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Keywords

nutritional transitions, political ecology, Central America, nutrient-deficient ecologies, agricultural intensification, obesity, stunting

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Towards a Political Ecology of Nutritional Transitions in Central America: The Construction of Nutrient-Deficient Ecologies

Warren Dodd

Introduction

The nutrition and health statuses of individuals and households within Central America are changing. The transformation that is underway in the region can be considered a nutritional transition. Some contemporary literature attempts to explain this regional phenomenon through the use of simplified models that do not necessarily consider many of the complex and contextual factors that influence the nutrition of individuals and households (Popkin 2003). One of my central objectives is to demonstrate that nutritional transitions in Central America cannot be reduced to simplified models, but instead are complex and contextual processes that have diverse impacts for individuals and households. For the purposes of this article, a nutritional transition is any distinct change over a particular period of time in nutritional intake for an individual or household, whether that is an increase in nutrient consumption or a decrease in nutrient consumption. Nutritional transitions can encompass entire regions, or only influence a specific household or individual. Thus, there can be localized nutritional transitions occurring within regional nutritional transitions.

There is a need for a nuanced perspective of nutritional transitions, as much of the past literature concerning this subject does not adequately grasp the complexity of these changes (see Carr 2006 for an exceptional model). Instead, most researchers simply focus on the process of globalization, which is considered to be responsible for altering diets and lifestyles

(Popkin 1994; Popkin and Gordon-Larsen 2004). Although globalization has an integral role in nutritional transitions, we need an improved model to appropriately contextualize and problematize cases where individuals do not have sustained access to sufficient levels of quality macronutrients and micronutrients. This article draws on the theoretical framework of political ecology and introduces the concept of a nutrient-deficient ecology to begin to adequately address the contextual and localized nature of nutritional transitions in Central America.

In this article, I argue that the contemporary nutritional transition underway throughout Central America is a dynamic, complex and diachronic process. Furthermore, this process entails much more than simply the “Westernization” of diets and the “sedenterization” of lifestyles as much of the nutritional literature has purported thus far. Rather, the interactions of specific factors in different contexts are responsible for the construction of nutrient-deficient ecologies whereby the health and nutrition of primarily marginalized actors and households is put at risk.

This article reviews previous research that investigated health, disease and nutrition using a political ecology theoretical framework. A discussion of specific gaps in political ecology research and theory with respect to nutritional transitions, in addition to an exploration of alternative approaches employed to understand nutritional transitions, will follow. The nutrient-deficient ecology model will be introduced as a synthesis of political ecology theory and other disciplines and sub-disciplines that address changes in individual and household nutrition. This model will then be applied to two case studies within Central America. The first case study examines the relationship between agricultural intensification in southern Honduras and changes in nutrition

among individuals and households in this region. The second case study is more thematic in nature and investigates the coexistence of stunting and obesity in individuals, households and cities throughout Central America.

Towards a political ecology of health, disease, and nutritional transitions

Political ecology serves as a useful and appropriate framework in the examination of nutritional transitions in Central America. This theoretical orientation broadly seeks to understand the numerous complex interactions and forces within spaces or 'ecologies' that directly or indirectly influence the livelihoods of individuals and households.¹ Traditional political ecology research has primarily focused on the transitions and adaptations of marginalized groups in agriculture, natural resource management and other livelihood strategies, following significant changes in and interactions between the local and wider natural, economic and political environments (Stonich 1993; DeWalt 1998; Jansen 1998; Shriar 2007). This mode of analysis usually takes place within a rural context at a local scale in low-income and middle-income countries (Bryant 1992; Bryant and Bailey 1997).

Recognizing that individual, household, and community health and disease experiences are influenced by local and systemic processes and actions, some political ecology research examines the interactions between contextual 'ecologies' and the physical condition of various actors.² Relationships can be forged through an analysis of human health and the health of natural ecosystems in addition to other traditional elements commonly found within political ecology literature (Turshen 1984). Furthermore, infectious disease is one area that has garnered attention in political

ecology and health research. Mayer (2000) advocates that a political ecology perspective is necessary in understanding contemporary emerging infectious diseases. Kalipeni and Oppong (1998) demonstrate the utility of a political ecology framework in the examination of infectious disease environments in refugee camps throughout the African continent.

