (Rose-Jacobs et al. 2008), and lower mean language and comprehension scores among 18 month old Bangladeshi children (Saha et al. 2010). Evidently, there is abundant evidence linking food insecurity with poor health outcomes and decreased cognitive functioning. In the following section, I examine the links between malnutrition, immunological function, and overall health.

**Malnutrition, Immunology, Epigenetics and Health**

It is well established that inadequate nutrition can lead to decreased immune functioning, and overall physiological systemic disruption. Immunodeficiencies stemming from malnutrition (as well as from taking cytotoxic drugs or chronic diseases) are referred to as a secondary immunodeficiency. Primary immunodeficiencies are those caused by inherited genetic defects (Yates and Lyczak 2004:23). Key characteristics of both kinds of immunodeficiencies include enhanced susceptibility to infection resulting in more frequent illness episodes, diseases due to uncommon or even nonpathogenic microorganisms (including weakened vaccine strains), and decreased responsiveness to standard antimicrobial therapy (Yates and Lyczak 2004:23).

Similarly, the combination of malnutrition and illness, which in turn may be associated with anorexia, can have negative consequences on growth, since undernourished children are more susceptible to infection. Once infected, the ill child has higher energy requirements at which time anorexia becomes likely (Norgan 2006:152).
Two of the most severe kinds of malnutrition are edematous protein malnutrition, also known as kwashiorkor, and non-edematous protein-calories malnutrition, also known as marasmus. The former is a disease typical of children weaned to a protein-scarce diet. The key symptom is edema, or fluid retention which starts in the feet and progresses throughout the rest of the body until the child looks bloated. Marasmus occurs among infants and is characterized by growth retardation, severe emaciation, absence of subcutaneous fat, muscle atrophy, and apathy and irritability of the infant (McElroy and Townsend 1996:214-217). Children with kwashiorkor experience higher than normal oxidant damage because of reduced glutathione, a major component of the body’s antioxidant defenses (Badaloo et al. 2002), and have elevated fat content in the liver (Badaloo et al. 2005).

Among infants with marasmus, increased growth hormone secretion has been found, possibly as an attempt to utilize the diminished quantity of amino acids available for protein synthesis (Becker 1983), with reported decreases in insulin-like growth factor binding proteins (necessary for adequate growth to proceed) (Clemons and Underwood 1991). Similarly, there is evidence for gonadal damage in this form of malnutrition, as well as elevated plasma free cortisol with abnormal diurnal rhythms (Becker 1983)

Other complications associated with general malnutrition include increased permeability of intestinal lining, resulting in increased secretion of ions and fluids, and increased potential for fluid and electrolyte loss, and reduced total absorption of nutrients (Ferraris and Carey 2000). Similarly, malnourished children have lower conversion rates of riboflavin into its cofactors, a necessary step for energy metabolism (Capo-chichi et al. 2000). Zinc deficiencies result in growth retardation, dermatitis, and impaired immune function, through suppression of thymic function, T-lymphocyte development, lymphoproliferation, and T-cell dependent B-cell
functions (Fisher Walker and Black 2004:256). Deficiencies of folate, cobalamin (vitamin B-12) and iron can result in decreased circulating erythrocytes (red blood cells), or, anemia (Koury and Ponka 2004). Folate and vitamin B-12 deficiencies result in impaired DNA synthesis of the precursor stem cell for erythrocytes (Koury and Ponka 2004:111). Iron deficiency, on the other hand, results in decreased formation of hemoglobin, decreasing the successful binding of harmful oxygen radicals in addition to impairing oxygen transport (Koury and Ponka 2004:114).

Other harmful interactions between nutrition and immunological functioning can be seen with parasitic infections. In summarizing various meta-analyses of studies on the impacts that helminth infections have on child growth, Crompton and Nesheim state that endemic helminth infection among children can result in growth deficits and reduced appetite (2002).

Burdge and Lillycrop (2010) review the evidence on the impact that nutritional insult may have on the developmental trajectories of individuals. They suggest that a possible mechanism for the increased risk for cardiovascular disease, obesity, and associated conditions experienced by individuals deprived of adequate nutrition early on in their lives, may be altered DNA methylation rates, resulting in changes in the areas of the genome are made available for transcription. Among the more telling examples they cite, is the case of female honey bees (Apis mellifera). In this species, female bees are genetic clones, and all bees are fed the same diet (referred to as “royal jelly”) during their first three days of life. However, only bees destined to be queens are fed the jelly after three days, and this distinction in nutritional exposure creates the stark morphological, reproductive, behavioral, and other life history trait differences that distinguish queen bees from regular female bees. Delage and Dashwood propose a similar epigenetic mechanism in order to explain how maternal diets can have long lasting impacts on
health and disease risk, suggesting that histone\(^5\) modification, resulting from maternal nutrition, may impact DNA replication and repair, chromosome segregation, and gene expression (2008:348).

Thus, as the preceding discussion makes clear, there is ample empirical documentation of the deleterious effects that malnutrition (in many of its manifestations) can have on the overall wellbeing of humans. The impacts range from the chromosomal, metabolic, and actual constitution of bodily organs. This more-detailed knowledge of the relationship between nutrition and immunology sheds light on the associations reviewed above concerning food insecurity and poor health outcomes. In the next section I review the literature on child growth and development as it relates to adverse environmental exposures. An evolutionary perspective on health and disease highlights the importance of growth and developmental phases as key determinants of morbidity, mortality, and health. Thus, by examining the conditions under which growth faltering has taken place, one can better understand the relationships between food insecurity (among other negative exposures) and health.

\(^5\) Histones are structural proteins around which DNA strands wrap themselves.
CHAPTER THREE:
CHILD GROWTH AND DEVELOPMENT

In this chapter I present an overview of the human pattern of growth and development. This is followed by a review of a broad range of studies dealing with human growth and development within the context of malnutrition, poverty, food insecurity, and general exposure to adverse environments. Given that anthropometry is a major tool for nutritional assessment in clinical and field studies (Norgan 2006), and that in the absence of adverse environmental exposures, humans exhibit consistent and predictable growth and developmental trajectories (Bogin 2001, 1988; Cameron 2006; Lejarraga 2006), studies on human growth and development are powerful indicators of the overall wellbeing of populations. By understanding the patterns of variation concerning body composition and timing of life history stages, powerful analyses implicating our social systems can emerge. This is by no means an esoteric exercise. Evolutionary thinkers have begun to appreciate the crucial role that selection on the timing of life history traits (such as the eruption of the first molar) may have on macro-evolutionary processes, such as speciation (Shea 2000). For humans, the selection for an extended period of post-weaning feeding dependency has recently been proposed to have played a major role in the biocultural evolution of our species (Bogin 2009). In bringing up this broad-viewed evolutionary observation I do not intend to sound alarmist, nor do I have pretentions of making macro-evolutionary arguments based on the fact that we live in a world in which there is a wide range of outcomes in our growth and development based on the unequal distribution of resources. My
intention, instead, is to point out that since the timing of life history events is crucial in a macro-evolutionary sense, we should be doubly concerned about the impacts that variation in the way populations grow and develop may have on their wellbeing during their own lifetime. That is, since life history stages have been the focal point of strong selective pressures, they are intimately tied to our overall wellbeing at all points throughout our lifespan. Life history stages act as dots connecting our physiological status from early on in life to those during our subsequent years. In a sense, they are the fabric that bind individual metazoan organisms throughout the life cycle; and they do so by responding to ecological stimuli and adjusting so as to maximize survival, to the extent permitted by resource availability and phylogenetic constraint. Within the context of food insecurity research, it is now understood that the deleterious effects of food insecurity early on in a person’s life may have negative health and growth and development consequences in subsequent life stages (see Himmelgreen 2013).

As a final note, few of the studies reviewed below actually measured food security status and/or dietary intake; therefore, the majority of analyses are more ecological, in the sense that they examine a wide range of environmental impacts on human growth. This wide perspective in no way implies an epistemological shortcoming. In fact, given the great complexity involved in growth and maturation, it would be foolish to seek for narrow determinants. As Norgan writes:

“Nutrition is one of a number of environmental influences on growth. The others include infection, poverty, poor housing, and schooling; and it can be difficult to identify and evaluate the precise contribution of nutrition to growth or growth failure. The type, duration, and intensity of the nutritional challenge influences the nature of the response in growth, as does the ecological setting. There is thus no quantitative law like relationship
between nutrition and growth, and descriptions of the relationship tend to be either rather
general or biosocial case histories.” [2006:148]

Before discussing studies on growth and development, I first lay out what is known about
human auxiology, starting with a definition of these two terms.

**Human Growth and Development**

Following Cameron, I use growth to refer to increase in size and development to refer to
an increase in functional ability (2006:10). While experts in the area of human growth and
development certainly agree that in the absence of harmful exposures, humans exhibit
predictable and astoundingly similar patterns (Bogin 2001, Cameron 2006), surprisingly, there
are differing views on how to characterize the different stages of human growth and
development. Concerning the similarity of growth among normal, well-nourished children,
Bogin reports that no significant differences were found between the growth curve of the son of
the Count de Mountbeillard (born in 1759 and measured bi-annually until 1777) and that of a
modern U.S. sample. Commenting on this finding, he writes: “The similarity in growth between
a child and a sample of children across time periods and across geographical boundaries
emphasizes the common pattern of growth shared by all normal children and the predictability of
this pattern” (Bogin 2001:82).

Concerning the differences in the conceptualization of human growth stages, Cameron
(2007) describes human growth as conforming to a triple logistic pattern in linear dimensions,
relying on a series of generalized logistic functions representing infancy, childhood and
adolescence. Noticeably absent in Cameron’s (2007) typology is the juvenile stage, which Bogin
(2001:84) defines as a period in between childhood and adolescence during which pre-pubertal
individuals are no longer dependent on their parents or adult guardians for survival. As discussed below, the juvenile period is marked by its own characteristics and hallmarks, setting it apart from childhood and adolescence.

From my reading of the literature, Bogin (1988, 2001) presents the most holistic and biocultural definitions of the different stages of human growth and development. An example can be seen in how Cameron (2006) and Bogin⁶ (2001, 1988) define infancy: the former as representing the first five years, while the latter ascribes it to the first three years. Cameron describes growth during infancy as a “decaying polynomial” (2006:4) function, as it departs gradually and negatively from a straight line as age increases. Bogin, in turn, views this negative departure of growth from a straight line as one indicator among several that the childhood stage begins at three years of age (2001). Bogin takes extra analytical steps and situates his definition of childhood within a larger socio-cultural and demographic context, arguing that the retention of a highly neotenous⁷, and dependent, but slow growing phase of childhood allows for a higher fertility rate among humans than predicted for a primate of our size and with a similar period of reproductive viability (Bogin 2009). As such, I will rely on his conceptualization of human auxology, pointing out differing views when relevant. For the sake of brevity, I omit a discussion of pre-natal growth.

Infancy represents the first three years of postnatal life and is characterized by the most rapid growth rate of any of the postnatal stages, and the fastest deceleration in growth rates

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⁶ Both Cameron and Bogin represent are considered leading anthropological authorities on human growth and development.

⁷ Neotenous refers to the retention of infant-like characteristics. Humans are said to be more neotenous than Chimps because an adult human resembles an infant human much more than an adult chimp resembles an infant chimp. Other researchers, however, argue against a simplistic description of humans as neotenous, instead arguing that we are the product of a mosaic pattern of evolution, with some neotenous traits, and others that clearly are not (Shea 2000).
During the first six months there is a surprising homogeneity of growth across a wide range of contexts. Bogin suggests that this uniform pattern of growth during the first six months may stem from the fact that breast milk provides all the necessary nutrients required by the infant during this time period. After six months, differences in size that stem from access to resource become apparent (Bogin 2001:78). More than 50% of infants exhibit either catch-up or catch-down growth during the first two years of life. In addition to catch-up growth as a recovery from early nutritional insult, the high percentage of infants that shift through growth centiles stems from the canalization of growth: “Indeed, it is true to say that all children, when in an environment that does not constrain their growth, exhibit a pattern of growth that is more or less parallel to a particular centile or within some imaginary ‘canal’” (Cameron 2006:16).

The brain grows more rapidly during infancy than almost any other tissue. The hypothalamus in particular grows at a fast pace during fetal growth and early infancy, producing high levels of gonadotropin releasing hormone (GnRH). This stimulates the release of luteinizing (LH) and follicle-stimulating hormones (FSH) from the pituitary gland, which travel through the blood stream to the gonads, stimulating the production of estrogen or androgen hormones. By late infancy, the hypothalamus becomes inhibited, secretion of GnRH virtually stops, and sex hormone levels fall, suspending reproductive maturation (until puberty) (Bogin 2001:79).

Generally, no correlations have been found between nutrition and the emergence of deciduous teeth, although dental emergence may be delayed in the case of severe protein-calorie malnutrition (PCM). Even in those cases, the effects of malnutrition are greater on other parameters, such as height, weight and bone age (Demirjian 1986:272).

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8 Holliday (1986) defines infancy as ending by year one, and Cameron (2006) as ending by year 5. Bogin, however, relies on a suite of biocultural traits to characterize infancy, and thus presents more holistic criteria.
Head circumference increases the fastest during infancy, increasing by 35% during the first year (Johnston 1986). Similarly, during the early months of life, as much as 40% of total energy requirement is used to sustain growth (Holliday 1986:101). The end of infancy is signaled by the eruption of the last deciduous tooth: M2. At this stage, humans can eat appropriate weaning foods (Bogin 2001:80).

Childhood, ranging from three to seven years, is defined by its own pattern of growth, feeding behavior, motor development and cognitive maturation. The rapid deceleration in growth rate seen in infancy ends when childhood begins, leveling off to about five centimeters per year (Bogin 2001:81). It is noteworthy that Cameron (2006) also ascribes a continuous linear pattern of growth to childhood, although for him it represents ages five to ten. Lejarraga (2006) also describes a smooth and regular growth rate from year three until just before adolescence, lending support to Bogin’s typology. In terms of feeding, children are weaned from the breast or bottle, but they still depend on others for food. The pattern in most mammalian species is to move from infancy directly to a stage of independent feeding. A few social species, such as lions, hyenas, dogs, marmosets and tamarins, also exhibit some post-weaning feeding dependency. For instance, lion cubs are weaned at six to eight months but remain somewhat dependent until around 24 months (Bogin 2001:81). The degree and length of human post-weaning dependency, however, is much greater.

Human children need specially prepared foods due to their premature dentition, small stomachs and intestines, and rapidly growing brains. They need easy to chew diets that are low in total volume, while energy-dense (high in lipids and protein) in order to satisfy brain growth requirements (Bogin 2001:81). Newborns use 87% of their resting metabolic rate (RMR) for brain growth and function; this drops to 44% at five years and to 20-25% for adults (Leonard and
Robertson 1992). In addition, children cannot prepare meals for themselves because they lack adequate motor and cognitive skills. Finally, increased vulnerability to diseases and accidents means that they need protection. As Bogin writes, “There is no society in which children survive if deprived of care provided by older individuals (2001:81).

Important developmental milestones during childhood include the emergence of the first permanent teeth (Bogin 2001) and the completion of the growth in weight of the brain (Cabana et al. 1993). The first molar (M1) erupts on average around 5.5-6.5 years, with the central incisors quickly following. The eruption of M1 during childhood reflects the importance of this period as a life history stage in humans. For instance, there is a close association between dental development and other aspects of growth and maturation. Smith, working on data on humans and 20 other primate species found that the eruption of M1 and adult brain size were highly correlated (r=0.98) (1991, 1992). Major maturation also takes with regards to locomotive patterns during childhood. At three years of age, humans are still toddlers: they can walk bipedally, but lacking the efficiency and gait of an adult. In energetic terms, per kilogram of body weight, children are 85% as efficient as adults during walking (Kramer 1998). On average, humans achieve the efficiency and gait of adults at age seven (Nakano and Kimura 1992).

The end of childhood is marked by a small increase in growth rate, referred to as the mid-growth spurt (Bogin 2001:84). Bogin states that other researchers have questioned whether this growth spurt takes place, and attributes the inconsistencies to the use of smoothing techniques that are applied to longitudinal data, stating that many curve fitting procedures assume a priori that no juvenile growth spurt takes place. By age seven, most children have erupted their 4 M1s and their permanent incisors have begun replacing the deciduous ones (Bogin 2001:83).

Similarly, the brain has achieved its maximum weight at this age, meaning that humans can now
process adult diets and require fewer nutrients for brain growth (Cabana et al. 1993). As a result of maturation in dentition, improved motor and cognitive skills, and decreased nutrient requirements related to the cessation of growth in weight of the brain, humans can achieve post-weaning feeding independence only after they enter the juvenile stage. Having detailed the patterns of growth and development through childhood, I now turn to a review of studies that examine factors contributing to variation in growth and development outcomes.

**Broad Environmental Influences**

Despite the prolonged and well-designed efforts devoted to discovering a genetic basis to differences in growth patterns across a wide range of ecological contexts (reviewed in Huss-Ashmore 2000, Schell 2006), the consensus among human biologists is that most differences stem from either developmental acclimatization, for instance to high-altitude hypoxia (Stinson 1982), or from environmental insult, such as smoking and air pollution (Schell 2006) or undernutrition (Bogin et al. 2002).

Concerning high-altitude hypoxia, again, the consensus is that differences in growth rates between populations stem from developmental acclimatization, undernutrition and low socio-economic status, or both. Hass and colleagues (1982), for instance, found that infants in La Paz, Bolivia, were significantly shorter at one and six months, and had lower rates of gain in recumbent length compared to low-altitude infants. Other studies have found similar consistent reductions in growth of length and weight among high-altitude infants, extending into the first two years of life (Moore et al. 1998). For slightly older children, significantly heavier weights have been found among low-altitude versus their high-altitude counterparts (Beall et al. 1977, Mueller et al. 1978), with slower rates of growth among the high-altitude samples (Hoff 1974).
Finally, Frisancho and Baker (1970) found delays in growth in height and weight for both sexes, and a prolonged growth period (22 years for men, 20 for women). As Leonard (1989) reminds us, however, high-altitude hypoxia’s impact on growth is difficult to disentangle from low socio-economic status and poor nutrition. Studies that take these issues into consideration are discussed later.

Other well established patterns have been documented in relation to climate. Roberts (1978), for instance, found evidence for a relationship between adult size and shape that is consistent with Bergman and Allen’s rules. This means that there is a significant negative relationship between both body weight and sitting height as a proportion of total body height and mean annual temperature. According to Schell (2006), this and other similar studies suggest that growth in hot environments is prolonged, since there is an association between delayed maturation and a linear body type, or that growth in cold environments is shortened, as a result of the relationship between early maturation and stocky body type.

Other documented patterns of variation include seasonal variation in growth rates. As early as 1933, Palmer found that at temperate latitudes, height growth was faster during spring and summer, while weight growth was greater during fall and winter (Schell 2006). Height growth reaches maximum from March to May, and is around two and a half times higher than the average growth velocity between September and November. Similarly, around two-thirds of annual weight gain takes place between September and February, but this seasonal rhythm is not established until around two years of age (Schell 2006:169). Other seasonal influences on growth may stem from rainfall or exposure to sunlight. Bogin (1978) found that among Guatemalan children, 75% of pre-adolescent children and 65% of post-adolescent boys reached a maximum rate of growth during the dry season and grew the least during the rainy season. More recently,
Godoy et al. (2008) examined the effects that rainfall during gestation, the first year of life, and years two to five may have on adult height among 211 women and 215 men, ages 20 and up in low-land Bolivia. Among women they found that a ten percent increase in rainfall during years two to five was associated with 0.7-1.2% lower adult height. It is possible that the association between rain and growth could actually be an artifact of the relationship between sunlight exposure and growth, since at least for Bogin’s (1978) study exposure to sunlight was greatest during the dry season. In 1929, Nylin tested the effects that exposure to sunlight may have on growth by exposing one group of Swedish boys to sunlamps during the winter (with a group of controls who were not exposed to the lamps) and found that the exposed group grew on average one and a half more centimeters. The control group, in turn, grew faster during the summer, resulting in no mean annual differences in height gains between the exposed and control groups (Bogin 1988). Bogin states that explanations of seasonality of weight gain may stem from variation in resource availability and rates of disease, but that this explanation does not hold for more well-nourished populations, possibly pointing to an endogenous seasonal rhythm of weight gain (Bogin 1988).

**Political-Economic Influences on Growth**

Before I begin this section of the review, I want to clarify that by using the phrase “political-economic perspectives on growth,” I am applying a very loose and generous definition of political-economic analysis. I use it to refer to any study that takes into account differences in access to resources, be they food, housing, education, income health care, etcetera.

Returning to the discussion on growth in high-altitude environments, Stinson found stark height differences between upper-class French school children and lower-class Bolivians. In this
sample, the French school children were 13 cm taller. When the analysis was restricted to Bolivian children, however, only length of residency at high altitude significantly affected height, with those that spent the least amount of time at high altitudes being approximately 3.75 cm taller than those who spent their entire lives there (Stinson 1982).

More recently, Stinson (2009) examined differences in sitting height among low socio-economic status Aymara children and children of European ancestry and of high socio-economic status. Overall, the Aymara children had shorter legs relative to their trunks and overall height than the Europeans, but there was some overlap between the samples. In order to tease out the nutritional, developmental, and genetic sources of variation, Stinson ran sex- and age-specific regressions of relative sitting height on age, and compared the nutritional status of the 20% in each group that had the residuals closest in the direction of the other sample, with the remaining 80% of their group. That is, she examined the height, weight, triceps and subscapular skinfolds differences between the 20% of children of European ancestry that had relative sitting height indices closest to the Aymara children and those of the rest of the European children (doing the same respective procedure for the Aymara sub-sample). The children of European ancestry were significantly taller and heavier than the Aymara, but the latter were significantly heavier for height. This greater weight for height, in turn, was not the product of fat, since the Aymara had lower skinfold thicknesses. Finally, and more tellingly, the Aymara children with the lowest relative sitting height (more similar to the European sample) were significantly taller, heavier, and fatter than rest of the sub-sample. Likewise, the European-ancestry children with relative sitting height more similar to the Aymara were significantly shorter, had spent more time at high altitude than the rest of their sub-sample, and had at least one parent born in Bolivia (Stinson 2009). Stinson concludes that “The strongest support is for the influence of nutritional status in
rural Aymara children (2009:611), although the results of the European-ancestry children supports that developmental acclimatization, and possibly some form of intergenerational effect are also playing a role in creating variation in the well-nourished sub-sample.

Other studies have also examined the intergenerational transmission of growth and body composition patterns. Varela-Silva et al. (2009) looked at the effects that maternal stature, age at pregnancy and infant birth weight have on childhood growth, and found that the mother’s height and child’s birth weight predicted overweight. Children with a mother less than 150cm were less than half as likely to be overweight compared to children with taller mothers. Similarly, children with birth weights less than 3,000 grams were a third as likely to be overweight than their heavier peers. Children with mothers less than 150cm were also 3.6 time more likely of being stunted than children with taller mothers, and children with birth weights less than 3,000 grams were over three times as likely of being stunted than heavier counterparts (Varela-Silva et al. 2009). The authors claim that although their results contradict some of the findings on intergenerational and fetal programming impacts on risk for overweight (Kuzawa 2005), this may stem from the fact that the children in their sample might have exhibited slow post-partum growth. They note that the greatest risk for overweight has been documented among children born with low birth weights who subsequently exhibit fast post-partum growth (Varela-Silva 2009:661). Elia et al. (2007), for instance, found that increases of one standard deviation in birth weight were associated with decreases of 1.95% fat among pre-pubescent children. Nevertheless, the negative significant association found by Varela-Silva et al. (2009) between maternal height and risk for stunting suggests some form of intergenerational transmission. Furthermore, the coexistence of elevated stunting rates and higher-than-reference BMI values among the sample
children conform to the pattern documented among populations undergoing the nutrition transition (Blackwell et al. 2009).

Despite seeming counter-intuitive, there is a growing body of literature that identifies potential metabolic pathways for the coexistence of stunting and overweight among populations in the developing world (Frisancho 2003). It seems as if scarce nutrition in the mother’s lifetime—during gestation or in early life—may result in physiological transformations that result in the preferred metabolic use of carbohydrates over fat (Walker et al. 1991). Studies have shown that previously malnourished individuals preferentially oxidize carbohydrates for energy needs and tend to store fat (Dulloo 1997, Dulloo and Girardier 1990, Hoffman et al. 2000). For instance, male rat offspring from mothers who were food-restricted during first two weeks of pregnancy became obese by week five of their lives (Jones and Friedman 1982, Jones et al. 1984). Dulloo and Girardier (1990) found that food-restricted rats had an increased efficiency at energy utilization and preferential accumulation of fat.

Studies among humans are harder to come by, but evidence on the impacts of the Dutch Hunger Winter has shown that individuals whose mothers were deprived during their first two trimesters of pregnancy had a greater incidence of obesity than the general population (Ravelli et al. 1976). Moreover, supplementation studies on growth-retarded children have shown that interventions do not have a major effect on body growth in length, but result in increased skinfold thickness (Walker et al. 1991). Results from the Minnesota Semi-Starvation\(^9\) Experiment also have shed important light on the topic of malnutrition and metabolic function. Among the results were reduced rates of energy expenditure among the severely energy-deprived

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\(^9\) A study conducted at the University of Minnesota in between 1944-1945 on 36 volunteers, with the aims of understanding the consequences of starvation.
men, stemming from decreased physical activity, but also, from decreases in the Resting Metabolic Rate (RMR). Further, re-fed subjects gained weight due to increased fat accumulation (Keys et al. 1950, Grande et al. 1958). Similar reductions were found in the Sleeping Metabolic Rate (SMR), which is related to an auto-regulatory feedback system where signals from depleted fat stores suppress thermogenesis, resulting in decreased RMR and a metabolic pathway favoring fat storage (Keys et al. 1950, Dulloo and Jaquet 1998). Other studies have found that non-obese cyclical dieters had significantly lower energy expenditure per unit of body weight in treadmill exercises than controls (Manore et al. 1991), and that obese pre-pubertal children exhibited greater oxidation of carbohydrates than lean counterparts (Rueda-Maza et al. 1996). Thus, while more work needs to be done in order to better identify the mechanisms at play in these situations, there is ample empirical and theoretical evidence to account for the dual presence of stunting and overweight/obesity among poorer populations. As detailed in the section on the epigenetics of malnutrition in the previous chapter, possible mechanisms that may result in metabolic alterations as stemming from environmental stressors have recently been identified. These mechanisms are thought to underlie the higher rates of overweight and obesity (with associated health complications) among populations how have been raised in subpar nutritional environments.

Poverty has also been found to be related to a low leg-length index (length of leg to total body height) and increased body fat (Frisancho 2007). Cameron (1992) documented urban-rural differences in growth and nutritional status of South African children, showing that the urban poor had the worst indicators. Maya-American children have been found to be significantly taller and longer-legged than their Guatemalan counterparts (Bogin et al. 2002), which the authors attribute to better living conditions. Dangour (2001) also found height differences in his study of
Amerindian children in Guyana, with the taller and longer-legged children living in the tribe with better conditions. Other studies have also linked increases in stature in populations across time with improvements in general living conditions (Dangour et al. 2002, Stinson 2000, Jantz and Jantz 1999, Gunnel et al. 1998). Foster and colleagues (2005) documented very high rates of stunting among Tsimane boys and girls less than nine years of age, with very low rates of wasting. The strongest association they found was a positive one between the sum of skinfolds and the number of teachers in the village. Schott et al. (2013) found associations between parental education levels and presence of communal hospitals and child height-for-age z-scores.

In a large (n=2000 per country), four country study (Ethiopia, India, Peru, Vietnam), Petrou and Kupek (2010) found that children in the lowest economic quintile had significantly higher probabilities of being stunted in all four countries, compared to children in the highest economic quintile of the sample. Relying on the same multinational dataset, Dercon and Sanchez (2013) found that one standard deviation increase in height at ages 7-8yrs resulted in significantly higher test scores for self-efficacy, self-esteem and aspirations assessed on the children at ages 10-11.

Concerning food security status, very few studies have actually examined growth outcomes among children. The two I came across in my search found significant associations between food insecurity and decreased subsequent weight and length gain, with proportion of stunting and underweight lower in food secure households (Saha et al. 2009), and higher mean language comprehension and expression skills among children from food secure households (Saha et al. 2010). Belachew et al. (2013) found that food secure adolescent girls were significantly taller than their food insecure counterparts; this difference in heights by food security status was not present among boys in the sample, suggesting gendered difference in
household allocation of resources. While not actually accounting for food security status per se, Leonard (1989, 1990, 2000) found that significant nutritional stress could have affected growth patterns of children in Peru and Ecuador.

Immune activation (measured through C-Reactive Protein (CRP) levels) has also been documented to affect subsequent growth among nutritionally compromised Tsimane children (McDade et al. 2008). In another related analysis, McDade and colleagues identified age as the strongest predictor of elevated CRP levels; CRP levels were also positively associated with an elevated pathogen exposure, and a negatively so with household economic resources and CRP (McDade et al. 2005).

