OVERWEIGHT AND OBESITY AMONG WOMEN IN RURAL DOMINICA: MODELS OF BODY FAT, ATTITUDES, AND SOCIAL NETWORKS

By

SARAH KREBS COUNCIL

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Department of Anthropology

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of SARAH KREBS COUNCIL find it satisfactory and recommend that it be accepted.

Marsha B. Quinlan, Ph.D., Chair

Robert J. Quinlan, Ph.D.

Barry S. Hewlett, Ph.D.
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Globally, overweight and obesity represent major public health threats, threatening individuals with development of non-communicable diseases, particularly diabetes mellitus and hypertension. Shifting lifestyles and cultural models of body fat may contribute to overweight and obesity rates. In Dominica, recent modernization radically and differentially impacted rural women’s lifestyles. This dissertation uses mixed-methods research conducted over four trips (2008–13) to investigate culture surrounding overweight and obesity among the adult female population (N=108, ages 18 – 82) of a Dominican village. Ethnographic research focused on local models of body fat. Local anti-fat attitudes were measured using the attitudes towards obese persons scale (ATOP), standardized psychometric scale. A context-specific perspective is helpful to gain understanding of rising rates of overweight and obesity. Because overweight/obesity is known to cluster in social networks, the notion of overweight/obesity acting as a social
contagion was investigated via communication networks of female residents. Results indicate that rural Dominican women decipher two 'types' of body fat: hard versus soft. The former is considered a healthy type of fat representing vitality while the later is considered shoddy and unsightly. This ethnomedical model 'competes' with biomedical understandings of overweight and obesity as risk factors for the development of non-communicable diseases such as diabetes mellitus and hypertension. Because residents identify 'sugar' (i.e., diabetes mellitus) and 'pressure" (i.e., hypertension) as the two top health issues, it's important to interpret local models of body fat as they do not map onto biomedical realities of elevated levels of adiposity. Regarding anti-fat attitudes, results indicate that rural Dominican women display more extreme attitudes than study populations in the U.S. and Peru. Given the relaxed view of body image in rural Caribbean communities, these results are rather surprising indicating a prevailing shift of globalizing fat-stigmatizing attitudes. Lastly, overweight and obesity appear to act as a social contagion and 'spread' via female social networks. These findings are on par with other study populations. The upshot of the results may be used in public health efforts to prevent and manage overweight and obesity among female social networks as positive behaviors may cluster in the ways that deleterious behaviors do. 
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CHAPTER 1

INTRODUCTION

Introduction

Anthropology's contribution to the study of body fat is lengthy and diverse. Body fat studies use varied theoretical approaches. Some consider body fat as a protective mechanism in past human environments (Brown & Konner, 1987; Brown & Sweeney, 2009; Brown, 1991; Neel, 1962). Some anthropology seeks to understand fat stigma as an outcome of the obesity epidemic (e.g. Brewis, Hruschka, & Wutich, 2011; Brewis, Wutich, Falletta-Cowden, & Rodriguez-Soto, 2011; Brewis & Wutich, 2012; Crandall, 1994). There is an array of orientations towards body fat, which include local perspective, and therefore are categorized as 'body image research' (Anderson-Fye, 2004; Becker, 2004; Sobo, 1994; Sobo, 1993). A few other anthropologists and social scientists have investigated the dynamics of how ideas about body fat—such as ethnophysiology and beauty notions—and ideas that affect body fat operate in social networks (Bahr, Browning, Wyatt, & Hill, 2009; Christakis & Fowler, 2007; Hruschka, Brewis, Wutich, & Morin, 2011). This list, while not exhaustive, serves to highlight the assortment of anthropological studies of body fat. Because of the enormous increase in body size globally over the last three decades, interesting anthropological questions have arisen. Humans show a propensity to gain weight, and large-scale, global levels of obesity are occurring too rapidly to not consider the interaction of human culture and biology. Employing a biocultural framework, this research examines the study of body fat, generally, and obesity, specifically. Brewis calls for obesity studies with a
(theoretically) "wider framework that can treat culture as heterogeneous, flexible, and dynamic" (2011, p. 9). Bolstering this notion, development is associated with changing incomes as well as lifestyles (Hawkes, 2006), yet often has deleterious health effects on populations (Popkin, 2011). Therefore, the overall goal of this study is to investigate body fat among women in a rural village in the Commonwealth of Dominica, a small island nation undergoing development. It's important to emphasize the rapidity with which this community is experiencing development. Indeed, in 200 stand pipes were put in, marking major changes in the day to day activities for women associated with laundry and fetching water. This remarkable change brings up issues with acculturation as day to day activities shift. It also calls to mind the downstream affects that may be associated with 'development' (in this context weight gain due to decreased caloric output).

The research is segmented into three interconnected parts, each addressing body fat from a specific viewpoint. The opening piece of research builds a medical ethnography of body fat among local residents. Augmenting the ethnography, a biocultural perspective offers models of body image and body fat and an epidemiological snapshot of overweight/obesity among female villagers. This provides the footing of the study.

The second piece of research considers the current state of development of the study of overweight and obesity. Under the onslaught of the global obesity epidemic, traditional conceptions of body fat may be inconsistent with biomedical models. This, in turn, may generate new models of fatness among Bwa Mawegan residents. No longer residing in relative isolation, the village is modernizing in many ways (Quinlan &
Quinlan 2007), which may act as a driving force of shifting attitudes. Using a standardized psychometric scale, the Attitudes Towards Obese Persons Scale (ATOP) assesses villagers' viewpoints of overweight and obese persons. Not only does the ATOP measure individuals’ anti-fat attitudes, it also allows for cross-cultural comparison. This provides a lens in which to compare the affects of development on rural Dominicans' attitudes towards body fat.

The third, and final, piece of this research applies social network analysis to the study of body weight among female social networks. The task here is to assess overweight and obesity as socially contagious. The following questions will be considered: Does overweight/obesity 'spread' via female communication networks? If so, how does overweight/obesity cluster among female networks? How do the cluster analyses compare to other study populations? If overweight and obesity 'act' in predictable ways and cluster in social networks, this trend may be used in efforts to reverse overweight/obesity patterns in female social networks. This application of social networks has been used in other public health efforts such as smoking cessation (Christakis & Fowler, 2008). The goal here is to 1) determine whether fat clusters in social networks and 2) potentially use the trends to bolster public health efforts (i.e., use the same dynamics for weight reduction and/or obesity prevention).

In tandem, the different applications (1) provide a comprehensive representation Dominican ethnomedical concepts of body fat, (2) measure levels of anti-fat attitudes, and (3) assess the extent to which overweight/obesity 'spreads' among female social networks. Because anthropological studies of body fat reveal the depth and scope of the
discipline, this body of research employs a biocultural context with an emphasis placed on socio-cultural aspects of overweight and obesity.

For organizational purposes, the remaining portion of this chapter introduces the study of obesity including associated risk factors; biocultural understandings of body fat with a particular lens on the contribution of our evolutionary ecological history; social epidemiology of obesity; situating the global and the local facets of obesity, highlighting the interaction of modernization with local culture; specific treatment of overweight and obesity in Dominica; and, finally, my general research design and methodology. I present background literature specific to each area in each corresponding section, as will specific methodology.

Framing obesity

Obesity is generally defined as abnormal or excessive fat accumulation on the body. Biomedically, this excess in adipose tissue may impair health (Mascie-Taylor & Goto, 2007). However, the amount of excess fat and its distribution within the body as well as the health consequences vary substantially among obese individuals. In 2013 the American Medical Association officially designated obesity as a disease (Fitzgerald, 2013). Now considered a major public health threat, obesity is monitored internationally.

The body mass index (BMI) is the most common index for measuring overweight and obesity. BMI is defined as a person's weight in kilograms divided by the square of his/her height in meters (kg/m²). Beyond simplicity, BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and
for all ages of adults. In the late 1990s the National Institutes of Health and the WHO instituted the system for translating BMI scores into weight categories including: underweight, normal, overweight, and obese (World Health Organization, 2000). (Obesity is further categorized into three classes: obese class I, obese class II, and obese class III.) For purposes of this research the term "obesity" will be used to include all three obese categories as there are a negligible amount of class II and III obese women in the research site. See Table 1 for BMI categorical cut-offs. Of note, BMI may be considered a rough guide because it may not correspond to the same degree of fatness in different individuals. Specifically, BMI fails to account for site and distribution of adiposity. (A brief discussion of the site and distribution of body fat is below in the biocultural section.) For the majority of people, BMI correlates with the amount of fat in their body. Certain exceptions exist, such as high-caliber athletes whose physiques result in overly biased BMI scores due to a high muscle to fat ratio.

### Table 1: BMI and Associated Weight Categories

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Category</th>
</tr>
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<tbody>
<tr>
<td>18.5–24.9</td>
<td>Normal weight</td>
</tr>
<tr>
<td>25.0–29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>30.0–39.9</td>
<td>Obese</td>
</tr>
<tr>
<td>40.0 and above</td>
<td>Extreme obesity</td>
</tr>
</tbody>
</table>


According to WHO, worldwide obesity has more than doubled since 1980. Globally, WHO estimates that in 2008 more than 1.4 billion adults age twenty or over to
be overweight, of whom at least 300 million women obese. Recent estimates place one in three adults to be overweight with rates rising particularly fast in many developing nations (WHO fact sheet, 2014). Specific to women, the worldwide prevalence of obesity among women nearly doubled between 1980 and 2008, from 8% in 1980 to 14% in 2008 (Finucane et al., 2011).

This health threat is of particular concern because obesity increases morbidity from various non-communicable chronic diseases (NCDs) - cardiovascular disease, type 2 diabetes mellitus (TTDM), and hypertension (Ball, Brown, & Crawford, 2002; Loren Cordain et al., 2005; Eaton, Konner, & Shostak, 1988; Pijl, 2011). Cut-off levels below obesity (i.e. overweight category) also increase mortality risk, underscoring the risk of body fat levels considered overweight (Stevens et al., 1998). See Table 2 for related disease risk relative to weight status. Here, the disease risk considered includes TTDM, hypertension, and cardiovascular disease. Essentially, the relationship between BMI and mortality is U- or J-shaped, conferring a positive relationship between BMI and mortality (Mascie-Taylor & Goto, 2007). More, NCDs may be categorized as a pandemic of global proportions yet are now disproportionately found in lower income or developing nations (WHO, 2010). In 2008, 63% - or 36 million out of 57 million - of global deaths were attributed to NCDs (WHO, 2010). NCDs are projected to account for seven out of ten deaths by 2020 (WHO, 2010). In the United States and most Western countries, diet-related NCDs represent the single largest cause of morbidity and mortality. The major causes of NCD-attributable mortality are cardiovascular disease (30% of total global mortality), cancers (13%), chronic respiratory disease (7%) and TTDM (2%) (Unwin & Alberti, 2006). These diseases are epidemic in contemporary
Westernized populations and typically afflict fifty to sixty-five percent of the adult population. Developing nations are often hit with multiple aspects of this health burden. No longer confined to Western societies and the affluent in non-Western societies, this health predicament has now reached the some of the world's most marginalized - poor, rural members of developing nations. Dominica is no exception to this global phenomenon. Traditionally known for its appreciation of a plump female body (E. Sobo, 1993), rural Caribbean residents stand as an apt backdrop for the study of overweight/obesity as the affects of development and 'traditional' culture converge. Rural Dominican females, specifically, offer a fitting cultural and biological milieu in which to study overweight/obesity as development and modernization are rapidly occurring.
Table 2: Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks

<table>
<thead>
<tr>
<th></th>
<th>BMI (kg/m²)</th>
<th>Obesity Class</th>
<th>Disease Risk* Relative to Normal Weight and Waist Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underweight</strong></td>
<td>18.5 or less</td>
<td></td>
<td>Men 102 cm (40 in) or less</td>
</tr>
<tr>
<td><strong>Normal</strong></td>
<td>18.5–24.9</td>
<td></td>
<td>Women 88 cm (35 in) or less</td>
</tr>
<tr>
<td><strong>Overweight</strong></td>
<td>25.0–29.9</td>
<td>Increased</td>
<td>Men &gt; 102 cm (40 in) or less</td>
</tr>
<tr>
<td><strong>Obesity</strong></td>
<td>30.0–34.9</td>
<td>I</td>
<td>Women &gt; 88 cm (35 in)</td>
</tr>
<tr>
<td></td>
<td>35.0–39.9</td>
<td>II</td>
<td>High</td>
</tr>
<tr>
<td><strong>Extreme Obesity</strong></td>
<td>40.0 +</td>
<td>III</td>
<td>Very High</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Very High</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extremely High</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Extremely High</td>
</tr>
</tbody>
</table>

* Disease risk for type 2 diabetes, hypertension, and CVD.
+ Increased waist circumference also can be a marker for increased risk, even in persons of normal weight.

Source: From National Institutes of Health and National Heart, Lung, and Blood Institute

The large-scale, upstream force largely responsible for the obesity epidemic is known as the "nutrition transition" (Popkin & Gordon-Larsen, 2004; Popkin, 2011). This macroprocess encompasses the massive and recent shifts in our food systems during the last three decades (A. A. Brewis, 2011). The changes include shifts away from diets rich in whole grains, vegetables, and reasonably low fat proteins to diets based in highly-processed foods with considerable amounts of sugar, sodium, and saturated fats.
The resulting diet is calorically dense yet nutritionally weak. Often referred to as the 'Western diet' (Martorell et al., 1998), this shift results in an increase in diet-related NCDs (Hawkes, 2006). This trend is rising in developing nations, as processed foods become more available (Mendez & Popkin, 2004). Other large-scale and significant drivers in the nutrition transition include the synergistic effects of development and globalization on overweight and obesity (Hawkes, 2006; Mendez & Popkin, 2004; Popkin & Doak, 1998). Occupational shifts to more sedentary employment and an increase in leisure time also contribute here. These lifestyle transitions occur simultaneously with the dietary shifts, resulting in an 'obesogenic environment' (Lieberman, 2008). See Figure 1 for the various stages of the nutrition transition.
A biocultural model of body fat

Profound changes in human subsistence history – from the pre-agriculture diet to the agricultural and industrial revolutions implicated the current obesity epidemic. I present implications of these changes on diet and lifestyle factors and the evolutionary mechanisms that may play key roles in the genetic underpinning of obesity will be discussed.
Pre-agriculture diet and lifestyle

For the vast majority of human history hunting and gathering was the exclusive subsistence pattern (Brown & Konner, 1987; Brown, 1991). Hunter-gatherers (HG) thrived on a mix of carbohydrates, proteins, and unsaturated fatty acids for millions of years. Carbohydrates were the macronutrient dietary staple (Pijl, 2011). Roughly two million years ago ecological changes facilitated major shifts in the human diet. Newly formed arid grasslands made large predator exploitation possible - marking shifts in an increase of protein and unsaturated fatty acid intake (Pijl, 2011). There has not been one universal diet consumed by all HG communities. Rather, as suggested by studies of contemporary HG groups and conventional wisdom, the availability of food depended on geographic locale and climate conditions. Despite the contention that the HG diet remained primarily carbohydrate-based, humans evolved as omnivores and it’s likely that over 50% of HG subsistence included animal food (Cordain et al., 2002). [For a full discussion of the misinterpretation of Lee’s (1968) work on HG diet composition see Cordain et al. (2002)]. Nevertheless, these macronutrient dietary adaptations mark a principal turning point in human evolutionary history - encephalization. Brain growth and development is facilitated by unsaturated fatty acids. Further, brains are extremely costly. It’s likely that an increase in protein-based meat and fish yield the more energy dense nutrients needed for neural activity (Pijl, 2011). Brain growth and development yielded two energy-saving adaptations: fire and cooking.