Despite these investigations into health and disease, in addition to agriculture and other livelihood strategies, limited political ecology oriented research analyzes the localized diets and nutrition of specific individuals and households and the changes that can occur in diet and nutrition. Finnis (2007) examines the dietary transition of small-scale farmers in the Kolli Hills (India) and argues that a political ecology framework provides a nuanced perspective of food contexts and supports previous political ecology research related to human health. While this investigation serves as a good introduction to localized nutrition and dietary change, more research is needed on these topics utilizing a political ecology perspective in different contexts.

Other disciplines and sub-disciplines investigate nutritional transitions using different methods and scales. The majority of nutrition literature concerning this topic considers global nutrition trends and changes, with a specific focus on the changes experienced by individuals in low-income and middle-income countries (Popkin 1994; Popkin 2003; Monteiro et al. 2004). Some nutritional transition literature concentrates on a specific region (see for example Romieu et al.'s 1997 work in Mexico and Central America) or an aspect of nutritional transition, such as growing rates of obesity in low-income and middle-income countries (Popkin and Gordon-Larsen 2004; Doak et al. 2005). Another approach to understanding nutritional

transition is through a political economy theoretical framework. Research with this perspective often examines the intersections among nutritional transitions, food security, national policies, and international agreements (Hawkes 2006; Thow and Hawkes 2009). Additionally, investigations into food security and nutrition within a broad and localized context are addressed by a number of different disciplines including anthropology (e.g. Shipton 1990; Pottier 1999; Mintz and Du Bois 2002), sociology (e.g. Beardsworth and Keil 1997; Scanlan 2009) and economics (e.g. Alderman and Garcia 1994; Tweeten 1999; Ahmed et al. 2001). Some of these studies choose to distinguish between rural and urban populations and investigate the specific needs of individuals in these different settings (Haddad, Ruel and Garrett 1999; Smith, Ruel and Ndiaye 2005). Others take a biocultural approach in the examination of nutritional transition and health. For example, Dettwyler (1992) addresses childhood nutrition and examines various social or cultural factors that have the potential to create circumstances where a child can become severely malnourished in Mali.

All of these theoretical perspectives and approaches bring important considerations to the study of localized nutritional transitions. Yet, what is missing within many of these approaches is a synthesis of the complex and dynamic factors that underlie and exacerbate localized nutritional change in addition to an examination of adaptation strategies of marginalized individuals and households that are experiencing nutritional transitions. A political ecology theoretical framework provides this critical level of analysis of nutritional transitions through the thoughtful consideration of the interactions among political economy, ecology and socio-cultural practices in any given context. Thus, poli-

tical ecology serves as a useful framework to meet the limitations of these other approaches.

However, the political ecology framework has its limitations as well. Although this theory and the common areas of political ecology research have clear relations to nutrition and health, there is little political ecology literature explicitly investigating the interconnections of these themes. Furthermore, the literature that does exist does not adequately consider the role of biological factors in nutritional transitions, nor does it challenge the entrenched rural and urban dichotomy that remains uncontested in a lot of political ecology research. Additionally, although infectious disease is addressed in political ecology literature, chronic disease, such as stunting and obesity, have yet to be critically examined within a diachronic political ecology theoretical framework.

The remainder of this article seeks to create a synthesis of political ecology as a framework for analysis and past approaches from other disciplines and sub-disciplines that consider nutritional transitions and the resulting impact on marginalized individuals and households. This synthesis will be utilized in the creation of the concept of nutrient-deficient ecologies, which will demonstrate that localized and contextual nutritional transitions are caused by a host of interactions among complex and dynamic factors within a distinct historical timeline. My use of a nutrient-deficient ecology does not imply a resource-poor ecosystem. Rather, in developing this model, I am merging the notion of ecology with an understanding that there are localized contexts where individuals are unable to access or sustain a desired level of nutrition. Finally, this concept of nutrient-deficient ecologies will be applied to two case studies of nutritional transition in Central America.

The construction of a nutrient-deficient ecology

There is a need for the creation of a new model that adequately addresses the complex, dynamic and diachronic nature of localized nutritional transitions within a political ecology theoretical framework. This concept must also capture the contributions and research of other approaches and disciplines. Thus, I argue that the creation of a nutrient-deficient ecologies model is necessary to accomplish these goals and to adequately examine localized nutritional transitions. The following section will construct the nutrient-deficient ecology through first defining what a nutrient-deficient ecology might look like, and then examining previous research and approaches that are similar to this mechanism. Second, I will show how the nutrient-deficient ecology differs from previous approaches. Third, this section will demonstrate how the concept of a nutrient-deficient ecology strengthens contemporary political ecology theory and the political ecology of health by addressing specific gaps in current political ecology literature. Finally, this section will conclude by considering what this new approach brings to the analysis of contextual nutritional transitions in general, and more specifically, to the examination of localized nutritional transitions in Central America.