Others have found that compliance with vaccine schedules, in addition to maternal height and weight, accounted for a large portion of the variance in child growth outcomes (Gray et al. 2010). Through ethnographic research, these authors noted increasing rates of various symptoms and infections among a sub-sample of their children who they followed closely for several months: after eight weeks, all developed eye infections; at the third month, all were symptomatic for lower respiratory infection; other common manifestations included diarrhea, malaria, and low-level skin infections. The authors attribute the positive association between symptoms and age with the warring off of the effects of passive immunity acquired through breast milk. McDade (2005) provides an excellent discussion on the energetic costs involved in immune-activation, and the potential consequences that may stem from this in the context of limited energetic resources. These life history tradeoffs help explain why undernutrition, poverty and illness lead to growth disruption as discussed in this review.
Issues on Collecting and Analyzing Growth Measurements

As the preceding discussion makes clear, growth is not a linear process among humans. And as Cameron notes, the patterns reflected in the growth curves are a function of the frequency of measurements collected (2006:4). This brings up an important point, which is how one knows what the appropriate frequency and spacing of measurements should be. Of course, there is no general prescription to follow, as this will hinge on the research question posed. But in terms of trying to detect possible differences in growth rates, some basic methodological guidelines are essential. First, as previously mentioned, growth does not proceed in smooth, linear and uninterrupted fashion. It is now clear that the growth process is characterized by periods of stasis, mini-growth spurts, and even decreases in size (Lampl 1993, Lampl and Johnson 1997, Hermanussen 1988, Hermanussen and Burmeister 1993). If one relies on stature measurements, Hermanussen (1988) states that more than 70 days of spacing between measurements are needed in order to obtain a 94% probability of falling within the standard error range of the true half annual growth rate; this number is reduced to 35 days if one relies on knemometric\textsuperscript{10} measurements.

In addition to measurement intervals, attention must be paid to factors that may affect growth such as nutritional status and illness. Accordingly, measures such as mid-upper arm circumference and triceps skin folds are important indicators of nutritional status (Malina 1986). From these two measures, estimates of muscle mass can derived. Malina (1986) states that these estimates, based on simple geometry, assume that the arm is a cylinder. However, Bogin (2001) dismisses these concerns as being mathematically insignificant. Concerning illness measures, a

\textsuperscript{10} Measurements of the distal leg bones, from the heel to the knee.
combination of the self-reported and observed biomarkers I have discussed above allow for controlling this effect at the analysis stage.

In addition to examining differences in growth rates or outcomes in their respective samples, human growth researchers compare their samples to standardized reference curves. This step is essential in order to assign study subjects to different nutritional categories, such as stunted (low height for age) and wasted (low weight for height). Specifically, stunting is defined as a z-score of less than -2 standard deviations for height for age indicators, whereas wasting is defined as a z-score of less than -2 standard deviations for their BMI, based on some standardized reference data, such as the NCHS/WHO data set (de Onis et al. 2007)\textsuperscript{11}.

Z-scores are also used within samples in order to examine if catch-up growth has taken place. For instance, the traditional clinical definition of catch-up growth was that of a change in z-score of height for age of 0.67 within the first two years of life (Ong et al. 2000). On the other hand, Martorell et al. (1994) and Adair (1999) defined catch-up growth as an inverse correlation between early height and subsequent growth, the former using raw data, and the latter z-scores. Cameron et al. (2005) discuss problems associated with Martorell and colleagues’ analysis, noting that stunting is defined by z-scores, which raises problems about the use of raw measures in order to assess catch-up growth. A second problem they discuss, concerns regression to the mean (RTM), a statistical phenomenon that predicts “that stunted children at 3 years will ‘regress to the mean’ and become relatively less stunted over time, and that RTM will be most obvious in the initially shortest children (Cameron et al. 2005:413). This results from the fact that the sample examined for RTM is unrepresentative of the population. Cameron and colleagues go on

\textsuperscript{11} Other researchers rely on other reference data. Varela-Silva et al. (2009), for instance use Frisancho’s (2008) data.
to show how Martorell et al. (1994) found no correlation between initial height and height change because they relied on the centimeter scale, and not z-scores.\textsuperscript{12} They conclude that catch-up growth can be defined as changes in z-score beyond that predicted by regression to the mean. Applying this criterion to a re-analysis of Adair’s (1999) and Martorell’s data, Cameron concludes that catch-up growth did not take place in these samples. Being able to adequately define and identify catch-up growth is important, as children who have experienced catch-up growth have been found to be heavier with more central deposition of fat, and have poor glucose tolerance and insulin resistance at age seven (Cameron 2007).

It is also important to select appropriate dimensions to measure, to ensure that any growth differences detected are more likely to be related to nutritional issues. As discussed in greater detail in Chapter 3, relative leg length is a common marker of nutritional status. Specifically, longer-leggedness is believed to stem from adequate nutrition and improvements in overall living conditions (Bogin et al. 2002, Dangour et al. 2001, Jantz and Jantz (1999, Stinson 2000, Frisancho 2007). Knemometric measurements, in addition to having very low technical error of measurement, allow for the detection of growth during short measurement intervals (Hermanussen 1988), thus providing confidence that sizeable differences in growth rates by food security status will be detected (provided the null hypothesis is false). Recently, Bailey et al. (2007) examined the impacts that hypoxia and nutritional stress have on child growth, and found

\textsuperscript{12} RTM states that : \( E(z_2)=rz_1 \); expected value of second z-score is first z-score multiplied by the correlation between them (with the exception of \( z_1=0, r=1 \), and \( r=0 \)). The amount of RTM to expect = \( \Delta z= z_1(r-1) \). With repeated measures, \( r-1 \) is negative, so that the expected change in z-score is inversely proportional to the first z-score (Cameron et al. 2005:413). Martorell et al. (1994) found positive correlation between initial measurement and subsequent growth (.07 and .08, males and females)—and this is due to their reliance on raw measures:

“So it is possible for height change to be uncorrelated with initial height, but only if height change is measured on the centimeter scale rather than the z-score scale. It happens when the correlation between the two heights is equal to the ratio of their standard deviations” (Cameron et al. 2005:413). Catch-up growth =\( z_2-rz_1 \)
that those with lowest blood oxygen saturation, and lowest fat stores were impacted the greatest in their tibias. Furthermore, Frisancho and Tracer (1987) came up with 5 operational categories of nutritional status based on means, z-scores and percentile ranges of upper arm muscle area by stature, to be used in addition to weight/height tables, in order to obtain or more complete assessment of body composition and nutritional status.
CHAPTER FOUR:
RELEVANT THEORETICAL FRAMEWORKS

In this chapter I discuss aspects of political economic perspectives as they relate to the study of culture and health outcomes. Political economists employ a macro-level theoretical framework in order to explain mid-range level phenomena, such as conflicting ideologies concerning resource management in a small village. The challenge for them is the successful synthesis of both material and semiotic/ideational factors – an analysis that begins with a focus on the distribution of resources stemming from the social distribution of labor, reflecting strong materialist concerns, and examines how semiotic pressures dialectically interact with the production and allocation of resources. By “levels” here I am referring to the timing, onset and causality of phenomena; at the “macro” end of the continuum are economic and political policies, such as trade tariffs, subsidies, etc. These processes are generally related to the units of analysis dealt with by political scientists. Towards the “micro” end of the continuum I am referring to processes that unfold within the realm of social encounters (gestures and such).

The first section of this chapter, devoted to political economic analyses employed at a mid-range level, begins with what I consider to be the logical starting point for an application of contemporary political economy at smaller analytical levels: an exploration of alienation from a Marxist perspective. Here, I review alienation according to the early scholarship of Marx, relying on his views as set forth in his Economic and Philosophical Manuscripts of 1844. After outlining my reading of Marx’s position on alienation, I review some recent anthropological explorations.
of Marxist alienation. Next, I examine other applications of political economic theory to explain patterns “on the ground,” paying particular attention to the theoretical work employed in order to make these analyses cogent.

One final word before proceeding. In crafting and carrying out this dissertation, “theory” has played multiple roles (as it should under a hypothetico-deductive pattern of research) with different theories tasked with different analytical tasks. For instance, biocultural theory, encompassing political-economic perspectives, life course theory, epigenetics, embodiment, etc, played the instrumental role in allowing me to identity hypotheses that I could test that would be interesting and of practical relevance. During the analysis and writing phase, semiotics gained prominence in my mind and writing in that it proved instrumental in allowing me to tease apart some of the micro-sociological phenomena I had studied. And at yet another phase, Critical Theory (Frankfurt School) has played the role of meta-theory, in the sense that I have been intrigued throughout this research process about the possibilities of and limitations of the emancipatory prospects of science as outlined by scholarship in this field. All of this says that while there is eclecticism here concerning theories that guide and shape this research, I view this eclecticism as different from postmodern eclecticisms in that I have sought to be as epistemically consistent as possible throughout the phases of analysis and have generalizing intentions through my work. That is, I do not wish to highlight simple particularities in the vast mosaic of humanity, but rather, I am trying to uncover structures and patterns that characterize our health as a species.

**Political Economy on the Ground**

From the literature I have reviewed, I noticed a pronounced separation between Marxist scholarship and the political-economic work inspired by Marxist insights and concerns, which is
to a large extent divorced from many details of Marxist theory. In many regards my reading of the literature conforms to the crude typology outlined by Firth (1975) many years ago, in which he distinguished between cerebral and gut Marxists. By cerebral, Firth referred to the mostly French, theoretically driven scholars, whereas the gut Marxists were comprised of mostly North American scholar/activists, inspired by Marxist problematics but not bogged down by theoretical details. Following Firth, I have split the first part of this chapter in two sections. In the first, I deal with the more cerebral aspects of political economy, by examining Marxist notions of alienation; in the second, I treat the more general (gut) use political-economic analyses. Insofar as Marx’s ideas on alienation entail micro-sociological and existential treatments of humanity, I feel it is the logical starting point for an examination of political-economy applied at a mid-range level.

**On Alienation**

To understand Marx’s notion of alienation one must first understand his perspective on what it means to be human. To understand Marx, though, one must begin with Hegel. Hegel believed that through the objectification of reality—that is, through understanding, through knowledge, humans objectified the world and therefore became aware of their own self development, objectified in this process of growth and creation (Patterson 2009). Drawing on Hegel’s dialectic (McClellan 1975), but standing it on its head in order to acknowledge the material conditions that humans encounter and construct, Marx advanced a biocultural and existential theory of humanity. While Marx included material processes in the dialectic, he also accepted Hegel’s fundamental notions of self-growth and human realization. This is evident in Marx’s theory of humanness, implicit in his discussion on alienation, in which he grants a
primary role to self-objectifying activities as the mechanism for human self-realization. In extending Hegels’ dialectic in order to include material processes as factors in human self-realization, Marx paid particular attention to the role that labor, in so far as it transforms the world, transforms humans. Through labor, humans see their humanity objectified in their products, and therefore, become aware of their own subjectivity.

Taking under consideration Marx’s existential theory of humanity, it is clear that the material units of Marx’s analysis gain significance insofar as the Hegelian notions of self-realization are first accepted. Such a dynamic is apparent in Marx’s discussion on “Man’s species being” (Marx 1978:77). Here, Marx draws a distinction between humans and other animals by arguing that the “animal is immediately identical with its life-activity. It does not distinguish itself from it. It is its life-activity. Man makes his life-activity the object of his will and of his consciousness. He has conscious life activity”13 (Marx 1978, 76). In this same passage, Marx identifies labor, or “the productive life” as the existential engine that drives human self-realization. Thus, where Hegel saw knowledge and thought as the means towards human growth (hence the term Hegelian idealism), Marx grounded this emphasis on knowledge through material, labor practice. Despite the ontological differences implied by Marx and Hegel’s dialectic, it should be noted that from a purely kinematic perspective, the immediate14 consequences of dialectical processes under both thinkers are the same: the self-realization of

13 Whether or not this is true of human beings is an empirical question. Buddhist epistemologies may be seen as counter-examples to what Marx is arguing here. This is a fruitful question that should be tackled by biocultural anthropologists.

14 It must be stressed that this only holds on immediate terms, given that Hegel held teleological views about the progress of humanity, whereas Marx subscribed to a historically-contingent perspective (at least in some of his moments).
humans through their objectification of reality; by objectifying either knowledge or products of labor, the human subject becomes conscious of its subjectivity, or life-activity.

Marx, of course, did not think of humans as isolated beings, individually working and creating their own consciousness separate from one another. Instead, Marx emphasized that humans entered into social relations that pre-existed them. This notion of historical contingency, and of the interrelated aspects that constitute sociological experiences, are exemplified when he states that, “In the social production of their life, men enter into definite relations that are indispensable and independent of their will, relations of production that correspond to a definite stage of development of their material productive forces” (Marx 1978, 3). Thus, out of historical necessity, humans are born into a world in which social relations exist as objectified, and this objectification of relations stem from the productive activity of earlier generations (i.e., their labor). That is, there are set ways through which individuals relate to each other and to the world at large, which are the result of historical political-economic forces, ultimately boiling down to the material aspects of production:

“The sum total of these relations of production constitutes the economic structure of society, the real foundation, on which rises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the social, political and intellectual life process in general. It is not the consciousness that determines their being, but, on the contrary, their social being that determines their consciousness.” [Marx 1978, 4, emphasis added]

This passage captures Marx’s social ontology succinctly. It must not, however, be interpreted as a vulgar materialist position, whereby an arrangement “X” of the relations of production will always result in “Y” and “Z”, corresponding to the legal-political structure and
forms of consciousness, respectively, of a given society. Such a reductive interpretation of this passage overlooks Marx’s emphasis on historical contingency. Furthermore, his use of the qualifier “in general” referring to the relationship between the material mode of production and the social, political, and intellectual aspects of a society should be enough to caution against deterministic positions like the one described previously. These cautions aside, one should not be too timid in reading notions of causality when referring to the relationship between the organization of labor and the resultant effects that this will have on the worker’s ability to achieve self-growth and realization. Furthermore, given that Marx considers that relations between people are also the product of the degree to which they can achieve their species-being status, it also follows that the objectified social relations that people enter into, will be the product of their society’s mode of production. In fact, this is the logical conclusion that must be reached when we combine Marx’s theory of humanness with his discussion on larger social arrangements. Given that for Marx, labor constitutes the primordial life-activity whereby humans achieve their status as species-being (as opposed to just being) through the transformation of material reality and thus, the objectification of the world such that it permits humans to realize their subjectivity through their labor, it is only logical to assert that the relations of production in a given society will be a determining factor influencing the degree to which humans may fulfill their existential, species needs. This, again, will be reflected in how people relate to each other. The importance of the relational aspect among humans, and between humans and nature, is a product of the application of dialectical thought to realms above and beyond the psycho-existential level. Analytically, I believe Marx makes an argument by analogy,

15 This is why Marx referred to communism as the “negation of the negation” (Marx 1978, 93).
starting with individual human realization—as embedded in social relations—and proceeding up in higher levels of sociological abstraction, so that he sees relational connections established among all parts and levels of a complex, dynamic social system. As O’Laughlin (1975:343) notes, “Since all structures are dynamic processes—relations between being and becoming—they cannot be known positively through their phenomenal surface form. Structure can only be known when relations are dialectically conceptualized.” And structure, in this case, again relates to the mode of production in a society. That is, the social arrangement of labor.

The ethnological validity of Marx’s assertions on the role that labor has in psychoexistential and sociological aspects of humanity is an empirical question, and is a task I have approached through my formative ethnographic research leading up to the design of this research. For now, it should be noted that Marx arrived at his theories of humanness and of the materialist conception of history through a careful study and critique of the political economy of his time (both of the actual political-economic processes at work, but first and more importantly, the political-economic philosophy of this time). He took particular issue with the fact that political-economy (the body of knowledge) assumed as facts and starting points for analysis and policy creation, concepts that needed to be explained in their own right, namely, private property and the accumulation of capital. His conclusions after detailed analysis about the interrelationship between labor, private property, and the accumulation of capital were at serious odds from that of his contemporaries’:

“Thus through estranged labour man not only engenders his relationship to the object and to the act of production as to powers that are alien and hostile to him; he also engenders the relationship in which other men stand to his production and to his product, and the relationship in which he stands to other men […] Private property is thus the product, the result, the necessary
consequence, of alienated labour, of the external relation of the worker to nature and himself.”

[Marx 1978, 78-9]

**Alienating Labor**

Discussing the outcome of estranged or alienating labor, Marx put it so: “Whatever the product of his labour is, he is not” (Marx 1978:72). What, then, constitutes the alienation of workers through labor? We have already established that according to Marx, labor is the primordial means through which humans fulfill their species needs of self-realization and growth. Linking this assertion with the previous quote from Marx, it is clear then that alienating labor is labor that does not allow humans to fulfill their species needs. Fundamentally, then, alienating labor is a task of production that is antithetical to the very biocultural properties of humans as a species-being. This condition arises, according to Marx, when people are forced to engage in wage labor, because this signals a switch from a situation in which labor fulfilled the roles of material reproduction of humans (food, water, shelter, etc.) and self-realization, to a situation in which the relationship between labor and the material reproduction of humans is mediated via wages, and the process of labor itself is a process of self-denial: “In tearing away from man the object of his production, therefore, estranged labour tears him from his species life, his real species objectivity” (Marx 1978, 76). Whereas before humans affirmed their selves through work, they now have to resort to life outside of work; and life outside of work, of course, becomes tightly restricted under capitalism\(^{16}\) for the working classes.

\(^{16}\) It is interesting to point out that Malthus also acknowledged the working class’s reduced ability to engage in “leisure” as an obstacle towards the realization of virtue among this class. Of course for Malthus this lack of opportunity to engage in leisure was understood as an inevitable fact of the asymmetry between the mathematical
The resulting situation is one in which labor becomes a “means to satisfy needs external to it” (Marx 1978, 74), namely, the means to earn wages in order to subsist; in which the worker stands in an alienated relationship to the product of his labor, precisely because it is produced not for himself, but rather, for the capitalist. Through this dynamic, the objectification of the alienated object thus acquires great significance for the worker that has produced it, in that it represents the objectification of the social relationships that are inherent in its production, where the worker becomes an object, a means for the production of capital, for the accumulation of the capitalist class.

To wrap up this cursory treatment of Marx’s notion of alienation, I want to highlight some important insights that stem from his analysis. First, that alienation exists as a theoretical attitude and on a phenomenological level for the workers. In contrast, for the capitalist alienation exists only as a theoretical construct where the tenets of capitalist political-economy form the habitus of this class. Second, that through the theoretical and experiential aspects of alienation, the worker objectifies the external world, conceptualizing it solely as a means to labor’s end, therefore becoming alienated from nature as well. This theoretical notion regarding nature, coupled with the material manifestations of private property, result in a situation that literally chains the worker to wage labor, since this becomes the only means by which workers can reproduce themselves materially17. Furthermore, the worker objectifies the social relationships that naturalize the relations of production, ultimately rationalizing the alienating circumstances he finds himself in. Finally, the conjunction of the preceding conditions that stem from, and

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17 By material reproduction I mean the literal, day to day reproduction of the human body, including growth and development, metabolic processes, etc.
result in alienating labor, ultimately and immediately prevent the workers from fulfilling the very essence that characterizes them as species-beings. That is, alienating labor as outlined by Marx, prevents humans from being human, and therefore, should be understood as the worst form of oppression conceivable.

**Case Studies on Alienation**

The anthropological literature on alienation I review next falls tightly into a rationalist/analytical tradition of scholarship. That is, the authors advance highly deductive arguments through which they analyze their research experience in a top-down analytical framework. Given the overview of alienation according to Marx, this should not be surprising, as the prospect of empirically studying alienation seems unlikely, whereas post hoc explanations can easily (with creativity) be made to fit ethnographic observations. In addition to the conceptual shape that the arguments conform to, the authors pay close attention to Maussian\textsuperscript{18} notions of gifts, commodities, and their respective circulation. This Maussian addendum fits nicely with the relational properties ascribed to alienation, as evidenced by the following quote from Mauss: “We can see the nature of the bond created by the transfer of a possession […] it is clear that in Maori custom this bond created by things is in fact a bond between persons, since the thing itself is a person or pertains to a person. Hence it follows that to give something is to give a part of oneself” (Goddard 2000:145).

The closest application (insofar as this is tenable) of Marx’s notion of alienation can be seen in a recent ethnographic study by Mollona, in which he examines “the subjective,

\textsuperscript{18} Within this literature there is debate concerning whether or not gifts and commodities should be conceptualized as distinct entities, but those details are beyond the purview of this review.
experiential and symbolic ways through which manual workers imagine themselves and the relations of production in which they are embedded (2005:178). Through his study, Mollona witnessed how two distinct segments of workers in a factory producing metal drills had differing views concerning their role in the production process. The workers in charge of forging the metal were older and had mentor relationships with younger relatives or friends. These older workers viewed there labor as highly creative, developing intimate mimetic relationships with their machines. The younger workers, in charge of refining the metal segments into drills, on the other hand, where mostly preoccupied with finishing their products quickly so they could earn bonus wages (Mollona 2005:190). After considering the distinct perspectives concerning the role of labor for the respective groups of workers, the author concludes that the “metamorphosis of raw steel into finished products is paralleled by the metamorphosis of labour on the shopfloor: from the individual and inalienable property of the workers into alienable commodities in the cold department increasingly adapted to the morphology of the market” (Mollona 2005:190).

In another ethnographic treatment of the subject matter, Sykes (1999) discusses Melanesian youth that migrated to urban centers for wage jobs. She notes how the patterns of consumption practiced by the youth invert the traditional ones in which wealth is redistributed. This, according to the author, signals a rupture with their concerns over relationships with kin, and is a sign that they have become alienated. Sykes also grounds the youth in a material context in which they earn low wages and spend them on beer on chicken wings in their attempts to maintain social ties in the city. Thus, she links patterns of labor to social relations.

Others have applied the concept of alienation to processes outside of capitalist transactions. Miller (1986), for instance argues for a functionalist explanation of a system in which potters produce ritual and common vessels for regular customers in light of growing class
distinctions. The pattern of the “jajmani” system, the author argues, ameliorates the alienation intrinsic in the circulation of the vessels. In this regard, this study fits squarely within those critiqued by Roseberry (1988) as providing functional explanations for the retention of cultural traits in the presence of increasing market forces. Others, claiming to investigate Marxist notions of alienation, apply semiotic definitions of the concept (following Turner) in order to argue that the production of certain Chinese religious rituals is alienating, because they invert the relationship between the product and the producer (Sangren 1991); that is, since the ritual obscures the fact that the deities worshipped are the product of people worshiping them, this is supposed to be an alienating experience. Further post hoc invocations of Marxist alienation are applied to historical analyses of changing labor patterns (McCorriston et al. 1997, Carrier 1992), and the associated changes in social relations that accompany these transformations (Carrier 1994).

As is probably obvious by now, I was not particularly impressed with the applications of Marxist notions of alienation to anthropological research. This discontent of mine is partly rooted in the highly theoretical nature of the formulation of the concept of alienation. It is not the theoretical depth or complexity per se that sits uncomfortably with me, but rather, the potential for empirical translatability that is thwarted from the very outset. Furthermore, there are many unfounded assumptions on which the concept hinges upon, that I believe to be counter to contemporary anthropological understandings of humanity. If in fact alienation through estranged labor precludes humans from realizing their species-being status, then one would should be able to examine for biological correlates of this phenomena, as it is firmly established that humans are complex biocultural beings in which psycho-social processes and biology are intimately intertwined (McEwen and Seeman 1999, Goodman and Leatherman 1998). The
consensus among researchers who have investigated processes of social transformation—such as
the penetration of capitalist ways of life into “traditional societies,” however, is that the people
who cannot conform to the ascending way of life because of limited resources are the ones that
suffer psychologically and physiologically (Sorensen et al. 2009, Sweet 2010). Biological
correlates of status and rank have also been documented among non-human primates (Anestis
2006), pointing to deeper, primate-dependent trait of sociality and wanting to fit in that may be
more compatible a theory of humanity than those assumed by Marx.

Prospects for studying alienation should rest on more sound assumptions of human
biocultural characteristics. It certainly seems intuitive that the way in which labor is organized
will have effects on the ways in which humans conceptualize themselves, others, and nature. The
current formulation of alienation under Marxist terms, however, proves theoretically and
empirically inadequate. Nevertheless, I felt that it would be shallow of me to overlook this
obvious application of political economy at a mid-range level, since most (if not all) of
contemporary political economy in anthropology is directly tied to Marx.

**Gut Political Economy**

Having dealt with the “cerebral” applications of Marxist thought to mid-range
phenomena, I now turn to a discussion of contemporary applications of general anthropological
political economy. To a large extent, applications of political economy have been used in studies
of development and globalization. Thus, a political economic analysis can be one that deals with
any aspect related to the social and political distribution of resources, and need not be confined
to those of a Marxist bent. Leys (2005), for instance traces the history of theories of development
and globalization in the 20th century, parting from the Keynesian economics instilled in the
Bretton Woods arrangements, passing through a period of dependency thought in the 1970s, then neoliberal economics after the Reagan and Thatcher era, concluding with a resurgence of dependency-like and rational choice theories. In discussing the shortcomings of all development theories Keys concludes that what “is really incoherent is a ‘development theory’ that does not rest explicitly on a as clear a general theory of world history, and of world capitalism in particular, as it is possible to have” (2005:123). The missing general theory for Keys should specify the parameters of what is and is not possible for all actors involved. Of course, as I have stated several times already, most if not all of anthropological political economy follows a line of Marxist scholarship (Roseberry 1988). In this regard, anthropological political economy can be said to be on more solid footing, since it may rest (at least potentially) on a general theory of world history and world capitalism. Eric Wolf’s Europe and the People Without History is a prime example of one such analysis. And yet, Wolf’s work is better considered as an anthropologically oriented historical account of macro world processes, and as such, is not really pertinent to this discussion on mid-range applications. In a similar vein, Mintz (2005) work on the consumption and production of sugar may be seen as a historical work of anthropological significance. Mintz deals more directly with questions of culture, particularly in his discussion on the role that the aesthetics of class resulted in a trickling down of tea drinking practices in England.

In seeking more grounded applications of political economic analyses, Edelman and Haugerud (2005) state that studies integrating political economy and analyses on consumption practices are mostly lacking. This represents an important omission, as they note that “Capital has always denied to many the dream of consumption, but in the era of neoliberal globalization the images that fuel the fantasy are ubiquitous, the ‘needs’ more infinite, and the possibilities of
realizing the dream still minimal or nonexistent for a vast share of the world’s people” (Edelman and Haugerud 2005:33). Consumption, thus, represents a good entry point for studying micro-level practices as they relate to political economic forces (Miller 1995).

The importance of studying practice has long been noted in anthropology. Referring to the need to investigate practice—of things that people do—Ortner raised some poignant criticisms of what she considered to be political economic theory back in 1984; noting the overemphasis on the material aspects, its capitalism-centered point of view, and the lack of “real people doing real things (Ortner 1984:142), Ortner made a call for anthropologists to apply practice theory in their studies. While a poignant observation, as Morgan (1987) noted a few years later, the incorporation of “political economy” within medical anthropology usually meant the application of dependency theories at the expense of other formulations of political economy. Roseberry (1988) similarly notes that most North American scholars adopted the work of Frank and Wallerstein into their conceptual frameworks, neglecting other branches of Marxist political economic thought. Thus, it is probable that it was the predominance of dependency and world system theory proper that were at the root of Ortner’s critique. And yet, the point, in essence remained the same: political economic analyses needed to situate the material and ideational processes under question among their ethnographic informants. By doing so, it could then be analyzed how micro-level patterns reflect and reproduce deeper structural issues, such as the social division of labor.

Whatever the motivating factor has been, it is certainly the case that since the critiques pointed out by Ortner, Morgan and Roseberry, anthropologists have been much more successful at applying political economic theory in conjunction with micro-level analyses of practice. From a theoretical perspective, however, I question how much of this can actually be attributed to the
application of political economy to lower levels of analysis. In fact, I believe that the successful incorporation of analyses of practice stems from an incorporation of whole new bodies of theory into analyses that also employ political economic perspectives. I am referring to the ascendance of post-structural strands of thought associated with Bourdieu, Foucault, and to some extent, Gramsci and de Certeau. As a corpus of scholarship, I think it is safe to say that the bulk of theoretical work in political economy (broadly conceived) has been carried out by the cerebral Marxists. For instance, I could have bored the readers for quite a few more pages than necessary by touching upon the whole mode of production debates that revolved around the work of Althusser, without ever reaching any consensus. The case for gut political economy is more direct and simple, making it easier to pinpoint commonalities across scholars of this theoretical bent. Allow me to quote Roseberry, quite possibly the most “cerebral” of the gut Marxists, in order to sum up the general theoretical structure of political economy:

“My approach is historical, but not in the sense implied by a science/history opposition. The approach suggested here would then be one that is materialist and one that is simultaneously political economic and symbolic. It rejects evolutionism and particularism, and it tries to place itself between the extreme versions of explanatory scientism and interpretive self-absorption. That is, it rejects the goal of an explanatory science that postulates a set of transhistorical laws of history or evolution. Yet it is also resolutely materialist: it sees ideas as social products and understands social life as itself objective and material. Its approach to public symbols and cultural meanings would therefore place those symbols and meanings in social fields characterized by differential access to political and economic power.” [Roseberry 1989:37]

While he is quite careful about not positing any sort of determinism of a diachronic sort, there certainly is a determinism of synchronic processes alluded to in this quote. Specifically, I
am referring to the fact that ideas are conceived as social products, and that symbols and cultural meanings should be understood as operating within fields characterized by uneven distribution of resources. This determinism need not imply a formulaic scenario (such as x=y), but there certainly seems to be a strong ascription from power-laden fields towards symbols and meanings. Conventionally, in political economy, the jump from macro and materialist distribution of resources to micro-sociological accounts of meaning and symbols is achieved by relying on Marxist notions of “ideology” and “consciousness” (Comaroff 1985:4), or on Gramscian notions of hegemony (Roseberry 1989, Backet 1993). But as Comaroff (1985) notes, the two dimensions of ideology—theory and practical consciousness—are seldom synthesized successfully.