Agricultural revolution

While climate change and the subsequent dietary adaptations influenced the growth and development of the human brain, the first major event triggering the current
obesity epidemic (and metabolic disorders) is the Neolithic (or Agricultural) Revolution (Pijl, 2011). The advent of agriculture significantly affected the composition of the human diet. As noted above, the HG diet was a mixture of carbohydrates, proteins, and unsaturated fatty acids for millions of years. Before the advent of agriculture and animal husbandry, seasonal variation limited the ability of various types of food to be consumed on a regular basis. Agricultural produce primarily contains carbohydrates. Neolithic founder crops include cereals, legumes, and flax (Pijl, 2011). Marking a profound dietary shift, in all likelihood, agriculture re-introduced carbohydrates as the principal macronutrient in the human diet (Pijl, 2011). Additionally, animal husbandry introduced dairy and promotes the consumption of saturated fat in place of unsaturated fat. Cattle meat partially replaced fish in the human diet. It's important to note that fish is a vital source of unsaturated fatty acids. Animal domestication disrupts the cyclical depletion of subcutaneous and abdominal fat stores that primarily contain saturated fatty acids by year-round feeding of stored plant foods. This results in cattle maintaining more saturated fat when domesticated than in the wild. Additionally, it's more advantageous to slaughter animals at peak body fat percentage (Pijl, 2011). The affects of these dietary changes resulted in a deteriorated state of human health (Brown & Konner, 1987; Brown, 1991; Cordain et al., 2002; Cordain et al., 2005; Pijl, 2011). Average adult height declined substantially after the advent of agriculture (Cohen, 1989). Osteological studies indicates that the advent of agriculture occurs simultaneously with higher incidence rates of osteoporosis, rickets, and dental caries (Harris & Ross, 1987).
Traditional Dominican horticulturalists, followed a Neolithic-style planting regime, yet remained healthy. They farmed very few animals, relying mostly on local fish, ‘peas’ (beans), supplemented with scant amounts of purchased meats, when available (Quinlan, 2010). Their primary traditional carbohydrates came from dasheen (taro, *Colocasia esculenta*), tania (tannia, *Xanthosoma sagittifolium*), yams (*Dioscorea* spp.), breadfruit (*Artocarpus altilis*) and cassava (manioc, *Manihot esculenta*), which are fiber-rich and have low glycemic indices compared to other other starch staples (e.g. potatoes and grains) (Thorburn, Brand, & Truswell, 1987; FAO, 2006). Dominican gardeners, of the recent past remained healthy, and Dominica has a remarkable concentration of very old people in good health (Pickford, 2007), with the perhaps the highest rate of centenarians per-capita (Caribbean Journal, 2014). These elderly Dominicans developed and lived most of their lives relatively isolated from globalization, and entirely reliant on the traditional horticultural diet, which only began to change in the 21st Century.

*Industrial revolution*

Beginning in the late 18th century major technical developments in the United Kingdom created socioeconomic and cultural changes that would mark one more significant event in the world’s development of obesity. Agricultural production capacity saw dramatic increases due to machine-based manufacturing and farming. Food storage capabilities grew as well. Additionally, motorized labor and transport lessened physical workloads. Despite the scarcity of caloric intake data during this period, it is generally assumed that food consumption increased during this time. Further, dietary composition changed: Highly refined cereals were introduced; refined sugar intake
rapidly increased (Mintz, 1985); sodium intake increased while potassium intake decreased; micronutrient density declined while caloric density increased; fiber content declined; and saturated fat replaced unsaturated fat (Cordain et al., 2005; Pijl, 2011). In conjunction, it is generally accepted that physical activity levels diminished during this period as well (Pijl, 2011; Popkin & Gordon-Larsen, 2004; Popkin & Doak, 1998; Prentice, 2006; Satia, 2010) yet reliable data are only just emerging (Pontzer et al., 2012).

The health consequences of these major shifts in diet and activity patterns are clear. When traditional diets are modified in favor of a Western diet, obesity and, subsequently, NCDs quickly emerge (Gordon-Larsen et al., 2003; Himmelgreen, 2011; Mendez & Popkin, 2004; Popkin & Doak, 1998). Conversely, when there is a return to a HG diet among obese Australian Aborigines, TTDM diagnoses are reversed (O’Dea, 1984). Pijl (2011) offers four evolutionary hypotheses to explain the current obesity epidemic. I will briefly discuss the following hypotheses: thrifty gene, predation release, fetal and maternal origins of obesity, and insulin resistance.

The thrifty gene hypothesis

Neel’s pioneering thrifty gene hypothesis (1962) proposes that laying down abdominal fat to conserve calories offers a selective advantage of this genotype in times of food scarcity (Candib, 2007). The thrifty gene hypothesis suggests that TTDM results from genetic discordance between Stone Age genotypes adapted to environments with food shortages and high energy demands and contemporary Westernized lifestyles with abundant food supplies and low energy demands (Loren Cordain et al., 2005). While Neel (1962) had to revisit the original mechanistic link between diabetic genotype and
phenotype, the basic premise still holds (Pijl, 2011). Indeed, Pijl (2011) notes that there is consensus that genes influence the variation in both body weight and body fat distribution in a given environment for about 50 to 70% (Maes, Neale, & Eaves, 1997). The thrifty gene hypothesis proposes that those of us carrying a hereditary trait to efficiently harvest or store calories are the ones who run the greatest risk to grow obese in contemporary industrialized environments. While this 'thriftiness' presents a selective advantage in an environment marked with food shortages, these genes now exist in obesogenic environments (Brown & Konner, 1987; Brown, 1991; Cordain et al., 2005; Lieberman, 2008). Consequently, the term "diabesity" has been coined to address the co-occurring conditions of obesity and TTDM given that TTDM often results from the metabolic disruption related to obesity (Lieberman, 2008). In an update to his earlier work, Neel (1989) returned to earlier work asserting that selective pressures occurred more recently in human history; famine and food shortages were rare among HG populations and common among agricultural populations—as Robert Quinlan (2010) found for 20th Century Dominican history. Neal's work remains the subject of anthropological debate (Prentice, Hennig, & Fulford, 2008).

The predation release hypothesis

Despite contradictory opinion (Brown & Konner, 1987; Brown, 1991; Gordon-Larsen et al., 2003), Speakman (2007) argues against the notion that our ancestors were exposed to periodic famine enough to warrant the proliferation of thrifty genes. Further, Speakman (2007) argues that HGs would grow fat during periods of receding famines due to the strong selection of thrifty genes. This assertion is substantiated by a lack of reported weight gain in such times among contemporary HG (Pijl, 2011). Speakman
(2007) concludes with asserting that the thrifty gene hypothesis does not account for the amount of normal weight people [or "weight maintainers" (Ball et al., 2002)] in the current obesogenic environment, given that the thrifty genes would have time to propagate in the gene pool. Instead, mutations that cause obesity were selected against in order to reduce the risk of predation. Here, Speakman (2007) turns the evolutionary mechanism on its head - predation is the major driver in this line of reasoning. Obese persons would be the obvious and most accessible targets for predation. Cultural innovations such as fire and tool manufacturing alleviated the selective pressures for weight maintenance below an upper set point (Pijl, 2011). Random mutations that allow for an increase in body weight were no longer selected against in the gene pool. According to Speakman (2007), the reason why some people are able to maintain a normal weight is because the mutations spread through genetic drift, not directed selection.

Fetal origins of adult obesity

It’s now widely acknowledged that fetal nutrition shapes its metabolic phenotype (Jackson, Burdge, & Lillicrop, 2010; Pijl, 2011) and that an adverse intrauterine environment leading to low birth weight has been linked to later development of obesity and NCDs (Candib, 2007; Gluckman & Hanson, 2004). Candib (2007) summarizes several scenarios of what is sometimes referred to as the thrifty phenotype. In one situation, genes that maximize energy conservation (and thus lead to fat accumulation in energy abundant environments) are permanently switched on by the fetus. In this scenario childhood and subsequent adult insulin resistance lead to TTDM in adulthood. The second scenario comes from animal models. In this scenario, the uterine
environment programs the biologically plastic fetus for present—and likely future—existence in a scarce food environment. If an environmental mismatch occurs, a predisposition to caloric hoarding happens. This leads to childhood, and later adulthood, fat storage. For a full discussion of animal studies and epidemiological studies highlighting the idea of the thrifty phenotype, see Candib (2007).

An evolutionary perspective on insulin resistance

Insulin resistance links to a number of metabolic irregularities including, but not limited to, hyperglycemia, hypertriglyceridemia, low plasma HDL-cholesterol levels, hypertension, and abdominal obesity. Collectively, this disease cluster is referred to as 'metabolic syndrome.' Pijl (2011) notes the complex gene-environment interactions involved in insulin disruption, placing particular importance on our ancestor's dietary switch from a carbohydrate-based to a protein-based diet. Because of the brain's reliance on glucose for energy requirements, this dietary shift promoted brain growth and, concurrently, presented a threat in the form of glucose deprivation. When seasonal food deprivation occurred, insulin resistance may have functioned as a survival benefit, providing the much-needed glucose for the maintenance of brain health. This scenario incorporates the seasonal cycling of fat storage seen in undomesticated animals and most likely includes HG. Here, Pijl (2011) places particular interest on the role of fat in the pathogenesis of insulin resistance. Later, the industrial revolution marked yet another dietary shift whereby carbohydrates returned as the dominant macronutrient. As previously mentioned, mechanization and other technological innovations made the availability and consumption of refined sugars ubiquitous. In this dietary environment,
insulin resistance no longer conferred a selective advantage. Instead, high levels of circulating blood glucose predisposed individuals to TTDM.

In dietary novel environments, insulin resistance may have played an advantageous role in our ancestors’ brain growth and development. Food staples and food-processing methods occurring during the Agricultural and Industrial Revolutions mark great shifts in the micro and macro nutrient components of the human diet. Under permanent environmental change, a genetic mismatch underscores the phenotypic human propensity to obesity, TTDM, and other NCDs (Candib, 2007; Cordain et al., 2002; Cordain et al., 2005; Pijl, 2011).

Throughout most of human history, obesity was never a common health problem, nor was it a realistic possibility for most. That all of humanity has been subjected to natural selection by famine probably explains humankind’s natural tendency to gain weight easily when food is abundant (Prentice, 2006). Brown & Konner (1987) and, later, Brown (1991) highlight the ubiquity of food shortages in our evolutionary past and their contribution to a biocultural hypothesis in development of obesity. For females, larger energy (or fat) reserves serve as a selective advantage. These reserves offer protection - for their own survival, and that of their fetuses, and/or nursing offspring during periodic famine. Seasonal accumulation of food energy is an evolved trait allowing humans to synthesize and store fat, aiding in defense during the inevitable times of food scarcity. In particular, the site and synthesis of adipose tissue in women (slow releasing peripheral fat) was probably selected for to guard against the selective pressures and nutritional demands of both pregnancy and lactation. (I discuss this more below.)
Humans are among the fattest of all mammals. The proportion of fat to total body mass ranges from approximately ten percent in the very lean to over thirty-five percent in obese persons (Brown & Konner, 1987; Brown, 1991). For other mammals, fat deposits protect and provide insulation from the cold, whereas in humans, fat deposits serve as energy reserves, particularly in times of food scarcity as mentioned above. While our genome accommodates the propensity to become obese, obesity is not necessarily inevitable. Humans are not biologically destined to become obese (Astrup, 2001). A biocultural model explains the human predisposition and, specifically, "attempts to understand iterative and complex interactions between human culture, ecology, biology, and history (including our evolutionary history)" (Brewis, 2011, p. 9). Fat-causing traits that were adaptive in past environments have become maladaptive in food-rich environments (Chakravarthy & Booth, 2004). Additionally, from a socio-cultural perspective, fatness may have been 'selected' for as it represents and symbolizes both material and reproductive success (Brown and Konner, 1987, Brown, 1991). Here, the interaction of genes and culture collide in contemporary society and are manifested in the current obesity epidemic.

Social epidemiology of human adiposity

The social distribution and epidemiological mapping of obesity elucidates further understanding of the complex ways that biology and cultural traits interact. It should be noted that, while the prevalence statistics for obesity and NCDs become quickly outdated (Prentice, 2006), generalized patterns emerge and aid in our understanding of the social distribution of obesity. I will briefly discuss the following four social
epidemiological facts: 1) sexual dimorphism; 2) the quick rise in obesity rates that follows rapid modernization of traditional societies; 3) the shifting trend of obesity to associate with poverty rather than wealth and 4) ethnicity as a predictor of elevated obesity rates (Brown & Konner, 1987; Brown, 1991).

Sexual dimorphism

Perhaps the most important component of sexual dimorphism is soft tissue – specifically, differences in the location of fat deposition. Indeed, "fatness, particularly peripheral or limb body fat, is the most dimorphic of the morphological variables" (Brown & Konner, 1987, p. 30). On average, men are larger in stature and total body mass while women have higher levels of subcutaneous fat. For purposes of this discussion, the site of the distribution of adipose tissue is the most salient. Women have a much larger degree of peripheral fat in the legs and hips compared to men. Of importance is the lack of association between peripheral fat and the development of NCDs whereas centripetal, or trunk, adiposity is positively associated with NCDs. Also noteworthy is the rate at which dimorphic fat deposition appears. While present in childhood, there is a marked fat increase of females during adolescence occurring just before the onset of sexual maturity. Cross-culturally, dimorphic fat distribution appears to be widespread (Brown & Konner, 1987). Sex differences also exist in the prevalence of obesity. Globally, females have a higher prevalence of obesity than males (Mendez et al., 2005). From an evolutionary perspective, selection has favored peripheral fat in females. This is due to the nutritional demands of reproductive fitness, specifically pregnancy and lactation. Peripheral fat serves several functions: it increases reproductive fitness as it’s associated with earlier menarche, regular cycling, and is
mobilized during the later stages of pregnancy and, subsequently, during lactation. Interestingly, current trends of reduced number of pregnancies and the reduction of breast feeding in developed nations may play a substantial role in obesity risk because of diminished opportunities to mobilize peripheral fat (Worthman et al., 1989).

**Affects of modernization on body fat**

Among anthropometric studies of traditional HG populations, there is little indication of obesity (Pontzer et al., 2012). Yet for groups or societies undergoing modernization, obesity quickly emerges. Here, per Brewis, 2011, I employ McGarvey’s (1992) definition of modernization which includes "fundamental changes in technological, social, and economical arrangements that accompany the rapid transition of small-scale local and regional economies". Shifts in diet, or the 'westernized diet,' appear to be the causal link between modernization and obesity. Here, shifts in dietary patterns via food processing and urbanization result in weight gain (Popkin & Doak, 1998). This trend has also shifted from urban to rural areas. In the majority of developing nations, overweight and obesity rates are highest in urban areas with ranges from 10 to 70% of the population. Concurrently, prevalence of overweight and obesity among rural women ranges from 4.5 to 65.6% (Mendez & Popkin, 2004). The role of the westernized diet, and the rapidity with which obesity appears, highlights the influence of socio-cultural factors in the obesity epidemic.