I define a nutrient-deficient ecology as an ecological space where individuals and households are unable to access and sustain, for whatever reason, a balance of macronutrients or micronutrients necessary to maintain a desired level of health and well-being. Biologically, the presence of a nutrient-deficient ecology can result in individual under-nutrition or over-nutrition. This ecology is composed of many interacting components including: the external environment; the availability and nutritional

value of food sources; and the geographic location of an individual or household. The external environment signifies more than solely the natural environment. Rather, the external environment encompasses any physical infrastructure, levels of urbanization, the natural landscape, and any flora and fauna that exist in this space. It is also crucial to recognize that a nutrient-deficient ecology can be shaped by external factors such as the economic opportunities for individuals and households; cultural and social norms and practices; and the national and international economic and political policies that have local consequences. It is important to acknowledge that none of these interacting factors are static and neither are nutrient-deficient ecologies. Rather, they are dynamic, complex and contextual areas that are influenced by history and can change over time. It is also important to emphasize that the presence of a nutrient-deficient ecology does not necessarily mean that a nutritional transition is underway in a specific region or within a household.

The construction of a nutrient-deficient ecology is similar to previous approaches in nutrition literature that aim to conceptualize areas where environmental and geographic factors intersect to produce spaces where the nutrition of households and individuals is poor and one's access to nutritious food is limited. The establishment and analysis of 'food deserts' in primarily high-income countries represents one method of understanding the complexity of factors that lead to a poor food environment. Although there is no universally accepted definition of food deserts, it is established that this concept encompasses a wide range of economic, geographic, psychological, and sociological factors that create circumstances where individuals are unable to consistently access a healthy and nutritious diet (Whelan et al. 2002; Shaw 2006).

Traditionally, food deserts were considered to be an urban phenomenon with distinct policy implications in urban areas (Cummins and Macintyre 2002). However, there is an increase in research and literature that recognizes that food deserts can also arise in rural settings (Furey, Stugnell and McIlveen 2001; Morton et al. 2005). Common sites of urban and rural food desert research include the United Kingdom (Cummins and Macintyre 1999; Furey, Stugnell and McIlveen 2001; Wrigley 2002), the United States (Morton et al. 2005; Hendrickson, Smith and Eikenberry 2006), and Canada (Smoyer-Tomic, Spence and Amrhein 2006; Larsen and Gilliland 2008). There is also limited food desert research into the health and medical consequences of these settings for individuals. Cummins and Macintyre (2005) investigate the relationship between obesity and one's food environment in the United States and call for further research into this relationship in other high-income countries.

Despite the similarities between the nutrient-deficient ecology model and food desert research, there are some clear distinctions that must be made between these two approaches. First, the nutrient-deficient ecology is not static, but rather it is constructed by the interactions of the external environment and the individuals that reside in a contextual and localized space. This ecology is directly impacted by the economic, political, social, and cultural factors that influence day-to-day life, health and nutrition. Second, and related to the first distinction, the nutrient-deficient ecology challenges the rural and urban dichotomy because of migration. The nutrient-deficient ecology is not solely bound by geographic locality. Individual actors are an integral component of the nutrient-deficient ecology, and it is important to emphasize that individuals have the ability to migrate. This

is especially important in Central America as there are high levels of internal migration within specific countries in addition to out-migration between countries. If an individual is exposed to a nutrient deficient ecology in one setting, he or she can carry the impact of this exposure to a new setting. Third, the nutrient-deficient ecology explicitly considers the relationship between malnutrition and human biology. Finally, this proposed model is explicitly utilized to examine the nutrition and health of marginalized groups. Thus, the nutrient-deficient ecology model can be more easily applied to low-income and middle-income settings. However, the nutrient-deficient ecology model would be useful in analyzing pockets or groups of marginalized individuals within a presumed high-income setting.