Achieving a successful synthesis of this sort is what drives her ethnographic treatment of ritual complexes of the Barolong boo Ratshidi society of the South African-Botswana borderland (Comaroff 1985). But to successfully achieve this theoretical fusion, Comaroff aligns Marxist notions of ideology with Foucault’s notion of discourse; similarly, she draws from a Bourdieuan notion of structure-agency dynamics, noting that “Social action is thus not merely an ‘expression’ of structural principles, it is an attempt to reconcile contradictions inherent in these principles and in the relationship between them and embracing material realities” (Comaroff 1985:18). Thus it is in her hybrid political-economic-practice theory perspective that Comaroff is able to address Ortner’s (1984) critique of political economy.

Other foundational figures of anthropological political economy follow suit, specifically invoking Foucault’s conceptualization of power as relational and Bourdieu’s situating of communication within different “markets” as fruitful analytical compliments to political economy (Wolf 1999, Roseberry 1988). Recently, Friedman (2005) applied this notion of differential consumption of symbols in different markets to analyze the ideational and
imaginative implications that stem from the declining role that the nation-state has played in identity formation projects since the 1970s. In a nutshell, he discusses the consequences that have stemmed from shifts in the world system, from that of nations as projects of development, to trans-cultural, transnational financial projects driven by cosmopolitan elites, pointing to a rise of ethnic projects being fueled by disenchanted immigrants while the financial elites embrace a cosmopolitan, global identity.

Another good example of an ethnography grounded in traditional political economic concerns, but made more nuanced by relying on Bourdieu, Foucault, Gramsci and de Certeau is Yelvington’s (1995) treatment of gender, ethnic and class relations in a Trinidadian factory. Not satisfied with an orthodox Marxist account of class relations, he draws heavily on Bourdieu in order to analytically disentangle the interactions between material and ideological resources, documenting how they are both mutually constitutive in relations of domination. He writes: “Given the workers’ experiences of class, which includes such ‘cultural’ variables as ethnicity, gender, comportment and command of cultural resources, it is clear that a concept of class such as that of classical Marxism, which identifies one’s class position simply as one’s ‘relation to the means of production,’ is inadequate for empirical or theoretical explanation” (1995:28). In distancing himself from “classical” Marxist understandings of class relations, Yelvington accomplishes two things: first and most importantly, he remains attuned to his ethnographic context, not allowing theory to trump empirical observation; second, he situates his work within a current of scholarship committed to documenting and analyzing the ways in which people are active agents in the construction of their cultural and material worlds. In Ortner’s (1984) terms, he presents real people doing real things—and he situates them inside world-historical processes.
As stated previously, much of the critiques that were raised against a homogenous depiction of political economy should in fact have been leveled at dependency and world systems theory. This point is particularly relevant when one considers political economic analyses situated in areas in which capitalism did not arrive, but rather developed in situ\textsuperscript{19}. In this regard, the work of Merrill Singer provides excellent examples of political economic analyses that investigate the roots and consequences of social inequality on human health (Singer and Castro 2004, Singer 2001, Singer et al. 2006, Rhodes et al. 2005). Singer’s work pays very close attention to what people think and do, thus providing nice on the ground evidence of the effects of large structural forces. And while his theoretical formulations are not always explicit, it is clear that he draws from practice theory in his examination of structures, agency, “cultural logic” (Singer et al. 2006: 2010) and health outcomes. Similar theoretical approaches can be seen in studies on high AIDS-risk environments (Mtika 2007, Lockhart 2008, Rhodes et al. 2005, Hunter 2007, Farmer and Castro 2004), women’s access to tuberculosis treatment (Chard 2009), psychotropic pill consumption (Epele 2010), narratives about the causes of homelessness (Lyon-Callo 2000) and on the interactions between poverty and illness among poor farming households (Leatherman 1996, 1998). In more general terms, the relationship between political economic structures and micro-level structure-agency interactions in relation to health outcomes are frequently investigated in anthropological studies, with both historical and evolutionary (Armelagos et al. 2005, Thomas 1998) and contemporary treatments (Bor 2007, Coburn 2004, Chavez et al. 1992, Janes and Chuluundorj 2004).

\textsuperscript{19} By this I don’t mean to suggest a “billiard ball” model of historical development, in which isolated groups come into contact but bounce off each without integrating to some extent. My attention to Wolf above should be testimony to the fact that I don’t subscribe to such a model. The development of capitalism in certain parts of the world was certainly related to happenings in other areas. I make this distinction because much of the political economic literature in anthropology has investigated the effects of the arrival of capitalism to the third world.
In sum, I feel I can safely characterize recent and contemporary political economic scholarship in anthropology as having adequately addressed significant shortcomings in the way it linked (or failed to) broad, macro forces with real people, going about their daily lives. The fact that many of the insights that allowed for such nuance did not come from political economic theorists should in no ways detract from the body of scholarship. If anything, it attests to the dynamism and commitment to advancing the epistemic status of anthropological studies exhibited by scholars of a political economic bent.

Conclusions

To wrap things up, I want to synthesize what I consider to be useful theoretical frameworks for my study on child growth and development in the context of food insecurity. First, although not discussed in this chapter, the very nature of my research question betrays my thinking in terms of life-history or life course theory. I believe that life history frameworks serve as a clear and explicit guide for the study of intra- and inter-individual biological variation over time. I don’t think it is far off to characterize scholarship in this area as comprising a successful research program, one that has consistently yielded testable hypotheses, empirical corroboration for central theoretical tenets, and the generation of added layers of theoretical nuance to submit to further empirical test. A life history approach offers the best conceptual fit for linking the dynamics involved in nutrition, immunology and growth and development, and as such, it forms the cornerstone of my biological thinking.

Another body of literature which I omitted from the discussion (because I covered it in Chapter 5 has to do with the cultural consensus/cognitive theory of culture approach currently in vogue in much biocultural research. The treatment of this literature was better handled in the
methods section of my dissertation, since in all honesty, the theoretical contributions of this scholarship is basically restricted to processes of operationalization and statistical analyses related to cultural taxonomies. As I state in Chapter 5, the strengths of this approach include a structured research design which is logical and easy to follow from start to end, the collection of information that can be analyzed through qualitative and quantitative methods and the ability to treat biological and cultural taxonomy data together through statistical techniques. The underlying assumption of this theoretical stance with regards to culture/cultural taxonomies is that people share (with varying degrees) cognitive domains of a given phenomenon. Through structured and unstructured research techniques, researchers are able to uncover conceptualizations of a given domain (say food), and examine the extent to which this cultural model is shared by the study population.

This approach is not without its limitations, but I am inclined to believe that the limitations as seen in the literature stem from lack of nuance on behalf of the researchers applying this framework more so than it stems from any property inherent to a cognitive theory of culture. I am referring to a lack of distinguishing between what people think and what they do, and a failure to acknowledge the multiple social fields that people operate under, invoking certain aspects of a cultural domain under some circumstance, others in a different context. I feel there is a logical connection between the concepts of “cultural schemas” or “models” as employed in this literature, and that of “habitus” as advanced by Bourdieu (1977). The Bourdieuan notion, however, has the added advantage of including phenomenological, emergent connotations, allowing for non-rational, experiential treatments of how knowledge is shaped by and deployed in experience. As made abundantly clear above, I regard practice theory as a valuable conceptual tool for linking political economic perspectives with micro-analyses of human engagements.
Furthermore, its attention to semiotic and material factors in the recursive constitution of micro-structures that shape interaction help me discuss the conceptualization of food insecurity experiences and the food environment, as well as the larger consumerist context that characterizes aspects of identity performance as detailed in the following chapters. As discussed in Chapter 2, food insecurity in currently understood as a process—one intimately linked to economic conditions. This dissertation furthers the understanding of this experience by drawing attention to the ways in which semiotic factors interact with economic conditions in shaping household nutritional experiences, and ultimately, child growth and development outcomes. The following chapter outlines the research design, methods and analysis employed in this dissertation.
CHAPTER FIVE:
STUDY AIMS, RESEARCH DESIGN, METHODS AND ANALYSIS

This dissertation research is a biocultural, ethnographic examination of the experiences of food insecurity in Monteverde, Costa Rica. The study aims were to investigate if food insecurity and cultural consonance (defined below) are related to child growth and development indicators. Specific attention was paid to emic conceptualizations of status symbols—material, ideational and practices—that may impact food decision making processes in the context of food insecurity. The goal was to elucidate the cultural logic(s) that guides food and resource-related practices in times of worry concerning the quality, quantity and source of food, and to situate these practices within evolving scenarios that structure, and are structured by the study participants’ “habitus” (Bourdieu 1977).

Specifically, this research examined:

A1. The degree to which measures of food insecurity co-vary with an ethnographically constructed index of cultural dissonance (defined below)

A2 If children from food insecure households exhibit growth, development and body composition patterns that differ from children from food secure households

A3. If children from culturally dissonant households exhibit growth, development and body composition patterns that differ from children from culturally consonant households

Before detailing the research methods used in this dissertation research, I want to summarize why it makes sense to study children (ages 3-7) for my examination on the impacts
that food insecurity may have on growth and development (see the previous chapter for a more in-depth discussion). First, children present the most consistent rate of growth of any of the developmental stages, averaging close to five centimeters a year (Bogin 2001). Consistency in growth rates is essential if I am to examine differences according to food security status, as it represents one less thing I will have to control for statistically. Second, children still are dependent on their adult caretakers for feeding. Since food insecurity is measured at the household level, it makes more sense to sample individuals within the household with less ability to acquire food independently outside of their homes (as teenagers might). Similarly, given the post-weaning dependency exhibited by children, studying them will allow for an examination of intra-household food management strategies that may not be possible were I to sample individuals with greater access to food outside of their households. This may shed light on coping strategies employed by adults when faced with issues of food insecurity. Finally, from my formative ethnographic research, I have encountered juvenile males working on farms with their fathers, spending all day cutting grass, shoveling dirt, and hauling heavy equipment. I have not encountered, nor heard of any children that engage in any such labor. This distinction is very important, as the variation in energy expenditure is likely to be greater among juveniles and adolescents than among children. This again, presents one less possible confounder I may encounter in my examination of growth rate differences by food security status.

**Ethnographic Site: Globalization, Changing Economies, and Food Insecurity**

Much research has documented the links between the shift towards a tourist-based economy and reductions in dietary diversity in many areas of the underdeveloped world, as a result of larger political-economic forces (Daltabuit & Leatherman 1998, Leatherman &
Goodman 2005, Popkin 2006, Himmelgreen et al. 2006, 2013, in press). One region of the world in which these trends have been particularly pronounced is Central America (Tardanico 2003). As of the late 1980s, tourism rates for Central America rose faster than for any other region of the world (Stonich 1988). Stonich (1988) attributes this rise to the end of the Central American violent conflicts and to a restructuring of the global economy, which affected Central American nations through the implementation of structural adjustment programs spearheaded by the World Bank and the International Monetary Fund. Such programs created incentives for foreign investors, as the Central American governments diverted their resources from educational, social, and health programs, and reinvested them in the construction of roads, ports, and other infrastructure necessary for large scale tourism (Leatherman & Goodman 2005, Lecuona and Momayezi 2001) and the export of natural resources (Laurell 2000), through the creation of export processing zones (EPZs) (Rodriguez Clare 2001). Great economic incentives were offered with the establishment of EPZs, including waivers on import taxes for all their inputs and equipment, a period of eight years without any income taxes followed by a subsequent four years in which the companies would only have to pay 50% of their income taxes (Rodriguez Clare 2001). The move away from the previous Import Substitution Strategy (ISI) that had characterized most of Latin America since the end of the Second World War, as spearheaded by the World Bank and International Monetary Fund reached a high point of success in Costa Rica, with the opening of an Intel micro-processor building plant in the late 1990s on the western edge of the Central Valley. By 1999 Costa Rica had its first trade surplus in decades (Rodriguez Clare 2001). This suggests that the macro-economic consequences of the liberalizing policies of the 1980s and 1990s were impressive.
But as anthropologists are keen to point out, macro-economic indicators might obscure the impacts as faced by people in their day to day lives. In this regard, it is instrumental to balance macro-economic indicators such as GDP and trade surpluses with poverty rates and indicators of income inequality. Generally speaking, rates of poverty in Costa Rica have decreased as the economy has grown. In 1961, for instance, roughly half the country’s population was considered poor. By 1971, this figure was a little bit more than a quarter of the population. Poverty rates continued to decrease steadily during the 1970s, (Barquero and Trejos 2003). With the economic crisis of the 1980s, poverty rates oscillated, in part due to the impact that the crisis had on low-skilled urban workers (Seligson, Martinez and Trejos 1997). Gindling and Trejos (2005) found that income inequality fell from 1976 to 1986 (with a temporary increase in inequality during the 1980-82 onset of the recession). Research suggests that during the recession of 1980-82, there was a substantial increase in the presence of women, non-heads of household, and children in the labor market. These social sectors presented low-skill labor, and thus, accounted for decreased earnings. Consequently, the influx of these non-traditional sectors into the workforce would account for declining educational returns a few years down the road, which in turn, would contribute to the stymieing of wage increases during the 1990s (Gindling and Trejos 2005). From 1987-1992, income inequality continued to decline, albeit, at a slower rate. The authors attribute this slowing down of the trend to declining real earnings and hourly wages (Gindling and Trejos 2005).

Another very important factor impacting income inequality in Costa Rica, as a result of the Structural Adjustment Programs, can be seen in the shifting composition of the labor force of the actual state (that is, who works for the state). In 1980, employment in the public sector accounted for 28.3% of urban employment. By 1991, this percentage had dropped to 23.4%
(Tardanico 2003). Examining the decomposition of decreases in state-sector employment by educational levels, the author found that while employment for people with no more than primary schooling fell by 31.8%, it grew by 8.5% for those with secondary education, and by 36.2% for those with post-secondary studies (Tardanico 2003:127). This reorganization of the roster of the public sector employees exemplifies the potentially devastating effect that economic globalization under liberal economic policies can have on the worsening of existing socio-economic inequality. It highlights the fact that different social sectors will have differing kinds of capital to draw on and, pardon the redundancy, be able to capitalize (or not) according to the changing political-economic dynamics. Another example of the principle just described can be seen in Maitre d’Hotel and Bosc’s (2011) analysis of the ability of milk, coffee and black bean producers to influence policy that regulates and protects each of the sectors products. The authors show a continuum, with dairy farms accounting or large-scale operations, characterized by a virtual monopoly of Coopedospinos (only 27% of dairy farmers belong to this cooperative), and small-scale black bean producers on the other extreme, made up of mostly small scale farmers (coffee producers representing a middle ground of small-scale producers with linkages to cooperatives or private export firms). While Coopedosinos accounts for the majority of dairy products sold in Costa Rica—with continuing successful inroads in Central American, North American and European markets, 75% of black beans consumed by Costa Ricans are imported (Maitre d’Hotel and Bosc 2011). Since the cessation of state-subsidies and price controls on black bean production in 1995, this sector of farmers has continued to lose social, political and economic influence.

While economic indicators have continued to suggest growth, since the 1990s poverty rates in Costa Rica have stagnated at around one fifth of the population. The latest data from the
Costa Rican Institute of Statistics and Census (INEC) show poverty rates for 2010 of 21.3%; 2011 of 21.6%; 2012 of 20.6%; and for 2013 of 20.7%. These numbers, again, point that while the “pie” is indeed getting bigger, the distribution of its “slices” continues to reflect growing inequality.

As mentioned previously, another economic consequence of the economic liberalization that Costa Rica underwent since the 1980s was a rapid increase and economic dependence on tourism. Since 1995, tourism surpassed the exportation of coffee and bananas as the primary source of foreign exchange. Costa Rica’s dependence on tourism is reflected in the extent of public protection of land, with 25.1% of the national territory under some form of governmental environmental protection (Vivanco 2006:10). Data from the Costa Rican Institute of Tourism (ICT) show the rapid rate at which tourism increased during the 1990s, going from total yearly visitors of 684,005 tourists visiting Costa Rica in 1993 to 942,853 in 1998 (ICT-INEC). Corresponding data for the year 2013 is of 2,427,941 tourists visiting Costa Rica.

Recent research on the nutritional status of Costa Rican children suggests the need to further investigate the factors shaping outcomes in this domain. A nationally representative survey carried out among 85,984 first graders in 1997 by the Ministry of Health found moderate and severe stunting among 7.4% of the sample, with mild stunting among 25.7% (Ministerio de Salud 2001). This same study documented rural-urban differences, with the former exhibiting 3% more stunting then the latter. Furthermore, urban children were found to be on average 0.5 cm taller than their rural counterpart. Girls were also found to fare better than boys with regards to moderate and severe stunting (5.6% vs. 9.1%). Compared to previous studies carried out in 1989 and 1979, the authors found that stunting had decreased by 1.9 and 13 percentage points, respectively. Median height increased 2 cm, from 118.6cm in 1981, to 120.6 in 1997. Increases
in overweight-for-age prevalence were also found, from a rate of 2.3% in 1982, to that of 6.2% in 1996 (Ministerio de Salud 1996).

Notice that the time frame under question from the first study (1979) to the one cited here (1997) corresponds closely to the period during which the majority of financial overhauls discussed in the previous section took place. From the data presented here, it seems that the liberalization of the Costa Rican economy did not have a negative effect on slowing down stunting among young Costa Ricans. Conversely, overweight rates increased as would be expected from the nutrition and epidemiologic transitions associated with urbanization, advances in sanitation, etc.

A more recent study carried out by UNICEF and the Costa Rican Ministry of Health suggests that the certain indicators of infant and child health continue to improve. For the year 2011, for instance, only 6.6% of infants were found to have low birth weights, with 97.8% of infants weighed at the time of birth (Ministerio de Salud 2011). The study also found that 97% of children had been breastfed at least once, with 46.3% being predominantly breastfed for the first 6 months of life. Median duration of breastfeeding was found to be 14 months.

While the preceding data show positive trends, it must be remembered that the characteristics described are consistent with an epidemiologic transition away from infectious diseases towards complications associated with sedentary lifestyles, and other factors associated with modernity and globalization. For instance life expectancy among Costa Ricans had increased steadily until 1999 when it reached a high of 76.9 yrs. Also increasing has been the prevalence of deaths due to cardiovascular diseases, with a high of 32 and 35% among women and men, respectively, for the year 2000 (Ministerio de Salud 2003). Other studies have found rates of overweight among school children 22.1% in an urban setting in San Jose, and of 14% in
a rural town of Guanacaste. Corresponding figures of adults in the urban setting were found to be of 56.4% for women ages 19-44 yrs and 58.8% for men ages 19-59 yrs. The rates for the rural setting were of 58.8% and 40.6%, respectively (Ministerio de Salud-INCIENSA 2002). This same study also documented high per capita consumption of calories (2749 Kcal), with the majority of calories coming from rice, sugar, meats and bread. Low dietary fiber and high cholesterol consumption was also found.

Given this recent political-economic history, the Monteverde Zone of Costa Rica can be seen as a perfect case study to examine the impact that global political-economic forces can have on the nutritional and health status of individuals in small rural communities of the underdeveloped world. Located in the Central Mountain Range of Costa Rica at elevations from roughly 1,200-1,400 m, the Monteverde Zone is home to around 6,000 permanent residents (Nadkarni and Wheelwright 2000; Vivanco 2006). For the past three decades, the Monteverde zone has been experiencing a drastic transformation as a result of a shifting economic base. Whereas the people of this region have historically been mostly devoted to dairy farming and agricultural pursuits, today they are rapidly becoming involved in the eco-tourist economy (Himmelgreen et al. 2006, Vivanco 2006; Himmelgreen et al. 2013; Himmelgreen et al. In Press). In a recent exploratory study, Himmelgreen and colleagues (2006, 2013) found food insecurity rates of 67-73% in the towns of Santa Elena and San Rafael, in the Monteverde Zone, respectively. The authors found that not being a member of a food cooperative, not having a working stove, and elevated BMIs predicted food insecurity in these two villages (Himmelgreen et al. 2006). More recently, through an NSF-funded research project (#0753017) food insecurity rates of 51% have been found in the proposed study site, with positive associations found between working in the tourist sector and food insecurity at the household level. Similarly,
statistically significant increases in the rates of soft drink consumption have been found among food insecure households (Ruiz et al. 2009, Himmelgreen et al. 2013).

The transition from an agricultural and dairy farming economy to one primarily based on eco-tourism has brought with it changes in the patterns of consumption, and therefore, nutritional status of the people of Monteverde. Leatherman and Goodman coined the term “coca-colonization” (2005: 838) to refer to the process of dietary delocalization and commercialization of food systems that accompany the processes of globalization, specifically the penetration of the market economy in underdeveloped areas of the world. Through his Masters research, Ruiz (2009) identified two competing models concerning the desirability of food items in the Monteverde Zone. One model held that the more traditional food items that form the staples of Costa Rican diet were more desirable; a second model held that foods associated with tourism and consumptive goods were the more desirable. These findings have been corroborated by further ethnographic research carried out by the PI and his advisor, in which they identified two general narratives concerning the role that tourism has played in the area: one highlighting aspects deemed positive, the other, highlighting negative outcomes of tourism (Himmelgreen et al. In Press). Discourses about the production and consumption of resources are complexly interwoven with notions about God, gendered-divisions of labor, and “right” ways of working the land. This project will pay close attention to the nested, complimentary and conflicting narratives that impact the local food landscape.

Data Collection: Ethnographic Methods

Underpinning the entire research process was in-depth ethnographic component based on participant-observation and unstructured interviews. The PI had already conducted over 24
months of ethnographic research in the area prior to executing this dissertation, and throughout this process, he has successfully established friendly relationships with numerous key informants. Participant observation in the area was initiated in June, 2008. Being a male, he has exploited the gendered role ascribed to men in the area that values outdoor work, such as farming, animal husbandry, cattle herding and transport of goods. Thus, participant observation for the current purposes can be defined as spending time with key informants, in ways that allows the PI to help them undertake various labor and recreational activities. Having earned the trust and respect of various informants through the methods just described, the PI also established relationships with women in the communities under study, thus creating the possibility for continuous informal data collection with women as well. A central component related to participant observation is the systematic and continuous recording of detailed notes concerning interactions with informants. These notes served for the documentation of ethnographic vignettes as well as for an iterative process of inquiry, examination, evaluation, reflection and further inquiry. Another foundation of participant observation is reciprocity, a value with high cultural importance in the zone. This made participant recruitment easier, since the PI is already respected by many members in the community.

**Sampling**

Systematic data collection began in August, 2013 and concluded in the second week of September of the same year. The first step of systematic data collection entailed free listing exercises (Weller and Romney 1988). A quota sample of 30 informants (15 men, 15 women) was asked to list material possessions and practices that they believe are indicative of successful lifestyle in their communities. As part of the free listing exercise, respondents were asked to
explain why the listed items are indicative of high status and to give examples of ways in which status is communicated by these material items and practices. Following the free listing, another quota sample (same criteria as previous) of 30 informants was asked to rank salient items drawn from the free lists in terms of status and desirability. Respondents were asked to rate the items as “not important,” “somewhat important,” or “very important” in conveying status. The free listing and ranking exercises help to gain a better understanding of the symbolic markers of status in the area, and of their relative importance in conveying status. The latter is a necessary step in developing a measure of cultural consonance, an indicator of the degree to which an individual approximates—through behaviors and material possessions—the cultural model of success in a given domain (Dressler and Bindon 2000). The flip side of consonance is cultural dissonance, or the extent to which an individual deviates from the desired cultural model.

Analysis: Ethnographic Data

Ethnographic notes were coded and analyzed following a grounded theory approach as discussed by Bernard and Ryan (1998). This approach places an emphasis on seeking out salient themes, as opposed to looking for deductive patterns. Since the ethnographic notes were instrumental in the formative phases of this research, a premium was placed on more inductive, ground-up coding techniques. Free list data was analyzed in Anthropac (Borgatti 1996). First the free list responses were typed and saved as a “txt” file. Following procedures outlined by Borgatti (1996), the txt file was prepared for input into the DOS-based Anthropac software. Once prepared, the file was input into Anthropac, using the Free List function. This produces the frequency and salience index for each item, and was used when determining what items to include in the consensus survey (discussed below). Frequency of each item represents the sum of
each time an item was mentioned. Saliency represents the frequency of each item weighed by the order in which it was mentioned. The assumption behind this procedure is that more prominent items should be listed towards the beginning.

Based on the free list results, a 22 item questionnaire was created and administered to a second sample of 30 informants. You will recall that respondents were asked to rate the importance of each item (very, somewhat, not important) as markers of a successful lifestyle. These ranking questionnaires were also analyzed using Anthropac, but with the cultural consensus function (CCA). This procedure allows the researcher to test whether respondents share a model concerning the ratings of salient items produced from the free lists. CCA is a data reduction technique (a type of factor analysis). Data reduction refers to statistical techniques that explore for shared behavior of multiple variables, resulting in the creation of multivariate indices (factors) that may account for large portions of the overall variance. Under CCA, the focus of the analysis is the behavior or respondents across responses. Thus it examines if there is agreement in the way in which people perceive a certain cultural domain. As a rule, if the first (most powerful) factor accounts for more than three times the variation then second factor, then it is assumed that there is a shared cultural understanding of the given domain (Borgatti 1996). The key diagnostic parameters to interpret from this analysis, therefore, are the ratio of the first factor’s eigenvalue to that of the second factors (3:1 or greater) and the posterior probability assigned to each ranking of the questionnaire items. Following standard practices (Weller 2007), items on the consensus survey were considered as the “culturally correct” response if they have a posterior probability of at least 0.999. Thus CCA tells you if there is agreement on a given domain, and it also provides you with the “content” of the agreement. In the case of this study, it provides an answer key with the “culturally correct” ranking for each item (very, somewhat, not
important). Posterior probability here refers to the likelihood of an item being ranked as say “very important,” given the behavior of respondents, as analyzed by the CCA. It can be considered as the inverse of the standard p-value employed in science.

**Data Collection: Survey and Biological Methods**

Based on power calculations (Lenth 2006), a sample 70 households with children between the ages of three and seven years was be targeted for systematic data collection. With a multiple regression model with five predictors, and a detectable effect size of 0.8cm, a sample of 60 households yields a power estimate of 0.804. Statistical power refers to the ability to be able to successfully detect significant differences among means according to a given treatment effect. Treatment effect here refers to the purported action of the independent variables on the dependent variables (food insecurity on growth and development indicators). Effect size refers to the unit at which a statistical test will be able to discriminate successfully between, say, food secure and insecure children.

As detailed in the previous chapter, the age range of three to seven ensures that the children are growing at about five centimeters per year and that they have the same metabolic requirements and generalized patterns of energy expenditure (Bogin 2001). This age group is also important because it represents a phase of post-weaning feeding dependency on adults, making it appropriate for examining the effects of intra-household dynamics of food insecurity. Households with the characteristics just described were approached and asked to participate in the study. After informed consent was been obtained, and the visit scheduled, the head of household most responsible for acquiring and preparing food was administered the Household Food Insecurity Access Scale (HFIAS).
The HFIAS is an 18 question instrument designed to examine three domains related to food insecurity: anxiety and worry over availability of food, worries about quality of food, and material reductions in the food consumed in the household. This instrument has been successfully adapted and used in the Monteverde Zone by the PI and his advisor, David Himmelgreen, in an NSF-funded research project (#0753017). Adapting the HFIAS entails that community members understand the questions as the researchers do. A helpful strategy to achieve this goal is to include locally-relevant examples in the phrasing of the question. For instance, questions inquiring into worries about food availability due to limited resources can be phrased in order to include examples of pertinent resources, such as transportation, money and time. Two questions were added to the HFIAS that inquired about coping strategies and food procurement in times of worry and scarcity. The HFIAS is designed to inquire into the 30 days prior to the interview. In this research, however, the HFIAS was also administered to inquire into the previous year, as well as the years since the child’s birth. The HFIAS assigns households to one of the following categories: food secure, mild insecure, moderate insecure and severe insecure. As Coates et al. (2007) explain:

“A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. A mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often,
and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions. A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure.” [19-20]

**Cultural Consonance Questionnaire**

This was followed by a cultural consonance questionnaire, in which the heads of households were asked whether or not they possess the material items, or engage in the practices listed in this instrument. Recall that the 22 items listed on this instrument were the same ones which were previously ranked by 30 informants according to their importance as symbolic markers of a successful lifestyle. In this case of each household, the interest was not in gauging their perceived importance of the items as markers of success, but rather, to examine the degree to which each household approximated the cultural narrative of success.

**Anthropometrics**

Next, following conventional practice (Frisancho 1990), weights, heights, sitting heights, triceps, and subscapular skin folds, and mid upper arm circumferences were collected from study children, and height data were collected from parents. Children were instructed to remove their shoes and any heavy clothing prior to taking the measurements. They were placed in the
Frankfurt plane on both the weight and height scales. Three triceps skinfold measurements were taken, and the average of the three measurements recorded. My previous work and courses with Dr. Himmelgreen had provided me with training in order to carry out these anthropometric measurement techniques.