**Socio-economic status**

The association of obesity and SES has shifted. Historically, fatness has been positively associated with SES, symbolizing health and wealth. The classic example is found among Polynesian islanders who associate a large body with status (Prentice,
Yet, among traditional societies the social epidemiology of adult adiposity is not well documented (Brown & Konner, 1987). Among modern affluent societies, women’s SES and fatness are not correlated (McLaren, 2007; J. Sobal & Stunkard, 1989), marking a reversal of the previous, age-old association between SES and adiposity. Further, women of lower SES in developed nations such as the U.S. have higher fertility rates yet rely on formula feeding in lieu of breast-feeding. This marks a missed opportunity to mobilize peripheral fat stores (Brown, 1991). Among developing nations, poverty previously associated with low calorie intake, yet as a result of the nutrition transition, less expensive calorie-dense, nutrient-poor food is widely available (Candib, 2007; Mendez & Popkin, 2004; Popkin & Gordon-Larsen, 2004; Popkin & Doak, 1998). Due to the effects of the nutrition transition, developing societies are experiencing a diet high in saturated fats, sugar, and refined foods, but low in fiber - or the 'western diet' referred to above (Popkin & Gordon-Larsen, 2004). Indeed, these dietary changes are occurring at great speed and at earlier stages of the economic and social development of each country. The burden of obesity is shifting towards the poor (Popkin & Gordon-Larsen, 2004). Of particular concern is the fact that, for females, SES is the strongest social epidemiological predictor of obesity (Brown & Konner, 1987; Brown, 1991). Obesity is most prevalent among lower SES women (Allan et al., 1993). It is valuable to note the role of body image and the Western idealization of thinness as it pertains to the obesity epidemic. Social stigmatization of fatness (Brewis et al., 2011) may limit the rise in obesity. However, in "many developing countries this psychological brake has been absent" (Prentice, 2006; p96). This is, perhaps, partly responsible for the rise in obesity.
rates among those found in lower SES environments. I discuss body image and fat stigma specifically in chapters 2 and 3, respectively.

**Ethnicity**

The role of ethnicity in the social epidemiology of obesity is difficult to interpret. In the U.S., ethnic-specific groups known to have high rates of obesity include African Americans, Mexican Americans, Puerto Ricans, and Pacific Islanders (Brown, 1991). Recent literature shows that, for American women, obesity rates over a twelve year period from 1999 - 2010 overall showed no significant increase. However, when adjusted for ethnicity, non-Hispanic black women and Mexican Americans show statistically significant increases in obesity levels. Among non-Hispanic black women, 58.5% are obese; and 44.9% of Hispanic women are obese. The percentage of obesity among white women is 32.2% (Flegal et al., 2012).

In a naturalistic study of values related to body size, obesity correlates with ethnicity and SES, specifically among black women of lower SES (Allan et al., 1993). The authors attribute this to the subject’s shared social milieu whereby body ideals are less rigid and more flexible (i.e., a larger range of acceptable body sizes). From this study, the difficulty with interpreting the role of ethnicity in obesity is apparent. Ethnicity, SES, and cultural ideals related to body size (or body image) interact. Genetic transmission alone cannot explain the relatively higher levels of obesity found in certain groups.

The obesity epidemic and the associated NCDs represent a major threat to human health. Aptly referring to present-day people as "Stone Agers in the fast lane," Eaton et al. (1988) pinpoint the incompatibility of the modern human diet and our
genes. Profound changes in the human environment occurred too recently for our genome to adjust (Cordain et al., 2005). Indeed, "human pre-dispositions to obesity are found in both genetic and cultural traits that may have been adaptive in the context of past food scarcities but are maladaptive today in the context of affluence and constant food surpluses" (Brown, 1991, p. 32). The drivers, both historical and contemporary, include the pre-agriculture diet, the agricultural and industrial revolutions, evolutionary mechanisms, social epidemiological components, socio-cultural values and trends, and the nutrition transition. The sequence of dietary and ecological change was the initial catalyst for modern-day obesity; most recently, obesogenic environments foster what is quickly becoming the modal human body type (A. A. Brewis, 2011).

The global and the local

No longer living in relative isolation, rural Dominicans are connected to the 'outside' world in various ways. The dichotomy of the 'West and the rest' is no longer applicable. Instead, we see convergence via travel and immigration (Quinlan, 2005) and television (Quinlan & Hansen, 2013), and recently, via the internet specifically. Indeed, rural Dominicans are more 'worldly' than in the past. Development has ushered in a better paved road and water in 1999-2000 (Quinlan, 2004), cable television in 2004 (Quinlan & Hansen, 2013), cell phones, and now the internet in a few homes. While the village's geographic situation is considered rural, even by Dominican standards, development and modernization are having deleterious health consequences.

As previously mentioned, our genomic history lays the physiological foundation for the propensity to become obese. The nutrition transition and its accompanying
macroprocesses of more sedentary activities and employment set the cultural milieu for widespread obesity. Low SES also plays a significant role as its one of the major predictors for obesity. Specifically, low SES and residency in developing nations act synergistically to develop deleterious levels of body fat. Ironically, obesity has become the plague of those most marginalized, rather than an overindulgence of the rich.

This research attempts to simultaneously incorporate understandings of large-scale forces at work, as modernization and its accompanying social, economic, and technological changes (McGarvey, 1992) are ushered into rural Dominica. Appreciation of how structural forces affect on the ground, local situations is paramount (sensu Farmer, 2005). Indeed, basic understanding of socio-cultural, demographic, and economic factors that help to shape patterns of obesity, can aid in elucidating global distributions of obesity (A. A. Brewis, 2011). Certainly, culture does not exist in a vacuum. Attention to the iterative processes of the 'global and the 'local' afford a more all-encompassing, and thus appropriate, examination of body fat.

**Obesity and non-communicable diseases in Dominica**

A recent report by the World Bank ranks Dominica as having the highest obesity prevalence for women in the Eastern Caribbean (2012). (Other Eastern Caribbean nations include Antigua and Barbuda; Grenada; Montserrat; St. Kitts and Nevis; St. Lucia, and St Vincent and the Grenadines.) Impressively, it's estimated that in 2010 84.5% of women were overweight (inclusive of obese status individuals). Since 2002, it's estimated that rates of obesity grew from 31.5% in 2002 to 60% in 2010, with projections of that 65.3 percent of females will be obese this year (by 2015). As 2002
was at the very beginning of the modernization wave in the remote Dominican villages, there has likely been an urban-to-rural radiation of obesity during these World Bank study years. Remote villages, such as Bwa Mawego, have certainly had the greatest weight changes. Non-Communicable Diseases (NCDs) are the primary driver of mortality in Dominica. In 2010, the proportional mortality rates in Dominica were as follows: diabetes 9%, CVD 36%, and other NCDs 14% (World Health Organization, NCD country profiles, 2011). Regarding metabolic risk factors, overweight was estimated for seventy-one percent of Dominican women in 2008 (World Health Organization, NCD country profiles, 2011). Interestingly, overweight was the highest metabolic risk factor for women, (surpassing raised blood pressure, raised blood glucose, raised cholesterol). Research among villagers reveals that sugar (i.e., TTDM) and pressure (i.e., high blood pressure) are the top two health problems. Here, we see the potential of conflicting explanatory models (EMs) regarding disease causation. Locally, villagers identify TTDM and hypertension as the principal health threats, yet it appears that body fat has yet to be medicalized. Thus, body fat’s contribution to deleterious health is not recognized. This ‘perceptual space’ is the focus of the first piece of research (chapter 2) in order to establish local models of body fat. The ultimate goal here is explore how local models may interact, differ, and/or agree with biomedical models of body fat. Following, culturally sensitive and aware health campaigns aimed at prevention efforts can be suited for this community.
Research design & methodology

Data are drawn from research that took place during four trips between 2009 - 2013. Ethnographic data were collected using participant-observation (P-O), informal interviews with key informants, and focus groups. Anthropometric data was also collected, including body mass index (BMI). This mixed methods approach was used in order to capture a biocultural perspective of overweight/obesity. Specific methodology and sample sizes pertaining to research questions and approaches will be addressed in their corresponding chapters.

Participant-Observation and Informal Interviewing

I used P-O to gain a greater understanding of how bodies and body fat are viewed among residents. Bwa Mawegans are affective at and known for liming [Caribbean term for relaxing while engaging in creative conversation (Quinlan, 2004)]. Unless they are commercially employed, women are at home during most days doing housework, gardening, and tending to children. Walking to and visiting with women in their yards, home gardens, and homes is a daily fieldwork occurrence. Conversations naturally flow and I was able to ferret out initial understandings, conceptions, and terms for body fat. Key informants included residents with whom I developed an easy, working relationship, and could ask some of the more probing questions. Beginning with 'grand tour' questions (Spradley, 1979), I guided conversations on various occasions. For instance, the village seamstress was an invaluable source. She noted changes in women's figures over the years as they would return to her for a piece of clothing. Often, the resident would remark that the seamstress could use the measurements on file; the seamstress would counter with the fact that she needed new measurements due to
weight gain. Other key informants include women in whose homes I've stayed throughout different trips, and thus developed closer relationships. An expected social interaction in Bwa Mawego is to *check* someone. This is simply dropping by the person’s home for a visit and occurs on a regular basis. During these ‘checks’ I was able to have fruitful conversations and ask more specific questions. Themes included the acceptability of talking about body fat, explanatory models (EMs) (Kleinman, 1980), and descriptions of body fat. Canvassing the village, informal interviews were conducted in women’s homes and yards. All interviews were presented verbally, in English, Dominica's official language. (For formal interviewing methodology, see specific chapters.)

*Focus Groups*

Focus groups (FGs) are a valuable tool to gain a lot of understanding in a short amount of time. They take advantage of group dynamics and a flow of ideas via collective conversations (Kitzinger, 1994). Groups interviews are good for pilot and early-stage research to gain an emic understanding of subject matter. I conducted three FGs of 3-6 women. FGs lasted just over an hour and included topics such as body fat, body image, non-communicable chronic diseases, dietary choices and preferences, and dynamics of commercial occupation. FGs were recorded and entered into Microsoft Word documents so that exact phrases could be selected for quotations.

*Body Mass Index*

In order to consider the health implications of body image conceptions, physiological data must be present (Flynn & Fitzgibbon, 1998). Therefore, anthropometric data on all participants includes age and body mass index (BMI)\(^1\). As
mentioned earlier, BMI (weight in kilograms divided by the square of height in meters \([\text{kg/m}^2]\)) is the most useful population-based measure of obesity (World Health Organization, 2000). I measured height (stature) using a stadiometer and weight using a digital scale. I found BMI for each individual, and determined weight categories using the standardized cutoff points for underweight (BMI < 18.5), normal weight (18.5–24.9), overweight (25–29.9), and obese (30 and above). Graded classification of weight categories allows for meaningful comparisons among and between populations (World Health Organization, 2000). Beyond qualitative understandings of body fat, anthropometrics allow for an epidemiological snapshot of overweight/obesity among female residents.

In sum, hereafter in the dissertation, chapter 2 describes the research site, including its situation in the Caribbean, its history, the village situation culturally and regarding health. Chapter 3 is an ethnographic description of fat attitudes and realities in Bwa Mawego. Chapter 4 delves into village values regarding obesity. I examine intra-cultural variation of individual scores on the Attitudes Towards Obese Persons (ATOP) psychometric scale in association with various cultural and sociodemographic traits. Chapter 5 examines social clustering of obesity within the Bwa Mawego. There I identify some underlying pathways of local overweight and obesity epidemiology. Finally, in chapter 6, I draw some conclusions on state of overweight/obesity in Bwa Mawego as an example of a rapidly modernizing community.
CHAPTER 2
THE SETTING

Introduction

This chapter offers a geographical and historical context of the Caribbean, generally, and the study site, specifically. Historical consideration of the Caribbean provides insight into the immense ethnic diversity and various levels of economic development of the region. Next, socio-cultural trends common in West Indian societies are reviewed as they shed light on social phenomenon in rural communities. A brief history of Dominica is put forth, aiding our understanding of Dominica as a marginalized nation within the Caribbean. Lastly, the study site is described in ethnographic detail to help better situate the study.

A Brief History of the Caribbean

The Caribbean is a unique socio-cultural region (Horowitz, 1967) covering a land area of 91,000 square miles with a population of 36 million (Hillman, 2003). Hillman (2003) suggests that the region be divided into five areas: Greater Antilles (Cuba, Puerto Rico, Jamaica, and Hispanola); Lesser Antilles (Windward Islands – Dominica, Martinique, St. Lucia, St. Vincent and Grenada, and the Grenadines) and (Leeward Islands – Monserrat, Antigua and Barbuda, St. Kitts and Nevis, Saba, St. Eustacius, St. Barthelemy, St. Martin, and Guadeloupe); the Insular Caribbean (U.S. and British Virgin Islands, Barbados, Trinidad and Tobago, and the Netherland Antilles – Aruba, Bonaire, Curacao); islands in the region but not in the Caribbean Sea (Bermuda,
Bahamas, and the Turks and Caicos Islands); mainland countries with coastal Caribbean attributes [South America (Guiana, French Guyana, Suriname, and enclaves in Venezuela and Colombia), Central America (Panama, Costa Rica, Nicaragua, Honduras, and Belize), and the U.S. (Miami and south Florida)].

The Caribbean is a heterogeneous region yet shares a common history of colonialism, plantation economy, and slavery. There is considerable ethnic, linguistic, and religious diversity (D’Agostino, 2003). Each island’s socio-political landscape is related to its particular colonial history, the transition to independence, and the length of time spent under colonial control. Some nations experienced British parliamentary rule while others experienced Spanish-style authoritarian regimes and strong presidential campaigns. Further, some of the larger islands such as Haiti and Cuba have had major effects in the region’s politics as compared to the smaller islands, particularly in the Lesser Antilles.

The origins of the New World black slave culture is the subject of the Herskovits-Frazier debate (Smith, 1963; Yelvington, 2001). Herskovits argues for African cultural continuities throughout the Caribbean, supplementing with an index of various cultural survivals. Frazier counters with New World cultural creations in light of plantation slavery and the experience of discrimination. In short, blacks were another disenfranchised group, particularly in the eastern U.S. During the mid-twentieth century anthropologists were divided between these camps. Since then, Frazier’s viewpoints have fallen out of favor. Instead, West Indian culture is portrayed as an amalgam of African cultural continuities and New World creations (Baranov &
Yelvington, 2003). This process and designation is best described as creolization (Mintz & Price, 1992).

The Ortoiroid were the first group to inhabit the region. They were hunter/gatherers. Differences in the Caribbean from other pre-contact cultures and areas lie in development and scale – in numbers, diversity, and agriculture. Large-scale civilizations flourished in Meso-America and South America. Meanwhile, large-scale agriculture didn’t arrive in the Caribbean until the sugar revolution (Mintz, 1985). At the time of Columbus’ arrival in the West Indies, Caribs comprised the regions inhabitants. Northern Caribs (mainly in the Greater Antilles) reported their neighbors in the Lesser Antilles as “cannibals.” This myth was propagated by the sighting of human skulls in Carib camps. In reality, it’s more probable that it was a form of ancestor worship (M. B. Quinlan, 2004). This reputation was further fed by the reality of Dominica as a Carib (and maroon) refuge and political holdout to the transgressions of colonialism.

The West Indies were colonized primarily by the Spanish, English, French, and Dutch. Columbus arrived at the end of the 15th century. Spain dominated the region throughout the 16th century while creating the sugar economy. Spain decimated the Caribs in the Greater Antilles, creating a labor shortage for the sugar plantations. To solve the labor problem Spain began the African slave trade into the West Indies in the early 1600s. In total, between four and five million slaves were brought to the Caribbean (Randall, 2003).