The concept of the nutrient-deficient ecology strengthens existing political ecology theory and the political ecology of health, but also challenges previous rural research agendas found in traditional political ecology research. This model addresses fundamental areas of political ecology research that are presently neglected or under-researched. First, this model draws on biocultural approaches and openly investigates the biological consequences of nutrient-deficient ecologies for individuals and households.³ Second, despite the political ecology research on the construction of 'disease ecologies' (May 1954), and despite calls for further research into the political ecology of chronic disease (Mayer 1996: 442), limited research has been conducted with respect to chronic disease using political ecology as a theoretical framework. The nutrient-deficient ecology considers the long-term impact of poor nutrition for individuals and households and the range of physical manifestations of this poor nutrition.

Furthermore, the nutrient-deficient ecology re-evaluates the rural and urban dichotomy that is entrenched in much of the present political ecology research. Traditional political ecology research has a connection to the natural environment and rural areas. More recently, urban political ecology emerged as an important research agenda within this theoretical framework. Pelling (1999) investigates flooding and vulnerability to flood hazard in urban centres in Guyana and the relationship to history in addition to social, economic, and political structures. Moffat and Finnis (2005) examine access to, management of, and conflict over natural and social resources in urban and peri-urban settings in Nayabasti, Nepal. Both of these studies illustrate that cities and urban centres are settings where political ecology research is important to understanding human activity and their relationship to the natural environment. However, the nutrient-deficient ecology model goes one step further by reconceptualizing the role of urban and rural settings in an individual's access to balanced and sustained nutrition. An individual's geographic location and external environment only constitute part of the nutrient-deficient ecology. Even though an individual can migrate from a rural setting to an urban centre, this individual can still be confronted by a nutrient-deficient ecology. This is a result of overarching economic, political, social, and cultural factors that shape the nutrient-deficient ecology and often transcend geographic location.

The utilization of the nutrient-deficient ecology model is valuable in the general analysis of localized nutritional transitions that are underway in various settings. The nutrient-deficient ecology brings a broader perspective in addition to synthesizing past approaches and disciplines

to study these contextual changes in individual and household nutrition. The nutrient-deficient ecology model also seeks to highlight the environmental, geographic, economic, political, social, cultural, and historical factors that underlie an individual's lack of access to nutritious food sources and the biological consequences of this limited access.

Two case studies from Central America demonstrate the utility of the nutrient-deficient ecology in examining localized nutritional transitions in this region. The first case study shows how a specific geographic region and natural environment can be impacted by agricultural industrialization and external development agendas. This case study in southern Honduras extending from the 1950s to the early 1990s investigates the social changes and nutritional consequences for marginalized individuals and households as a result of agricultural intensification in this region. The second case study is more thematic in nature and investigates the co-emergence of stunting and obesity among individuals in the same households, communities and cities throughout Central America. This case study demonstrates how the concept of a nutrient-deficient ecology cannot be contained by geography and the external environment. Rather, this case study points to underlying economic and social inequalities perpetuated by globalization and other actors that create spaces where individuals and households are unable to access and sustain a balance of macronutrients or micronutrients necessary to maintain a desired level of health and well-being.

Case study 1: agricultural intensification in southern Honduras

Southern Honduras, and more specifically, the departments of Choluteca and Valle, is a dynamic region within Central

America that currently experiences some of the highest rates of food insecurity and malnutrition in Honduras (World Food Programme 2010).⁴ These levels of food insecurity persist despite high rates of agricultural production and relatively recent efforts by national and international agencies to promote agricultural development throughout the region. Furthermore, this region is undergoing a distinct nutritional transition, especially among the poorest individuals and households, and this transition is representative of what is happening on a larger scale in Central America (Stonich 1991a:46). Between the 1970s and the late 1980s, evidence suggests that overall rates of nutrition fell throughout the region (Stonich 1991b:732). This is a clear indication of the emergence of a nutrient-deficient ecology. In order to demonstrate that a nutritional transition is indeed underway in southern Honduras, we need evidence that suggests that levels of individual and household nutrition are in flux or have undergone some sort of change from the past to the present in this region.

Until the early 1990s, there was a well-documented history of agricultural intensification in southern Honduras and the diverse impacts that this intensification has had on communities, households and individuals (DeWalt 1998; Stonich 1991b; Stonich 1992). Following World War II, Central America became a target of agricultural development assisted by agrotechnologies in an attempt to boost economic growth and agricultural production throughout the region (Murray 1991:19). In particular, Honduras was subjected to President Kennedy's comprehensive agricultural development strategy termed the Alliance for Progress. This program promoted the cultivation of particular non-traditional agricultural exports in addition to export diversification (Stonich

1991b:728). The first non-traditional agricultural export that was heavily introduced in southern Honduras was cotton, followed by sugar and melons. Also, the cattle ranching and shrimp aquaculture industries grew substantially during this period.