**Household: Parental Interviews, Structured Questionnaires and Anthropometrics**

A total of 70 households were contacted and asked if they would be willing to participate in the study. Sixty six of those households said they would be willing to participate, with four stating that their work schedules were too complicated to allow for a visit. Coordinating with these four households was complicated by the fact that one or both heads of households had extensive commutes to work, often times sleeping in a different town altogether (in Tilarán, for instance). Of the 66 households who agreed to participate, visits were carried out with 61; the meeting time was never coordinated with the remaining five in a way that accommodated their and my schedule. A week after I had carried out one particular visit, the mother informed me that her son was adopted. Since maternal and paternal heights were collected as predictors of child growth indicators, this household has been dropped from the analyses that include anthropometric variables. Similarly, there was one household where I was able to interview and measure the mother, but we were never able to meet again for her son’s anthropometric measurements. Needless to say, this household is also excluded from the analysis. Finally, one child stands out as a serious outlier in terms of his weight for age (WHO reference z-score=4.7) and BMI for age (z-score=4.86), and is thus excluded from anthropometric analyses. Despite the exclusion of these three cases from examinations of growth and nutritional status, I have decided to still include their responses to various other questions, such as those related to cultural
consonance, food insecurity and parental perceptions on the pros and cons of raising children in the Monteverde Zone. When cultural consonance and food security statuses (or scores) are examined in relation to anthropometry, neither case will be computed in the analyses of variance.

This results in a sample of 58 children with parallel data linking anthropometric indicators to food security status, cultural consonance, and the height of at least one parent. As was the case with the previous study (NSF #BCS000172105) carried out in the area, mothers were more likely to meet with me or be present with their children at the time of the interview compared to fathers. Paternal heights were collected for 48, and were estimated for an additional 6, resulting in 54 cases with a non-missing “father’s height” value in their covariate pattern\(^{20}\). The estimates were done in reference to my stature. I showed the mothers my height (pointing it out on the stadiometer), and they estimated using my value as a reference point. The remaining four cases with missing values for paternal height were cases where mothers stated that there was no father. “He doesn’t factor…he doesn’t exist”, said one respondent, looking me straight in the eye. I opted to probe no further in these situations, as the topic would likely be a sour one for participants to discuss. Maternal heights were collected for the entire sample. Values for paternal heights should therefore be treated with more caution than those for maternal heights.

**Analysis: Survey and Biological Data**

The main analytical procedures used in this research were generalized linear models, run in SPSS 21. The main dependent variables are child growth and development outcomes, such as stature, leg length (in centimeters), weight (in kilograms) and the skinfolds and circumference

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\(^{20}\) A “covariate pattern” refers to any given assortment of the data points, across respondents.
measurements. These measurements have been standardized into age-specific z-scores in using a WHO international reference population (de Onis et al. 2004a) (through AnthroPlus). Predictor variables include food security status, household cultural consonance score (computed as the number of material items or behaviors that the parent possesses or engages in divided by the total items in the questionnaire. Table 1 shows the relationship between the research questions and the methods used to address them.
Table 1. Research Design.

<table>
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<th>Research questions</th>
<th>Data collection methods</th>
<th>Data collection methods</th>
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<tr>
<td>Test for different growth, development and body composition among food secure and insecure children</td>
<td>Anthropometrics, including heights (relative and total), weights, skinfolds and circumferences.</td>
<td>Household Food Insecurity Access Scale</td>
<td>Generalized linear models with anthropometric indices as dependent variables</td>
</tr>
<tr>
<td>Test for different growth, development and body composition patterns among children from households with differing cultural status congruity values.</td>
<td>Anthropometrics, including heights (relative and total), weights, skinfolds and circumferences.</td>
<td>Cultural consensus survey on markers of “success” (including free listing and ranking exercises)</td>
<td>Generalized linear models with anthropometric indices as dependent variables. Cultural consensus analysis in Anthropac.</td>
</tr>
<tr>
<td>Examine if food security measures co-vary with cultural status congruity measures</td>
<td>Household Food Insecurity Access Scale</td>
<td>Cultural consensus survey on markers of “success” (including free listing and ranking exercises)</td>
<td>Cultural consensus analysis in Anthropac. Correlations and regression procedures in SPSS.</td>
</tr>
<tr>
<td>Ethnographic examination of consumptive and productive landscape</td>
<td>Participant observation</td>
<td>Free listing and ranking exercises.</td>
<td>Grounded theory and metaphorical analysis of coded themes. Iterative process, feeding into each phase.</td>
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CHAPTER SIX: 

RESULTS

Ethnographic Cultural Domain Exploration: Successful Lifestyles

Prior to carrying out the 30 free lists interviews, more open ended discussions were held with a variety of informants concerning the wording to be used for the free list prompts. The interest, here, was in identifying salient items related to a “successful” or “desirable” lifestyle. To explore the different ways I could potentially frame the free list interviews, I approached community members who knew about my research and previous work in the community. I asked them what they thought people would interpret from the prompt: “What do you think people in your community consider as important markers of a successful/desirable lifestyle?”

It didn’t take long to notice a slight, but important distinction in the ways in which “successful” and “desirable” were interpreted. Looking back, this should not be surprising. The two words are not synonymous, after all. The differences that emerged, however, were to prove to be a fundamental backdrop for me to approach the remaining phases of the data collection and analysis process. When prompted to think what community members considered markers of a “desirable” lifestyle, the responses were short and basic. They were reminiscent of pleas from the world’s dispossessed. And while the economic conditions were far from easy for people in the Monteverde Zone, the bare-necessity form that characterized the received responses certainly highlighted the sense of urgency and need expressed in these conversations, prompting me to doubt my ability to construct an ethnographic scale that might capture the consumerist and
materialist trends palpable in the community. Fortunately a little probing and reframing of questions proved useful in this regard. Take the following exchange with one key informant as I worked to define my prompts.

“Well for people that need to work, work!” she said. “For those that don’t, I don’t know. They probably want to go to the beach more often, or have newer cars... I don’t know. But most people need to work. And most people want to study so they can get good jobs.”

The class-based distinctions raised in the previous quote would surface again with another informant two days later. As I accompanied her on her walk to drop lunch off for her nephew at the Monteverde Friends’ School, she pointed out that,

“Well here were we are going is a good example. There is a mix of people, and that is good. My nephew learns English which he needs to. They teach him well, I think. But he also learns other things that aren’t so good. Now he wants to have what his friend (a boy from the US) has. I tell him that we can’t have all the expensive toys, or eat where they eat. Our concerns are with getting your education and English. He’ll listen and nod, but it’s something that he comes back to frequently, so I need to be telling him the same things over and over. I think he understands, but I think part of him is hopeful that one day we will have their level of life.” (Woman, 36)

In this particular instance, class is intimately overlaid with nationality/ethnicity. In many regards the Monteverde Zone presents a de facto apartheid of jobs and land holding patterns, and in some instances, these differences can be accounted for by reference to nationality/ethnicity/perceived origin of groups of people. The history and pattern of settlement in the Monteverde Zone accounts for a large part of this distribution of land holding and job opportunities. Add to that the ecologist and biologist boom of the 1980s that further reinforced a Monteverde-United...
States link, providing for the continued exchange and contact of researchers from (mostly) the United States with the Quaker settlers, and the resulting history is one in which many US-Monteverde links were steadily reinforced, with ever increasing points of contact and exchange (including familial, personal, University-based, grant monies, land purchase campaigns, etc). During my first prolonged period of ethnographic field work in the area, I was having dinner with friends who had lived there for the previous eight years. I mentioned a guy from San Diego whom I’d just met. He was visiting/volunteering at one of the reserves for three months. “Oh, you still are at the phase of being friendly” they said to me. Not knowing what they meant, I asked for clarification. “See after a while you get bored of so many people coming and going. It’s not worth investing time to make friends with gringos because by the time you really like someone, they are back in the US.” The next few years of ethnographic work in the area would confirm my friends’ assessment (on the transient quality of a certain segment of the Monteverdean population).

The ability to fly back in forth between countries—let alone the ability to make it into the US to begin with\(^{21}\) highlights a very real inequality between the type of people who live and work (or play and travel, as with the case of tourists and volunteers) in the Monteverde Zone. For the purposes of the study’s research question, it is worth highlighting another layer that strongly and successfully marks distinction in the current example: not only do different people travel (or don’t) to different places, but as a result of this, different people can acquire different things: shiny things.

\(^{21}\) I cannot recount how many times people would ask me how I managed to obtain a visa to enter the United States. The trip to the embassy in San Jose, alone, stood out as too outside of the grasp of many people in the zone.
Take rubber boots as a poignant example. For at least several months out of the year, rubber boots, preferably of decent height, are the shoe of choice. The vast amounts of precipitation coupled with the poor state of the roads and rural landscape make for much mud. It wasn’t uncommon for four wheel drive vehicles to get stuck in the mud of their own driveway\textsuperscript{22} or along the town’s road. The passenger vans used to transport tourists and locals wind up in ditches (as do delivery trucks and rental cars). The point is, rubber boots represent a necessity, not a superfluous shoe design to make a fashion statement. But there are rubber boots, and then there are rubber boots. For around US$10 one can acquire a pair of black boots at Super Compro, or at one of several hardware stores. If one seeks diversity of color, then one can opt for a mossy green variant carried frequently at the veterinarian store. Not all black rubber boots are the same: some are more flexible, some have more tread on the sole; some are very tall, where as some barely approach ones’ calve muscles. But by and large these kinds of rubber boots can be reduced to one similar category. As with many other instances in human processes, identity or boundedness of category seem to emerge only after a distinction is drawn in reference to something else.

Enter the fashionable rubber boots worn by study abroad students, volunteers and tourists. Why wear plain black rubber when a shiny blue background with cute yellow stars is an available option for fashion-conscious travelers from the US? As if aesthetics weren’t enough, consider the makeup of each kind of boot: the black rubber ones are cut from rubber, inside and

\textsuperscript{22} During the 2012 winter our car had to be towed out of our driveway—then a foot deep river—on four different occasions. For the next year, I returned the favor to other stuck drivers four times.
the more artistic imports are lined with soft fabrics, thus greatly reducing or eliminating the harsh chaffing that can arise where the top of the boot meets your leg. 23

Whether at the super market, or in the reception area of zip line parks, or at the campuses of several study abroad outfits that cater to US students, or in the cafeteria of the Monteverde Cloud forest reserve, I witnessed the following scenario unfold ad nauseum.

A young girl/women enters the room and looks through items (brochures, menus, books, etc). The employees, themselves mostly young women, slow down their pace of conversation, their eyes having been drawn strongly to the bright, colorful rubber boots worn by the young women. Her boots compliment her Gore-Tex jacket and North Face pants. The women all wear open toe shoes or even stiletto heels now, as they are safe from the elements indoors in their workplace. Outside the entrance to their building (or in some cases, tucked behind the building), their black rubber boots line up monotonously, waiting for the trek home after work.

It was not uncommon for women from Monteverde to purchase these used boots from the women leaving back to the United States. In some cases I witnessed women request the rubber boots months prior to the date of departure from the young woman from the US. In the muddiness of everyday walking, a little color on your boots can mark as big difference. Of course there is variation in the type of boots worn by local and visiting women. Some visitors wear the black boots, while some local women purchase colorful boots in Costa Rica. This example is not meant as a catch-all situation; it is simply an illustration of a pattern.

So far I have stressed class-based differences that hinge greatly upon nationality as context behind potential indicators to include in an ethnographic scale aimed to measure cultural

23 The conventional black boots didn’t seem to slow down many kids and young men seen printing with them after soccer balls on wet “fields” riddled with cow manure, one day as we played soccer in San Luis.
consonance with regards to a “desirable/successful” lifestyle. Other differences related to place of origin and class, were also frequently phrased in reference to other areas of Costa Rica, namely San Jose (as is discussed later on below, framing issues in reference to San Jose was quite common). Often times my lack of familiarity with farm tools or farm work, or with ways in which certain animals or plants were called were explained away by the fact that I was a university student from San Jose. My beard and scraggly hair further marked distance, often time raising questions about my “Costa Ricanness”: “Pero, ¿Usted de verdad, de cepa?” (“But are you a real Costa Rican, from origins?”) And if that wasn’t enough, the fact that I had worked and studied (and was affiliated with the University of South Florida (USF)) in the United States for quite some time, added conceptual blurriness to my sociological status. The blurred sociological line that upheld my category as a person provided me with fertile grounds for exploring markers of difference concerning people in Monteverde. On the one hand, it provided me with the excuse for not knowing “the way things are,” thus providing justification for my inquisitiveness. On the other hand, the fact that I could exploit (in varying degrees) “shades” of my persona depending on the occasion, resulted in a methodological situation where I could also claim “Costa Rican” status, prompting my informants to further delve into greater subtleties and situations in which people were defined. Consider the following exchange as an example of what is being discussed:

I had been helping an older informant clear land so we could plant some beans in the coming days. This was the second day of swinging machete and shoveling, but we still had a lot of ground to cover. There was only one shovel available, and we really could use two, so I said I would go look for one to borrow at the farm next door (I regularly visited there and also helped them with farm work). After greeting them, and explaining them what I came for, the woman surprised us both by exclaiming firmly “No!” Stunned, I stood there quietly, getting ready to say,
Thanks” and head on back. Then she laughed, blushing slightly, stating that she was sorry. “Usted no es tico. Llevese la pala.” (“You aren’t Costa Rican, take the shovel.”) But I am “tico,” I explained as I thanked her for the shovel. “Yes” she replied, “but you are not from here. You won’t steal it.”

Complaints of stealing tools, fertilizer, bunches of bananas, and other things were quite common during my ethnographic work in the farming areas of the Monteverde Zone (particularly San Luis and Las Nubes). These discussions were layered within larger observations about how people used to help each other out, but were now selfish, willing to step over each other in order to “get ahead in life”. Back with the elder informant, with two shovels we made quick work of the field. “Before we were all poor” he told me. “We were all poor but we didn’t know it. Now a lot of us are poor and a few aren’t, but everyone knows it, and nobody cares.”

This ethnographic detour on the route to presenting the results of the free list interviews carried out serves a couple of purposes. First it highlights the fact that the items or categories elicited from these free list interviews correspond to markers or identity situated upon a social landscape with “steep” class-based distinctions. As mentioned, these distinctions are understood through geographical lenses (places of origin) as well as consequences of an economic system that results in selfishness, competition, and stealing. Second, these ethnographic observations (as well as others presented in this dissertation) act as case instances in which factors associated with the adoption (or encroachment) of modernity and consumerism enter into synergistic relations with preexisting markers of sociological difference. The more avenues for asserting identity, and the greater extent to which these avenues correspond to items purchased (or signified) through market-based transactions, then the greater extent for inequality and cultural dissonance to
emerge in communities such as Monteverde, that while rich in flows of people and different forms of capital, can be characterized by great inequality in the extent to which people can access these different forms of capital and identity markers.

Returning to the piloting of the free list prompts, the remainder of my key informants presented a marked distinction when asked about “desirable” vs. “successful” lifestyles. “Desirable,” again, resulted in lists containing basic needs: education for their children, steady employment and health. The results of these discussions were short, and frankly, sad in that they lacked much aspiration beyond basic needs. They didn’t match up to what I had seen and heard through more informal participant observation, where people talked openly about wanting smartphones, luxurious cars, brand name clothing—shiny rubber boots. When I asked my informants directly about these material longings, they would confirm my suspicion, stating that “yes,” people did want those things very much. To gauge this “domain” of wants, it turned out, I should ask about markers of a “successful lifestyle”. Recognizing the theoretical importance that health, education and employment carry under a materialist conception of society, I opted for including some indicator related to these categories for my free list instruments, as detailed below.

Perhaps the connotations associated with “desires” and “success” implies something deeper about the kind of wants one should have. I did not really explore this distinction any further, however, having found a methodologically appropriate phrasing more my theoretical

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24 I suspect that part of the “basic needs” aspects of these responses has to do with a cultural pattern of showing meekness and humility under God, and others, in Costa Rica. Take the expression “en la lucha” as an example. “In the struggle” is commonly used as a way to express how one is doing in Costa Rica. “Pulseandola” is another variant, offered at greeting exchanges, to suggest that one is working towards a goal of improving one’s lot. These expressions are offered by all kinds of people, regardless of socioeconomic status, or the degree of cultural consonance. In a historically relatively homogenous population, these linguistic strategies reify a national narrative based on humble peasant origins, were little differentiation is said to exist.
inquiries. Whatever the reason, to ask about markers of success resulted in more generous responses from my key informants, as well as from those who were free listed later on.

**Free Lists Results**

Table 2 presents the results from the Anthropac analysis conducted on the free list data (n=30). The free listed items are in order of frequency with which they were listed, the percentage of respondents that listed each item, and Smith’s saliency index, which is a statistic that describes the “saliency” of an item, taking into account the frequency with which respondents mentioned it, and the place it holds in each person’s list. The assumption behind this statistic is that the most salient items in a given respondent’s mind will be among the first ones listed. The top two items in order of frequency, “trabajo, educacion,” are also the two most salient (S values of 0.636, 0.43, respectively). But notice the third and fourth most frequently listed item, actividades para jovenes and casa. While the former term was listed by four more respondents than the latter, this last one still has a higher S index score, based on the fact that it was listed higher on the lists of respondents than the former term. Several items listed are interesting in that they represent community-level factors, such as activities for the youth, improvements to the local soccer field, improved health services, and improvements to the road conditions. That they would be listed as markers of a successful lifestyle suggests the weight that they carry in the informant’s eyes, given that they are not achievable for anyone in the community as of yet. Along similar lines, costo de vida is interesting in that it got mentioned at all. That life is expensive in Monteverde is easy to ascertain. The fact that people (n=8) suggested that a reduced cost of living might represent a marker of a successful lifestyle again suggests the weight that this factor must carry from the respondents point of view.
<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Respondent Percentage</th>
<th>Smith’s S Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trabajo</td>
<td>25</td>
<td>83</td>
<td>0.636</td>
</tr>
<tr>
<td>Educacion</td>
<td>17</td>
<td>57</td>
<td>0.43</td>
</tr>
<tr>
<td>Actividades para Jovenes</td>
<td>16</td>
<td>53</td>
<td>0.241</td>
</tr>
<tr>
<td>Casa</td>
<td>12</td>
<td>40</td>
<td>0.26</td>
</tr>
<tr>
<td>Salud</td>
<td>9</td>
<td>30</td>
<td>0.185</td>
</tr>
<tr>
<td>Lugares para Recreacion</td>
<td>8</td>
<td>27</td>
<td>0.108</td>
</tr>
<tr>
<td>Carro</td>
<td>8</td>
<td>27</td>
<td>0.139</td>
</tr>
<tr>
<td>Costo de Vida</td>
<td>8</td>
<td>27</td>
<td>0.148</td>
</tr>
<tr>
<td>Smartphones</td>
<td>8</td>
<td>27</td>
<td>0.103</td>
</tr>
<tr>
<td>Carretera</td>
<td>6</td>
<td>20</td>
<td>0.151</td>
</tr>
<tr>
<td>Seguridad</td>
<td>6</td>
<td>20</td>
<td>0.127</td>
</tr>
<tr>
<td>Actividades Deportivas</td>
<td>6</td>
<td>20</td>
<td>0.102</td>
</tr>
<tr>
<td>Moto</td>
<td>5</td>
<td>17</td>
<td>0.038</td>
</tr>
<tr>
<td>Tranquilidad</td>
<td>5</td>
<td>17</td>
<td>0.108</td>
</tr>
<tr>
<td>Familia</td>
<td>5</td>
<td>17</td>
<td>0.101</td>
</tr>
<tr>
<td>Comida</td>
<td>5</td>
<td>17</td>
<td>0.1</td>
</tr>
<tr>
<td>Turismo</td>
<td>4</td>
<td>13</td>
<td>0.087</td>
</tr>
<tr>
<td>Trato Turistico</td>
<td>3</td>
<td>10</td>
<td>0.039</td>
</tr>
<tr>
<td>Comunidad</td>
<td>3</td>
<td>10</td>
<td>0.064</td>
</tr>
<tr>
<td>Computadoras</td>
<td>3</td>
<td>10</td>
<td>0.035</td>
</tr>
<tr>
<td>Comodidades</td>
<td>3</td>
<td>10</td>
<td>0.046</td>
</tr>
<tr>
<td>Vivir Alejado</td>
<td>2</td>
<td>7</td>
<td>0.05</td>
</tr>
<tr>
<td>Ambiente Sano</td>
<td>2</td>
<td>7</td>
<td>0.03</td>
</tr>
<tr>
<td>Ropa de Marca</td>
<td>2</td>
<td>7</td>
<td>0.019</td>
</tr>
<tr>
<td>Morales</td>
<td>1</td>
<td>3</td>
<td>0.013</td>
</tr>
<tr>
<td>Gimnacios</td>
<td>1</td>
<td>3</td>
<td>0.013</td>
</tr>
<tr>
<td>Compras para Chiquillos</td>
<td>1</td>
<td>3</td>
<td>0.017</td>
</tr>
<tr>
<td>Mejorar Cancha de Futbol</td>
<td>1</td>
<td>3</td>
<td>0.021</td>
</tr>
<tr>
<td>Estabilidad Emocional</td>
<td>1</td>
<td>3</td>
<td>0.033</td>
</tr>
<tr>
<td>Mejores Servicios Medicos</td>
<td>1</td>
<td>3</td>
<td>0.028</td>
</tr>
<tr>
<td>Terreno Propio</td>
<td>1</td>
<td>3</td>
<td>0.004</td>
</tr>
<tr>
<td>Servicio de Satelita/Cable</td>
<td>1</td>
<td>3</td>
<td>0.021</td>
</tr>
<tr>
<td>Pantalla Plana</td>
<td>1</td>
<td>3</td>
<td>0.004</td>
</tr>
</tbody>
</table>
A total of 23 items from the free lists were incorporated into the ethnographic Cultural Consensus Questionnaire (CCQ). Items included those rated as most salient, as well as other items not listed at all in the free lists (such as eating out, having children in a private school) at all. These later items were added upon further consultation with key informants, as well as from ethnographic insights gathered over the course of the investigation. With the CCQ ready, another sample of 30 respondents were asked to rate the items according to the importance they had as markers of a successful lifestyle in their community (Very important, Somewhat Important, Not Important). First they were asked to rate the items according to how they thought people in their communities thought of them. Then, they were asked to rate them according to their own perspective.

Table 3 presents the results of the Cultural Consensus Analysis (CCA) carried out on the CCQ concerning respondents’ own ranking of the items.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
<th>Percent</th>
<th>Cumulative Percent</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12.96</td>
<td>68.7</td>
<td>68.7</td>
<td>3.665</td>
</tr>
<tr>
<td>2</td>
<td>3.536</td>
<td>87.5</td>
<td>87.5</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>2.36</td>
<td>12.5</td>
<td>100</td>
<td>3.665:1.5</td>
</tr>
</tbody>
</table>

As can be seen, the first factor produced by the CCA accounts for more than three times the variation of the second factor (Eigenvalue ratio >3:1; 3.65:1.5). Furthermore, it can be seen that the first factor accounts for 68.7% of the variation exhibited among respondents. Therefore we can conclude that there is one cultural model at work corresponding to perceived markers of a successful lifestyle. In other words, there is strong agreement among respondents concerning the
relative importance of the items included in the CCQ concerning their status as markers of a successful lifestyle.

Table 4 presents the results for the CCA carried out on the CCQ when respondents rated the items according to how they thought their community members ranked the items.

**Table 4. Cultural Consensus Analysis, CCQ-Community.**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
<th>Percent</th>
<th>Cumulative Percent</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.265</td>
<td>87</td>
<td>87</td>
<td>12.904</td>
</tr>
<tr>
<td>2</td>
<td>1.428</td>
<td>7.2</td>
<td>94.2</td>
<td>1.238</td>
</tr>
<tr>
<td>3</td>
<td>1.53</td>
<td>5.8</td>
<td>100</td>
<td>12.904:1.238</td>
</tr>
</tbody>
</table>

As expected, there is even greater agreement among respondents when they rate the CCQ items according to how they think people in their community perceive them. In this case, the first factor accounts for 87% of the variation exhibited among respondents, with the second factor accounting for an additional 7.2%. The eigenvalue ratio of the first to second factor in this case far exceeds the 3:1 value deemed as necessary in order to infer agreement among respondents (12.904:1.238). Respondent bias probably accounts for the greater agreement exhibited in this model; that is, respondents probably felt more at ease ranking as important markers of success potentially superfluous items, such as smart phones, brand-name clothing, etc. Whatever the reason for the differences in CCA results according to how the respondents ranked the items (their own perspective vs. how they feel these items are perceived by community members at large), in both cases there is a shared model concerning the importance of the items as markers of a successful lifestyle.

The differences in CCA results can be further explored by examining the posterior probabilities associated with each “response” (that is, ranking: very important, somewhat
important or not important, for each item in the questionnaire). CCA provides a “culturally correct” answer key, allowing one to see what the respondents are agreeing about. From the rankings according to their own perspective, all items were rated as being “very important markers” of a successful lifestyle, with the exception of wearing brand name clothing (rated as “not important”). This aggregate answer key must be interpreted in relation to the posterior probability associated with each “answer” (ranking). All items in the self-ranked CCQ scored a posterior probability of 0.99 or higher with the exception of owning a flat screen TV and wearing brand name clothing. In the case of the former item, the posterior probability of it being ranked as “very important” is 0.98. Concerning the latter, the posterior probability of it being ranked as “not important” was 0.714; the probability of it being ranked as “very important” as 0.286. The results of the CCA concerning the rankings according to how respondents feel community members perceive the importance of items was more straight-forward: every item was ranked as “very important”, with all rankings carrying a posterior probability of 1. Given that all items in the second CCA resulted in posterior probabilities of 1.0, they were all included in the Cultural Dissonance Questionnaire administered to each household.

**Household: Parental Interviews, Structured Questionnaires and Anthropometrics**

A sample of 58 children with parallel data linking anthropometric indicators to food security status, cultural consonance, and the height of at least one parent was obtained. As was the case with the previous study (NSF #BCS000172105) carried out in the area, mothers were more likely to meet with me or be present with their children at the time of the interview compared to fathers. Paternal heights were collected for 48, and were estimated for an additional 6, resulting in 54 cases with a non-missing “father’s height” value in their covariate pattern.
Maternal heights were collected for the entire sample. Values for paternal heights should therefore be treated with more caution than those for maternal heights.

**Raising Children: Positive Aspects**

Parents were asked during the opening segment of the visit, to think of positive aspects they thought the Monteverde Zone had for raising children. They were asked to think of their own experiences raising children in the area as they responded. Table 5 below presents the results of a free list analysis carried out on the coded parental responses in Anthropac.

Parents place great positive weight on the fact that their children can spend so much time outdoors, often time imbuing play outdoors as “more natural ways” of growing up and being a child. “My kid is not into electronics,” said one respondent proudly. “He likes to be outside, to play. He is growing up more natural that way.” The top elements of this generated list reinforce each other, and characterize a “safe” community, where children are sheltered from morally inappropriate behavior they are likely to encounter elsewhere (such as San Jose, mentioned specifically as a contrast by 12 respondents). The “communal nature” that characterizes their town, where people know each other, children can be outdoors with “nature,” results in a situation where children have ample learning opportunities both in and outside the classroom. Add to this “pure” water, air, rural landscapes, access to space for planting food, and a tradition (seen as endangered of disappearing) of “campesino” culture, and parents lighted up as they listed the positive attributes about their community as a place to raise children. Responses were frequently phrased in a way that suggested that their way of life was threatened by outside forces that would eventually overrun their community. “This place is still safe…,” “We can still walk everywhere without worries;” “We still know our neighbors;” “We still enjoy and respect
family.” The rapid pace of change of life in their community, as well as abroad, was not lost on respondents. And as the next section shows, much of this change was viewed as negative, indicative of the disintegration of a moral fabric, but also, of tough economic times.

Table 5. Free Lists: Positive Aspects of Raising Children.