The seventeenth and eighteenth centuries saw constant warfare with the colonialists jockeying for territory. Across the region slave revolts occurred. During the French Revolution in 1789, slaves in Haiti staged a revolt that would be the impetus for
the abolition of slavery. Under French rule, Haiti had become the most profitable non-Spanish sugar island. The profits were strictly due to the large slave population. After the successful slave revolt in 1804, 440,000 slaves were freed. The English were the first to abolish slavery while the Spanish were the last. In Jamaica during the twenty years following emancipation, the number of black land owners shifted from 2000 to 20,000. Following emancipation, the second wave of a labor shortage was created. The English solved this by bringing indentured servants from China and India to the West Indies. This added further ethnic blending to the region. By 1917 one-third of Trinidad’s population was East Indian.

The story of the Spanish Caribbean was quite different. Abolition didn’t occur in Cuba until 1886. A revolt ensued and this created trade conflict between the Spanish and the U.S. resulting in the Spanish American War of 1898. As a result Cuba became a protectorate and Puerto Rico became a U.S. territory. U.S. hegemony continued in the region until the 1930s. Suffrage was extended to the region during the 1930s and 1940s and to the Windward and Leeward islands in 1952 (Randall, 2003).

By sheer numbers the most widespread language is Spanish. Sixty percent of West Indians are Spanish speakers – primarily in Puerto Rico, Cuba, and the Dominican Republic. French comprises twenty-two percent of the region’s speakers found in Haiti, Martinique, and Guadeloupe. French is spoken alongside English in Dominica and St. Lucia. English is the third most spoken language with seventeen percent. Lastly, Dutch is spoken by one percent of the population (Pantin & Attzs, 2003).

With the exception of Bermuda, the Caribbean lies solely within the tropics. While the region is known for its cultural diversity, this creates a shared environmental
element in terms of ecology (Boswell, 2003). Most people in the Caribbean are smallshare farmers yet fifty percent of the region’s food is imported. This unique juxtaposition illustrates the Caribbean’s dependent status. Further, the Caribbean has entrenched ‘structural dualism’ (McGregor, 2003). In this context, large-scale commercial farmers use the best land for export while small-scale private farmers are relegated to the steep hillsides. These marginalized areas are home to the peasantry class throughout the West Indies. (The study site is an example of this.)

The Caribbean supports three major sectors - agriculture, extractive industries, and tourism. Agriculture and tourism are the largest sectors. Unlike Dominica, tourism is an economic boom for some islands. Dominica supports some eco-tourism, and one cruise ship a week lands there, so their tourism economy is small. However, Gmelch & Gmelch (2000) note the ‘multiplier effect’ whereby demands and goods are needed from the service and construction industries. This may be to the detriment of the environment. Even on Dominica, some of these effects occur. The Caribbean faces three areas of environmental degradation: biological diversity (loss of flora and fauna), topsoil erosion due to landslides (Haiti is the most extreme example), and marine life (coral and fish depletion) (Boswell, 2003).

The Caribbean is one of the most ethnically diverse regions in the world (Hillman, 2003). Ethnicities include Amerindian, African, Euro-Caribbean, Black Carib/Karifuna, Indo-Caribbean, and Chinese-Caribbean. West Indian racial identity is defined by gradations of light or dark skin color, rather than ‘pure’ racial types (Baranov & Yelvington, 2003). Racial variation can be understood as a continuum (Hillman, 2003). Most West Indian islands have class hierarchies that correspond to skin color.
gradations of white as the highest class, blacks as the lowest, and the various brown to red shades in the middle. Skin color often depicts class status. For the majority of the Caribbean a white aristocracy makes up the upper class with various brown and red shades in the middle class. Blacks comprise the lower class. Dominica is one of four islands (Grenada, St. Lucia, and Haiti) where racial relations are distinct from the rest of the Caribbean because resident upper-class whites are nearly, if not completely, absent. Dominicans are of mixed Native American, African, and European ancestry (Honychurch, 1995).

**Socio-cultural trends in the Caribbean**

Dominant socio-cultural trends found in West Indian societies – matrifocality, kinship, and social networks (Clarke, 1957; Kerns, 1997; Quinlan, 2006; Wilson, 1969, 1973) and reciprocity (Kerns, 1997; Macfarlan, Remiker, & Quinlan, 2012) - elucidate shared body image conceptions across the region. Matrifocality is a common occurrence in the Caribbean (Quinlan, 2006; Macfarlan et al., 2012; Macfarlan, 2010; Clarke, 1957; Kerns, 1997; Wilson, 1969, 1973). Matrifocality is a feature in which mothers and adult daughters often form the household core. It occurs in impoverished communities where females in their roles as mothers are the focus of relationships within households (Smith, 1963; Quinlan, 2006). Female-female social relationships are affectively close, long lasting, and predicated upon kinship, the domestic unit, or church groups (Dirks, 1972). Engaging in exchange relationships in domestic tasks, such as child rearing, cleaning, and food preparation, strengthens female social bonds and results in matrifocality. Reciprocity between mothers and daughters often forms the
core of stable family relations (e.g., Kerns, 1997). For women, kinship and social networks largely overlap. Indeed, these sociocultural trends overlap and act synergistically among West Indian women.

A Brief History of Dominica

Dominica is unique in the Caribbean in that it is the most mountainous, least developed, and one of the most rural islands (Honychurch, 1984; Quinlan, 2004) with a population of 71,684 in 2012 (World Bank). More than anything, environment has shaped its course. With an elevation of over 5000 feet, the Carib word for Dominica is “Waitikubili” meaning “tall is her body” (Honychurch, 1984). The Commonwealth of Dominica lies between the French departments of Guadeloupe to the north and Martinique to the south. The island is twenty-nine miles long and sixteen miles wide. Its inhabitants are Carib, African, and European descent. English is the official language but a French Patois is the ‘language of the people.’ Roseau is the capital with about 90 villages scattered throughout the island (Quinlan, 2004).

The first inhabitants of Dominica were the Arawaks. They arrived on the island around 400A.D., coming from the Orinoco river valley in South America. They fished, hunted, and relied on processed manioc (cassava). The second group was the Caribs – also coming up the Orinoco valley – arriving on the island around 1200A.D. As mentioned earlier, the Caribs developed a reputation throughout the greater region as warring cannibals. While the warring was true, their cannibalism was a false myth. Dominica is still home to the Caribs. Initially, Caribs found solace from island settlers in Dominica’s rough interior. The Carib (or Kalinago) Territory was designated in 1903 on
the island’s east coast, consisting of 3000 acres (Quinlan, 2004), not far from the study site.

Both the French and English claimed Dominica in 1627 but neither did much with it. The larger islands, specifically in the Greater Antilles, were preferred since the Caribs had been subdued there and the landscape was more conducive to sugar plantations. Dominica was also home to maroons from other islands. There was substantial mixing of Caribs and Africans. In the early 1600’s a slave shipped in route to Barbados wrecked near St. Vincent. The British captured the slaves and sent them to Tortola. From there, the maroons went to mainland Belize and Honduras (Kerns, 1997), and other maroons went to Dominica. This led to thirteen chief-lead maroon camps in Dominica’s interior and east coast (Quinlan, 2004).

French settlers came to the island in the early 1700s, paving the way for imperialism. The French grew coffee (This was one of the only cash crops that could survive Dominica’s landscape). In 1763 the French ceded the island to the English. Soon after Roseau and Portsmouth became free ports where tax-free purchases of slaves could be made (Honychurch 1985, Quinlan 2004). At this time, the English introduced sugar estates. The sugar industry came late and in small scale to the island. As well, the estates in Dominica had absentee landowners. This was vastly different than the plantations on the sugar islands. Because of these absent colonists, Dominica lacked a white aristocracy. Dominica and only three other islands – Haiti, St. Lucia, and Trinidad – is not ruled by a white majority. Whites are largely absent in these islands. Instead of skin color denoting social class, language acts as the major determinant. Here, a town-rural dichotomy exists. The upper class speaks West Indian English not Dominican English.
Creole or Patwa. The middle class speaks Dominica English Creole and may use Patwa as a trade language. The lower class (or peasantry) speaks the two Creole languages. Some of the most rural inhabitants speak only Patwa. The study site is home to a few of these individuals (Quinlan, 2004).

The French took back the island in 1778, then it was returned to the English in 1783. Dominica stayed under English rule until it gained United Kingdom Commonwealth status in 1978. There are French, English, and Carib cultural traits in Dominica. In many ways Dominica is unique in the Caribbean. It is rural, (relatively) underdeveloped, and lacks a major tourism industry (Quinlan, 2004). Yet it shares many of the socio-cultural traits commonly found in West Indian societies – matrifocality, kinship, and social networks (Clarke, 1957; Dirks, 1972; Wilson, 1969; Quinlan, 2006; Macfarlan, 2010). Using these shared traits is a jumping off point for public health research. Women’s networks primarily consist of female relatives (Dirks, 1972). Mothers, daughters, and their children form the household (Quinlan, 2006). Women (mothers, daughters, sisters, nieces) procure food, cook, clean, and eat together.

**Research Site: Bwa Mawego, St. David’s Parish**

The village of Bwa Mawego (village name is a pseudonym) is located on the windward (Atlantic) side of Dominica. It’s rugged and rural even by Dominican standards. The village is located about a half-hour drive from a main road at the end of a narrow, mountainous road. The population of the village has been declining in the past 15 years, fluctuating as villagers come and go for temporary work, school, and to visit family (Macfarlan & Quinlan, 2008). The village has a population of approximately
500–600 residents living in 180 households (Decker and Flinn, 2011). Women are more than twice as likely to emigrate from the village than men (Quinlan, 2005). Average annual income in Bwa Mawego is approximately $5,000 E.C. ($1,850 U.S.). Economic opportunities are limited, and many villagers have emigrated either temporarily or permanently in the past three decades. Commercial employment includes fishing, running a rum shop, teaching school, driving a transport (shuttle to the capital, Roseau), and part-time trades such as electrician or carpentry. Young women are now finding clerical work in Roseau. Production of bay oil or baw den, an ingredient used to make perfumes and soaps, is the most significant financial contributor to many households (details below).

Ecologically, the village is rugged and steep. It sits between 1400 foot mountain ridges that are steeply sloped to the sea (Beard, 1949). "To Dominicans, Bwa Mawego's most remarkable feature is its geographic situation. It's remote - a village in the bush - even by rural Dominican standards" (Quinlan 2004, p. 22). Bwa Mawego is a veritable tropical garden, with the majority of the land cultivated or covered in greenery. Annual rainfall levels on the windward coast vary from 100 - 150 inches. The most typically cultivated trees include coconut palm, mango, breadfruit, soursop, avocado, coffee, and cocoa.

There is one continuous, looping road leading into and out of the village. There is currently construction on connecting the road to the next village over. Although, it must be noted, this work has been in progress for years. As such, the village remains relatively isolated. The road is not directly accessible to all hamlets and homes. There is a network of footpaths. These paths cut through the bush (or rainforest) and yards, bathing and
water-catching spots connecting the village. Referred to as "tracks," they must be maintained in order to keep them as accessible as possible. Many of them are often very steep and rather slick and dangerous due to rain. With the road expansion and increase in transports, the road is now used as the primary transportation route for many, with the exception of the most remote homes and areas.

Bwa Mawegans are traditionally horticulturalists. The majority of the land in the village is cultivated with dispersed settlements among twelve hamlets (Macfarlan, 2010). Most Bwa Mawegans maintain a bush (rainforest) and home garden. Bush gardens are maintained primarily by males and contain food staples such as taro (or "dasheen") and yams. Historically, root crops make up the bulk of the rural Dominican diet. Other important root crops include bitter manioc, yams, bananas, and plantains. Gardens are either cleared from secondary forest at the village’s periphery or larger gardens are cleared in the bush. Home gardens consist of herbs used for cooking and medicinals as well as flowers.

Bay trees are cultivated in steep areas of the village on family plots. The fallow plots are otherwise too steep and rocky for other cultivation. Bay oil production is a labor-intensive, multiphase process. This is often an extended family affair as the family owns the bay leaf and still (known as a "factory") (Macfarlan, 2010; Quinlan & Flinn, 2005). The factories are pavilions built over oil stills. This distilling process typically occurs twice a year - during the summer months in order to provide cash for school costs (books, supplies, uniforms) and before the Christmas holiday.

The people of Bwa Mawego live in small (150–600 ft), mostly one- to three-room houses of wood or cinderblock. Roofs are corrugated steel or galvanized tin. A majority
of the homes have two outbuildings - a kitchen and a latrine. Kitchens are comprised of a shed with a table for food processing, a stool or two, and either a hearth for cooking with wood, a propane stove, or both. The latrines are deep and covered with a stool or sometimes a retro-fitted toilet seat. The vast majority of houses have electricity. Often, families build their houses in compounds. Although there is a lot of variation in construction and composition, compounds may include the grandparent's house and a few houses of (usually) their daughters and grandchildren. There may or may not be a shared yard space, with an outdoor kitchen and a latrine. Often, homes have their own yard, kitchen, and latrine.

In 1999-2000 the village obtained piped water. This resulted in a reduction of the daily amount of time women spent on chores going back and forth to the nearest river or spring. No longer do women spend their day at the river or stream doing laundry and carrying water to their home (Quinlan & Hansen, 2013). Standpipes have brought water into close proximity to most homes. Many residents have plumbing in their residences and/or family compound making water readily accessible. A few homes now have washing machines. Piped water and, now, the few washing machines are two significant changes in the day to day lives of women.

Because Bwa Mawego is a matrifocal community, the typical house contains a mother and her children. Sometimes the mother’s spouse or boyfriend also resides there. Household makeup varies but may also include grandparents and grandchild; a woman, her children, and one or two of her sister’s children; or, a woman, her husband/boyfriend, their child, and the woman’s brother. Single men and elderly widows may live alone yet still within a family compound. Once a child is born, couples
sometimes together. There are no sets of housemates in the village. More, almost everyone in the village is related through consanguineal or affinal links (Quinlan & Flinn, 2005).

Opportunities for secondary school began in 1980. During the following twenty years, government assistance provided opportunities to the best few rural students to attend secondary schools in Roseau (Quinlan & Quinlan, 2007). In conjunction with this increased education, living in and/or commuting to town afforded these select students with an urban experience. As of 1998 there is a secondary school located a few villages away and education is now compulsory to graduation or age 16. Additionally, some young men and women attend college (the 12th and 13th year of school [equivalent to a high school diploma in the U.S.]). This level of education is expensive and is afforded by a select few. Young women comprise the majority of college students. Most students live in the capital while some commute back and forth.

Regarding physical appearance, Bwa Mawegans resemble Black Caribs, or Garifuna, of Central America (Kerns, 1997). Bwa Mawegans (and the majority of east coast residents) are ancestors of the Maroons and Caribs that retreated to the island's rugged east coast in order to hide from the European colonialists. The Carib Territory is about five miles north of the village. Villagers' appearance is more similar to Native American ancestry than African ancestry. Amerindian skin tone, cheek shape, and eyelids predominate. Hair is typically curly 'Afro' hair. Straight hair is referred to as "Carib" hair. Evidence of European ancestry also exists - there are a few villagers with Carib hair and green or blue eyes.
Concerning ethnicity, as noted earlier, due to a lack of white aristocracy on the island, Dominica historically lacks the skin color-based social status that prevails in other Caribbean islands. The same holds true for rural Dominicans. Save for the Peace-Corp volunteer, the ever-present Jehovah's witnesses missionary that frequent the residents' yards, and the anthropologists, white people are a rarity in the village. Rural Dominicans recognize differences in skin color. Verbal descriptors that differentiate skin tone and shade exist. "Fair" or "clear" (i.e., pale) is considered attractive yet does not factor into mate or friendship selection. Among siblings there are references to one being the "red" one, another as the "brown" one, and another being the "black" one noting the variation. Caribs are considered red. Additionally, a common vernacular use of the word "race" refers to a genetic influence. For example, when stating that diabetes or high blood pressure has a genetic component, a respondent may say "It's they race." (i.e., "It's genetic."). "Race" is also indicated in shared body types and size among kin, noting a propensity for certain body sizes and shapes to be predominate in a family.