The introduction and proliferation of cotton cultivation following World War II, specifically in the departments of Choluteca and Valle, coincided with an increased use of pesticides and environmental degradation in these departments, coupled with the amplification of social inequalities and divisions (Murray 1991:20). All of these factors represent integral components to the construction of a nutrient-deficient ecology. The escalating use of pesticides to combat invasive species and emergence of resistant organisms during the cotton boom continued into the period of melon production (Stonich 1991b:745). This lenient use of high levels of pesticides had, and continues to have, severe ramifications for the natural environment and agricultural production throughout southern Honduras.⁵ Pesticides, in conjunction with other poor agricultural practices led to land degradation, a loss of soil fertility, watershed depletion, erosion, and landslides. Areas were deforested to clear pasture for the cattle industry (Stonich 1991b:736; DeWalt 1998:298). The direct consequences of this alarming rate of environmental degradation and resource depletion were disproportionately felt by marginalized individuals and households.

The widening disparity in the access to land between large landowners and small-scale farmers became the primary social consequence and the legacy of the cotton boom during this era. Many small-scale farmers were unable to compete with capitalist export-oriented agricultural ventures and withstand the difficulties associated with environmental degradation caused

by these large enterprises (Murray 1991:26). This led to a dramatic decrease in the size and number of small-scale farms and an increase in the size of larger-scale agricultural enterprises. DeWalt (1998) demonstrates that the unequal access to land that is pronounced in southern Honduras is indeed a country-wide problem; however, the root of this problem in southern Honduras lies with the push for export-oriented and industrialized agriculture. At the same time, the expansion of cattle ranching had similar social impacts with respect to land appropriation as with the cotton industry (DeWalt 1998:298).

The cotton industry in southern Honduras, like many commodity-based industries, was volatile and subject to market fluctuations. By the end of the 1980s, the cotton industry contracted, and melons became a more important agricultural export (Murray 1991:20-21). The cattle industry also faced challenges, while shrimp aquaculture expanded during the last years of the 1980s (Stonich 1991b:737). The contraction of two of these export-oriented industries led to high rates of rural unemployment with distinct seasonal variations throughout southern Honduras. According to Stonich (1991c), "overall rural unemployment in 1980, based on the corresponding monthly supply and demand of labour, averaged 62.2% for the year – ranging from 15.7% in September to 95.5% in March" (141). With such unpredictability and fluctuations in employment, a number of individuals made the decision to temporarily or permanently migrate from rural areas to urban centres or across international borders in search of improved economic opportunities.⁶ Yet this migration continues to have consequences for levels of agricultural production of members of small-scale households that remain in southern Honduras. DeWalt (1998) explains that,

"because the poor have increasingly come to depend on the remittances from those members of their family who engage in temporary or permanent migration, they are unwilling to invest time and resources in attempting to intensify their agricultural operations in the south" (308).

The combination of environmental degradation, social inequality and the continual marginalization of the poor has clear implications for nutrition of individuals and households in this region in addition to the construction of a nutrient-deficient ecology in southern Honduras.⁷ As previously indicated, the presence of a nutrient-deficient ecology does not necessarily mean that a nutritional transition is underway in a specific space. However, in this case, levels of nutrition were changing throughout southern Honduras in conjunction with the construction of a nutrient-deficient ecology. Stonich (1991a:46) states that the average Honduran in southern Honduras was less capable of consuming and sustaining an adequate balance of nutrients in the early 1990s than in the mid-1960s. One study in the 1980s suggested that approximately 49% of households did not meet the recommended daily levels of calorie consumption in southern Honduras (DeWalt 1998:306). Furthermore, it was reported that semi-urban families consumed fewer calories than rural households (Stonich 1991b:736). This finding demonstrates the complexity with respect to the location of a specific nutrient-deficient ecology and the need to challenge the dichotomy between rural and urban spaces with this model. Through more research, the direct biological consequences of this low caloric diet become obvious. Data obtained from nine communities within the departments of Valle and Choluteca in 1982 reveal that approximately 65% of all children under the age of five years were stunted (Stonich

1991b:736). Furthermore, the rate of infant mortality in the region was 99 deaths per 1,000 live births, which was much higher than the national average of 64 deaths per 1,000 live births (World Bank 1992:272 cited in DeWalt 1998:306).