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Respondent Percentage</th>
<th>Smith’s S Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niños Afuera</td>
<td>31</td>
<td>53</td>
<td>0.362</td>
</tr>
<tr>
<td>Educacion</td>
<td>27</td>
<td>46</td>
<td>0.248</td>
</tr>
<tr>
<td>Ambiente Comunal</td>
<td>26</td>
<td>44</td>
<td>0.244</td>
</tr>
<tr>
<td>Naturaleza</td>
<td>25</td>
<td>42</td>
<td>0.29</td>
</tr>
<tr>
<td>Tranquilidad</td>
<td>24</td>
<td>41</td>
<td>0.334</td>
</tr>
<tr>
<td>Seguridad</td>
<td>22</td>
<td>37</td>
<td>0.268</td>
</tr>
<tr>
<td>Ambiente Sano</td>
<td>18</td>
<td>31</td>
<td>0.222</td>
</tr>
<tr>
<td>Ambiente Rural</td>
<td>14</td>
<td>24</td>
<td>0.12</td>
</tr>
<tr>
<td>Buena Comida</td>
<td>13</td>
<td>22</td>
<td>0.097</td>
</tr>
<tr>
<td>Aire puro</td>
<td>13</td>
<td>22</td>
<td>0.147</td>
</tr>
<tr>
<td>Compared to San Jose</td>
<td>12</td>
<td>20</td>
<td>0.03</td>
</tr>
<tr>
<td>Cultura Campesina</td>
<td>11</td>
<td>19</td>
<td>0.102</td>
</tr>
<tr>
<td>Espacio</td>
<td>9</td>
<td>15</td>
<td>0.106</td>
</tr>
<tr>
<td>Poca contaminacion</td>
<td>9</td>
<td>15</td>
<td>0.088</td>
</tr>
<tr>
<td>Poca drogas</td>
<td>8</td>
<td>14</td>
<td>0.062</td>
</tr>
<tr>
<td>Control sobre niños</td>
<td>8</td>
<td>14</td>
<td>0.05</td>
</tr>
<tr>
<td>Salud</td>
<td>7</td>
<td>12</td>
<td>0.073</td>
</tr>
<tr>
<td>Familia</td>
<td>7</td>
<td>12</td>
<td>0.057</td>
</tr>
<tr>
<td>Medio ambiente</td>
<td>6</td>
<td>10</td>
<td>0.075</td>
</tr>
<tr>
<td>Economia</td>
<td>5</td>
<td>8</td>
<td>0.04</td>
</tr>
<tr>
<td>Agua pura</td>
<td>5</td>
<td>8</td>
<td>0.055</td>
</tr>
<tr>
<td>Poco tránsito</td>
<td>5</td>
<td>8</td>
<td>0.043</td>
</tr>
<tr>
<td>Poco estres</td>
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<td>7</td>
<td>0.036</td>
</tr>
<tr>
<td>Ingles</td>
<td>4</td>
<td>7</td>
<td>0.039</td>
</tr>
<tr>
<td>Es bonito</td>
<td>3</td>
<td>5</td>
<td>0.031</td>
</tr>
<tr>
<td>Multicultural</td>
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<tr>
<td>Poco consumismo</td>
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<td>0.016</td>
</tr>
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<td>Acceso a servicios</td>
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</tr>
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<td>Deporte</td>
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<td>Trabajo</td>
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<td>0.017</td>
</tr>
</tbody>
</table>
Raising Children: Negative Aspects

The list of negative aspects for raising children in the Monteverde Zone, as shown in Table 6, is characterized by lacks, deficiencies in services and infrastructure, and the economics that characterize towns heavily reliant on tourism. Taken together, the situation described by respondents is understandably a worrisome one. The combination of deficient services offered in the community with the very poor state of road and transportation infrastructure that characterizes the community results in a situation in which people need to leave the area for basic services, such as pediatrician appointments, or any kind of medical examination by a specialist; leaving the area is complicated by the deplorable situation that characterizes all roads coming into Monteverde. Several parents indignantly pointed out to me that one “has to be careful to get sick according to the clinic’s schedule. If you are sick on the weekend or at night, then you are in trouble!” In addition to the hours of operation, respondents consistently reported that the attention received at the clinic was deficient in quality: from over prescribing antibiotics, to treating everything with acetaminophen, to detached and cold medical personnel, respondents resoundingly voiced serious discontents with the health services available to them in their community. And again, the difficulties entailed in travelling to Puntarenas, San Ramon, Liberia or San Jose, as numerous respondents said they had to in order to see pediatricians, ophthalmologists, psychologists, etc., simply heightens the state of concern of available health infrastructure and services.
Other sets of concerns can be lumped under an “enrichment/recreation” category. That is,
parents feel across the board that their community lacks basic recreational and educational
infrastructure which they deem essential for the positive upbringing of their young.

Remembering the way in which the “positive” traits listed in the previous section were phrased
in terms of time—mentions of “this place is still safe…”—when parents talk about what their
community lacks for the youth, serious concern is expressed as to what is going to happen to
their children once they stop being children and gain greater degrees of autonomy. As one
mother put it, “We can still control them because he is six and his friends just want to run and
play. They’ll just play outside my house, or in the street, and we can all see them. But when they
are teens? What happens when they want to go to downtown, or to bars, or to see girls? Beyond
soccer, running and church, there is nothing for them to do here. Nothing!” These observations

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Respondent Percentage</th>
<th>Smith’s S Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficient health services</td>
<td>33</td>
<td>60</td>
<td>0.346</td>
</tr>
<tr>
<td>Access to resources/services</td>
<td>21</td>
<td>38</td>
<td>0.306</td>
</tr>
<tr>
<td>Lack of recreational activities</td>
<td>21</td>
<td>38</td>
<td>0.25</td>
</tr>
<tr>
<td>Inadequate educational services</td>
<td>15</td>
<td>27</td>
<td>0.223</td>
</tr>
<tr>
<td>Cost of living</td>
<td>13</td>
<td>24</td>
<td>0.12</td>
</tr>
<tr>
<td>Inadequate transport infrastructure</td>
<td>11</td>
<td>20</td>
<td>0.112</td>
</tr>
<tr>
<td>State of roads</td>
<td>10</td>
<td>18</td>
<td>0.095</td>
</tr>
<tr>
<td>Lack of parks</td>
<td>8</td>
<td>15</td>
<td>0.074</td>
</tr>
<tr>
<td>Difficult access to universities</td>
<td>8</td>
<td>15</td>
<td>0.114</td>
</tr>
<tr>
<td>Drugs</td>
<td>6</td>
<td>11</td>
<td>0.089</td>
</tr>
<tr>
<td>Public education</td>
<td>6</td>
<td>11</td>
<td>0.067</td>
</tr>
<tr>
<td>Lack of child care services</td>
<td>6</td>
<td>11</td>
<td>0.082</td>
</tr>
<tr>
<td>Lack of pools for residents</td>
<td>5</td>
<td>9</td>
<td>0.043</td>
</tr>
<tr>
<td>Tough economy</td>
<td>4</td>
<td>7</td>
<td>0.029</td>
</tr>
<tr>
<td>Lack of sports</td>
<td>4</td>
<td>7</td>
<td>0.026</td>
</tr>
<tr>
<td>Limited purchasing options</td>
<td>3</td>
<td>5</td>
<td>0.031</td>
</tr>
<tr>
<td>Lack of playgrounds</td>
<td>3</td>
<td>5</td>
<td>0.037</td>
</tr>
<tr>
<td>Cost of private education</td>
<td>2</td>
<td>4</td>
<td>0.033</td>
</tr>
</tbody>
</table>
were frequently paired with mentions of the increased prevalence of drug use. Interestingly, when pressed for more information as to which drugs were common, parents would just say “drugs,” or else, say they did not know. This trend of using the blanket term “drugs” was common among community members through informal exchanges carried out during the course of this investigation.

Parents also complained that there is no place for their children to play and socialize now. Outside of schools and one hotel, there are no playgrounds to be found in the entire Monteverde Zone. A substantial part of my recruitment for this research took place at a coffee shop that has a trampoline in the back. Parents would come, get something to drink and socialize with each other while their children played. Asked if there was anywhere else they would go for “play dates,” a few mentioned a pizza place that had swing sets. “Everything is for the tourist. We have to pay here for our children to have somewhere to play.” Along similar lines, the lack of opportunities for children (and adults alike) to learn and practice swimming compounded parental feelings that their children were not getting the type of development and educations that they deemed adequate. In the off season, one hotel reportedly would let locals swim for a fee. “But when there are tourists here there is nowhere we can go.” Further tied to the tourist economy was the cost of living. In addition to having fewer options for purchasing basic items and goods, what is available in the area is viewed as too expensive. Private schools, considered an important investment for their children to learn English and get “ahead,” are considered too expensive for the majority of people in the community.
Children Wants

Parents were then asked to think of things that their children want them to buy for them (excluding food items). Figure 1 below shows the breakdown of these desires.

As would be expected from a sample of children ages 3-7 y, toys top the list of their wants: toys, n=20; toys and technology, n=8. This category encompasses balls, dolls, cars and
trucks, roller skates, board games, etc. Next in line was technological devices, notably smartphones, tablets, mp3 players, game consoles, laptops and desktop computers (technology, n=7; technology and toys, n=8). Interestingly, 21 parents reported that their children did not actively ask them to buy them anything. To further parse out these results, tests of column proportions were carried out examining whether children wanted anything from their parents (yes/no) by sex (p=0.838) and by food security status (p=0.033). Food security status yielded a statistically significant result, as depicted in Table 7 below.

Table 7. Food Security by Child Wants.

<table>
<thead>
<tr>
<th>Does child want you to buy stuff?</th>
<th>Food Secure?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
</tr>
</tbody>
</table>

As can be seen from the table, fewer food insecure children than expected are reported to not want anything bought for them.

Children Cravings

Next, parents were asked to think of the type of foods that their children most commonly asked to eat. Figure 2 below present these results.
As can be appreciated from the figure there is a resounding craving among children for junk food (just junk food, n=35; junk food and something else, n=15, for a total n of 50, or 85% of the sample). Parents evinced great frustration when discussing this issue, stating how picky their child was, and detailing the struggles they experience during meal time. “All she wants is sweets and chips and ice cream,” said one parent while another stated “Can you believe she won’t eat gallo pinto? My daughter does not like gallo pinto!”
Children: Anthropometry

Table 8 shows the age and body composition characteristics (raw and the age-standardized data) of the study children. With a range from 3.04 to 7.88 y, the mean age was 5.73 y, with a standard deviation of 1.31y. Weight ranged from a minimum of 11.5 to 37.4 kg, with a mean and standard deviation of 19.77 and 4.38, respectively. Children height was distributed from 91 to 131.2 cm, with a mean and standard deviation of 110.2 and 9.4, respectively.

Table 8. Children Anthropometrics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Sex</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Girl</td>
<td>Standard</td>
<td>Range</td>
<td>Boy</td>
<td>Standard</td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Deviation</td>
<td></td>
<td>Mean</td>
<td>Deviation</td>
<td></td>
</tr>
<tr>
<td>Child height (cm)</td>
<td>108.41</td>
<td>10.02</td>
<td>40.20</td>
<td>111.99</td>
<td>8.46</td>
<td>27.40</td>
</tr>
<tr>
<td>Age of child</td>
<td>5.40</td>
<td>1.35</td>
<td>4.79</td>
<td>6.03</td>
<td>1.22</td>
<td>4.78</td>
</tr>
<tr>
<td>Weight (kgs)</td>
<td>19.72</td>
<td>5.18</td>
<td>25.90</td>
<td>19.83</td>
<td>3.50</td>
<td>14.30</td>
</tr>
<tr>
<td>Weight for age z-score WHO</td>
<td>.07</td>
<td>1.19</td>
<td>4.52</td>
<td>-.40</td>
<td>.93</td>
<td>4.19</td>
</tr>
<tr>
<td>Height for age z-score WHO</td>
<td>-.59</td>
<td>1.00</td>
<td>4.18</td>
<td>-.80</td>
<td>.89</td>
<td>3.89</td>
</tr>
<tr>
<td>BMI for age z-score WHO</td>
<td>.59</td>
<td>1.24</td>
<td>5.00</td>
<td>.16</td>
<td>.88</td>
<td>3.56</td>
</tr>
<tr>
<td>ZSitting Height Index</td>
<td>1.91</td>
<td>1.71</td>
<td>8.87</td>
<td>2.26</td>
<td>1.45</td>
<td>5.98</td>
</tr>
</tbody>
</table>

Weight-for-age, height- for-age, and BMI- for-age z-scores were computed with the software, AnthroPlus. This program calculates the z-scores for a sample relying on a WHO international reference population of more than 8,000 children, allowing for interesting and valuable comparisons of the nutritional status of populations around the globe. Unfortunately, AnthroPlus does not compute z-scores for other anthropometric indicators, such as the sitting height index (SHI), mid-upper arm circumference (MUAC), or triceps skin folds. Reference values for MUAC and triceps skin folds were computed for children in the sample no older than 60 months (n=16) in AnthroPlus, with the WHO reference population. Given the very small
number of cases with data for these variables, these values are unfortunately of little use. Finally, in order to examine the contribution of child height according to different segments of the body (trunk length, leg length, etc.), z-scores for sitting height index (SHI) were computed for the sample relying on the NHANES III reference populations (Frisancho 1997). SHI is computed as follows:

\[
\left( \frac{\text{Sitting Height}}{\text{Stature}} \right) \times 100
\]

The growth and nutritional status of the study sample are consistent with trends seen among developing-to-transition populations. Height-for-age z-score (HAZ) values range from -3.34 to 1.36, with a mean of -0.69 and SD of 0.94. Weight for age (WAZ) ranges from -3.06 to 2.62, with mean and SD values of -0.17 and 1.09, respectively. BMI for age (BAZ) ranged from -1.8 to 3.8, with mean and SD values of 0.37 and 1.1, respectively. Figures 3, 4 and 5 depict the distribution of the study sample, comparing it to WHO reference values. In general, this sample has lower height for age values, roughly similar weight for age, and slightly higher BMI for age values when compared to the WHO reference population. This sample, like other ones from developing areas, can be roughly characterized as being of low stature with elevated weight. Shapiro-Wilk statistics show that for the three nutritional parameters being currently discussed have a normal distribution of values (p=.713, p=.866, p=.573, for HAZ, WAZ and BAZ, respectively).
Figure 3. Height-For-Age Z-scores Distribution.

Figure 4. Weight-for-Age Z-scores Distribution.
As mentioned previously, z-scores for sitting height index could not be computed with the same reference population as for the previous anthropometric indicators. Nevertheless, these values were computed using the NHANES III data as a reference population. The z-scores for stated index were not normally distributed (Shapiro-Wilk p=.000), and are strongly skewed towards the right (short-legged). They range from a minimum of -0.37 to a maximum of 8.5 (mean=2.1, SD=1.6). These values indicate that the study sample is short-legged, with several very high values.
Parents

The descriptive data of mothers and father height are as follows:

Table 9. Parental Anthropometrics.

<table>
<thead>
<tr>
<th>Parents</th>
<th>Mean Height (cm)</th>
<th>Standard Deviation (cm)</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothers</td>
<td>157.62</td>
<td>6.15</td>
<td>169</td>
<td>144</td>
<td>25</td>
</tr>
<tr>
<td>Fathers</td>
<td>170.77</td>
<td>6.15</td>
<td>185</td>
<td>150</td>
<td>35</td>
</tr>
</tbody>
</table>

Figure 6. Sitting Height Index Z-score Distribution.
Mother height values were distributed normally (Shapiro-Wilk, $p=0.166$), whereas those for fathers were not (Shapiro-Wilk, $p=0.003$). An examination of Figure 8, suggests a possible explanation of the non-normal distribution for father height values. Recall that height values were estimated for six of the fathers. I posit that these six height values were over-estimated and resulting in the peak toward the right of the mean that disrupts what is an otherwise, normally-distributed-looking variable. Interpretative caution is thus warranted for statistical models containing this variable.

![Histogram of Mother's Height](image)

**Figure 7.** Mother's Height.
Figure 8. Father's Height.

Households

Participating households were recruited from almost every residential area of the Monteverde Zone: Bajo San Luis, El Invu, Altos de San Luis, Monteverde, La Bomba, Cerro Plano, Manakin, Barrio “Country Lodge/Mariposa/No sé,” Santa Elena, Cementerio, Cementerio Abajo, La Colina, Los Llanos, La Plaza, Perro Negro, Cañitas. I did not recruit any households from La Lindora, the area of “La Finca el Buen Amigo,” or further towards the Pacific coast
beyond the former large coffee processing plant at the “puro bajo of San Luis.” The extent of my geographical reach towards the city of Tilarán in Cañitas was around the Panadería Jimenez area.

The breakdown of households by neighborhood is presented in Table 10.

**Table 10. Households by Neighborhoods.**

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monteverde</td>
<td>4</td>
<td>6.8</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Cerro Plano</td>
<td>12</td>
<td>20.3</td>
<td>20.3</td>
<td>27.1</td>
</tr>
<tr>
<td>Bomba</td>
<td>1</td>
<td>1.7</td>
<td>1.7</td>
<td>28.8</td>
</tr>
<tr>
<td>Manakin</td>
<td>5</td>
<td>8.5</td>
<td>8.5</td>
<td>37.3</td>
</tr>
<tr>
<td>Cementerio</td>
<td>6</td>
<td>10.2</td>
<td>10.2</td>
<td>47.5</td>
</tr>
<tr>
<td>Los Llanos</td>
<td>11</td>
<td>18.6</td>
<td>18.6</td>
<td>66.1</td>
</tr>
<tr>
<td>La Plaza</td>
<td>3</td>
<td>5.1</td>
<td>5.1</td>
<td>71.2</td>
</tr>
<tr>
<td>Perro Negro</td>
<td>2</td>
<td>3.4</td>
<td>3.4</td>
<td>74.6</td>
</tr>
<tr>
<td>Cañitas</td>
<td>1</td>
<td>1.7</td>
<td>1.7</td>
<td>76.3</td>
</tr>
<tr>
<td>Alto San Luis</td>
<td>4</td>
<td>6.8</td>
<td>6.8</td>
<td>83.1</td>
</tr>
<tr>
<td>Invu</td>
<td>6</td>
<td>10.2</td>
<td>10.2</td>
<td>93.2</td>
</tr>
<tr>
<td>Bajo San Luis</td>
<td>4</td>
<td>6.8</td>
<td>6.8</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Of greater interest to the questions examined here, Table 11 presents households by aggregated area, lumped into two categories: San Luis (as representing an area with less tourist development, fewer consumer outlets and greater agricultural practice and rural landscape, and everything else, representing areas in and immediately surrounding the main eco-tourism hub.

The ecotourism hub here is referred to as Monteverde.

**Table 11. Household by Town: Aggregate.**

<table>
<thead>
<tr>
<th>Town</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monteverde</td>
<td>45</td>
<td>76.3</td>
<td>76.3</td>
<td>76.3</td>
</tr>
<tr>
<td>San Luis</td>
<td>14</td>
<td>23.7</td>
<td>23.7</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>
As can be seen, the majority (76.3%) of households come from the Monteverde area, with the remaining 23.7% representing San Luis. In terms of distribution, the contribution from San Luis is relatively low, and the study could have benefitted from a more equal partitioning of households by the two main areas. The silver lining to this distribution is that with approximately 100 total households in San Luis, 14 stands as a decent representative figure.

**Food Security**

For the study the main variables of interest at the household level correspond to food security classification and cultural consonance scores. Recall that food security data was collected with three different time frames as reference points: the four weeks preceding the interview; the rest of the previous year; and the time period since the child’s birth. Table 12 shows the distribution of food security and food insecurity levels during the previous four weeks by town. It must be noted that the HFIAS has only been tested for collecting food security data stretching back to four weeks prior to the interview. Thus, in this dissertation I am employing this instrument in ways in which it has not been accounted for methodologically. Specifically, there is the issue of recall, in which participants may or may not be able to adequately remember any instances of food insecurity going back further than four weeks. Since the main hypotheses of this study deal with growth and development indicators, it was nevertheless imperative for me to gauge food insecurity for periods of time much longer than the preceding four weeks. Thus I administered with two different time periods as references as discussed above. I am confident that in dealing with food insecurity, particularly episodes of scarcity and great worry, parents would not have a hard time recollecting. The specificity with which they shared details about
these episodes (how they felt, what they did, etc.) suggests to me that recall bias is not an important issue in my study.

**Table 12. Food Security by Town.**

<table>
<thead>
<tr>
<th>Town</th>
<th>Food Secure During Previous 4 Weeks</th>
<th>Food Secure</th>
<th>Mild Food Insecurity</th>
<th>Moderate Food Insecurity</th>
<th>Severe Food Insecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Row Total</td>
<td>Count</td>
<td>Row Total</td>
<td>Count</td>
</tr>
<tr>
<td>Monteverde</td>
<td>32</td>
<td>71.1%</td>
<td>9</td>
<td>20.0%</td>
<td>3</td>
</tr>
<tr>
<td>San Luis</td>
<td>8</td>
<td>57.1%</td>
<td>4</td>
<td>28.6%</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>67.8%</td>
<td>13</td>
<td>22.0%</td>
<td>5</td>
</tr>
</tbody>
</table>

There is relatively low frequency of food insecurity in the overall sample (32.2% of households suffering from some form of food insecurity, with the majority of these cases representing Mild Insecurity (68%), and Moderate and Severe Insecurity representing low percentages, at 26% and 5%, respectively. Given the small cell sizes for Moderate and Severe Insecure households, Table 13 presents the same data as the previous one, but aggregated across all Insecure levels (Food Secure vs. Insecure).

**Table 13.4 Aggregate Food Security by Town.**

<table>
<thead>
<tr>
<th>Town</th>
<th>Food Secure During Previous 4 Weeks?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Row Total</td>
<td>Count</td>
</tr>
<tr>
<td>Monteverde</td>
<td>13</td>
<td>28.9%</td>
<td>32</td>
</tr>
<tr>
<td>San Luis</td>
<td>6</td>
<td>42.9%</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>32.2%</td>
<td>40</td>
</tr>
</tbody>
</table>

Extending the time period under examination to include the entire year preceding the interview, the amount of households suffering from some kind of Food Insecurity goes up.
Tables 14 and 15 depict the breakdown of Food Security Status (disaggregated and aggregated, respectively) by town.

**Table 14.5 Food Security Previous Year by Town.**

<table>
<thead>
<tr>
<th>Town</th>
<th>Food Secure During Previous Year</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food Secure</td>
<td>Mild Food Insecurity</td>
<td>Moderate Food Insecurity</td>
<td>Severe Food Insecurity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Row Total N %</td>
<td>Count</td>
<td>Row Total N %</td>
<td>Count</td>
</tr>
<tr>
<td>Monteverde</td>
<td>31</td>
<td>68.9%</td>
<td>7</td>
<td>15.6%</td>
<td>5</td>
</tr>
<tr>
<td>San Luis</td>
<td>7</td>
<td>50.0%</td>
<td>6</td>
<td>42.9%</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>64.4%</td>
<td>13</td>
<td>22.0%</td>
<td>6</td>
</tr>
</tbody>
</table>

When examined for the previous year, the percentage of Food Secure households drops from 67.8% (the figure corresponding to four weeks prior the interview) to 64.4%. This drop in Food Security corresponds to one more household in each category for Moderate and Severe Insecurity. The aggregate Food Insecurity percentage goes from 32.2 (previous 4 weeks) to 35.6 when households report on their status for the preceding year.

**Table 15. Aggregate Food Security by Town.**

<table>
<thead>
<tr>
<th>Town</th>
<th>Food Secure During Previous Year?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Row Total N %</td>
<td>Count</td>
</tr>
<tr>
<td>Monteverde</td>
<td>14</td>
<td>31.1%</td>
<td>31</td>
</tr>
<tr>
<td>San Luis</td>
<td>7</td>
<td>50.0%</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>35.6%</td>
<td>38</td>
</tr>
</tbody>
</table>

Finally, Table 16 presents Food Security since the child’s birth below.
Table 16. Food Security Since Child’s Birth by Town.

<table>
<thead>
<tr>
<th>Town</th>
<th>Food Security Status Child’s life</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food Secure</td>
<td>Mild Food Insecurity</td>
<td>Moderate Food Insecurity</td>
<td>Severe Food Insecurity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Row Total</td>
<td>N %</td>
<td>Count</td>
<td>Row Total</td>
</tr>
<tr>
<td>Monteverde</td>
<td>32</td>
<td>71.1%</td>
<td>5</td>
<td>11.1%</td>
<td>5</td>
</tr>
<tr>
<td>San Luis</td>
<td>8</td>
<td>57.1%</td>
<td>4</td>
<td>28.6%</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>67.8%</td>
<td>9</td>
<td>15.3%</td>
<td>7</td>
</tr>
</tbody>
</table>

Interestingly, when the time frame under question is extended to encompass the entire child’s life, the percentage of Food Secure households returns to the same value reported for the four weeks prior to the interview (67.8%) instead of increasing. The increase in Food Secure households corresponds to a decline in the prevalence of Mild Food Insecurity (from 22-15.3%). With Severe Food Insecurity, however, one more household reports this condition during the time since the child’s birth with relation to the year prior to the interview (5.1 vs. 3.4%).

As mentioned previously, the HFIAS allows researchers to compute a continuous score for each household, ranging from 0-27. These values are the sum of the coded responses for each frequency of occurrence question. For instance, if a household responded that they did in fact worry about not having enough food in their house during the previous four weeks (or year, or life of their child), a frequency-of-occurrence follow up question is asked to further determine the severity of food insecurity. Coded responses to these questions range from zero to three; thus the worst case scenario for a household would be scoring “three” for all frequency of occurrence questions (nine in total=27). Given that the HFIAS was also administered for two time periods beyond the conventional four weeks, another composite score can be computed representing the sum of all frequency of occurrence responses for each administration of the instrument (ranging from 0-81). Table 17 presents the mean HFIAS scores for each iteration of the instrument by
town, as well as the composite HFIAS just described. Within this sample, the presence or absence of food security during the different time frames accounted for by the HFIAS in this study suggests that they are linked events. That is, households rated as food secure during the four weeks prior to the interview where statistically significantly more likely to be rated as food secure for both the preceding year (Chi Square Statistic=22.238, df=1, p=0.000), as well as for the time period since the birth of their child (Chi Square Statistic=11.854, df=1, p=0.001), as is depicted in Table 18.

Table 17. Mean HFIAS Scores by Town.

<table>
<thead>
<tr>
<th>Town</th>
<th>Monteverde</th>
<th>San Luis</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFIAS Score</td>
<td>1.36</td>
<td>1.36</td>
</tr>
<tr>
<td>HFIAS Score for Previous Year</td>
<td>2.02</td>
<td>2.07</td>
</tr>
<tr>
<td>HFIAS Score Since Child’s Birth</td>
<td>2.71</td>
<td>1.79</td>
</tr>
<tr>
<td>Total HFIAS score</td>
<td>6.09</td>
<td>5.21</td>
</tr>
</tbody>
</table>

Table 18. Food Security Status, Counts.

<table>
<thead>
<tr>
<th></th>
<th>Food Secure Previous 4 Weeks?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Food Secure Previous Year?</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>15</td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td>Food Secure Since Child’s Birth?</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 19. Food Security Status, Test of Independence.

<table>
<thead>
<tr>
<th></th>
<th>Food Secure Previous 4 Weeks?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \chi^2 ) (p-value)*</td>
</tr>
<tr>
<td>Food Secure Previous Year?</td>
<td>22.348 (.000)</td>
</tr>
<tr>
<td>Food Secure Since Child’s Birth?</td>
<td>11.854 (.001)</td>
</tr>
</tbody>
</table>

*The Chi-square statistic is significant at the .05 level. Degrees of freedom are 1 for all values.
As these tests of associations make clear, being food insecure at one point in time is highly and significantly associated with being food insecure at another point in time among the study households. This result highlights the systemic nature of food insecurity taking place in the Monteverde Zone, and suggests that there are structural factors at play keeping households caught in negative cycles of food insecurity.

**Cultural Consonance/Dissonance**

Based on the results of the free lists, and the two variants of the CCQs administered on a total sample of 60 individuals\(^{25}\) (free lists n=30, CCQ n=30), parents of children were asked whether they possessed or participated in any of the items listed in the CCQ. The idea with this instrument is to gauge through a continuous index, the degree to which respondents approximate through their material possessions and behavior, to the agreed upon cultural norm of leading a “successful lifestyle.” For each item that a household responded “yes” to, they would be coded as 1 (no=0). Thus each household would obtain a sum score, which was then divided over the total number of items in the scale (23), resulting in a 0-1 score for each household with “0” representing complete dissonance with the norm, and “1” representing complete consonance).

Given the variety of items included in the Consonance/Dissonance scale, and given that different items are indicative of differing degrees of spending power, economic stability and overall access to important services and resources in and beyond the Monteverde Zone (owning a car or motorcycle, for instance, allows people greater choice concerning the timing and place for acquiring food and other basic needs), three items were given greater weight in terms of their

---

\(^{25}\) Recall that these 60 individuals are distinct from the sample of 59 households visited for the main phase of data collection.
contribution to this scale: respondents with “yes” values of owning a car, motorcycle or a house, were given scores of “2”. Again, the rationale behind this coding scheme is to reflect the greater weight, in practice, that owning or lacking these items may have in the everyday unfolding of people in the Monteverde Zone. While the ranking exercises carried out in the formative ethnographic phase of this research clearly reveals that both owning a car and a smartphone are important markers or a successful lifestyle for respondents, it would be foolish to think that owning one or the other would translate into similar or equal effects in terms of providing opportunities for the mitigation of events related to food and livelihood security. Thus, the coding scheme is in keeping with the materialist conception of society that underpins a large part of this research.

Table 20 presents the descriptive statistics for the cultural consonance scores across sample households.

**Table 20. Cultural Consonance Scores.**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Range</th>
<th>Shapiro-Wilk Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Consonance Score</td>
<td>.71</td>
<td>.16</td>
<td>.35</td>
<td>1.00</td>
<td>.65</td>
<td>.297</td>
</tr>
</tbody>
</table>

With a p-value of 0.297 for the Shapiro-Wilk statistic, it can be seen that the cultural consonance score has a normal distribution across study households; the range is large, varying from a minimum score of 0.35 (low level of adhesion, in their practice and material possessions, to the shared cultural model of a successful lifestyle) to the maximum of 1.
Cultural Congruity by Food Security Status

Table 21 below presents the distribution of cultural consonance scores by household food security status (previous 4 weeks).

Table 21. Cultural Consonance Score by Food Security Status.

<table>
<thead>
<tr>
<th>Food Security Status Previous 4 Weeks</th>
<th>Food Secure</th>
<th>Mild Food Insecurity</th>
<th>Moderate Food Insecurity</th>
<th>Severe Food Insecurity</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Consonance Score</td>
<td>.74</td>
<td>.66</td>
<td>.67</td>
<td>.35</td>
<td>.40</td>
</tr>
<tr>
<td>Mean N</td>
<td>40</td>
<td>13</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

There is a marked drop in the cultural consonance score as food security turns into insecurity. Given that these data violate assumptions for running parametric tests, a non-parametric, Kruskal-Wallis test of differences in mean ranks was run to test for difference in cultural consonance score across food security categories. The test yielded a Chi-square statistic of 6.806, df=3, and p=0.078. Thus, while p-value approaches significance, we cannot infer differences in mean ranks of cultural consonance score based on disaggregated food security categories. A larger sample size might reveal if there are significant differences in this regard. As can be seen from the table, the cell sizes are small for moderate and severe food insecurity.