Rural Dominicans have an indigenous medical system referred to as bush medicine. Traditionally, this system is the frontline of healthcare and largely revolves around herb and plant-based remedies found 'way out in the bush'. [See Quinlan (2004) for a full treatment of bush medicine.) Based in a hot-cold humoral theory, medical culture in Bwa Mawego dictates that 'balancing' the body is the number one priority for proper health maintenance. Sustaining a "harmony between work and play, sitting and exercise, and so forth", humoral theory balances oppositional forces (i.e., humors) of hot and cold, and wetness and dryness (Quinlan 2004, p. 71). Specifically, health is maintained by the following: 1) eating a balanced diet; 2) not letting your body
becoming either deeply chilled or overheated; 3) getting enough sleep but not to the point of laziness; 4) exercising but not to the point of exhaustion; and 5) keeping the blood clean.

Local medical theory, based in hot-cold humoral theory, asserts that bodies are made of meat. The body, composed of tissues and blood, acts similar to meat and gravy. Analogous to meat and gravy, blood and other bodily fluids respond to heating and cooling, thinning when warm and thickening when cool. A consistent and flowing body-fluid viscosity is the focus, with primary importance placed on blood. Treatment of a "cold" illness is offset with a "hot" herbal remedy; conversely, treatment of a "hot" illness is offset with a "cold" herbal remedy. It should be noted that an exception to rural Dominican humoral theory is the addition of "neutrality". Not all illnesses are hot or cold, just as not all plants and herbs are hot or cold. Many are considered "neutral". "Bush teas" are the most common form of treatment. Remedies are widely-known among village adults and efficacious for commonly occurring illnesses (Quinlan & Quinlan, 2007). Quinlan (2004) found that bush medicines exhibit high pharmacological activity with about thirty bush medicines that are highly salient throughout the population. Body fat is considered to be 'hot' and "plenty fat" can make an individual extra hot. In line with local humoral theory, this state of heat must countered with a 'cooling' remedy.

Villagers’ access to biomedicine has been limited in the past. There was a local health center offering vaccinations and a scant supplies of first aid and medications (such as Ibuprofen). The nearest doctor was a 45 minute drive from the village while the closest pharmacy was a one-and-a-half to two-hour drive (Quinlan, 2010). Money and
access acted as barriers to biomedicine; bush medicine is accessible, free, and efficacious for day-to-day illness episodes. Presently, the village health center has been closed down and there is a clinic located in the neighboring village. Residents can get a ride, on a transport or on the newly acquired school bus, for a relatively low fee. Individuals with NCDs (most typically hypertension and TTDM) sometimes go for weekly visits to the health center.

Various effects of development have shifted dietary composition patterns. Villagers are moving away from a strictly traditional diet. Snack foods, soda, and refined pasta and rice are now ubiquitous in the village. Village shops used to carry basic staples such as sugar, flour, and tins of milk, (plus rum) processed foods and drinks are now normal. Daily transportation to "town" is available. Residents may go to town to shop or work. As well, some residents (primarily young women) commute back and forth or stay in town during the week to attend 'college' or work. On a village level, processed foods and drinks are readily accessible. On a household level, some families have replaced traditional food and drinks with ready-made and processed items. One example is replacing and/or substituting natural fruit juice with soda. Another shift is replacing the traditional provisions (taro, yams, plantains, and breadfruit) with a refined carbohydrate like rice or pasta. On an individual level, certain residents have increased access to consumable processed foods and drinks during frequent trips or stays in town.

In the past, residents of Bwa Mawego have enjoyed a healthy life. Life expectancy for Dominicans is 74. For the rest of the Caribbean life expectancy is 66 (Quinlan, 2006). Within the context of the Caribbean, Bwa Mawegans are some of the poorest, yet healthiest, population. There is a lack of infectious disease. Water-borne illnesses that
persist in much of the region have low prevalence rates due to the abundance of clean water (Quinlan, 2004). Residents are transitioning into an epidemiological state marked with NCD’s. As noted in chapter one, in 2010 the proportional mortality rates in Dominica were as follows: diabetes 9%, CVD 36%, and other NCDs 14%. Overweight is listed as the primary risk factor for women, indicating overweight status among 71% of the population (World Health Organization, NCD country profiles, 2011).

As might be predicted, the village is undergoing rapid development (Quinlan & Quinlan, 2007; Quinlan, 2005). However, consequences of development may act in unpredictable and diverse ways (Pena & Bacallao 2004). Education, commercial employment, and consumerism are increasing. Cable television came to the village in 2004 (Quinlan & Hansen, 2013). A few homes now have internet, cell phones are ubiquitous, and travel to/from town is frequent as is inter-island migration (Quinlan, 2005).

The Dominican Ministry of Health is now turning its attention to non-communicable disease (NCDs) and its associated risk factors, specifically elevated blood pressure and type two diabetes mellitus, as these conditions typically follow modernization due to a nutrition transition (Popkin and Doak 1998, Mendez and Popkin 2004) and obesogenic environmental changes (Lieberman 2008). Public health campaigns aimed at raising awareness of the harmful effects of extra body weight and elevated blood pressure and blood sugar are on the rise. For example, radio announcements and fliers promote hiking activities and encourage Dominicans to "Get healthy."
CHAPTER 3
"COMING FAT": A BIOCULTURAL ETHNOGRAPHIC STUDY OF BODY FAT

"Obesity is culturally entrenched and any hopes of dealing with the health consequences should begin with cultural patterns and perceptions, including how obesity is internalized by society" (Saryee & Lende, 2011).

Introduction

In the rural Caribbean village of Bwa Mawego, residents commonly make candid remarks about an individual's body, specifically about body fat. "You coming fat" is a local idiom indicating weight gain. It's met with different remarks depending on the context. It may be extended as a compliment (perhaps signifying happiness, health, or a well-fed lover), a teasing, flirty joke, a non-judgmental appraisal, or a derogatory comment meant to convey that a body is 'out of sorts' (i.e., not healthy, attractive). This unguarded banter is part and parcel of everyday dialogue in this small, kin-based (usually caring, often meddling) community. Straightforward and direct, Bwa Mawegans casually talk about bodies and body fat. Hearing "You fat, wi?" (You're fat, right?) hurdle so honestly into conversation provided the initial impetus for this study.

As Brewis (2011) points out, when studying body fat, the answer to the research question largely depends on the scale of the question. The opening chapter introduced large-scale, upstream forces largely responsible for the obesity epidemic. I offered evolutionary mechanisms indicated in the ability to convert an influx of calories into stored body fat were offered. Shifting into the present, research indicates an obesogenic environment rich in calorically dense and nutritionally weak foods as the cause for widespread obesity (among other inputs such as sedentary work environments and
leisure time 'activities') (e.g. Lieberman 2008). The processes of modernization and development are the drivers responsible for the speed and scope of global weight gain. Globally, the emergence and rise of obesity among the majority of populations indicates a universal capacity for obesity (Lev-Ran, 2001); in order to understand this biological phenomenon, local context must be considered (Brewis, 2012). Merging the local and the global will aid in situating global patterns of obesity within an ethnographic context. Assessing local models of body fat and attitudes towards obesity will help determine if and how rural Caribbean residents reflect cross-cultural and globalizing patterns of obesity. As such, the inquiry of this research is three-fold: 1) What are the local models of body fat? How do residents characterize body fat?; 2) Clinically speaking, are Bwa Mawegan women fat? Do rates of overweight and obesity mirror national and large, Westernized national rates?; and, 3) How do local models of body fat compare to biomedical models of overweight/obesity? If overweight/obesity is negatively affecting the health status of Bwa Mawegan women, it is important to understand potential conflicts in local and biomedical models of fat.

Ritenbaugh describes the tendency for "conceptual fusion" of biological data with biomedical categories (1982, p. 349). The former is a measurable human universal; while biomedical categories are culture-specific constructs which point to the hegemony of biomedicine. This fusion is applicable to obesity studies. While one might expect biomedically trained clinicians, as well as individuals from WEIRD populations [i.e., Western, Educated, Industrialized, Rich and Democratic populations, per Henrich et al. (2010)] to fuse biology with biomedical categories, such fusion is not a given amongst all members of societies. Clinically, obesity is a risk factor because of its co-morbidity with
NCD's and has been designated as a disease by the American Medical Association (Fitzgerald, 2013). Yet, the clinical message may not translate in local contexts where larger bodies are historically acceptable or preferred. Among U.S.-based study populations, body image assessments reveal disparities between women's perceived risk and actual levels of obesity (Bennett & Wolin, 2006; Flynn & Fitzgibbon, 1998) whereby a "cultural divide in body classification systems" is evident (Tookes, 2013; p. 115). It is imperative to approach the study of body fat as it is locally constructed. Investigating local models of body image, specifically of body fat, sheds light on conceptual discrepancies. In turn, preventative efforts may be informed of potentially conflicting models of overweight/obesity.

In 2011, I found through freelisting (Quinlan, 2005) (N = 27) that TTDM and hypertension are the most salient two health problems among Bwa Mawego residents. Nationally, Dominica mirrors pan-Caribbean mortality drivers [TTDM (9%), CVD (36%) and other NCDs (14%)]. Overweight is the highest metabolic risk factor for females, surpassing raised blood pressure, raised blood glucose, and raised cholesterol. Yet, unsurprisingly, overweight/obesity is not referenced by villagers as a designated health issue per se. Findings will address the void in disparities between ethnomedical and clinical models of fat.

Background literature

Body image & body fat

Conceptions of the body consist of culturally-driven (learned and shared) norms about the body, including an optimal size and shape and amount of body fat (Quinlan,
The 'thin ideal' dominates primarily white, Western-based populations as the ideal body type; it's associated with beauty and self-control (Brownell, 1991). The association with traits such as self-control and individualism symbolize highly regarded social traits in Western populations, particularly in the U.S. Additionally, 'fat' is considered 'bad' and 'unattractive' and may symbolize an individual's lack of corporeal control (Bordo, 1993; Jeffery Sobal, 1995). Conversely, many parts of the world espouse positive valuations of corpulence, particularly for women, in which 'plump' bodies are preferred (Brown & Konner 1987; De Garine & Pollock, 1995). Explanations for fatness do not adhere to medicalized, Euro-American standards of 'normal' and 'healthy' body sizes which endorses a thin ideal (Gremillion, 2005). For example, the Azawagh Arabs of Niger (Popenoe, 2004) encourage fattening to the point of immobility to signify accelerated puberty, enhanced sexuality, and to prepare girls for marriage. Among the Kipsigas of Kenya (Jasienska, 2013), fatter brides stipulate higher bridewealth payments (Borgerhoff Mulder, 1988 in Brown & Sweeney, 2009). In populations plagued by famine, fat storage conveys survivability rather than risk. Brown and Sweeney (2009; p. 10) suggest that a large body size for women signifies health, prestige, or maternity rather than obesity in and of itself. However, thin ideals are permeating 'the West and the rest' boundaries with research showing the influences from Western-based media messages and images (Becker, 2004).

**Afro-Caribbean body image & ethnomedicine**

Cultural ideas about the nature of the body and illness - also pervasive cultural philosophies - converge in an ethnomedical system. "Many people regard a person's body, not only as an assemblage of physical parts, but as a whole person with social
needs, obligations, and a reputation to uphold" (Quinlan, 2011; p. 384). Dominant socio-cultural trends found in West Indian societies – matrifocality, kinship, and social networks (Clarke, 1957; Kerns, 1997; Quinlan, 2006; Wilson, 1969, 1973) and reciprocity (Kerns, 1997; Macfarlan et al., 2012) elucidate shared body image conceptions across the region. Matrifocality is a common occurrence in the Caribbean (Quinlan 2006; MacFarlan 2010; MacFarlan et al. 2012; Clarke 2000; Kerns 1997; Wilson 1969, 1971, 1973). Matrifocality is a feature in which mothers and adult daughters often form the household core. It occurs in impoverished communities where females in their roles as mothers are the focus of relationships within households (Smith 1996; Quinlan, 2006). Female relationships with other females are affectively close, long lasting, and predicated upon kinship, the domestic unit, or church groups (Dirks, 1972). Engaging in exchange relationships in domestic tasks, such as child rearing, cleaning, and food preparation, strengthens female social bonds and results in matrifocality. Reciprocity between mothers and daughters often forms the core of stable family relations (e.g., Kerns, 1997). For women, kinship and social networks largely overlap. Indeed, these socio-cultural trends overlap and act synergistically among West Indian women.

Afro-Caribbean women's conception of body image is multi-factorial and is conceptualized differently than Western constructs of body image. Below are a few examples illustrating social trends that highlight a pan-Caribbean emphasis on matrifocality, sociability, kinship, and mutual support among women. Sobo's (1994, 1993) reckoning of the Jamaican body as a physical display of familial ties and as an index of social networks is valuable. In rural Jamaica, the ideal body is a plump body. A plump body is an index of social networks in which a person is enmeshed. It is symbolic
of individual character traits that effect social connectedness such as ability and willingness to forgive. It is a mark of fertility. Conversely, weight loss signifies social neglect, unkindness, unwillingness to share, and infertility. In Jamaica, pan-Caribbean socio-cultural trends are rather evident in notions of an ideal female body. She is connected to kin and social networks and displays acts of reciprocity via food sharing (among others). She's cared for and cares for others; and, her body is a social display of these characteristics.

For young Belizean women body shape, not size, is the most salient factor in body image and communal appraisals of beauty (Anderson-Fye, 2004). Experiencing rapid social change via the tourism industry, women's bodies are referred to as "Coca-Cola" [bottle] shape or "Fanta" [bottle] shape. Coca-Cola is an hourglass shape with the upper curve being a bit smaller than the lower curve. A Fanta shape is more slender on top, gradually increasing in diameter into a pronounced lower bottom. Anderson-Fye (2004) notes that it's split 50-50 as to which soda has the better, more preferred womanly shape. Yet the unanimous joke is that no one wants to have a "Diet Coke" shape because it's "straight shape" or "no shape" or 'bad shape" and is highly undesirable. (At the time Diet Coke only came in cans until plastic was introduced two years later.) An emphasis is also placed on wearing clothes well. Additionally, Belizean high school girls share an ethnopsychological principle referred to as 'never leave yourself' (Anderson-Fye, 2003). This guiding philosophy signifies not succumbing to body image dissatisfaction associated with Westernization, particularly in the wake of media exposure upholding a thin ideal. This concept of leaving and not leaving the self is dichotomized in which either one or other is the option. Young women report that they learn this principle from
their mothers, grandmothers, aunts, older cousins, and other important women in their lives. The concept may be applied to unwanted sexual advances from men, not performing well in school, or not drinking alcohol with peers. It's a self-protective metaphor used by young women to support positive decision making. It also reflects the influence of female relationships among West Indian women. Anderson-Fye's (2004) Belizean work offers a situation whereby the Western thin-ideal has yet to permeate local models of body image. Despite the onslaught of modernization, young Belizean women are maintaining more traditional notions of body image.