Generally, all households, regardless of income levels, were able to meet their protein intake requirements between the late 1960s and the early 1990s. Ironically, it was estimated that only 3% of this protein came from meat despite the large cattle industry in the region (DeWalt 1998:306). This low consumption of animal products is connected with some micronutrient deficiencies and additional health concerns including iron-deficiency anemia. This health problem is a country-wide concern in Honduras, and pregnant women and new mothers are particularly affected. In response to the high rates of anemia, there is a push by private and government agencies to provide iron supplementation to pregnant women. However, according to a study conducted by Nestel et al. (1999:169), only 51.8% of women surveyed in the rural southern region of Honduras received iron supplementation during their last pregnancy.⁸

Southern Honduras is a region within Central America that clearly underwent a nutritional transition between the 1950s and the early 1990s. Additionally, the high rates of malnutrition, low calorie intake, and evidence of health problems associated with micronutrient deficiencies are all indicators of the presence of a nutrient-deficient ecology. This case study has outlined some of the complex factors that led to the construction of this ecology and the direct environmental, social and biological consequences for marginalized individuals and households in the region. Furthermore, this case study serves as a valuable example of the coexistence of a nutritional transition

and a nutrient-deficient ecology within one geographic location in Central America.

However, this case study is not without its limitations. There is a lack of recent research in southern Honduras that investigates the contemporary outcomes of continued agricultural intensification, long-term environmental degradation, and widening social inequality for the nutrition and health of marginalized individuals and households. Additionally, it is difficult to generalize the findings of this case study to other regions of Honduras or Central America even though outside actors and policies influenced and continue to influence the construction and maintenance of the nutrient-deficient ecology of southern Honduras.

Presently, there is a need to widen our geographic scope and examine emerging nutritional patterns that are present throughout Central America. It is also necessary to consider the influence of various factors that compose nutrient-deficient ecologies on these emerging nutritional patterns. Thus, the subsequent case study examines the coexistence of chronic diseases associated with poor nutrient consumption in individuals, households and cities throughout Central America and the complex and dynamic causes for this different manifestation of a nutritional transition.

Case study 2: the emergence and coexistence of obesity and stunting

Globally, in low-income and middle-income countries, there is increasing recognition that differing biological manifestations of a nutrient-deficient ecology can coexist within one individual, the same household and one city. The purpose of this case study is to present evidence of the coexistence of stunting and obesity in individuals, households and cities in Central America, in addition to offering general

explanations for the appearance of this nutritional transition. Although the biological and nutritional causes of stunting and obesity seem unrelated, this case study also seeks to establish a connection between these two chronic diseases and demonstrate the variety of biological manifestations from long-term exposure to a nutrient-deficient ecology. Additionally, this study aims to demonstrate that the general process of globalization in addition to underlying historical, social and cultural inequalities perpetuated by numerous actors can create ecologies where individuals and households are unable to access and sustain a balance of macronutrients or micronutrients necessary to maintain a desired level of health and well-being.

It may be surprising that both stunting and obesity can manifest themselves in one individual. Duran, Caballero, and de Onis (2006) compare the association between obesity and stunting in preschool children in the Caribbean, South America and Central America. Their findings indicate that children in Central America have the highest rates of stunting, while similar rates of obesity were found in all three regions. Furthermore, the study found that “10 percent of the variability in the prevalence of overweight is dependent on the variability of the prevalence of stunting” (Duran, Caballero, and de Onis 2006:304). In another study in rural Mexico, Fernald and Neufeld (2007) found the coexistence of stunting and overweight in 5% of non-indigenous children and 10% of indigenous children. These findings are consistent with other studies with a more global focus that indicate that children that are stunted are at a higher risk of becoming obese later in childhood or later in life (Popkin, Richards, and Monteiro 1996). These findings also demonstrate that a nutrient-deficient ecology can have differing biological implications

for certain individuals at different times in their lives, yet the health and well-being of these individuals continues to be negatively affected because of their prolonged exposure to this ecology.