Therefore, Table 22 below presents the distribution of the cultural consonance score by food secure versus food insecure households, in aggregate form.
Table 22. Cultural Consonance Score by Aggregate Food Security Previous 4 Weeks.

<table>
<thead>
<tr>
<th>Food Secure?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>.74</td>
<td>.64</td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td>19</td>
</tr>
</tbody>
</table>

Cultural Consonance Score

Figure 8. Mean Cultural Consonance Score by Food Security.

The results of cultural consonance score by aggregated food security status are not surprising, given the trends seen in the previous table. In this instance, however, parametric and non-parametric (given the cell size of 19 for aggregate food insecure) statistical tests confirm a
significant difference in cultural consonance score according to food security status, independent samples T-tests, p=0.025; Mann-Whitney tests, p=0.24) with food secure households exhibiting lifestyles more congruent with the shared, cultural model of a “successful lifestyle” as identified in this study.

Table 23 and 24 below shows the same data, but this time, by food security for the previous year.

Table 23. Cultural Consonance Score by Food Security Status, Previous Year.

<table>
<thead>
<tr>
<th>Food Security Status, Previous Year</th>
<th>Food Secure</th>
<th>Mild Food Insecurity</th>
<th>Moderate Food Insecurity</th>
<th>Severe Food Insecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Consonance Score</td>
<td>.75</td>
<td>.66</td>
<td>.59</td>
<td>.46</td>
</tr>
<tr>
<td>N</td>
<td>38</td>
<td>13</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Non-parametric, Mann-Whitney tests show that statistically significant differences are found between Food Secure and Moderate Insecure (p=0.002); and Food Secure and Severe Insecure households (p=0.031).

Table 23 and Figure 9 below show the same data, but with the food security status aggregated into secure or insecure.

Table 24. Cultural Consonance Score by Aggregate Food Security, Previous Year.

<table>
<thead>
<tr>
<th>Food Secure Previous Year?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Consonance Score</td>
<td>.75</td>
<td>.62</td>
</tr>
<tr>
<td>N</td>
<td>38</td>
<td>21</td>
</tr>
</tbody>
</table>
Again we see statistically significant differences, with Food Secure households exhibiting higher mean cultural consonance scores through both parametric (independent samples T-tests, \( p=0.002 \)) and non-parametric tests (Mann-Whitney, \( p=0.031 \)). Finally, below we see the same descriptive data, means plots, and statistical tests, but this time examining food security since child’s birth.

**Figure 9. Cultural Consonance Score by Aggregate Food Security, Previous Year.**
Table 25. Cultural Consonance Score by Food Security, Since Child's Birth.

<table>
<thead>
<tr>
<th>Food Security Status Child's life</th>
<th>Cultural Consonance Score Mean</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Secure</td>
<td>.75</td>
<td>40</td>
</tr>
<tr>
<td>Mild Food Insecurity</td>
<td>.64</td>
<td>9</td>
</tr>
<tr>
<td>Moderate Food Insecurity</td>
<td>.65</td>
<td>7</td>
</tr>
<tr>
<td>Severe Food Insecurity</td>
<td>.54</td>
<td>3</td>
</tr>
</tbody>
</table>

Non-parametric, Mann-Whitney tests reveal statistically significant differences in the mean ranks of cultural consonance scores in between Secure and Moderate Insecure households (p=0.042).

Table 26. Cultural Consonance Score by Aggregate Food Security, Since Child's Birth.

<table>
<thead>
<tr>
<th>Food Secure during child's life?</th>
<th>Cultural Consonance Score Mean</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>.63</td>
<td>19</td>
</tr>
<tr>
<td>Yes</td>
<td>.75</td>
<td>40</td>
</tr>
</tbody>
</table>

When food security is examined since child's birth, aggregating all insecurity levels into one, both parametric (Independent samples T-tests, p=0.002) and non-parametric (Mann-Whitney, p=0.009) tests reveal significant differences, with food secure households exhibiting higher mean cultural consonance scores than their food insecure counterparts.
The results just described point to a methodological linkage between the food security and cultural consonance scale. To recapitulate: regardless of the time frame through which food security was examined, households with some form of food insecurity consistently exhibit lower cultural consonance mean scores. That is, food insecure households depart more through their behavior and material possessions, from the shared cultural norm concerning “desirable” lifestyle than their food secure counterparts. Theoretically, therefore, we can deduce that both scales are

Figure 10. Mean Cultural Consonance Score by Aggregate Food Security, Since Child’s Birth.
positing degrees of connectedness to a fundamental system—a mode of production, if you will—which as we will see in the next section, has important consequences in terms of child nutritional and growth and development indicators.

**Anthropometric Data by Food Security Status and Cultural Congruity**

Having presented the descriptive statistics on the study variables, as well as showing the distribution of food security statuses by town, and the relationship between food security and cultural congruity, we can now proceed to examine the inferential statistics related to the study’s main hypotheses: Are nutritional and growth and development indicators among children patterned along food security and cultural congruence lines? To put it another way, can we account for any of the variation exhibited in nutritional and growth and development indicators according to food security status and/or cultural congruence?

Table 27 presents the breakdown of child HAZ (height for age z-score), WAZ (weight for age z-scores), BAZ (BMI for age z-scores) and z-scores for child sitting height index (ZSHI) according to food security status.

**Table 27. Anthropometrics by Food Security, Previous 4 Weeks.**

<table>
<thead>
<tr>
<th>Food Security Status</th>
<th>Food Secure</th>
<th>Mild Food Insecurity</th>
<th>Moderate Food Insecurity</th>
<th>Severe Food Insecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Count</td>
<td>Mean</td>
<td>Count</td>
</tr>
<tr>
<td>Height for age z-score</td>
<td>-.72</td>
<td>40</td>
<td>-.53</td>
<td>13</td>
</tr>
<tr>
<td>Weight for age z-score</td>
<td>-.20</td>
<td>40</td>
<td>.09</td>
<td>13</td>
</tr>
<tr>
<td>BMI for age z-score</td>
<td>.35</td>
<td>40</td>
<td>.62</td>
<td>13</td>
</tr>
<tr>
<td>ZSitting Height Index</td>
<td>2.25</td>
<td>40</td>
<td>1.80</td>
<td>13</td>
</tr>
</tbody>
</table>
As can be seen, there are low cell sizes among the disaggregated food insecurity. Therefore, the following inferential statistics presented are only carried out on food secure vs. aggregate food insecure households. Out of the four anthropometric indicators presented in the previous table, significant results were only found relating to HAZ and ZSHI. The other indicators will therefore not be discussed any further in this section.

Two-way analyses of variance (ANOVAs) and analyses of covariance (ANCOVAs) were run in order to parse out the variance in the dependent variables from potentially contributing covariates and factors. Given that growth and development indicators are useful for reflecting an individuals’ long term nutritional status, food security since the child’s birth was chosen as the appropriate factor to include in these general linear models.

Table 28 below presents the results of an ANCOVA carried out with child HAZ as the dependent variable, food security status since child’s birth as a factor, and maternal height as a covariate. Paternal heights were not included in any inferential statistical tests, given the non-normal distribution it presents, as well as issues related to this variables consistency, as discussed earlier.

Table 28. ANCOVA: HAZ, Food Security Since Birth, and Mother’s Height.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>9.041a</td>
<td>2</td>
<td>4.520</td>
<td>5.187</td>
<td>.009</td>
</tr>
<tr>
<td>Intercept</td>
<td>8.225</td>
<td>1</td>
<td>8.225</td>
<td>9.437</td>
<td>.003</td>
</tr>
<tr>
<td>Mother’s Height</td>
<td>7.304</td>
<td>1</td>
<td>7.304</td>
<td>8.381</td>
<td>.005</td>
</tr>
<tr>
<td>Food Secure (y/n)</td>
<td>3.658</td>
<td>1</td>
<td>3.658</td>
<td>4.197</td>
<td>.045</td>
</tr>
<tr>
<td>Error</td>
<td>48.807</td>
<td>56</td>
<td>.872</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>82.451</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>57.847</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .156 (Adjusted R Squared = .126)
The overall model is highly significant \((p=0.009)\), and shows that maternal height \((p=0.005)\) and food security since child’s birth \((p=0.045)\) are also significant predictors of variation for child HAZ. Levene’s test for equality of variance reveals that the data are homoscedastic \((p=0.379)\), therefore, no assumptions of the model are being violated. Table 29 below shows the contribution that each parameter (predictor) has on the dependent variable.

### Table 29. ANCOVA Parameters: HAZ, Food Security Since Birth, Mother's Height.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>(B)</th>
<th>(\text{Std. Error})</th>
<th>(T)</th>
<th>(\text{Sig.})</th>
<th>(95%) Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-10.215</td>
<td>3.268</td>
<td>-3.126</td>
<td>.003</td>
<td>-16.761 to -3.668</td>
</tr>
<tr>
<td>estatmad</td>
<td>.059</td>
<td>.021</td>
<td>2.895</td>
<td>.005</td>
<td>.018 to .101</td>
</tr>
<tr>
<td>([\text{HFIASCATBCH}=0])</td>
<td>.548</td>
<td>.268</td>
<td>2.049</td>
<td>.045</td>
<td>.012 to 1.084</td>
</tr>
<tr>
<td>([\text{HFIASCATBCH}=1])</td>
<td>.0a</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
</tr>
</tbody>
</table>

a. This parameter is set to zero because it is redundant.

For every increase in maternal height (in cm), a corresponding increase is seen in child HAZ of 0.59 (just over half a \(z\)-score), while holding food security status constant. Being food insecure likewise results in an increase in \(z\)-score values for child HAZ; in this case, being food insecure results in an increase of 0.548 \(z\)-scores over food secure counterparts, while holding maternal height contributions constant. Figure 11 below depicts the contribution of food security to child HAZ.
It is well known now, that in addition to overall height measures, the decomposition of height into its varying contributors can shed further light on the nutritional history and growth and development trajectories of populations. To this end, another ANCOVA model was created to try to explain the partitioning of variance in the ZSHI of the sample. Table 29 below presents the diagnostic information on the model, as well as on the contributions from each parameter.

Figure 11. ANCOVA: HAZ and Food Security, Since Childs' Birth.
As can be seen, the overall model is significant (p=0.028), with food security since child’s birth being a significant predictor in the model. Maternal heights, town, and the interaction between town and food security status were also explored in the model, but were not found to be significant predictors. In this model, being food insecure results in a decrease of -0.75 z-scores in sitting height index, while holding maternal height constant. This means that among food insecure children, their legs contribute significantly more to their overall height relative to their food secure counterparts (food insecure children are longer legged). Figure 12 below depicts this statistical relationship, highlighting the towns of Monteverde and San Luis for illustrative purposes only (there are no differences found between towns).
Figure 12. ZSHI Means by Food Security Since Child's Birth.

Status Congruity, Food Security and Anthropometric Indicators

 Significant regression models were found that accounted for ZSHI as well as child HAZ, using cultural consonance score as a predictor variable (in addition to food security status). The amount of variation explained in these models, however, did not exceed 19%, and are therefore not presented here. Instead, the results of a principal components analysis are presented to show the distribution of variation among key anthropometric indicators, cultural consonance scores, and food security. This analysis, it should be noted, is not a hypothesis test per se. Rather, it
presents the linear combinations between select variables in a way in which the repartition of variation can be maximally explained through the creation of non-redundant (they are orthogonal) “super variables” (the principal components extracted from the analysis). Table 30 presents the results of the principal components analysis.

Table 31. Principal Components Analysis.

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.765</td>
<td>35.306</td>
</tr>
<tr>
<td>2</td>
<td>1.541</td>
<td>30.820</td>
</tr>
<tr>
<td>3</td>
<td>.744</td>
<td>14.875</td>
</tr>
<tr>
<td>4</td>
<td>.562</td>
<td>11.243</td>
</tr>
<tr>
<td>5</td>
<td>.388</td>
<td>7.756</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

Table 32. Principal Component Loadings.

<table>
<thead>
<tr>
<th></th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cultural Consonance Score</td>
<td>.699</td>
</tr>
<tr>
<td>HAZ</td>
<td>-.403</td>
</tr>
<tr>
<td>ZSHI</td>
<td>.720</td>
</tr>
<tr>
<td>Mid Upper Arm Circumference (cm)</td>
<td>-.113</td>
</tr>
<tr>
<td>Total HFIAS score</td>
<td>-.763</td>
</tr>
</tbody>
</table>

The analysis, which examined the linear combinations between the cultural consonance score, HAZ, ZSHI, MUAC and Total HFIAS score yields two principal components that account for the a cumulative 66% of the variation exhibited among these values. The first component represents children with high cultural consonance scores, low HAZ values, high ZSHI and low HFIAS scores (they are food secure). The second component represents children with high HAZ MUAC values. That is, this model distinguishes between culturally congruent, shorter-legged,
food secure children, and cultural incongruent, taller, longer-legged food insecure children; additionally, the model distinguishes between taller children with larger MUAC, and shorter ones with smaller MUAC. In the next chapter, I weave together a discussion linking the multiple results of this research along with broader trends in the literature.
CHAPTER SEVEN:

DISCUSSION

In this chapter, I attempt to bring multiple lines of evidence concerning things of different ontological status into conversation with each other. Ideally, a series of discursive lines will connect the data points of this research; ideally, the flow over these discursive lines will be logically sequential, resulting in an explanation that accounts for the patterns of growth and development indicators seen among children in this study.

I will first discuss anthropometric data in relation to the two predictor variables: food security status and cultural consonance. I will describe what can be inferred about the position of a given household vis-à-vis the larger and underlying social structure by relying on measures of access such as the HFIAS and an ethnographic cultural consonance scale. As this preceding statement makes clear, my theoretical position strongly discredits a post-structural stance that sees only surface play, with no underlying structure that can be said to account for social (and in this case, biological) processes (Bergensen 1993). A biocultural or medical anthropological research program cannot fall into such idealisms if it is to remain relevant to discussions on human health outcomes. The causes of health outcomes must be explicated; mechanisms should be posited, and the metaphor of a social structure should not be thrown away with the bath water. This does not mean one needs to rely on vulgar materialism, for there are plenty of shades of gray in between black and white. Consequently, after having explained the relationship between
dependent and independent variables, I will present theoretical observations on the structure of society, and on culture and identity, connecting my own ethnographic work and theorizing with larger trends in the anthropological, sociological and philosophical literature.

**Child Growth and Development and Structural Integration**

To begin the discussion of the results obtained through this research, it is important to first restate that the children in this sample have lower HAZ, higher BAZ and higher ZSHI when compared to large reference populations. That is, they are shorter, fatter, and relatively shorter-legged than populations associated with more optimal growth and development indicators. This pattern of body composition is consistent with that found among populations from the third world undergoing transitions towards greater urbanization and market integration (Bogin et al. 2014, Wells 2012). It suggests that the quality of the food that makes up the bulk of their diet is less than desirable, being probably high in simple carbohydrates, with relatively low nutritional value otherwise. While we cannot interpret the reported cravings of children as indicative of their actual dietary composition, the results obtained in this regard do suggest that the sample children have very unhealthy palates. Taken on its own, this result is not surprising, and probably does not differ much from children in other parts of the world that live in communities characterized by market-based ways of acquiring and consuming foods. Regardless of the potential ubiquity of this trend, it is still worrisome, particularly taken in combination with the anthropometric characteristics exhibited by the study children.

As detailed in Chapter 3 of this dissertation, low stature and relatively short legs are indicative of less than optimal nutritional histories for any population. Add to this high BMI-for-age, and this further underscores the deficient nutritional exposure these children have faced, and
points to a possible epigenetic alteration in their metabolism, consistent with either poor nutrition during gestation, during infancy and childhood, during their mother’s development, or some combination of these factors (as outlined in Chapter 2 and 3). Whatever the likely sources of the children’s epigenotypes, this study’s results point to an increased risk for cardiovascular diseases and related complications that will likely characterize the children as they grow older. More worrisome is that these characteristics describe the sample as a whole, regardless of food security or cultural congruity status.

The generality of these negative health findings are echoed by the concerns expressed in the parental narratives concerning what they consider to be negative aspects of raising children in the Monteverde Zone. Elevated costs of living, deficient health, inadequate road and transportation infrastructure, and a virtual lack of recreational and enrichment opportunities for children (but not a lack of awareness on the important contribution that these opportunities may bring for their children and community at large), were repeatedly listed as hardships associated with parenthood in the Monteverde Zone.

More troublesome for Monteverde’s health status are the patterns that emerge when predictive variables are compared to variations in anthropometric indicators. Two key proxies for degree of engagement with the market-based system were used in this study as predictor variables: food security status and cultural consonance. The former concept is necessarily a relational one: it entails access to a specific system for acquiring and consuming food in that it examines explicitly (through the design and piloting of the instrument) the cultural appropriateness of the quality of the food consumed (or not), and the appropriateness of the means for acquiring such food (as well as the degree to which this is actually achieved or not). In a collectivity, such as a human community, food security reflects the degree to which a
household is successful in its integration with the larger collectivity, through an examination of access and experiential domains associated with perhaps the most basic element of animal existence: food. A basic principle of behavioral ecology as it concerns resource optimization and reproductive strategies is that females focus on maximizing access to food, while males focus on maximizing access to females (Strier 2008). In a materialist hierarchy or priorities, food comes out as a first-level determinant. This example is brought up to point out the “basicness” as it were, of a household’s engagement with food, not as an attempt to explain the study’s results through behavioral ecology. A materialist conception of society, if it is to privilege labor, must first account for food-related labor, as calories represent the body’s fuel for its own “work” (i.e., metabolism). All of this is elemental ecology, and will be expanded on in the next section.

Cultural consonance is a more nuanced way of examining the interface between an individual/household and the larger collectivity. As has been stated previously, cultural consonance reflects the degree to which individuals/households approximate through their practice and material possessions to a culturally shared model of a “successful lifestyle.” Examining the distribution of consonance score across a sample allows for, among other things, an examination of the accessibility of a desired lifestyle across the different social categories that make up the collectivity. Further—and more centrally related to the aims of this study—it allows to track the relationship between the modes of life produced from a society’s modes of production, with varying “objective” indicators of human health and wellbeing. It is well documented now that the ability to fit in itself may account for positive health outcomes across social groups (Dressler 2005, Dressler et al. 2012). Dressler and colleagues have recently also tracked body composition patterns among a sample in Brazil that varied according to cultural consonance (Dressler 2012). Thus as the results of this dissertation also show, taking into
account peoples’ access to live life as they so desire should be taken seriously as a contributor to human biological variation.

Such a focus opens up new questions for researchers. For instance, what happens when the guidelines for fitting in are on their own unhealthy, either as some defining property of the structure that is adhered to (for instance, sedentary lifestyles associated with urbanization and modernity), or as related consequences that stems from an adoption or imposition of a new narrative and mode of production (as would be the case with economic inequality, variation in purchasing power, and elevated costs of living as explored and documented throughout this research?) This says nothing of the fact that the narrative advanced in the sample’s “desired lifestyle” is highly skewed towards material gratification, consumerism, and the production and portrayal of identities as extensions of a household’s purchasing power. I will return to this last issue again when discussing the prospects and epistemic requisites of a bioanthropological contribution to critical theory.

So what can be inferred about the relationship between households/children’s integration into the larger mode of production in the Monteverde Zone and growth and development indicators? The study’s results point towards worsening health indicators as the degree of integration increases, suggesting that the prevailing modes of acquiring, preparing and consuming foods, as well as the prevailing ways of desiring (broadly construed) and imagining, and working towards that imagined ideal result in what are largely agreed upon objective indicators of poor health outcomes. Where food security represents worse growth and development indicators, it must be concluded that what is “secured” is not optimal for health. That is, the structures of access as well as the imaginary that upholds the “desirability”—the qualitative dimension of food insecurity, if you will—would seem to guarantee access to and
desire for, less-than-optimal food. If ever there was an example of “coca-colonization,” with all the pejorative ideological judgment associated with the term, this study’s results would seem to fit the bill.

The observations on food security and health indicators can be extended to include cultural consonance. First, there is a significant statistical relationship between food security status and cultural consonance, as detailed in Chapter six (food secure households are more likely to be culturally consonant). Second, the results of a principal components analysis echoed the directionality of the statistical relationship just mentioned. This would suggest a degree of linearity between the two measures of structural integration. Again, given what food insecurity and cultural consonance can be seen to represent—measures of a household’s integration into the predominant way of producing and consuming resources, this is not surprising. Further explanations can be sought by examining the content of the “successful lifestyle” narrative. It is not unreasonable to expect the consumerist trend exhibited in the consonance scale to extend into other purchasing and acquisitive habits—such as food procurement—thus accounting, perhaps for a greater desirability of processed foods. Add to this situation the economic hardships that characterize households in the area, and the lack of child care infrastructure (or of transportation to take children to and from school), and the prospects for a well-balanced, home-prepared meal begin to look bleak.

In Chapter five I discussed the recent historical trends characterizing income inequality, poverty rates, and the composition of the state’s labor force in Costa Rica as a means to situate the current economic and ideational climate in the Monteverde Zone. Economists would have us believe that these changes are purely “economical”, given that under a liberal economic conception of humanity, humans are rational choice actors seeking to maximize profit. Culture,
for them may be relegated to “rituals” and other side-dishes of minimal importance.

Liberalization entails privatization. Another way of looking at this is emphasize the loss of collectivity. While I do not wish to suggest that the Costa Rican state prior to the 1980s was a collectivity equally distributed across all social actors, the historical evidence is resoundingly clear that the distribution of resources (and the distribution of access to these resources) has been continuously funneled into fewer hands since the adoption of liberal economic policies.

The anthropological toolbox provides us with ample tools to analyze the cultural consequences of economic changes. Through this research I have documented how the privatization of resources has “trickled-down” into the conceptualization of self and other (discussed in greater detail below). Furthermore, biological analogues have also been documented in relation to the ability to differentiate one’s self from others, by relying on private symbols (they must be purchased; economic liberalism, privatizing identity under the homogeneity of global capitalism.

It is worth clarifying here what is being argued. When discussing degrees of “structural integration,” as reflected through food security and cultural consonance, I am not saying that food insecure and culturally incongruent households are located outside of the structural reach of their community’s economic and ideological apparatus, and exist in some sort of ideological or economic vacuum. The point I am advancing is that these households have diminished access to the socially sanctioned means of consumption and manifesting identities. In a situation in which everyone evinces bad growth and development indicators it is clear that the economic and nutritional environment is one that is not conducive to healthy growth patterns. But more importantly perhaps, in a situation in which those who do not exhibit access issues—to food and other culturally important domains—have the worse growth patterns, then this suggests that the
prevailing mode of being that is advanced from a structural standpoint is one that does not benefit the health and wellbeing of community members. Ironically (perhaps even cynically, from a critical theoretic stance), it seems that the inequality that seems to characterize the economic sphere of the Monteverde Zone may have a slight silver lining (at another phrasing of critical theory, this case, opportunistically). It is hypothesized that those food insecure households are lacking in access to certain consumer items that are highly sought out, but that they are making up for these lacks through other readily available food items, such as bananas, plantains, tubers, squashes, chayotes, etc, that are readily found and easily grown throughout the entire region. This observation is indeed borne in the responses from food insecure households: when asked how they managed get by periods of worry and scarcity, two strategies were offered across the board by respondents. The first strategy entailed reduced meal quantities or sizes on behalf of the adults (child buffering). The second strategy entailed asking/receiving bananas, beans, squash, etc, from friends or relatives. This second strategy, it should be clear, was for households who did not have access to plant and harvest food of their own.

For households that did have the opportunity to plant and harvest crops, reliance on grown food understandably took on greater significance. As one very poor and food insecure informant would stress to me throughout the several years I worked with him,

“At least we’ll eat some plantains and squash. Every day I’ll go to the plot I have planted, and at least I’ll bring home a handful of green beans. We are very poor, and often times we can’t eat meat and other things. The kids always want me to bring them some cookies, but they also know that rice and beans come first. You see kids today, they don’t eat what is given to them. They just want cereal or juice. Not my kids! They have learned that they eat what is available and they eat it with joy! Food is God’s gift and to be picky about it
is to offend Him. People see us as poor, and in some ways we are. But in others we are very rich, for we see the value in food and family.”

This farmer, in his mid-fifties, had spent his younger adult years managing large cattle ranches on the low land pacific area near Abangares. Years of ranching and farming left him with a rod fusing two of lumbar vertebrae and hips that were “jodidos” (shot). Simply put, he was beat up, but he continued to work to feed his family. His eldest son did not finish sixth grade, both because of the need to help his father and his own lack of interest in school. Together, he and his father literally planted and harvested thousands of calories per year. In a given year, they harvested enough corn, beans, tubers (such as chamol, tiquisque, arracache), squash, yucca, plantains, and onions to feed the household of around 10 people.

The twelve year old boy, while probably short for his age, was a rock solid mass of muscle. He didn’t have a choice. Nor did he want one, happy as he was being in the field with his father and sometimes, older brothers. I spent weeks at times working with them as they carried out manual labor, and it was simply unbelievable the pace with which they would work. When I mentioned before that they made corrals, this meant that they began by falling trees to harvest wood. Using chainsaws, they would spend days harvesting “slices” of wood from the felled trees to construct the walls of the corrals. It was dangerous, loud and extremely tiresome work. But it was also very nice and fun.

26 Eldest of those residing at the house at the time. At least three older sons had their own households in different towns.
27 It varied frequently, with sons coming and going, as well as work-related transfers that the father would take around two or three times a year, depending on the availability of jobs in San Luis, or elsewhere in the country. Mind you, jobs in his regard meant: building corrals, lawn maintenance (with gas power weed wackers), maintenance for cow pasture fences, spraying fungicides, insecticides, etc.
28 He did not want to do anything else for the time being. This does not mean that he did not recognize potential limitations of his current tasks for economic advancement down the road. He often would ask me what he needed to do in order to be able to get a “job like mine”.
On some occasions the boy’s mother would come out with the smaller children. They would gather branches and make a fire. They would unpack beans and flour from bags and use them to prepare meals. Coffee came non-stop, as did the “arepas” (pancake). The younger children, a four-year-old boy, and girls, ages five, seven, and ten, would chase each other around; check in on the wood harvesting process; and pester each other and everyone else. They mimicked the chainsaw. The older kids were in charge of the younger ones, in succession. And the two older girls also made coffee and “arepas” and handed out water to the men (twelve years and up).

The father would talk at length about how the one thing he could and would pass on to his children was “how to defend themselves.” How to work: construed in his view as the harvesting of natural resources and working with them to derive products directly from them. No intermediate actors other than themselves between the raw and finished products. And it wasn’t just talk: after having lived roughly 8 years in a two bedroom, decrepit wooden house without electricity, adequate indoor plumbing or a waste removal system, they were given a government bond for a small, but up-to-code house on a plot in a much more accessible location (their first residence was in a valley about 50 meters below the road, down a steep and rough grade). In order to supervise the construction, they built a three story structure out of wood, connecting plumbing to the house from the river not far away. From trees to structure, they did it all on their own.

At their new, two-structure location, they were much more comfortable. One house had electricity. With the electricity came refrigeration and greater flexibility in terms of fuels to use.

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29 Basically a slightly sweet pancake made from wheat flour. During one bean planting season, we would each eat around 20 during a field outing.
for cooking. They had more space and adequate plumbing. The children were 300 meters from the school and church, whereas before they were around two kilometers away. They could borrow salt, oil, and eggs from their neighbors, always returning the favor in kind. These changes in their material infrastructure and arrangements coincided with an increased sense of ease that I noticed among all the family members. The father would express it to me as such: “No matter how bad this thing can get, at least now we have this chunk of land and this little house. Nobody can move us from here.” They had been moved before, from other houses or communities, through lack of labor and land ownership. Now, when there is no labor, he plants. “What I don’t earn in money, I’ll make up for it in beans. You see? Like that” as he put his hand into the big bag of beans, letting them slip out one end of his quasi-closed fist.

Some years they did not have to buy any beans or corn (or any of the items listed in the previous section) because what they harvested was more than enough for what they would consume. But even within a year of plentiful harvest there are chunks of time when few of the crops are ready to be picked or consumed, so for a week or two they would mostly eat plantains, arepas and tortillas. They would also purchase male calves from dairy farmers in the area from time to time. When they did, they would eat a lot of it. Like the arepas during more lean times, when there was meat it would circulate around continuously. “A lot of people look down on this type of meat,” he’d tell me. “They say it’s not good to eat because the calf’s muscles aren’t really developed. And one thing I really appreciate about you, Ernesto, is that you come to my house and you eat what I eat, and you say that you like it. And I know that you are polite, but I also know that you do like it. And that I find genuine and see as a sign of good education.”

There was a clear hierarchy concerning the timing and quantity of food, according to sex and age. I was always first to eat. Protest was futile, in more than one sense. I would say “Please,
you eat first.” They would acknowledge my gesture with a thanks and a “no. I knew it was a
delight for them to treat me when they could. I genuinely helped them out with work, gifts of
food, clothing, and books; I played with the children and talked with the adults. I was their
friend, so why would they not want to bestow niceties on me? After I had my plate and coffee,
the father would get his, followed by the sons that had been carrying out manual labor; then,
younger sons and women and girls alike would eat. The men who did manual labor would get
substantially larger portions of food with frequent multiple servings (regardless of expressed
satiety from wimpy ethnographers).