**Ethnophysiology of fluids & fat**

Local concepts of anatomy and physiology help to elucidate how a group addresses health issues (Quinlan, 2011). From an ethnophysiological perspective, an emphasis on maintaining a continuous, unimpeded flow of fluids through the body is common among those who value reciprocity and emphasize the obligation kin have to share with one another. One aspect of rural Jamaican women's body image is a focus on body fluids (Sobo, 1994; 1993). This emphasis on maintaining an unimpeded flow through the body symbolizes reciprocity and obligation to kin. A similar principle is found in rural Dominican ethnophysiology where balance and cleanliness are the two main principles (Quinlan, 2004). Following humoral theory (Foster, 1994), bodies function best at a neutral, warm state of equilibrium regarding 'hot' and 'cold' influences. Under this guiding principle the objective is to maintain equilibrium regarding food and drink intake & elimination of waste (Quinlan & Quinlan, 2006). Moreover, food sharing is symbolic of social relations and kinship. Mothers feed children, kin feed kin, and lovers feed each other (Sobo, 1993); the same holds true for
the study site. A healthy body symbolizes a well-cared for body that is adequately fed and 'full up' (i.e., healthy and strong). According to local Dominican ethnophysiology, a balanced body also symbolizes connectedness to a family.

Rural Jamaicans distinguish between ‘good’ and ‘bad’ fat. Good fat is firm, like a fit mango; bad fat is spongy, hanging slack and denotes declining fitness as if a person is an overripe fruit (Sobo, 1994; 1993). A similar perspective is found in rural Dominica. Residents distinguish between ‘hard’ and ‘soft’ fat. Hard fat is thick and strong, and is present when someone is 'full up'. Hard fat is described as mastiff fat rendering someone able to engage in arduous tasks. This form of fat is desirable and attractive. Some residents report that it runs in the race (i.e., genetic). Conversely, soft fat is shaky and wobbly, also hanging slack. Soft fat is considered to be watery fat and is sometimes referred to as "loose fat." As one woman articulated, "Loose is fat not good. (The) body just shaking, wi." Dominicans place value on working hard and sweating. Soft fat may be the result of not engaging in enough laborious activities. "Watery fat makes you breathless, tired, lazy." Soft fat is "not the right fat" as one informant described. Soft fat is also reported to be from consuming too much dietary fat - too many junks (junk food), too much fried food. Additionally, some residents report that it may be from taking birth control pills, and the pills 'aren't going with you' (i.e., not keeping you in balance). Soft fat is not the desired type of fat. It's unattractive and may signify an aging, sagging body as well. Here, there is a discrepancy between a sizeable body that represents health and capability versus a body that is 'out of sorts' or 'not in it'. The former is the result of hard work, genetics, and a healthy diet; the latter is the result of laziness, an unhealthy, out of balance diet, and possibly the result of birth control pills.
Methodology

This research uses participant-observation (P-O), informal interviewing, focus groups, and anthropometrics (BMI). For specifics, see the methodology section in the opening chapter. Sample size includes 108 women ages 18-82. See table XX for specific age categories. As mentioned above, initial observations of frank and open talk about body fat sparked this study. Preliminary questions and lines of inquiry revolved around social norms of body fat talk. How do Bwa Mawegan women speak about body fat? How is it described? Advancing this initial inquiry, more specific questions evolved. General explanatory models (EMs) (Kleinman, 1980) of body fat were elucidated to come to a greater understanding of the (potential) relationship between ethnomedical models of body fat and 'sugar' and 'pressure' because the former may impact the later. In order to augment qualitative findings, BMI scores were taken. BMI scores were then transferred into clinical weight-based categories of underweight, normal weight, overweight, and obese. Qualitative and quantitative data will aid in providing complete assessment of overweight and obesity in Bwa Mawego. Indeed, "biocultural ethnography benefits from an interactive approach to qualitative and quantitative data wherein insights from each suggest analytical refinements and new questions" (Aunger, 1995).
Table 3: Age Categories in 10 Year Intervals

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<th>Age Category</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>SD</th>
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<tr>
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<td>18</td>
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<td>3.02</td>
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<td>37</td>
<td>3.6</td>
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<td>43.38</td>
<td>39</td>
<td>47</td>
<td>2.6</td>
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<td>57</td>
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<td>68</td>
<td>75</td>
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<td>80</td>
<td>78</td>
<td>82</td>
<td>1.83</td>
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<td>Total N = 108</td>
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Results

Qualitative findings of body image and body fat

First, a note on one specific component of the research - weighing the subjects and determining their BMI. Subjects were eager to get on the digital scale and find out their weight as well as their BMI. Without fail, the scale was met with excitement. Often non-participants would coyly hint that they would also like to be weighed. Weighing-in, particularly with young women, can be rather competitive with shouts and accusations of "You fat, man!" or "How much?!" or "What she weigh?" Also, without fail, comments were met with giggles and light-hearted banter. This type of exchange occurred less frequently with middle-aged subjects. Middle-aged and older women often expressed surprise upon seeing and/or hearing their weight. "Wi papa" (Roughly translated as "Oh my gosh.") was the most common remark. Middle-aged women were also more likely to ask to have their scores written down, which I always obliged.

Bwa Mawegans have a relaxed view of body image (Quinlan, 2004). Comments about weight gain and weight loss are littered in day-to-day conversations and
observations. Remarks such as "You come fat, man." are commonplace in everyday salutations and conversations. Tone and delivery play into the connotations of the comments and questions. Generally speaking, this is a straight-forward observation and one portion of a conversation - it can be upon first encountering someone or it may be as they are walking away. It bookends a brief social encounter. For instance, while talking with an informant one afternoon her boyfriend's sister passes by the shop. The sister was making her way from her home to visit her mother's house, far up the village. Noting the very steep and long walk, the informant shouts to the sister "....but man you walking up there and still carrying fat on you." The sister's shoulder shrug was her only reaction to the comment. Pointing out body fat is part and parcel of everyday banter among village residents. Another manifestation of a relaxed view of body image involves viewing someone's body. Residents make careful observations of others - their body, the cadence of their walk, their style or their ways. These later concepts are an amalgamation of someone - their physicality and personal attributes. Low population density and close kin and social networks result in familiarity between villagers. Body weight - gain or loss - is just one of many observations when encountering another resident. The above referenced comments are part and parcel of everyday banter and exchange.

Both females and males indicate that they prefer women to have healthy, fit bodies. On par with pan-Caribbean trends, body shape, not an exact size, indicates an attractive body. An hourglass figure and a flat stomach are desirable; yet, there is considerable variation among personal opinions. Female subjects often report that a "nice shape" is the standard for an attractive, fit body. As one informant explains - "(I)
don't like people to be fat. A nice shape - not too big, not too small" (female, age 39).
"Not too big, not too small" is often expressed by female subjects. Further, "The right
weight for your height" is a common response from female subjects indicating a well-
proportioned figure. Men will often comment that they prefer "something to cuddle up
with in bed" or that "some meat on the bone" is desirable. Descriptions of "thick" and
"full up" are often echoed by respondents when asked what a healthy, attractive women
looks like. "Thick" describes a female figure with adiposity in all "the right places" (i.e.,
hips and thighs) while "full up" generally connotes vitality and also signals attraction.
Echoing work in rural Jamaica where thin women are said to be meager and powerless
(Sobo, 1993), a meg (skinny) body indicates some level of poorness - emotionally,
physically, or monetarily. While being "slim" is often attributed to an individual's race -
indicating an assumed genetic component. Slim may also be attractive, yet young
women without much visible adiposity may express their desire to put on a little weight.
One subject (age 26) articulated her desire to put back on a few pounds she lost due to
an illness. "Just a little here" pointing to her thighs and hips. She then points to her
friend's thighs, who was sitting next to her and had just revealed that she had gained
weight, and expresses "but not like that."

Villagers' EMs (sensu Kleinman, 1980) of overweight reveal a basic biomedical
understanding of excess body fat: an imbalance between caloric intake and output. Too
much food intake and too little exercise are identified as the causes; a decrease in food
intake and an increase in exercise are identified as 'cures'. These initial findings suggest
a lack of recognition of excess body fat as a risk factor for development of or association
with TTDM and hypertension. Diabetics and hypertensives are in regular contact with
the local health centers, indicating that these patients receive education on adiposity and NCDs. Moreover, a few subjects report having been advised to lose weight by health center staff (nurse, nurse practitioner, physician). This is met with mixed responses. One clinically obese informant reported that if she lost the recommended weight (about 30 pounds) she would look "too skinny" and "feel funny." Conversely, another subject bragged that she had lost weight after the nurse advised her to do so. She is also clinically obese and was very proud of her weight loss, although she remains clinically obese.

Residents of this previously isolated horticultural village are showing consequences of development in the form of NCDs - specifically, TTDM and hypertension. Rural Dominicans are one of the more healthy Caribbean populations in terms of communicable and waterborne disease (Quinlan, 2004) yet, when solicited, name TTDM and hypertension as primary health concerns. Residents with TTDM and/or hypertension frequent the clinic for check-ups, sometimes on a weekly basis. Biomedicine is more readily available (compared to the recent past) and utilized among residents with chronic disease. Some subjects report augmenting their prescribed medication with bush medicine to self-treat TTDM and hypertension, employing a medically pluralistic practice. While day-to-day illness episodes may be treated with bush medicine, patients with diagnosed NCDs most often use biomedicine.

**BMI & weight categories for women**

Roughly speaking, subjects are evenly distributed in the normal, overweight, and obese weight categories via the standardized cutoff points. Descriptive statistics on BMI are in table 1. As a reminder, the cutoff points are as follows: BMI ≤ 18.4 = underweight;
BMI $18.5 - 24.9$ = normal weight; BMI $25.0 - 29.9$ = overweight; and BMI $\geq 30.0$ = obese. Obesity is further categorized: BMI $30.0 - 34.99$ = class I obesity; BMI $35.0 - 39.99$ = class II obesity; and BMI $\geq 40$ = class III obesity. See Figure 1 for weight categories.

<table>
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<th>Table 4 Descriptive Statistics</th>
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<tr>
<td>N</td>
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<tr>
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</tr>
<tr>
<td>Age</td>
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<td>BMI</td>
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Four percent of subjects in the underweight category fall at both ends of the age distribution. (Three are 18 - 22 years of while the other is 78 years old.) Thirty-three percent of subjects are normal weight. Sixty-three percent of village women are overweight to obese, that is, they have a BMI of 30 or greater. Thirty-three percent are overweight. Thirty-one percent are class 1 obese. Seven subjects fall into the class 2 obesity category; two subjects fall into the class 3 obesity category.
Comparative statistics on national and cross-cultural rates of overweight and obesity

In 2008 the estimated prevalence percentages for Dominican females was 32 percent for overweight and 39 percent for obesity while the regional average of obesity was 29.7 percent (World Health Organization - NCD Country Profiles, 2011). As referenced above, the weight distribution of Bwa Mawego is that 34% of women are overweight while another 29% are obese. Among overweight women, Bwa Mawegans are slightly higher than national prevalence rates; obesity rates are lower than national prevalence rates (29% versus 39% respectively). Obesity rates among Bwa Mawegan women parallel regional averages - both at 29%. At present, rural Dominicans reside at
an important juncture, medically speaking, as overweight rates mirror urban trends and obesity closely follows. More, obesity rates are on par with regional averages. This trend is concerning as obesity rates are trending with those of the larger WHO Americas Region. The Americas Region includes the U.S. and Mexico, which are two of the fattest nations, globally (WHO 2011).

Discussion

Body image

Among urban Dominican and Barbadian females, there is an assumption that males prefer a 'pleasingly plump' female figure (Tull et al., 2001). Asked to choose which silhouette-figure men preferred on the Figure Rating Scale v, subjects' average score was a 3.33. Described as 'pleasingly plump', a 3.33 approximates a BMI score between 24.3 and 28.8 (Tull et al., 2001:659). In turn, a 'pleasingly plump' figure would fall on the very low to the upper range of a clinically overweight distribution which is a BMI≥25-29.99. In this case, perceived cultural norms among women may, in fact, encourage body fat levels that tend towards deleterious health effects. Indeed, data based on the Human Relation Area Files provides additional insight. 'Plumpness' or 'being filled out' is desired in 81% of 300 societies studied. Again, the clinical categories of overweight, and possibly obese, coincide with the "desirability of fat deposits, particularly on the hips and legs" (Brown & Sweeney, 2009; p. 11). While preference for extreme corpulence is rare, overweight female bodies may be the favored figure. Further, urban Dominican women perceive this body size to be men's preference (Tull et al., 2001). Clinically, these preferences fall into overweight, and possibly mildly obese, categories.
As for body *shape*, the preferences mentioned above is the shape that rural Caribbean residents would refer to as the Coca-Cola shape (per Anderson-Fye, 2003). This corresponds with a cross-cultural preference for hip-to-waist ratio that signals attraction and fertility (Brown & Konner, 1987). Echoing this preferred shape, elder women in the study village share stories of using a 'string stomach' or 'belly band' post birth. The string stomach is used to speed up the return of a woman's pre-pregnancy flat stomach and may take on a variety of types of forms. Typically, a piece of material with strings attached was positioned low on the abdomen, wrapped around the body and tied in the front. Often the midwife did this before a woman got out of the bed post birth. Also referred to as a 'girdle,' panty-hose type material was sometimes used as a later version of the original cloth variety. One woman reported that post-pregnancy "things are loose" and that the uterus is "trying to find its home." A string stomach makes you "feel strong." She went on to share that it's not particularly comfortable to wear but that it helps you "carry loads." (This is a local idiom for carrying out physically demanding work that includes lifting. This is often in reference to processing bay oil whereby bundles of branches must be transported from field to still.) The string stomach not only helps with making a woman feel stronger it also quickens their return to laborious domestic work.

Evolutionarily speaking, the preferred female figure is advantageous. Among men and women there is a preference for a decreased amount of centripetal fat and an increase in (or presence of) peripheral fat. The distribution of fat is significant (Brown & Konner, 1987). Genetic selection has favored the production of peripheral body fat in females. A minimal level of fatness increases female reproductive success due to its
association with regular cycling and earlier menarche (Frisch, 1987). Females' reproductive fitness depends on their ability to withstand the nutritional demands of pregnancy and lactation (Huss-Ashmore, 1980). Peripheral fat is usually mobilized during the late stages of pregnancy and during lactation (Bjorntorp, 1988). Of note is the fact that peripheral body fat does not have the same close association with chronic diseases (i.e., TTDM or hypertension) as centripetal or trunk fatness. Centripetal fat is most strongly associated with metabolic disorders (van der Kooy & Seidell, 1993).

Sociocultural trends reveal a desire for females’ figures that may reflect an improbable reality. Historically, body fat conferred a selective advantage for women. In societies where obesity was, in all likelihood, impossible, body fat symbolizes prosperity and health (Brown & Konner, 1987). Conversely, Western nations highly regard thinness as the body ideal. In Westernized obesogenic environments (Lieberman, 2008) fatness may be effortlessly achieved; while, for the vast majority, low levels of body fat must be actively pursued and maintained.

Rural Dominicans may reflect a feasible and realistic middle ground to this pattern. The culturally-driven preference for a ‘not too big, not too small’ female figure most likely equates to the clinically overweight category. Further, preferences for site and distribution of body fat (hips and thighs) does not present a predilection for clinically dangerous adiposity. Certainly, there is no evidence of a preference for abdominal fat nor do residents demonstrate a desire for levels of body fat considered obese by their standards. From an ethnomedical perspective, rural Dominicans strive for balance. This sense of balance extends to body image and body weight. Sentiments such as ‘the right weight for your height’ endorse these body ideals. Certain amounts of
fat that are appropriately placed characterize rural Dominicans body shape and size preferences for women.