At a household level, the term ‘dual burden household’ is sometimes used to represent a household where there are individuals that are both obese and malnourished (Doak et al. 2005).⁹ This terminology is applied to some low-income and middle-income settings (see Khor and Sharif 2003), yet little research is carried out exclusively in Central America concerning the presence of dual burden households. Barquera et al. (2007) analyzed the 1999 Mexican Nutrition Survey and found that a mother with central adiposity had as much as twice the probability of having a stunted child when compared to a mother with a lower weight-for-height.¹⁰ A similar study was undertaken by Romieu et al. (1997) throughout Mexico, which concluded that current methods for measuring nutrition among individuals are inadequate for explaining this nutritional paradox that emerges among mothers and their children. Although both of these studies do not explicitly investigate dual burden households, they give an indication of an emerging trend within households in Central America. It is also important to acknowledge the emphasis on maternal and child health in these studies and their potentially disproportionate exposure of these actors to nutrient-deficient ecologies. There are clear negative implications for the health of mothers and children as a result of this exposure.

At a city scale, the coexistence of stunting and obesity among different individuals is more easily observed. However, limited research is conducted at these scales to investigate any such association in Central America. Thus, results must be

extrapolated from previous studies that focus on either stunting or obesity in individuals within the same community or city. For example, in Guatemala City, research suggests the coexistence of obesity (Torun et al. 2002) and stunting (Johnston and Low 1995) among individuals residing in or migrating to this urban centre. Similar findings are observable in Tegucigalpa, Honduras where there is also the appearance of obesity (Rivera 2005) and malnutrition (Barrios et al. 2000) among different groups.

There are numerous complex factors that intersect to create ecologies where both stunting and obesity are present. The chronic nature of both of these conditions means that an individual's historical access to an adequate quantity and quality of macronutrients and micronutrients is a critical component of these ecologies. Beyond history, one's socioeconomic status is often used as a proxy for nutritional and health status. In the past, a low socioeconomic status was synonymous with poor nutrition and nutrient intake leading to a host of health problems including stunting. More recently, low socioeconomic status has become associated with obesity (Thow and Hawkes 2009). Furthermore, global nutrition literature has pointed to processes of globalization for the emergence of obesity in low-income and middle-income settings (Popkin and Gordon-Larsen 2004; Hawkes 2006). This includes an increase in food imports and a distinct change in diets with higher levels of animal products, fats and edible oils. Distinct decreases in activity levels and generalized changes in lifestyles are also cited as major contributors to the overall increase in obesity among individuals in Central America (Doak et al. 2005; Popkin and Gordon-Larsen 2004).

At an individual and household level, there are more contextual factors that interact within nutrient-deficient ecologies

and create circumstances where both obesity and stunting can appear in the same household or individual. Deep inequalities are at the core of these ecologies. Particularly, unequal access to nutrients based on gender, age and ethnicity are pronounced throughout Central America. Thus, these inequalities, which may be rooted in historical oppression, cultural traditions, or social norms, manifest themselves in the bodies and health of marginalized individuals.

This case study provided a broader geographic scope for examining nutritional transitions in Central America through an investigation of the coexistence of stunting and obesity in individuals, households and cities. Furthermore, the brief discussion of the far-reaching impacts of globalization in conjunction with contextual historical, social and cultural inequalities demonstrates the unequal access to nutrients throughout this region. This case study was limited by a lack of research into the interactions of the complex factors that are responsible for creating instances where obesity and stunting can coexist. Thus, in order to definitely establish the presence of nutrient-deficient ecologies in different locations, more contextual and geographically rooted research is necessary.

Specific research questions must be asked to better understand the longitudinal association between stunting and obesity at the individual, household and city level in addition to the contextual and localized issues that contribute to the construction of nutrient-deficient ecologies. It would be valuable to have a participatory investigation into the complex experiences of individuals living with stunting and obesity and their perceptions of the causes behind the coexistence of these conditions within a specific location. Also, an examination into the unequal access of nutrients in house-

holds and the underlying causes of dual burden households within a specific region would support the construction of a nutrient-deficient ecology. This research objective could be achieved using appropriate semi-structured interviews and focus groups where household power and social structures could be more easily discussed. Finally, the coexistence of stunting and obesity must be analyzed at a city-level with the intent on highlighting where access to a sufficient quality and quantity of nutrients is limited and the underlying social and cultural dynamics that perpetuate this inaccessibility. A larger quantitative survey may be appropriate to reach this research objective. With sufficient localized and contextual research into these themes, the presence of different nutrient-deficient ecologies centered on the coexistence of stunting and obesity within various areas throughout Central America could be established.