From these ethnographic case-examinations, I see various important threads that relate to
the larger discussion at hand. First, in framing a large part of his articulations concerning food
consumption, taste, pickiness, and associated evaluations of a person’s education and degree of
politeness, it becomes evident that experiential domains related to, and the sociological
connotations surrounding, food are important and central topical axes around which the head of
household understands his or her moral and social standing as a community member. In more
general terms, this could be seen as ethnographic support to the assertion that identities are
intimately produced and intertwined in the process through which resources are produced. To be

30 The act of a friendly gesture can be viewed as a very productive one (in the sense of generating a very present,
positive sense of ego within the social interaction); if we view expression through actions, words, signs, as
manifestations of directed persona—of a focused “face” in Goffman’s sense of a dramaturgical actor that draws
from the cultural repertoire of its character to breathe life into the act(or), then acts of kindness and friendship
should be viewed as holding a “privileged” vantage point for ethnographic researchers to “peek” into the projected
articulation of the persona in its most explicitly outward manifestation of its “pleasant” iteration. If an expression of
cultural self is the articulation of multiple normative (within the individual, at least for the time of the expression)
anchoring points of identity, then an expression of friendliness, with associated releases in dopamine, synergism of
smiles—the product of so-called “mirror neurons”, contagion of laughter, posture, ways in which faces are held, and
locations of tension on the body—should be viewed on methodological grounds, as providing important insights into
people’s conceptions of how they should be. It is undeniable that among primates, notions of self are, by default,
interactive and interdependent on the recognition of another’s recognition of one’s ego. That is, in order for us to
be—psycho-sociologically, we need to know that we are known by others whom we know to be.
31 There is a certain amount of piousness imbued into this expression of humility, relative poverty, and palate.
careful: I am not making an argument that certain kinds of labor result in the fulfillment of human species beingness (Marx 1844), and that this particular food insecure and status incongruent household represents un-alienated, fulfilled human beings as a result of the way the produce and consume resources. I am, however, making the argument that how resources are produced and consumed will have strong effects on the normative weight of how people understand themselves to be in relation to others, as they draw on the prevailing narratives they have inherited as social members (a quintessential materialist observation—more on this in the next section). Further, the associations between moral standing, food procurement, appropriate gender roles and humility under God, were consistent themes I witnessed in over three years of extensive ethnographic research. So while the points made here are being upheld by means of an ethnographic case instance, this example is illustrative in its generality.\textsuperscript{32}

Note, however, that I am relying greatly on the father’s characterization of moral standing, work, and so forth, in making a connection between labor and identity. This in large part stems from the fact that I spoke with him more than I did with any other member of the household. Spending time with the family as a whole, I got the impression that the children and young adults felt cultural dissonance as bearing more directly on who they were versus who they would like to be. As a general rule, as we sat in their house, or just outside it, there was never a moment in which one of the children (in this case, 16 years and younger) was not playing with a cell phone. As far as I could tell, the father, the 15-year-old daughter, and 16-year-old son each had one. These were standard, non-smart phones, but they had limited web connectivity, which

\textsuperscript{32} Such is the epistemic strategy behind ethnographic writing.
the kids frequently used, showing me, for example, pictures of soccer players and actors. They would also play games on the phone and often fight over whose turn it was to play.

Another son, 19 years old, would be at the house sometimes. He worked night shifts as a guard in Santa Elena, and would come to the house several days out of the week. He had a Samsung smartphone, and no one else could play with it as far as I could tell. He added me on Facebook one time, and showed me some pictures he had taken of a sloth. This older son also had a new motorcycle. It was orange, clean and slick. It looked nice and he looked proud as he would clean it. It was a Chinese bike, one of the numerous offerings that have increasingly become available in Costa Rica. At a fraction of the price of a Japanese bike, these Chinese products were accessible to much larger segments of the population. They were also notoriously unreliable products. And they were not exactly inexpensive (costing approximately US$2000-$4000).

I never asked this son what made him purchase this bike over a used Japanese model. Yamaha and Hondas in particular are viewed as being indestructible, and are widely recommended by owners and mechanics alike. Thus what follows is entirely speculative, but ethnographically informed speculation nonetheless. I view it highly likely that the allure of a new, shiny bike greatly outweighed any perceived drawbacks concerning Chinese bikes in this young man’s mind. It is also entirely possible that he simply was not aware of the reputation that followed these bikes. This is highly unlikely, given the central role that motorcycles play in young men’s portrayal of themselves—not to mention, the extent to which such vehicles are useful in the area (all terrain capability, fuel efficiency around 50 miles per gallon, etc.). I view

33 I had purchased a used Honda during my fieldwork, thus providing me with a reason to research the subject. Once having purchased the bike, I gave countless rides to people whose Chinese bikes had quit on them.
this instance as strong evidence of the pull that consumerist and materialist tendencies exert on people in the Monteverde Zone.

None of this should be surprising, really. In reporting this observation I do not want to reproduce an ethnographic enterprise that highlights how “they” now crave what “we” have. Influential scholars on globalization, transnationalism and the global imagination (Appadurai 1996) have long since observed that greater interconnectivity results in increased shared anchoring points for identity. Such instances would be expected to take place under a materialist conception of society: greater homogeneity of economic structures worldwide should result in greater aesthetic homogeneity as well.

The prevailing conception of society being advanced so far, would also suggest that there are generational differences in the aesthetic and moral appreciation of food production, consumption, and work more broadly construed. That is, older generations raised on a more farming-based mode of production would be expected to differ in their relation to work and consumption (a sociological truism if you ask me). The following ethnographic vignette exemplify these distinctions. The vignette foI visited an organization of small agricultural producers in search of beans to plant. They had none.

The vignette began when I tried to purchase beans to plant from an organization of small agricultural producers. They didn’t have any beans, so I purchased two bags of black beans ‘Don Pedrito’ in the “pulperia” (mini-market) in San Luis (alto) (800 colones for 900 grams, 1800grams total). Fortunately Don Ruben34 was pleased with the quality of the beans, commenting numerous times on how good they were. We walked down the slope of his plot,

34 All names presented are pseudonyms.
crossing into Jorge’s plot. Just like in the previous years, Jorge let Don Ruben use some of his land to plant beans. On our way to the section where Don Ruben had begun planting, he pointed out a section where he had lost all the bean plants from last year. “The water melted them.”

We walked around 100 meters more, entering another section of Jorge’s plot. “Look at all the land he has to “tapar frijol” (plant beans), and he does nothing. That man isn’t worth a damn.” We finally arrived at this slope, in which approximately 1,000 square meters were cleared. All that remained were dry grass, vines, brush and small trees on the ground.

“Damn, you did this all by yourself?” I asked him.

He laughed, telling me that people get scared with the amount of work he does. While I wasn’t scared, I was certainly very impressed.

Since we were planting a different kind of bean (he had previously planted caramel and pink colored beans) he made me plant stakes right at the edge of the brush that would soon be felled. The stakes, he told me, would mark where the differences in beans began. From this, we began making “lanes.” Carving our way through the “tacotal” (brush), we worked parallel to each other, at around two meters distance. Our lanes were eventually connected, producing a loop. The length of the lanes was approximately 50 meters. The lanes completed, Don Ruben walked first next to the stakes I had planted, throwing handfuls of beans into the brush. He then did the same process, as he walked through the lanes. He instructed me to begin chopping down the brush in between the stakes and the first lane. “Make sure you cut it all down to the grown. It has to be nice and low.”

The biggest obstacles we encountered were a thin, rubbery tree called “varilla negra” (black rod). With my “garabato” (a hooked stick, used to grab tree branches, vines, grass while one swings the machete) in my left hand, I would bend the branches as far down as I could,
repeatedly striking them with the machete at the base. Some would give faster than others. I began noticing differences in the feel of strikes, although I was not able (and still am not completely sure) how to articulate it, or to even embody the successful motion all the time. All I knew was that some of my strikes felt better, cut better, and hurt my hands less. The “good” strikes stemmed from a combination of grounding my center, by being conscious about the role my feet play in the swing, and really rotating from the hip. There was also a psychological/cognitive dimension to the motion. At first, my temptation was to simply swing the machete at whatever was in front of me. Faced with a small forest to clear, I don’t think this reaction was unreasonable. But in being so general and vague in relation to my target, my concentration and my mechanics became general and vague. It was directed effort, but of a rather sloppy kind. I began examining Don Ruben’s swings and realized that there was a very focused intent behind his every movement. By this I do not mean to suggest that I had no intention in my motion. It was clear that we had a tall task ahead: cut down a lot of brush, small trees and vines. But to use an apt metaphor, I could not see the trees for the forest, and therefore, my focus and technique suffered. Slowly I began being deliberate in each motion. I would guide my attention first with the garabato, placing it on the object I was about to strike. Once secured on my target, I very consciously brought up my strength from my feet, through my abs, out through my hips and down my arm, culminating in a bit of a swinging motion of the wrist.

Feeling inquisitive, I asked Don Ruben if he thought of something while he was swinging. “Why?” he replied, not lifting his gaze from the tree he was working on. “Well, I don’t know. I’m just curious to know if you think of something while you use the machete”.

“Why?” he asked again.
“Well since I am learning how to do all these kinds of things, I have to focus my mind on the machete. So I want to know if you have to do the same.”

“Well listen “viejo” (man), I’ve been doing this for so long. Well let me tell you that I wasn’t big at all and I was already “tapando” (covering) beans. I’ve done this all my life, so this is all natural to me.”

“So do you think of something while you do this?” I asked.

“All I am thinking of is to ask God to let these beans grow. I think that if God wills then we will have some nice beans in January. It’s all up to God. Do you think about this?”

“Yeah, I guess,” I lied. But then I thought that the thought was nice, and that maybe it wouldn’t be a bad thing to think. But it just wasn’t me. “But I also have to think on how to swing.”

We kept on going, until we had cleared everything up until the first lane. As usual, when Don Ruben got hungry he asked me for the time, volunteering that it might be eleven. Indeed, it was ten minutes before eleven, so he suggested we have our lunch.

“We’ve done some work today,” he said. “It’s not anyone that can do this kind of work. People sometimes tell me ‘how horrible this work is’. So I turn to them and say ‘cochinos!’ (dirty, pigs, lazy). I love to plant everything. I love to watch the land be nice and kept and watch the things grow. The people that say that this is horrible are ‘maricones’ (wusses, weak, wimps, homosexuals). They aren’t worth a damn,” he told me quite emphatically.

“But do people here respect the kind of work you do?” I inquired.

“Well let me tell you that people here are amazed that this old man works like this, but they just want their beans without working for them. They have to buy their beans. Cochinos! I like to plant, to watch things grow, and so my wife isn’t cheap when she cooks. I want her to use
as much vegetables as she wants, so we can all eat. I want her to use a lot of beans. It makes me happy.”

“So have you ever lacked beans or food?” I asked.

“No, no, no my friend! I have never had to buy any beans.”

“And the people here, do they lack beans sometimes?” I continued.

“Yeah, they have to buy them! Cochinos! They don’t have beans! They have to buy beans! And with all this land here. Antonio says he wanted to put some cattle here [on the land we were clearing for beans]. But then he has to buy beans. Lazy!”

We continued clearing the land up to the next lane. I continued to struggle with maintaining focus and directedness of effort. The bright red blood blister on my right hand had been replaced by dirt and a bit of loose skin. The main source of pain was in my hands, my fingers. At times the sweatiness of my palms made it difficult to properly grip the machete. Don Ruben had brought two files this time, so I had one at my disposal, which made the chopping experience easier. “You have to have the machete sharp, sharp” he stressed. “If not you hurt your hand.”

More swinging.

“Do you enjoy this Don Ruben?” I asked.

“I love this, my friend. This is what I love to do.”

“Well, what do you like about it?”

“Well, to put it this way, I like to watch the brush fall down.”

At this point he turned back to look at the progress we had made. “Look at that ‘corte’ (cut, referring to the portion of land we had done, and what remained to be worked on). That’s a nice ‘corte’!”
Several hours went by and we finally finished clearing all the way up to the second lane. We had cleared around 500 square meters. On our walk back to his shed, he asked me if I could come back the next day to finish the “corte.” He also asked me to get more of the same beans. We agreed on the time and I was on my way. I stopped by the “pulperia” (mini-market), taking my time to look around this time. There were about five shelves full of packaged and processed foods: chips, cookies, canned vegetables, beans in bags, and eggs in cartons, covered in plastic. In one corner there were three crates with some produce: plantains, potatoes, some citrus and pineapples. As I brought my beans to the counter I asked the person in charge if the produce was local.

“No, a guy brings them from, I don’t know where.” Behind her, a young boy around five years of age ate chips out of a bag while he sat two feet from a television, watching cartoons. I expected the pineapple to be imported (the elevation and climate is not right for producing pineapple in the Monteverde Zone), but the rest! I thought about Don Ruben’s contempt for people that buy their beans and it made me a bit mad too. It wasn’t so much that people buy beans that angered me, but rather the fact that they were beans brought in from somewhere else. Packaged, with labels.

I remembered a conversation from a month before, when an older woman mentioned to a friend that she no longer sold her eggs to the little store by her house because people refused to buy them. Her friend suggested that she wrap her eggs in plastic. So she obtained egg cartons and plastic wrap, sealed her eggs, and people began to purchase her eggs once more. An egg is an egg, but a packaged egg is a commodity.

I paid the cashier, thanked her and left.
Back at the Monteverde Institute I encountered a group of women leaving a workshop on effective communication strategies. Their children were running around, playing. I asked them how the workshop went. “Good,” replied a woman. “I guess we are not supposed to be angry when we reprimand our children. It makes sense, I guess. But it’s so hard sometimes! I mean, look at him [referring to her son]. He runs around, talks in class, pulls the girls pigtails. He loves causing trouble!”

“I know, I was like that,” I offered. “But I mean, weren’t you like that as a child too?” I asked.

“No, you see, we were raised on a farm, so we always had something to do. We had to go get the goats in the morning, milk them, feed the chickens, feed the pigs, carry water, wash clothes, make food, help dad with his planting. At night, you were tired and you slept.”

“It was real nice,” chimed in another woman. “We don’t have that anymore.”

“More and more I wish my son could be raised like that, on a farm,” the first woman remarked.

“Do you still have a farm?” I asked.

“No, father sold that a while ago. We don’t have land anymore.”

I take the preceding scenario to be indicative of various common processes unfolding in the Monteverde Zone. Though only a small description of a day’s ethnographic fieldwork, this vignette highlights a series of contradictions that permeate life in the area. Given that our concern is with understanding the causes and consequences of food insecurity, the focus here is on the contradictions related to these processes.

Without being too reductive or deterministic, I see the primary cause of food insecurity in this area as stemming from a consumerist, market-based set of ideologies and practices that
inform people’s lives, shaping their actions in ways that reproduces a capitalist life style. However, as a theoretical and empirical matter, I do not want to suggest an idealist explanation for a material and ideological phenomenon. The consumerist ideologies and practices under discussion should be understood as being the product of a material reality—a particular mode of production, which itself should be seen as the confluence of historical processes (material, ideological, always intertwined). Thus, as land use patterns and economic strategies change, and as new markets (in the economic and Bourdieuan sense of the term) open up, a prevailing and privileged way of imagining and undertaking productive and consumerist practices has indeed marginalized other ways of conceptualizing and undertaking food-related practices.

As it is currently understood, the concept of food insecurity entails emic conceptualizations of socially acceptable foods and of socially acceptable ways of acquiring food. Thus, my assertion that the main cause of food insecurity in the area is ideological (as a product of consumerism) might sound redundant, descriptive and obvious. But, once again, the argument being made is that it is a particular set of historically grounded ideologies and practices that are the main—proximal—causes of food insecurity. The distinction between proximal and distal causes in this regard is useful, in that it prevents the conflation of processes that unfold at very different spatio-temporal scales. In relying on a Bourdieuan framework to explain various unfoldings at the micro-sociological level (people interacting, carrying out their daily lives), I want to stress that these processes are of a different order than the distal, political-economic processes that have provided the foundation on which these micro-practices unfold. Thus, the present discussion entails an analysis that incorporates processes of different ontological scope. It is, in essence, an analysis of a complex system.
Theoretical clarifications aside, the ethnographic scenario above is informative in various regards. First, concerning the fact that food insecurity must be understood from the perspective of the population under study, the vignette highlights the heterogeneity surrounding issues of socially acceptable channels for the acquisition of food. That is, evinced in the case study is the simple fact that people have differing, contested ways of ascribing prestige to food processes. On the one hand, Don Ruben embodies an older, increasingly forgotten pride surrounding producing food for one’s family. Quality for him is intrinsically linked to the act of production. He can be seen as the prototypical case of a worker who is not alienated in the Marxian sense. Notions of masculinity, responsibility, strength and sacrifice surround and give meaning to the act of swinging machete. Piousness is also invoked with the affirmation that all the work is meaningless unless God wants to see it through. For Don Ruben, purchasing beans is an unacceptable way to acquire this product; from his perspective, people who buy beans could be considered as being food insecure.

Similarly, the vignette highlights competing sentiments. The fact that there is an alternative and dominating way of ascribing meaning to food practices is revealed through Don Ruben’s antagonistic reading of the ways in which many members of his community reproduce their livelihoods. Similarly, the way the “pulperia” operates reveals an underlying political-economic structure, guided and reinforced by a capitalist-centered logic. It is the changing set of ideas and practices that have resulted in a situation in which it “makes sense” to have a store that stocks products that have to be trucked in. The fact that beans and eggs must be packaged to look like those carried by big supermarkets the world over, in order to get people to buy them, betrays that a new arena—a new market—has risen, and people now use a different set of currencies to convey status within this microcosm of a broader system.
Food insecurity looms large in the area, but fewer and fewer people produce food. Food prices have risen on a global and national scale, but more and more people prefer to purchase food through intermediaries. These contradictions of the current system in Monteverde point to a worsening of the situation. That is, the ways in which ideologies and practices intersect with a deeper economic foundation results in fertile ground for food insecurity.

As previously mentioned, Don Ruben’s viewpoint represents that of an older generation that was raised through mostly subsistence farming and cash crop production. Younger generations have been raised in an increasingly market-based economy that revolves around ecotourism. In this regard, I represented somewhat of an anomaly in the area (as anthropologists might), given that I was a young, bilingual man—the perfect kind to work in tourism—interested in farming. While many young men from the farming communities worked to enter the ecotourism economy, I worked in the opposite direction.

Many times when I would work with Don Ruben it was not on his plot of land. Rather, we would work on someone else’s land in order to help them. “Pobrecita” (poor woman), he would say, when we approached his friend’s plot of land. “Her sons are lazy. Listen carefully and you will hear them snoring like pigs!” He would burst into laughter. “Pigs!”

The woman he was discussing had two daughters and two sons, all of whom worked in tourist outfitters. The oldest two worked full time, while the youngest two balanced school and work. They hardly seemed lazy to me. When I would bring this up to Don Ruben, he would scoff at me, stating emphatically that they did not work. “Work,” in his view (and others of his generation) was what men did in the field. Women did “oficio” (domestic chores). Men worked. In the case that a woman “worked,” she was viewed as both “valiente” (brave) and “pobrecita” (somewhat pitied). I too was viewed as “valiente,” suggesting that I was carrying out tasks
outside of my sociological script. In contrast, he viewed the woman’s sons as lazy, wanting to earn things the easy way. Having ample land to farm, but not doing so, was a sign of a serious moral deficiency in Don Ruben’s view. His way of making things better for the woman was to plant crops on her land, to help the “poor woman” with lazy sons. Notice that his diatribes were directed squarely at her sons. Her daughters were not expected to carry out “work.”

On one particular occasion, we were clearing brush in front of the woman’s house in order to plant corn. At around 9 am, one of the sons came out to greet us. He had a late night working, and was just getting up. Don Ruben smirked at me and raised his eyebrows as the son approached us. After a bit of small talk, the son grabbed a machete and worked alongside us for approximately 10 minutes. He then ran inside, showered, and took off on his motorcycle. “I told you…lazy,” Don Ruben said, not raising his eyes from the ground.

Instances such as this one were common throughout my field work. Men, in seeing that I was working their land, appeared compelled to enact a script in which they too were farmworkers. Frequently, they would grab my machete and comment on how dull the blade was. Many times they would take it from me, give me one which was undoubtedly sharper and say, “See, now you can work.”

The dull blade was a product (and proof) of my inexperience. I lacked the ability to adequately sharpen the file that is then used to sharpen the machete. Not once did I receive an approving comment on the state of my blade. It was true: my machete was simply never as sharp as that of men in the area. I had the gear, but I lacked the expertise to hone the gear into an emically accepted form. The dull blade was a sharp marker of my apprentice status; it signified my failure to “breakthrough” as it were, into the realm of “manhood.” It was also understood as a product of my city upbringing and of my extensive university studies. In effect, it encapsulated
my otherness in the eyes of many participants. And yet, the dull blade added to my status as “valiente” in that I would work alongside men, blood blisters and all—despite lacking appropriately sharpened tools.

I found it particularly interesting that younger men who worked in the tourist sector would “show me up” with their sharper blades (they also had much better technique and general knowledge of farming). I believe they felt compelled to prove to me (and themselves) that despite their departure from farming as an economic strategy, they still had the sociological attributes of manliness necessary to farm. Such characteristics of “ruralness” and “manliness” were frequently deployed in the tourist encounter by these same men; alterity vis-à-vis tourists—particularly women—was a common strategy through which young men presented themselves as part of the exotic, exciting landscape of the Monteverde Zone.

A lot has been said so far about the degree to which imagined and experienced identity are anchored through possessions and consumer items. To make further sense of this trend, the next section lays out an explicit theory of cultural identity, and makes the case for the use of ethnographic participant observation as a necessary methodological approach in order to document and theorize these phenomenological processes. Further connections are also spelled out between the more phenomenological aspects of identity, to the distribution of such idealist trends over society, as a result of an economic infrastructure.

**Participant Observation and Modes of Participating as Windows onto Being**

This section begins by laying out the necessary theoretical groundwork in order to advance claims about the roles that status symbols specifically, and signs in general, play in human identity processes. This analytical task is considered essential given the purpose of this
research, since any claims about cultural consonance/dissonance, as well as claims about the ways in which consumer items are meshed into identity statements, must first account for the experiential and analytical processes that result in the praxis of human identity. The starting point is simple: humans are cultural animals by biological constitution. This biological “hardware” that accounts for the cultural capacity, is no doubt the result of evolutionary processes that built on trends and constraints exhibited by our hominin (and beyond) ancestors, who likely exhibited complex symbolic behavior already. As cultural animals, we are necessarily symbolic. Our experience to each other and the world is mediated by signs. This entails a symbolic infinite regress: metaphors to account for other metaphors (Lakoff and Johnson 1980, 2010). The experience of identity necessarily entails a symbolic component, and the grounding of this semiotics appears to be linked to proprioception and the generalized experience of being embodied in our particular biped configuration (Lakoff and Johnson 2010).

Given this “topical” concern with identity, it is essential to lay out a theory of culture that accounts for the experience of identity, and in this case, also rank. The following section begins with an examination of the tasks of participant observation, using this as a building block for the remaining arguments about human semiotics.

To use a metaphor from jazz, the goal of the participant observer through ethnography (or at least, the stated epistemic uniqueness of this strategy) would be to flow, culturally: for the musician, the metaphor suggests an intuitive execution and connection of sound, dexterous articulation of digits over a fret board, and a chemistry and camaraderie with participating musical fellows. Research into the subject of musical and sports performance—two kinds of very “explicitly” cultural ways of manifesting and embodying identities (Kohurt 1997)—has often times used the concept of “flow” to describe a quality of embodied awareness, often times
characterized by the absence of a pronounced “ego” (in the Freudian or Buddhist sense), and a slight difference in hue in the way in which time and space are said to be experienced. By “explicitly cultural” I am referring to a given cultural “thing”—say activity, or corpus of knowledge—whose status as a socially-constructed enterprise is widely understood as a defining character of the unfolding of the enterprise itself. That is, participants involved in said enterprises are aware of the fact there is learning and acquisition of habits required in order to be able to participate. Examples would be vocations, learned skills, so-called hobbies and passions, arts and crafts, martial disciplines, culinary and healing practices, music execution and appreciation; basically any undertaking that requires explicitly learned (in both purely cognitive and more embodied ways of understanding the learning process) sets of criteria from agents. Participants are aware of the fact that they are undergoing socialization, usually, willingly. On the other hand, non-explicitly cultural ways of manifesting and embodying identity might be accepted or received sociological accents, tints and tones that characterize the deployment and retrieval of gendered, ethnic, nationalistic, linguistic, ludic, etc, anchors of, forgive the redundancy, cultural identity.

The contribution of cultural relativism—as a methodological endeavor—might be seen, perhaps, as stemming from the ethnographer’s ability to flow culturally, providing them with the inter-subjective insight necessary in order for them to “read” a non-explicit and explicit cultural phenomena from a normative, emic vantage point. A necessary precursor to such outcomes is the acceptance of social constructions (the ethnographer knows that she must learn a new way of seeing and experiencing a given set of cultural phenomena); further necessary analytical and embodied work would entail—to some extent—the necessary, momentary turning of one’s back towards social constructions, as the “logic” of the scenario breathes meaning into a socially-
constructed category (here the ethnographer acquires, through symbolic decoding; empathy; prolonged exposure to phrases and the pragmatics that bring meaning to them; and time, to the ability apply a reading, a “lexis” (Barthes 1961). An existential dawning ensues, as the ethnographer now realizes a new way of embodying their persona. Put another way, participant-observant ethnography may result in a form of identity emancipation, as the recognition of multiple vantage points through which one can embody, shifts from a theoretical attitude, to a new embodied experience. Signs are necessarily relational “things”, and as a result of this, “context” should be understood as the “whole” in a part-whole scheme.

Accepted and received semiotics might be seen to be the “structural” foundation—to borrow a metaphor from Levi-Strauss, that act as experiential anchors for fits of identity manifestation. Here I am describing the accepted habitus (per Bourdieu 1977), or the cognitive content one needs to “know” according to Goodenough’s (1950) Culture: “Culture is the what one needs to know…”; the “script” in Goffman’s (and by inheritance, Geertz’) dramaturgy (read as, Culture).

Under Peirce’s semiology, the concept of the “interpretant” stands as a psycho-social connector that facilitates “readings” of situations—a sort of culturally-patterned psychological way of decoding situations (the signs that make them up) (Bakker 2011). Peirce here exhibits attention

35 Not in an ideological sense, per critical theory. Emancipation from a category, upon recognizing said category’s nominalism.

36 A new expression of a gendered category, or a re-coding/modulation of an ethnic sense of being, like that experienced by Diaspora populations as they enter into new contexts. Last year, spending 5 weeks in Puerto Rico, I naturally acquired certain patterns of speech. Better put, I acquired a sense of a lexis (or various of them), pertaining to when to use certain expressions: “¡Diablo!” “Tu sabe…”. While words from the same langue I speak in Costa Rica, the parole were quite distinct. After one particularly visceral “tu sabe” I let out in the presence of friends, I felt quite enriched and momentarily liberated. A new way of being Latino for me, if only for a brief instant (I have since then not used the expression; I could not, not being in Puerto Rico anymore, not being exposed to the stimuli from social actors—the lack of necessary semiotic structures that give lexis coherence (that allow for a lexis to unfold in the first place).
to what other analysts would later refer to as pragmatics of language (the role that context plays in conveying meaning) (Mertz 2007).