Ethnicity plays a significant role in perceptual body image and the disparities between perceptions. Among Afro-Caribbean women, attitudinal or preference measures of body size among Barbadian women show an inverse relationship between time spent watching television and ideal body size (Tull et al., 2001), echoing other findings of the influence of Western media images. For urban Dominican and Barbadian women, body mass index (BMI) is associated with ideal body size. Approximately 78.5% of Dominican women and 80.2% of Barbadian women with a BMI ≥ 27.3 (clinically overweight) desire a smaller size (Tull et al., 2001). This multiplicity of findings and applications underscores the demand for applied perceptual models of body image. Perceptual models address the disparity between culturally constructed notions of preferred (and acceptable) amounts of body fat versus clinically diagnosable amounts of adiposity.

*Clinically-based weight categories*

As mentioned in the results section, Bwa Mawegan women have higher rates of overweight and lower rates of obesity compared to national averages. More, in this formerly isolated, rural village, overweight and obesity rates are trending with large, industrialized nations where obesity is considered a major threat to public health. Due to the affects of modernization and development, Bwa Mawegans may no longer be considered strict horticulturalists associated with a laborious lifestyle. Traditional ways of living (carrying water, subsistence and home gardening, and lack of commercial employment) may have served as protective mechanisms for women with regard to the
influences of an obesogenic environment. This lifestyle limited the various influences associated with weight gain (Mendez & Popkin, 2004), including convenience foods, frequent trips to the capital for work or shopping, and leisure based activities such as television (Quinlan & Hansen, 2013). A young woman, aged 21, perfectly articulates the problems of experiencing rapid development. She's recently moved to “town,” Roseau, the capital, in order to be closer to her clerical job and she returns to the village periodically to visit family and friends. When asked how she was adjusting to living in town, she pointed out the inherent difficulties of eating in a cash economy noting that, "...you have to buy everything," referring to her meals. When inquired if she desired to return to the village on a permanent basis, she remarked on the day to day pace, saying the village is "too slow." Because urbanization is correlated with weight gain (Mendez & Popkin, 2004), this young woman serves as an illustration of the many drivers in the global obesity epidemic. Namely, a shift in diet is implicated as well as the conveniences of urban residence. Indeed, it's highly likely that the higher rates of overweight among rural Dominican women compared to national averages will be replaced with equal rates of obesity in both settings. This shift in obesity rates would further contribute to Dominica’s place as a nation with dangerous rates of obesity.

Conclusion: Local conceptions and biomedical models of fat

"They big but not fat" (female consultant, age 19).
'Coming fat' may be extended as a compliment (being well fed or meaning that a woman's figure is 'filling out' in all the 'right places') or as a straightforward comment about weight gain with no intended negative implications. In this vein, biomedical warnings of added adiposity do not figure into the observations. In fact, there exists a mismatch between clinical designation of overweight/obese and culturally preferred levels of fat. This is particularly true when considering the preferred site of fat stores - hips and thighs. As noted above, peripheral fat deposits do not confer the same medical risk compared to centripetal fat. Moreover, some amounts of body fat send powerful messages - signifying health and sociality. Among small-scale communities these traits are particularly important because they signal individual health as well as ties to family and community. In small, socially-embedded communities such as Bwa Mawego there is a large amount of social importance placed on these traits.

Knowledge of ethnomedicine has become increasingly relevant for public health, particularly as the world system develops and stretches into remote areas of the globe (Quinlan, 2004); translation of ethnomedical knowledge aids in bettering health care delivery to the group under study (Quinlan, 2011). Obesity is a known risk factor and co-occurring condition with TTDM and hypertension. Because rural Dominicans have a laid back view of body image, clinically risky levels of fat are well within cultural norms. From a public health perspective, the difficulty or challenge is educating women on the differences of overweight and obesity. As mentioned above, while residents do not desire levels of body fat considered obese, there is a mismatch between culturally-constructed perceptions and clinical classifications of fatness. A BMI above 30 confers obesity yet may be interpreted as 'full up' according to local residents. This is
particularly true if the fat is considered 'hard' fat. A resident may not consider a certain amount of fat as potentially hazardous to her health. Incorporating local models of fat will aid in decreasing the risk that body fat plays in developing or exacerbating NCDs. Risks include the lack of recognition of the medical reality of fatness. The clinical designation of obesity may not resonate the same for rural Dominicans as in thin-driven Western nations. 'Coming fat' doesn't carry the same amount of social weight in Bwa Mawego.
CHAPTER 4

CULTURAL CHANGE AND EXPLICIT ANTI-FAT ATTITUDES

Fat Stigma: The problem and literature

Cross-culturally, variation in body norms is context dependent. In industrialized Western nations body fat is considered 'bad,' 'ugly,' and 'unattractive.' In the U.S. this reckoning of 'fat as bad' results in pervasive disparagement and stigmatization of the considerable levels of overweight and obese individuals (Crandall & Schiffhauer, 1998; Puhl & Brownell, 2001; Sobal, 1995). This perceptual trend has not always been so pervasive; previous anthropological research shows traditional societies that highly regard fatness as symbols of prosperity and health (Brown & Konner, 1987; Brown, 1991; Sobal & Stunkard, 1989; Sobo, 1993). As the processes of globalization take hold, local attitudes towards fatness are also shifting. More specifically, with increased media exposure and public health campaigns, fat stigma is increasing, and there is a "profound global diffusion of negative ideas about obesity" (Brewis, et al., 2011; p. 269). Most notably, the highest levels of fat stigma - namely, social stigma and prejudice - are found in middle-income developing nations (ibid).

Following Goffman (1963), a key component of stigmatization is the "pervasive devaluation of individuals possessing a 'discredited' personal attribute" (Carr & Friedman, 2005; p. 253). In the U.S. stigmatization results in discriminatory practices in the workplace (Larkin & Pines, 1979), education (Burmeister, 2013; Canning & Mayer, 1966), housing (Karris, 1977), and healthcare (Puhl & Brownell, 2001; Sabin, Marini, & Nosek, 2012; Schwartz, et al., 2003; Teachman & Brownell, 2001). Advancing
the scope of weight-based discriminatory practices, Puhl & Heuer (2009) note weight bias in interpersonal relationships, the media, and psychological and physical health. Additionally, overweight and obese individuals are more likely to perceive stigma (Annis, Cash, & Hrabosky, 2004; A. A. Brewis, Hruschka, & Wutich, 2011) exacerbating the effects of institutionalized discrimination.

The global spread of anti-fat attitudes may be attributed to a variety of factors (Latner, Rosewall, & Simmonds, 2007) and shifting body norms plays an integral role. These factors include: media, ethnographically driven markers of development, current weight, and education. Once considered a taboo topic for anthropologists (Ginsburg, Abu-Lughod, & Larkin, 2003), media anthropology now recognizes "mass media as vehicles of culture" (Spitulnik, 1993; p. 295). In a meta-analysis, Grabe, Ward, and Hyde (2008) review findings of the media's (a variety of magazine and television) influence on body image concerns. In the U.S., media and pop culture have been implicated in propagating the thin ideal (Bordo, 1993). Described as an "enculturative force" (Fedorak, 2012; p. 120), Western based television images provide an influential means of modifying body norms, particularly slim ideals (Rubinstein & Caballero, 2000) and body dissatisfaction and disordered eating (Slevec & Tiggemann, 2011). Becker's study of adolescent Fijian women documents the adoption of slim ideals over a decade following the introduction of television in a rural community (2004). As for media effects among West Indian women, attitudinal measures of body size among Barbadian women show an inverse relationship between time spent watching television and ideal body size (Tull et al., 2001). In the current study location, the introduction of television provided an avenue in which to view other, outside societies (Quinlan &
Hansen, 2013). As the media landscape changes researchers are increasingly investigating the effects of the Internet on body norms and attitudes as there are clear "social implications of becoming connected to a global community" (Miller & Slater, 2000; p. 122). Bair and colleagues present a link between Internet and television use and an increase in body dissatisfaction in young women (2012); while Tiggemann and Miller (2010) link Internet exposure with body dissatisfaction and a drive for thinness among adolescent girls. Finally, the role of online social networking (OSN) must be considered. Research from the University of Haifa address the role of Facebook use and the development of eating disorders among women (2011). As cultural 'borders' become more permeable, rural communities in developing nations no longer exist in relative isolation. The Internet's speed and scope is likely altering the transmission of ideas and attitudes.

Overweight and obese individuals typically have lower rates of weight satisfaction, yet the relationship between weight status and anti-fat attitudes remain unclear (Hansson & Rasmussen, 2014). The role of an individual's body size on attitudes towards obesity have been mixed; and, several studies have not been able to link weight and stigmatizing attitudes (Hanneman & Riddle, 2005; Puhl & Heuer, 2009). Conversely, obese individuals are reported to hold negative attitudes towards obesity (Cramer & Steinwert, 1998; Latner, Stunkard, & Wilson, 2005) with some research showing a modest association between body weight and weight bias (Schwartz et al., 2006).

Education is another potential contributor to anti-fat attitudes that has shown mixed results. Hilbert, Rief, and Braehler (2008) and Sikorski et al. (2011) found that
education is associated with obesity stigmatization. In these particular cases, lower
education predicts higher levels of anti-fat attitudes. Conversely, Hansson and
Rasmussen’s (2014) review concludes that education is not associated with ATOP. In
populations undergoing development - namely education - this later trend may not hold.
Education is likely to introduce Western-based, biomedical ideas of health and wellness
via mass media (Brewis et al., 2011). In the wake of rising global obesity rates, these
messages describe the risks of adiposity and exacerbate the idea of ‘fat as unhealthy’
(ibid).

Given the status of overweight and obesity as a major threat to global health,
turning our attention to the developing world is imperative (Popkin & Gordon-Larsen,
2004; Popkin & Doak, 1998). In the Caribbean, as elsewhere, the relationship between
obesity and the threat of costs in loss of productive time, lost opportunities, decreased
quality of life, and money spent on health care are significant (Pan American Health
Organization, 2004). The correlation between fatness and socioeconomic status (SES)
in traditional societies has long been established (Sobal, 1991); yet profoundly, obesity
now impacts those in lower SES in developing nations as well (Mendez, Monteiro, &
Popkin, 2005). Ethnographic studies throughout the Caribbean note the association of
larger body size among females with fertility, sociability, and positive body image
bodies with health and wealth (Simeon et al., 2003). Given these qualitative and
quantitative findings, relatively low-levels of anti-fat attitudes should be predicted.
Indeed, rural Dominicans serve as apt study population to investigate the correlates of
anti-fat attitudes and gauge levels against cross-cultural trends. Using a standardized
psychometric scale - the Attitudes Towards Obese Persons (ATOP) (Allison, Basile, & Yuker, 1991) this cross-sectional study will determine the levels of anti-fat attitudes among residents in a rural Dominican village experiencing significant globalization pressure (Quinlan, 2006; Quinlan, 2005). Body mass index (BMI) and assorted demographics will facilitate a better understanding of intracultural variation in anti-fat attitudes among subjects. Lastly, cross-cultural comparison will determine if villagers' attitudes parallel global trends.

**Predictions**

This study tested the following predictions for ATOP scores:

1) *Education*: Higher levels of education are predicted to be positively associated with higher levels of fat stigmatization (i.e., lower ATOP scores). Health education may result in an increased level of stigmatization due to the deleterious health effects associated with it (Brewis et al., 2011).

2) *BMI*: Individual weight status is predicted to impact anti-fat attitudes. In the U.S. subjects that are overweight/obese and trying to lose weight are likely to have the most negative attitudes about body fat (Friedman et al., 2005).

3) *Development*: The following markers of development are predicted to influence ATOP scores: commercial employment, luxury goods, gardening, and trip frequency to Roseau. Modernization in Dominica occurred very rapidly beginning at the turn of the millennium (Quinlan & Hansen, 2013). Individuals with commercial jobs regularly interact with people who are not from Bwa Mawego and they leave the village more often. Modern consumer items (i.e., refrigerator, washing machine) signify a more...
modern lifestyle. In turn, this lifestyle is connected to the outside world (Quinlan & Quinlan, 2007). Traditionally a horticultural village (Quinlan, 2004), Bwa Mawegans may be abandoning this lifestyle in favor of convenience foods as is shown in other populations.

4) Media: Exposure to media is predicted to increase ATOP scores. Ethnographic studies in this population demonstrate how changes locally reflect global patterns via the introduction of television (Quinlan & Hansen, 2013).

Methods

This study used a cross-sectional design to test the following hypotheses: higher anti-fat attitudes (lower ATOP score) would be positively associated with education, BMI, measures for development, and media. Using a convenience sample, 74 adult females ages 18-78 are included in the study.

Outcome Measure

Attitudes Towards Obese Persons Interview: Explicit anti-fat attitudes were measured using a standard psychometric scale - the Attitudes Towards Obese Persons Scale (ATOP). This scale consists of twenty questions with a six-point Likert scale, ranging from "I strongly agree" to "I strongly disagree." The questions include negative and positive associations with overweight/obesity and contain statements such as "Obese people are usually sociable," and "Obese people are just as healthy as non-obese people." (See Appendix A for the full scale.) Of note, a higher ATOP score is suggestive of less anti-fat attitudes. This scale is reliable and valid, and has been tested in
numerous populations, including other middle-income developing nations such as Paraguay (A. A. Brewis & Wutich, 2012).

**Predictor Variables**

**Education** was self-reported, and scored as follows: 0 = none; 1 = primary school; 2 = secondary; 3 = college/business training school; 4 = university. (In Dominica, secondary school ends after 11 years of education, with graduation around age 16. 'College' is the optional and competitive 12th and 13th years of education, with typical graduation at age 18.)

**BMI** was assessed using a digital scale (Omron full body composition sensing monitor and scale) and portable tape measure. Standard BMI cut-offs are as follows: normal weight (BMI 18.5 - 24.9), overweight (BMI 25 - 29.9), and obese (BMI of 30 or greater).

**Development** was measured by four indicators. Those measures include the following: 1) commercial employment; 2) garden work; 3) owning 'luxury' items such as a washing machine; and 4) trip frequency to town. Commercial employment was dichotomized with a presence or absence response. Likewise, garden work was dichotomized with a "yes" or "no" in response to the question, "Do you garden?" Luxury items were an index score of total items owned. Trip frequency to town were scaled to: 1 = never; 2 = less than two times/year; 3 = less than twelve times/year; 4 = monthly; 5 = weekly; 6 = daily; and 7 = lives in town part time.

**Media** was measured with three predictor variables: 1) Facebook account; 2) Ownership of a computer; and 3) Ownership of a television. Each variable was dichotomized into a presence/absence (0=no, 1=yes).
Confounding Variable

Age was included as a potential confound for markers of development. In Bwa Mawego, older women typically maintain traditional lifestyles, e.g. cooking on a fire as opposed to a stove, whereas younger women are more likely to use media and work in a commercial occupation.