Conclusion

This article deconstructed contemporary notions of nutritional transitions and demonstrate their complex, dynamic and diachronic nature. Furthermore, this article synthesized the valuable contributions of past approaches and disciplines that have investigated nutritional transitions with a political ecology theoretical framework to create an original model, termed the nutrient-deficient ecology. This synthesis challenged past political ecology theory and research and met some of the present limitations of this theoretical framework with respect to its understanding of nutritional transitions. The purpose of this model was to improve our comprehension of cases where individuals and households are unable to access a sustained and appropriate balance of macronutrients and micronutrients necessary to achieve an adequate level of health.

The nutrient-deficient ecology was then applied to two case studies of nutritional transition within Central America. The first case study demonstrated the interactions among and the influence of agricultural intensification, environmental degradation, and widening social inequalities on the nutrition and health of individuals and households within southern Honduras. This case revealed the significance of the geographic location and external environment in nutritional transitions and the manner in which these factors intersected with social and economic inequalities and led to the further marginalization of the poor in southern Honduras. The second case study concentrated on the recent co-emergence of stunting and obesity within one individual, household or city throughout Central America. This case study confirmed previous research concerning the role of globalization in nutritional transitions, but also exposed underlying historical, social and cultural factors that aid in the construction of nutrient-deficient ecologies throughout the region and limit the access to nutrients by individuals and households.

This overall analysis was primarily limited by a lack of recent research in the areas of nutrition and nutritional change explicitly in Central America and sub-regions within Central America. This lack of research is incredibly disconcerting, as contextual and complex nutritional transitions are currently underway throughout the region. These nutritional changes are disproportionately impacting the access of marginalized individuals and groups to quality nutrients, and consequently, the health and longevity of these people. More research must be undertaken to explicitly investigate cases where nutrient-deficient ecologies may exist and the underlying and contextual causes of these ecologies in

addition to distinct nutritional changes. This research must draw on multiple disciplines and approaches to adequately understand this complex phenomenon and create viable policy changes that improve the access to quality nutrients for marginalized individuals and households within Central America.

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Notes

¹ In this context, ‘ecologies’ is used to refer to, and is synonymous with the natural environment. This usage of ‘ecology’ is common within political ecology literature (see Peterson 2000).

² ‘Ecologies’ is used more broadly and is not synonymous with natural environment in this instance. This application acknowledges that the natural environment is not the only ecology that is a part of the human experience. A nuanced perspective of ecologies is necessary to understand the complex interactions between individuals and the spaces in which they inhabit. This approach borrows some ideas from post-structuralist political ecology (see Escobar 1996), and recognizes that the construction and maintenance of ‘ecologies’ is context-dependent.

³ See Dettwyler (1992) for an example of a biocultural approach to child nutrition and nutritional change in Mali.

⁴ The country of Honduras is divided into 18 departments. Each department has its own governor and is subdivided into municipalities.

⁵ This high rate of pesticide use is not only harmful to the natural environment, but it is also extremely costly. Thus, impoverished small-scale farmers were unable to access the newer necessary pesticides to combat pesticide-resistant organisms putting their crops at risk (Murray 1991:20).

⁶ Migration challenges the dichotomy between rural and urban spaces. An individual in an rural area can impact the economic well-being and health of an individual in an urban area and vice versa. Additionally, individuals have the ability to move freely between rural and urban spaces.

⁷ The diverse forms of environmental degradation compromised the ability of small-scale farmers to produce food for household consumption and export. Moreover, the loss of land, rising debt and rampant unemployment had clear economic consequences for individuals and households (Murray 1991:24). Additionally, national and international economic and political agendas continually overlooked the poor of southern Honduras (Stonich 1991b:728). Thus, an inability to produce food, a lack of economic opportunities, and oppressive political and economic structures are all important components that impacted the construction of the southern Honduras nutrient-deficient ecology.

⁸ Iron deficiency and maternal anemia can negatively impact neonatal health. There are connections between maternal anemia and preterm delivery, low-birth weight, and health complications in infants. (Allen 2000).

⁹ The term ‘dual burden household’ can be problematic as it can overlook the underlying causes of unequal access to nutrients within one household. Despite this limitation, the concept of a ‘dual burden household’ remains a useful perspective from which to examine the coexistence of obesity and stunting within the same household in Central America.

¹⁰ Central adiposity is an accumulation of fat around the abdomen, which increases waist size.

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