By default, it would seem that in an act involving semiotics, there must be an unnoticed act of interpretation; that is, if meaning is to arise and take hold of the subject, then the interpretation, the lexis, must pass as “natural”: content concealing form. Here I am discussing what Merleau Ponty referred to as the primacy of perception: the act of perception, as an intake of a somewhat finished “product,” conceals the decoding that takes places as one perceives; in the switch of one steady state (decoding, perception as active, driven), to another (decoded, perception as outcome, received), the triumph (through impression) of the Category (per Adorno 1931), conceals the generative process that brought it forth. Considered in this way, the fact that the “genesis” is hidden from consciousness is what attributes the “taken-for-granted” with its normative ontological weight. Categories, thus, may be seen as varying in “weight” in so far as the degree of explicitness or taken for granted attention paid to the genesis, performance, and reproduction of cultural processes, with some being obvious performances, in the common parlance form of the term (a ballet for instance), and others understood and advanced as more self generating, self assuming per cultural stimuli, as the flirtatious cacophony one can witness on a canopy tour in the cloud forests of Monteverde:

The three or four zip line operators run this tour. They appear to be in their early twenties. Bushy beards or clean shaven, they all wear earthy colors. Required bilinguals, there is a pattern underlying choice of language, and the expressive characteristics around it; between themselves, strictly Spanish, with noticeable range in tone, volume and pitch. “Dele mop…”;  

37 Another lens to view this process may be through Kant’s a priori categories.
with the tourists, strictly English. “Ok…how do you like Costa Rica? Great!” Whoever has used the term “monkeying around” to describe young males around girls they deem attractive is an apt sociological and primatological observer. At 65 feet above the ground, up in a tree house of thin metal, painted in green, anchored onto a massive tree, the forest canopy and the infrastructure of the park (e.g., the metal cables, harnesses and carabineers) provide a unique backdrop for certain identities to be deployed, performed, negotiated and contested (not to mention, supporting “props” for the monkey metaphor). Consider the mingling of conceptualizations concerning exotic others for third world peoples that, say, the tourists from Atlanta bring, with the pristine nature of the forest. Consider that the tour operators have had success when deploying laid-back attitude and narratives when dealing with tourists from first world countries; consider that part of the success has been at least in part due to the extent to which the tour operators have been able to deploy a laid back attitude and present it as a “natural” extension of who they are, and why they are the way they are. Consider, further, the strong possibility that given the employment and educational opportunities (to name two constraining, material “factors”) that strongly influence the type of activities groups of people (say adults in their lower to mid-20s—as well as the associations attributed to the activities and to the people who carry them out)—

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38 Success here I mean in a Goffman sense of facework as a functionalist mechanism through which social actors work towards collusion and harmony of social encounter; an exchange in which no one loses face, and in which categories presented through social exchange are received with harmony; and in which negotiation is expected and even encouraged, resulting in relaxed space upon from which identities may be subsequently deployed. They are “relaxed” insofar as an a priori value placed on negotiations towards an outcome of communicative exchange, can result in fluidity upon the very terms which are used to express such communication. Such interactions may be particularly common and marked in initial ethnographic exchanges, in large part, I would argue, due to the marked nature of the interaction, stemming from the marked categories of the interactors: researcher qua research “subject”, “participant”, “informant”. Overlay upon this further the fact that researchers will generally also represent a suit of traits that further present social distance from the lived experiences of informants (including, phenotype, manner of speech and dress; the associated prestige endowed upon education, etc.), and the situation is one which is ripe for attention and explicit respect placed upon difference and alterity (consider it an issue of qualitative multicolinearity, to borrow a term from linear regression)
available to the young men that work as tour operators at zip line parks, have in fact been raised and continue to live in a socio-cultural environment with more relaxed standards concerning time\(^{39}\), and with categorically different attributions attached to the distribution of chunks of time within one’s day (number of coffee breaks, vs. the idea of even entertaining a coffee break during the day\(^{40}\)). Further, let us entertain the distinct possibility that somewhere beneath the logos of the actors involved in this ethnographic vignette, further ontological, normative anchoring results from associations of growing up near and in the forests—being more collected to the land, what have you—resulting in the emergence of synergistic narratives, fed by received and redeployed (at convenience, with varying degrees of explicitness and success) notions about who the different actors “are”; the resulting situation may be seen as one in which the agreed upon boundaries provide comfort and guidelines for the potential interactions that may follow.

“Do you have a boyfriend? Oh…but, not in this country…Do you know how to dance salsa and merengue? Oh…but you need to learn…and I can teach you…”

With “success” and willingness from all parties, Act Two may take place outside of the tourists’ hostel. Now the young men may switch outdoorsy apparel for a dirt bike, adorned with stickers of energy drink and apparel brand names. Their wardrobe, once invoking the forests which they work in, now says, California, New York, Paris, London. Whereas before “nature” was invoked heavily, the current deployment suggests acquisitive power, connections to

\(^{39}\) Time expressed or relied upon as a bounded unit. That is, as a consistent category: “Ahora despues paso por su casa” (“I’ll swing by your house later”, where “later” is defined sensu lato).

\(^{40}\) A man from Boston who had spent a year in Monteverde with his wife during their sabbatical, once said to me: “Ernesto, so I think I’m finally understanding this whole Tico time thing: At first it really annoyed me! People would be like 20 or even forty minutes late! I mean the guy who came to paint the wall, people at meetings, busses! But I think I got it. Do you think if I consistently show up 15 minutes late to places I’ll be cool?” Feeling quite wise and knowledgeable (and Carlos Castañeda-esque, and smug…), I replied “I think you still don’t get it,” to which he burst out laughing upon realizing that he was resorting, by some sort of “cultural inertia,” to the application of consistent criterion to what, emically, could be construed as an inconsistent phenomena, and in some cases, even a non-category (something that will go unnoticed, or lacks nuance in its delimiting factors).
modernity, etc, but still managed with a meticulous distance that says “we can too, but on our own terms”. For instance, the dirt bike has no headlights—it isn’t street legal, and therefore has no license plates. Helmets bring antithetical results when dealing with the spiky, gelled up hairdo, but they may be brought along to assuage doubts and concerns of potential first world passengers. With luck they will move from the hostel’s front porch to a bar, for dancing, more drinks, what have you. But they won’t relocate without first checking in with others, via text messages and phone calls. In fact, there is very little indeed they will do without first consulting their cell phones. On the front porch of the hostel they listen to reggae-roots, people watching and chatting. People walk to get food, groceries and souvenirs. The souvenir shop several doors down sells stuffed animals, such as the famous quetzal, toucans, and other fauna you may encounter during a hike, but also, elephants, rhinoceroses and lions. What is more, tourists buy these animals as souvenirs. They put them in their Guatemalan-motif hand bag they have purchased down the street, that happens to be made in Pakistan. Everything goes in this semiotics, as long as it respects and pays allegiance to exotics, nature, and the anthropomorphic manifestation of these traits in Costa Rica, the all-encompassing “pura vida” ethos.

As with any characterization, certain criticisms may be leveled at the one I have just advanced concerning performances of identity that I believe, based on extensive ethnographic research, to capture a great deal of dynamics that characterize the intersection of flows of capital and information in the Monteverde Zone. In presenting the preceding vignette as indicative of certain processes, I do not wish to subsume individual people’s actions, emotions, motives and ways of believing and identifying to purely structuring coding schemes that tell them who, how and what they are, when and where they find themselves to be. To rely exclusively on such an interpretive position is to assume human agency to be inexistent or inconsequential. But we are
cultural beings, prima facie, and this necessarily entails a preceding set of symbolic structures that must be received, and to a large extent, accepted, for any interpersonal exchange (and henceforth, identity creation) to take place. In this regard, I find it useful to draw a parallel between cultural and evolutionary processes, in that both sets of unfolding dynamics are heavily determined by constraints. For the latter, a founding of a population based on a small number of individuals will greatly increase the chances of a founder’s effect to reduce the genetic variation of the new population, therefore potentially limiting the norms of reaction that individuals from that new population may exhibit upon encountering certain stimuli. For the former, it must be accepted, that any symbolic reworking of a category must begin with a certain degree of received baggage. Even analytic categories advanced to distinguish between the degree of reception/rejection/reworking of cultural processes—from issues of political maneuvering to more micro-sociological observations on “role theory” and the shared patterning of behavior, acknowledge an a priori “engagement” with what is received. I have in mind in this particular instance of De Certau’s distinction between tactic and strategy, but I believe the same implications arise from a reading of Foucault’s historical writings on power, or Gramsci’s observations on historical blocks, wars of position and maneuver. The case need not be stated further, for I believe it a truism based on ethnological and primatological research. Symbols, while by definition nominal, must be understood as acquiring realist implications during the praxis of being human—that is, being cultural.

In the preceding I have said nothing about what drives cultural processes over historical time. The treatment of “culture” here has been largely Geertzian. What has been described and theorized is largely cultural sui generis. To take another metaphor from evolutionary biology, the thick description here has been applied at the equilibria, not the phase of punctuation. Continuing
with the analogy, I further suggest that different processes and factors contribute to the outcomes, depending on time-scale, related to cultural sustaining processes. That is, macro-evolution (Culture) cannot be accounted for by the simple accumulation of micro-evolutionary processes (culture, sui generis). In this regard I find it useful to invoke the materialist metaphor of a multi-tiered patterning of society, with greater generative weight bestowed upon the production, distribution and consumption of resources within a society as a source for generating meta-narratives, categories of people and things, from which the praxis of semiotics (micro-evolution) can then spring from. Given the ways in which participant observation is carried out, and the methodological contributions that it brings to the analytical table, discussions that stem from it are directed at elucidating cultural micro-processes that uphold the frames of reference people use to interact and manifest identity through their day-to-day behavior. Furthermore, within the analytical tasks of this particular bio-cultural study, the “cultural” interface with study variables is specifically of micro-focus (definitions of successful lifestyles, and the context through and how such narratives are played out). The macro-cultural interface, dealing with the partitioning of resources among households, etc, is accounted for in this study by growth indicators, food security status, and through the historical overview of the political economy of health in Costa Rica presented elsewhere in this dissertation.

As the preceding discussion makes clear, there are numerous, rich bodies of scholarship that in one way or another have dealt with identity processes as stemming from semiotics. Acknowledging the symbolic foundation that upholds our cognitive content and populates various fields of our awareness is an important starting step to draw inferences from the ethnographic data presented in this dissertation. Further, the means through which new symbolic narratives have taken a hold of people in the Monteverde Zone—Halton (2008) speaks of “mind”
parasitizing “matter” to suggest the way in which humans give expression to superorganic, idealist phenomena—and the ways in which identity narratives are deployed and reworked through social interaction suggests at least two important observations. First, given the historical, political-economic backdrop that has shaped the demographic and economic composition of the Monteverde Zone, it is clear that there is a great deal of inequality in terms of access that different people have to emically defined important markers of identity. In a situation in which great weight is placed upon acquisitive habits for various presentations of self, economic hardship and inequalities present formidable obstacles to large segments of the population when trying to live a certain lifestyle and communicate a certain status.

The psycho-social-cultural importance of fitting in is well documented by research on psycho-social stress (Dressler 2005, Dressler and Bindon 2000). This importance is further underscored when a broader, cross-species lens is applied to human semiotics. A case in point can be seen in Dunbar’s (1998) “social brain hypothesis”, that posits that contemporary human intelligence stemmed from selection favoring our ancestors that were able to read the social landscape and recognize hierarchy. Our contemporary intelligence, under this scenario, is viewed as an exaptation (Gould and Vrba 1982). As evidence for his hypothesis, Dunbar (1992, 1995, 1998) demonstrates that neo-cortex size grows with social group size among primates. The take away point from this primatological comparison is that our ability (perhaps even tendency) to read rank is a deep rooted trait of our primate psyche.

With the advent of mass production technologies, and later, the explosion of information and communication technologies and the parallel increase in global interconnectedness, a particularly noxious result can be seen as the numerous, consumerist ways in which identity is signified. What is harmful in this scenario is not that identity per se is signified via consumerist
means; rather, the harm stems from the unequal access that characterizes people’s ability to consume and signify aesthetics. Viewed in this light, the infrastructure that sustains and produces consumerist trends (both marketing and the distribution of labor opportunities across the planet), results in a situation in which large segments of the human populations are left grasping for the means to signify and say “me too!,” albeit, unsuccessfully.\textsuperscript{41} Early in the 20th Century, Adorno and Horkheimer were already grappling with the consequences of mass-culture, nationalism, and what they saw as the subjugation of people through the imposition of categories. In their view, the compartmentalization of the means of production scaled allometrically to the compartmentalization of experience and identity. This is the “tyranny of the concept” that Adorno discussed at length in his writing.

Returning to the distribution of growth and development indicators found through this research, and argument can be made about one level of embodied effects stemming from the degree of participation in consumerist, market-based signification. Greater degrees of immersion in a consumerist, mass-produced (both for material goods and anchors of identity) system results in worse health indicators. This evidence is particularly damning, given that it is widely known (and has been for hundreds of years), that barring adverse stimuli, the pattern of growth and development exhibited by children is universally homogeneous (Bogin 1998). Further, given the emphasis placed on the concept of “optimality” in many forms of contemporary systems thinking (market economics being one of them), a situation in which one group of children fares worse than others in a domain in which there should be no differences, the results of this research lend potential support to a critical theory with a gaze towards human emancipation. There is

\textsuperscript{41} Bourdieu’s work on the inability of less privileged classes to fit in with their “superiors,” as a result of their lack of symbolic capital, the embodied \textit{hexis}, is instrumental in understanding this process.
something particularly unflattering about sub-par health outcomes among children, which is one reason why child health outcome are widely regarded as insightful indicators of a particular social arrangement (Bogin 1998).

**Triangulation: Narratives About Raising Children In Monteverde**

The positive epistemic contribution of engaging in conversation with people cannot possibly be stated enough. Scales are great in that they lend themselves to quantitative analysis. The bioanthropologist will be hard pressed to move away from working with scales, so long as the intention is to correlate (broadly speaking) patterns of human biological variation with processes traditionally studied by cultural anthropologist, sociologists and others. Certain aspects of human biology may certainly be dealt with by means of qualitative description: presence or absence of an allele. Additionally, qualitative variables can certainly serve as strong predictors of biological phenomena: cigarette smoker or not. But the fact of the matter is that biometry is handled best via quantitative means. Given that bodies are best described and inserted into systematic scrutiny by means of a quantitative description of them, it makes sense to want to triangulate a socio-cultural phenomenon, in some way or another, via parallel quantitative means.

It is because of this analytical property ascribed to scales (such as the cultural consonance one developed through this research) that I chose to explore narratives of “success” via a mixed-methods approach. The opening phases of the scale creation lent themselves to open-ended discussions, throughout which I attempted to carve out a approximation of the symbolic web which stood as frame of reference for the topic at hand. In this regard, this quantitative approach (scale) yields nice qualitative insight through the scale creation process. From this iterative
process I crafted two very simple questions to act as starting points for my interview with the children’s parents: What are the positive/negative aspects or raising children in the Monteverde Zone.

As detailed in the previous chapter, parents expressed strong desires for extra-curricular activities for their children. To some extent childhood is understood as an innocent phase throughout which exposure to nature and systematic and unbounded activities should be maximized. This “innocence” attributed to children by parents is interesting, given that many of the parents grew up in an age in which children were supposed to work around the house or farm. And yet, this work is consistent with depictions of innocence, in that children were out in nature, or around their relatives, as they helped with chores.

Childhood is aptly recognized as an important formative period as far as the moral character and health and wellbeing of the person are concerned. Individuals should be sheltered from vices (e.g., drugs, drinking), dangers such as speeding cars or muggings, dengue, particularly as children. There is a lot of cognitive content which parents would prefer their children not be exposed to. But there is also a sense of inevitability concerning the exposure of such cognitive content. Further, there is an impending sense that their children will not only be aware of “bad” things “out” there, but that they are likely to experience or witness bad things happening.

Within this backdrop, parents view—aptly so—that activities that promote good health through exercise and positive constructions of self-esteem will contribute to a core personality (or even moral) trait that will allow the child-come-young adult overcome their exposure to bad things, resulting in a fulfilled life. Recall, further, that people boasted of the communal quality of their home community, stating that people knew each other and had each other’s backs. There is
respect for family, and children are exposed to large networks of kin and friends. Thus there is a strong premium placed on communal activities that promote play, arts, crafts and alternative educations. There are also very basic needs considering we are social mammals: a place for children (and adults) to recreate. Recreation should be understood as being a very potent experiential phase of identity formation; it could be argued that it is a very powerful means through which we embody. Whether it be ludic (children playing tag, or making up words), or more of an explicitly cultural phenomena (the instilment of proprioceptive habits and ways of feeling, imagining, such as a particular dance discipline), recreation is a situation in which substance and form come into a continuous dance, exposing each “other” as manifestations of something larger than “both of them”. This is one analytical instance in which I see utility in the concept of dialectics; that is, the dialectical metaphor contributes positively (!) to the elucidation of a particularly complex phenomenon: the phenomenology of identity as stemming from recreation (or micro-sociological interaction, for that matter, through a constructive/destructive, iterative sequence). Merlau Ponty, once more, might be seen as a theorist that has framed phenomenology dialectically (and interestingly). Regardless of the analogy used to explain and describe the construction of a persona, with all the psycho-social “hardware” (again, the Levi-Straussian “structure”)42, the following observations remain:

Human identity creation necessarily stems from collective, social interactions; and social interactions that provide for the psychological needs of the individuals while minimizing negative experiences, will foster positive, pro-social manifestations of human identity, and;

42 Here I am betraying methodological holism in my perspective.
Parents of children in Monteverde expressed strong dismay for the lack of organized extra-curricular activities available for their young, and strongly decried the complete lack of public space in which children may recreate.

Taken together, these sets of observations can be seen as a generalized set of circumstances that work strongly against the basic needs and concerns of parents as far as raising healthy children is concerned. Further observations are worth drawing, particularly as far as notions of a successful life are concerned.

While the data from the cultural consensus analysis suggests strong desires for the portrayal of conspicuous consumption as a central axis in the deployment of identity, the results from the qualitative interviews suggests that there are other issues on the forefront of parental conceptions of “successful” (or at the very least, desirable) ways of raising children. Narratives about how adults should come into being provide indirect ways of exploring ideas and ways of phrasing “success”, in that it lays out explicit and implicit organic pedagogy. In this particular case, parents lamented the encroachment of consumerist desires, suggesting they diverted children from more natural ways of being—playing outdoors, learning about natural systems, respecting elders and spending time with relatives, etc. Similarly, parents recognized the central role that education (and in it, computer and technological literacy, not to mention English and a sense of globalism) will play in their children’s lives, as they turn into adults. Modernity is imminent, and so caution must be exerted in mediating how it enters into their child’s life.

Whether dialectically inspired (Althusser) (Backet 1993), or of Pragmatic roots (Peirce) (Mertz 2007), semiotics entails a system or relations: ideas and signs stand in relation to each

\[\text{Meant here to denote the incipient state of intellectual that Gramsci suggests humans are in, but without the political baggage.}\]
other, and through this relatedness, meanings can and do emerge. This system of relations, being symbolically mediated, is not a “logical” system. That is, ideas that are contrary can and do stand in relation to each other, as they make up the cognitive content that populates peoples’ awareness. Cultural systems—historically patterned semiotics, are perfect examples of patterned contradictions. While the ideas are related to each other symbolically, the ideas also act as pneumonic devices that anchor perceptions about types of people, rank, hierarchies. That is, they are the mechanism and consequence of the practical result that resources and the means to access and produce them are not distributed equally. They are naturalizers, par excellence, in that a prerequisite for engaging in semiosis is a momentary praxis of normativity. It is this “naturalizing” force that accounts for the power of identity among humans, and that in this particular instance, adds great force to the consumerist trends discussed in this research.
CHAPTER EIGHT:
CONCLUSION

This dissertation research was designed to investigate two main research questions:
Do children ages 3-7 in the Monteverde Zone exhibit variation in their growth and development patterns that can be accounted for by their food security status?
Do children ages 3-7 in the Monteverde Zone exhibit variation in their growth and development patterns that can be accounted for by their cultural consonance status?
A third and implicit research question was entailed in exploring the second main objective of this research: what is the underlying narrative about successful lifestyles as described and performed by people in the Monteverde Zone? Like most, if not all current biocultural research, this project examined the connections between a combination of economic and ideational factors on the one hand, and anthropometric indicators on the other. The topical breadth covered in this project stands as a firm testament that the anthropological toolbox—broadly construed—and the anthropological biocultural research strategy—more specifically—is alive and well, and relevant for examining complex and pressing issues affecting many populations across the world today.

Descriptive statistics of the study’s sample highlight the ubiquity of sub-par nutritional environments that characterize many communities of the world. Specifically, this sample reveals anthropometric indicators associated with less-than-adequate nutritional exposure: low stature for age, high weight-for-height, and low relative leg-length. Results from the inferential statistics paint an even more worrisome picture: children from food secure and culturally congruent
households exhibit statistically significant worse anthropometric indicators than those from food insecure and culturally dissonant households.

It is argued here that both food security and cultural consonance can be seen as indicators of structural integration for households vis-à-vis the prevailing, market-based mode of producing, acquiring and consuming resources. The fact that the HFIAS—a cross-culturally validated instrument that explores peoples’ perceptions of the quality and quantity of food they consume—and the ethnographically constructed cultural consonance scale co-vary lends support to the conclusion that both instruments track a given households approximation to a mode of life. In this case, the “mode of life” alluded to represents one that is more intimately tied to a market-based economy, both in terms of the degree to which food is commoditized, and in the larger ideational matrix that upholds people’s desires and aspirations in so far as communicating success is concerned. These results are taken as evidence that the economic homogenization that has accompanied greater penetration of market forces has brought with them accompanying aesthetic homogenization as well, as reflected in the results of the free listing, ranking and ethnographic data.

Parental narratives concerning the process of raising children in the Monteverde Zone reflect the paradoxes of globalization, namely, that while the promise and allure of global citizenry, modernity and opportunities for social mobility are exciting, real, and more accessible to greater numbers of people today than ever before, such globalization also brings with it disruptions in traditional patterns of social support, resource production and consumption, and presents children-come-adults with a whole suite of morally-decadent lifestyle choices that now loom over their children’s’ shoulders, enticing them on the street, as it were. Parents also recognize that the pace of infrastructural development as far as educational and recreational
opportunities has greatly lagged in comparison to the awareness of the importance that these areas of growth and development represent for their children. An absence of playgrounds, limited childcare, expensive private (and in English) education and computer literacy, deficient or inaccessible transportation services: these and other factors are prominent themes discussed by parents as the hardships of raising their children to a new global standard. Add to these deficits the high cost of living and an unstable economic landscape and the resulting situation is one of economic hardships superimposed over an awareness that children are not getting what they “deserve”—per their constitution as children (innocent, naïve, natural, etc.)—nor what they need given the direction of Costa Rica’s development and further integration into a globalizing system.

It is not surprising, therefore, to hear many parents express dismay that their children will not eat “gallo pinto”, and that all they want to eat is cereal, junk food and pizza. The situation facing parents and children here is in many ways an all too common one: commodification of food systems, pressing work schedules related to job insecurity and cost of living; rampant consumerism; and a prevailing way of signifying success, or perhaps simply belonging (“me too”), that privileges consumption and the portrayal of mass-produced identities.

This research is in many ways an exploration into and a critique of the ramifications of how the economic infrastructure of late-capitalism scales allometrically into peoples’ lives, as reflected here through peoples’ desires and the relationship between nutritional status and food security and cultural consonance. In this regard this research traces its raison d’etre to the projects of the Frankfurt School of Sociology, most notably the work of Theodor Adorno and Max Horkheimer. Genealogically and topically, this research also traces back to Marx’s exhortations about the crushing of human creativity and freedom under capitalism as expressed
in his Economic and Philosophic Manuscripts of 1844, and later, in non-Hegelian language in his German Ideology.

Critical theory, as an enterprise, can be distinguished from conventional approaches to science in that it places a premium on the role of reflection and awareness creation through a sort of political enlightenment which people are supposed to undergo (Geuss 1996). Put another way, science under critical theory should provide cognitive content (just as positivist science does), but this content should then resonate with people in a way that entails a transformative political experience. Freire’s work in literacy aimed at guiding marginalized populations to realize that their marginality was produced as other, more power groups benefited. This is praxis under Marx.

In some ways, critical theory and anthropology can be strange bedfellows, given that the former stands as an antithesis to cultural relativism, while the latter rescues it, at the very least, in its methodological application. In other regards, ethnographic research sits very well with the existential postulates of critical theory, given the premium placed on empathy-driven encounters, and sustained contact with informants as a means of soaking up the “pragmatic” cues that allow for a cultural lexis. As discussed at length in the section on participant observation and a cultural theory of identity and semiotics, ideas as symbols are not bound by the rules of logical consistency as they stand in relation to each other. Perhaps this semiotic inconsistency is reflected in critical approaches in the social sciences as well.

It is clear from this research that both parents and children are aware of very important, and yet basic conditions that they lack: recreational and educational opportunities. Furthermore, parents are aware that economic issues greatly shape the lack of opportunities; parents aptly note that the Monteverde Zone is a very rich one in financial terms, but one that lacks appropriate
redistributive mechanisms. Traditional social support networks of extended kin and friends make way for bosses and employees; stretches of mountains and farm land are cordoned off as amusement parks are built, and eco-tourist-coffee outfits try to tap into private enterprises. And to top it off, the mechanisms through which distinction and rank are portrayed grow at exponential rates with fashion, technology—commodities—while the financial opportunities to consume conspicuously stagnate, or even decline.

The theoretical approaches employed in this dissertation greatly advance the purview of bio-cultural conceptual frameworks. The analytical work carried out here dovetails with the social-epidemiological research that relies on cultural consonance analysis and human adaptability while bringing in a much stronger reliance on ethnographic, semiotic analysis. While the theories relied upon are not new per se, their articulation as presented in this dissertation is novel for biocultural anthropology. They present a small step towards articulating the mechanisms that link symbols, desires and biological outcomes.

Furthermore the findings here contribute greatly towards discussions on the concept of food security, with potential implications for policy creation and future research. The obesity-food insecurity paradox is already well documented, and the metabolic mechanism that uphold this pattern are also well understood. To my knowledge, however, this is the first research that reveals another very important paradox: the food security and less-than-optimal growth paradox. The concept of food security is powerful in my opinion, precisely because it is applicable in numerous and different contexts. The importance that peoples’ perceptions about their access and experience with food acquisition plays in the concept allows researchers to study food security cross-culturally, while preserving operational homogeneity. What the findings of this dissertation underscore, however, is the fact that context must be brought to the fore explicitly
when discussing security/insecurity. What is secured? Is it fresh produce and lean protein? Or is it sugary cereal and soft drinks. While definitions of food security speak of “nutritionally adequate” food, the instruments used to gauge food security status do not account for this aspect. Often times, researchers rely on other measures of food consumption and articulate their findings with the food security scales they have chosen. A main take-away message of this dissertation is that food security should be understood as a measure of the degree to which a household is successfully integrated within its community’s ideological and economic apparatus. Consequently, I find it of utmost importance to be explicit about what this integration entails for individuals and households. What is the larger context, both in terms of ideological aspirations and means for generation resources, for the community being studied? Unless these factors are spelled out and accounted for methodologically, food security research will leave too many unanswered questions.

From the foregoing, this research helps rescue and project the voices of concern of parents by sharing research findings with the Fondo Comunitario de Monteverde. This initiative applies the principles of Travelers’ Philanthropy, in an attempt to redistribute some of the wealth that enters the Monteverde Zone via tourism into community-based projects. The results that resonate the most with this initiative are the need for play and recreational spaces for children and adolescents. This is a significant contribution, but not one necessarily in line with the postulates of critical theory.

The question of how and when and why to contribute to social movements is by no means new to social science researchers—a large part of our formative courses in this graduate program have dealt at length with the history and ongoing discussion of applied work. From the perspective of a critical theorist, the most “useful” result from the study appears to be the fact
that food secure and culturally consonant households have children with worse growth and development indicators. Following a hypothetical critical theory script, this finding may result in a realization that the values of consumerism working in tandem with the nutritional value of mass-produced food are negatively impacting their children’s health and potentiality. Critical biocultural research has the potential to move beyond an aesthetic critique of culture (“false ideology”, “hegemony”) towards one that shows the potential impacts that aesthetics and materials (in this case, food) can have on the body. It is not just that people may have false consciousness; in this instance, it perhaps could be seen that their false consciousness is hurting their children’s growth and development. The issue, however, is not so straightforward, which is why I discussed the preceding as a hypothetical scenario.

People in the area voice concern that the food they get is not as good as what they used to grow, as far as quality of the product. Provenance of food weighs heavily on people’s minds. But the diversity of options and the ease of preparation of many (instant mixes, etc.) is something that is very much appreciated as well. Over the course of hundreds of conversations over the span of 4 years, not one informant ever said that they would prefer to go back to the way things were when they were children (subsistence farming, less market integration, etc). Access to schools, electricity, supermarkets and clinics: all of these amenities and services greatly improved their quality of life and that of their children, as they saw it. You would be hard press to disagree with them. The potential critical angle might be to use these results as a bolstering of local food production efforts and as nutritional education campaigns against the perils of too much processed foods. More research and thought is needed on how to address this complex scenario. With that in mind, the next section discusses the limitations of this project.
Limitations

The biggest weakness of the dissertation is the small sample (n=58). While the sample size was adequate for testing the main hypotheses, it precluded more nuanced explorations (for instance, anthropometrics by town). While San Luis and the rest of the Monteverde Zone are intimately linked along numerous lines, they remain quite distinct places. San Luis is undoubtedly more rural; its population density is much lower, as is the saturation of signs of modernity. Future research should sample adequately in order to be able to have larger cell sizes across a greater variety of socio-demographic categories.

Another design drawback has to do with the cross-sectional approach employed. A snapshot is informative. But dynamic data tell a more complete story, and allow for more complex patterns to be teased out. With this in mind, future research should also examine the rate of growth and development. When dealing with change over time in children, the issue of sample size is also addressed, in that one does not need to rely on age-specific z-scores, but can compare a 3 year old's growth with that of a 7 year old's (given the same expected pattern of annual growth).

Missing from this study is a better treatment of what is eaten and where it comes from. Little engagement with this issue was chosen as a matter of limiting intrusiveness into peoples’ lives. But this comes at the expense of inferential power. If food insecure children show better anthropometric indicators, what accounts for this? Food insecure parents stated again and again that they would get fruits, legumes and vegetables from friends and relatives. They also stated that cereals and sweets were among the things that their children wanted but lacked frequently. So perhaps the answer lays in different foods being consumed, with the wants being processed junk food and cereal. Another possibility is that the stress of being a culturally-consonant
household—that is, of being more immersed in the consumerist ideational matrix is taking a toll on children’s growth and development. These are empirical questions that should be addressed in future research.

Finally, this research suffers from the limited anthropometric data on parents. Future research should measure parental sitting height to allow for a more nuanced treatment of life course variables that may account for the differences found in this study.

**Recommendations**

As stated previously, a report of these findings is being shared with the Fondo Comunitario de Monteverde. It is strongly recommended that the Fondo adopt as one of its initiatives the funding of centers for recreation. Furthermore, these results will also be shared with the Monteverde Institute, particularly, Jenny Peña, the director of the public health program.
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