Statistical Analyses

Multiple linear regression in STATA/IC v. 10 for Macintosh was used to test for associations among variables. A new measure for age was created using three quantiles (AgeQ3). Quantiles were determined by a Kernel Density Estimate, which revealed three groups of age. Quantiles included the following age ranges: Young (18-28), Middle (29-46), and Old (47-75). This measure was created to ease interpretation of interaction effects. Across all models, however, ATOP scores were regressed on the untransformed “age” variable and AgeQ3 to ensure consistency of results. The results below only present the findings for AgeQ3. First-order variables were also centered on their means to test for interaction effects. Quadratic terms were tested with continuous variables, and interaction terms were entered for each predictor and significant effects were retained in the models. Alpha level was set to $\alpha = .10$ for quadratic effects and $\alpha = .05$ for interactions.

Results

This study tested the following hypotheses to predict ATOP scores: education, BMI, development, and media. The response rate for this study was 100%. Table 1 displays the descriptive statistics. On average, participants were 38 years old.
The average BMI was 27.2 (range: 16.3-44). ATOP scores ranged from 16 to 93, with a mean of 56.3, with a Cronbach’s alpha of 0.89, which indicates excellent internal reliability.
Table 5: Variable description and summary statistics

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<td>26.7</td>
<td>5.6</td>
<td>16.3</td>
<td>44</td>
</tr>
<tr>
<td>Education</td>
<td>1.6</td>
<td>1</td>
<td>0.9</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Trip frequency</td>
<td>3.93</td>
<td>4</td>
<td>1.26</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>AgeQ3 X FBook</td>
<td>-0.3</td>
<td>-0.5</td>
<td>0.3</td>
<td>-0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Garden X Fbook</td>
<td>-0.1</td>
<td>-0.2</td>
<td>0.2</td>
<td>-0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

According to a power analysis for multiple linear regression, with 74 participants the probability is 80 percent that the study will detect a treatment difference at a 0.05 significance level, if the effect size is 0.16 and predictor variables are three or less per model. Thus, ATOP score was initially regressed on three predictor variables per each hypothesis.
Table 6: Linear regression models of ATOP scores

| MODEL 1 | ATOP Scores | Coeff. | Std. Error | T-value | P>|z| | 95% Confidence Interval | Model Statistics |
|---------|-------------|--------|------------|---------|-----|--------------------------|------------------|
|         | Fbook       | -9.21  | 3.62       | -2.54   | 0.013 | *                       | -16.43 — -1.99 N= 74 |
|         | Computer    | -1.34  | 3.66       | -0.37   | 0.715 |                         | -8.65 — 5.97 R²= 0.10 |
|         | Television  | 1.75   | 4.14       | 0.42    | 0.674 |                         | -6.51 — 10.00 Adj. R²= 0.07 |
|         | _cons       | 59.62  | 3.91       | 15.22   | 0.000 |                         | 51.81 — 67.44    |

| MODEL 2 | ATOP Scores | Coeff. | Std. Error | T-value | P>|z| | 95% Confidence Interval | Model Statistics |
|---------|-------------|--------|------------|---------|-----|--------------------------|------------------|
|         | Fbook       | -11.1  | 4.5        | -2.5    | 0.02 | *                       | -20.1 — -2.1 N= 74 R²=0.16 |
|         | AgeQ3       | -2.7   | 2.7        | -1.0    | 0.31 |                         | -8.1 — 2.1       |
|         | Fbook X     | 13.2   | 5.4        | 2.4     | 0.02 | *                       | 2.4 — 24.0       Adj. R²=0.12 |
|         | AgeQ3 _cons | 70.25  | 6.89       | 10.21   | 0.00 |                         | 56.53 — 83.98    |

| MODEL 3 | ATOP Scores | Coeff. | Std. Error | T-value | P>|z| | 95% Confidence Interval | Model Statistics |
|---------|-------------|--------|------------|---------|-----|--------------------------|------------------|
|         | Fbook       | -10.5  | 3.3        | -3.1    | 0.002 | *                       | -17.1 — -3.8 N= 74 R²=0.22 |
|         | Garden      | -4.9   | 3.3        | -1.5    | 0.15 |                         | -11.5 — 1.8      |
|         | Fbook X     | 19.2   | 6.7        | 2.9     | 0.01 | *                       | 5.8 — 32.6       Adj. R²=0.19 |
|         | Garden _cons| 64.75  | 2.94       | 22.00   | 0.00 |                         | 58.88 — 70.62    |

Across all hypothesized variables, Facebook account was the only significant variable ($b= -15.0$, $p=0.01$), such that having a Facebook account predicted higher anti-fat attitudes (Table 2, Figure 1). Next, we tested for interaction effects across all variables against Facebook account, since variation in the main effect of having a Facebook account might depend on the effect of another predictor (Table 2). For example, age might moderate the relationship between Facebook and perceptions of obesity. Although the main effect of AgeQ3 was not significant (see Figure 2), there was a significant interaction effect between Facebook account and AgeQ3 ($b= 13.2$, $p=0.02$). For the younger age category, having a Facebook account predicted higher anti-fat
attitudes. In the older age category, only 2 women reported having a Facebook account. A significant interaction effect was also found for presence/absence of garden work and Facebook account: when garden work was zero (a marker of development), having a Facebook account predicted higher anti-fat attitudes ($b=19.2, p=0.01$). Of the women who did not garden, 30% had a Facebook account, whereas among women with a garden, 61% had a Facebook account. Figure 3 displays the significant interaction effects. Figure 4 displays the non-significant interaction effect between BMI and presence/absence of having a Facebook account by ATOP scores. Analyses did not yield significant quadratic effects for any continuous variable. Overall, results indicated that the model including the interaction between Facebook account and garden work explained the most variance in ATOP scores ($R^2=0.22$). Beta weights were calculated for each model to determine the largest effect. Across models, Facebook remained a significant variable with the largest beta weight ($\beta=0.39-0.58$).
Figure 3: Relationship between Presence/Absence of having a Facebook Account and ATOP scores.
Figure 4: Relationship between 3 Quantiles of Age and ATOP scores.
Figure 5: Estimated effects of ATOP scores regressed on the following interaction effects: A) Facebook by 3 quantiles of age; and B) Garden X Facebook
Regression diagnostics were conducted for all models, including variance inflation factor (VIF) to test for multicollinearity, Cook’s distance, and residual plots. Variance inflation factors for all models were below 3.0, Cook’s distances scores were less than 10 times the mean, and residual plots did not stray from normality. Overall, these findings indicate that the models presented here demonstrate adequate linearity.

Discussion

This study tested the association between ATOP scores and various predictor variables: education, BMI, development, and media. Based on the ATOP scale, rural Dominicans display rather high explicit anti-fat stigma in comparison to other study
populations. This finding is somewhat surprising given the fact that socio-cultural trends in the Caribbean favor larger bodies, particularly for women (Anderson-Fye, 2004; Sobo, 1994; Sobo, 1993). Previous research by Brewis & Wutich (2012) includes samples of Paraguayan women and U.S.-based undergraduate students. The Paraguay sample (N = 200) had a mean ATOP score of 58.05 (SD = 14.5). For the U.S. undergraduate population (N = 66) the mean ATOP score was 64.59 (SD = 16.7). Paraguayan women exhibit higher levels anti-fat attitudes compared to U.S. undergraduates and slightly higher scores compared to rural Dominican women. Findings among Dominican women fall in line with middle-income and developing nations showing the highest levels of anti-fat attitudes among populations studied.

Results also found that having a Facebook account was the strongest predictor of anti-fat stigmatization. Finally, Facebook account interacted with garden work and age. Previous research shows that media influences, particularly internet-based communication, have the ability to transform a society. This social change may occur with unparalleled breadth and rapidity via the Internet (Bargh & McKenna, 2004). In particular, social media is a "great information equalizer" (McNab, 2009; p. 566) and online social networks (OSN) play a particular role due to their interactive nature. Indeed, the ubiquity of Facebook is undeniable (R. E. Wilson, Gosling, & Graham, 2012) with over 500 million daily users, yet its utility beyond social interaction is questionable. In fact, its use may lead to harmful psychological consequences (Kross et al., 2013). Current research among young American reveals that time spent on Facebook is correlated with body dissatisfaction due to peer comparison (Eckler, Kalyango Jr., & Paasch, 2014) and maintains risk of eating disorders among adolescents (Tiggemann &
Slater, 2013). In this case, it may be one primary avenue in which stigmatization of overweight and obesity is spreading. Among rural-based populations such as Bwa Mawego this potential avenue of transmission is most important for future investigation.

Furthermore, it is no surprise that Facebook interacted with age, such that having a Facebook account increased young women’s anti-fat attitudes. For the 'younger' and 'middle' age categories, having a higher education was associated with lower ATOP scores as well. We expect younger women to have a greater connection to 'outside' world via online social networks (OSNs), as indicated by prior research (Miller & Slater, 2000; Tiggemann & Miller, 2010; Tiggemann & Slater, 2013). Having a Facebook account reflects this connection, and in turn, provides greater access to cross-cultural social constructs, such as fat stigma.

In terms of the interaction effect between gardening and Facebook, garden work (or lack thereof) is a marker of a lifestyle associated with tradition. Conversely, Facebook signals connectivity to a more modern habits. As women 'modernize,' they may abandon practices associated with an antiquated lifestyle. Indeed, one of the themes that emerged during informal interviewing was that women who were away from home more (i.e., attending school or working in town) did not partake in domestic tasks. Gardening is one such task associated with domesticity. In Bwa Mawego gardening may be viewed as somewhat of a social relic. In tandem, OSNs (and specifically Facebook) usher in new connections with the outside world. Both (lack of gardening and an online presence) represent new trends in Bwa Mawego; high levels of anti-fat attitudes appear to reflect these trends.
This study reveals that powerful ways that media, namely OSNs, may transform cultural aesthetics. Rural West-Indian populations are known to prefer a 'plump' build for women (Sobo, 1993), yet body norms appear to be shifting. This reflects Becker's (2004) study of the introduction of television among young Fijian women. There, traditional cultural aesthetics also favored a robust build for females. Media shifted these traditional preferences in a short amount of time (López-Guimerà et al., 2010).

Cross-cultural comparison:

Regarding cross-cultural trends, rural Dominicans interject body fat into conversation in an open and frank manner - "You fat, wi." (You're fat, right). Everyday conversation includes candid remarks about an individual's body, including amounts of fat. Given this social truth, it's not surprising the attitudes towards fatness are explicitly expressed among residents. This open expression of fat stigma may be connected to a lack of value on politically correct speech. Brewis et al. (2011) note that Mexican, Paraguayan, and American Samoa samples lack self-censorship in terms of expression of fat stigmatizing statements. This may not reflect beliefs, per say, but rather social norms regarding open expression. Ethnographically speaking, the same holds true for the study population. Communication in this small-scale group is candidly frank. Thus, Bwa Mawegan women appear to be expressing body norms that are disseminated via Facebook.

Conclusion

On par with global trends, rural Dominicans are expressing attitudes towards body fat by showing increased stigmatization. Low ATOP scores demonstrated these
negative viewpoints. No longer isolated from the affects of globalization, OSNs are acting as conduits for the dissemination of body norms, generally, and body fat specifically. Undeniably, Facebook's influence on body image calls for more consideration (Tiggemann & Slater, 2013). The ubiquity of Facebook has far reaching effects as demonstrated among this rural community.
CHAPTER 5

OVEREIGHT & OBESITY IN FEMALE SOCIAL NETWORKS

Introduction

Increasingly, social scientists and health researchers are investigating the notion of 'social contagion' as it relates to the spread of obesity between members of social networks (Christakis & Fowler, 2013). The social clustering of obesity has been documented in a few studies in [country(ies)] (Christakis & Fowler, 2007; Cunningham, et al., 2012; Hruschka, et al., 2011) yet the exact mechanisms of this phenomenon remain poorly specified. Globally, obesity and its associated chronic conditions such as diabetes, hypertension, and cardiovascular disease (CVD) continue to grow as major public health threats. Moving beyond individual risk factor profiles, social patterning of obesity is paramount to successful public health efforts (Miranda, et al., 2008). Identifying the underlying pathways of the social contagion of overweight and obesity will assist in bridging gaps of preventative efforts in the obesity epidemic.

Literature Review

Coleman (1994) suggests that social networks are a form of social capital that may be used for productive ends. Social networks provide a means of enculturation (Wolfe, 1997), social support, social influence (e.g., norms, social control), social engagement, and access to resources (e.g., money, jobs, information) (Berkman et al., 2000). Certain behaviors linked to weight gain and weight loss appear to be socially infectious (Smith & Christakis, 2008). The effects of a friend's body weight has been
established via studies between ego and friends' body weight (Christakis & Fowler, 2007; Smith & Christakis, 2008; Trogdon, Nonnemaker, & Pais, 2008). While these studies confirmed significant associations between ego's and friends' body weights, they did not test shared social norms. Christakis and Fowler (2007) determined that obesity can spread through social networks person-to-person, much like a contagion. Data from the Framingham Heart Study in Massachusetts indicates that obesity clusters in social networks within three degrees of separation from ego. In other words, if an ego's alter's alter's alter is obese, the likelihood that ego is obese is increased (Christakis & Fowler, 2007). If a person's friend becomes obese, it increases the likelihood that the person will become obese by 57%; if a person's sibling becomes obese, it increases the likelihood of the person becoming obese by 40%. There are larger effects if both persons in the relationship are the same-sex for both friendship and sibling relationships (Christakis & Fowler, 2007; Smith & Christakis, 2008). A concerning finding from the greater Los Angeles area is that social clustering of overweight is found among adolescents, implicating that the person-to-person contagion may start at an early age (Valente, et al., 2009). Specifically, U.S. studies find that adolescents' body weight is effected by the average body weight of peers (Trogdon et al., 2008); higher BMI of close friends is associated with a higher BMI among adolescents (Renna, Grafova, & Thakur, 2008).

Social Context & Social Norms

Social interactions can encourage, discourage, and endorse attitudes and behaviors (Crosnoe, Cavanagh, & Elder, 2003; Cunningham et al., 2012). Studies of social norms implicated in their role in obesity typically concern body-type norms and eating behaviors (Hammond, 2010). Hruschka and colleagues (2011) found negligible
support that shared social norms account for comparable body mass index (BMI).

Further, "reverse causation" may account for outcomes of BMI on shared body norms - body weight and/or structure may affect body norms. In the U.S., binge eating (Crandall, 1988) and unhealthy weight control behaviors (i.e., self-induced vomiting, laxatives, diet pills, or fasting) (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005) have been identified as shared behaviors. Still, a review study "found almost no evidence consistent with friends influencing bodyweight through their own weight-related behavior" (Cunningham et al., 2012; p. 1181). If shared body norms and weight-related behaviors do not account for the social contagion of body fat, perhaps communication of shared body norms is accountable. "Communication from friends may influence body weight because it creates shared norms and beliefs" (Brechwald & Prinstein, 2011).

Indeed, Cunningham and colleagues' (2012) review found limited evidence that communication between friends about weight and weight-related behavior affects weight; they call for further explanation of this potential underlying pathway implicated in the spread of body weight.

It's been well-established that perceptions and attitudes about overweight and obesity are shared (Brewis et al., 2011; Brewis & Wutich, 2012). Social networks share ideas and behaviors (Berkman et al., 2000) including social clustering of eating behavior (Eisenberg et al., 2005). While speculated, empirical evidence for the role of social norms in the social clustering of obesity has not been established (Cunningham et al., 2012). To further complicate the issue, studies of social clustering of adolescent obesity support homophily (i.e., the 'birds of a feather' hypothesis or the tendency for individuals to select friends similar to themselves) on BMI as well as social influence on
BMI (Shoham et al., 2012). Among network studies, the exact mechanisms have been debated, yet the findings highlight the importance of understanding obesity patterns. 

For public health efforts, Hruschka and colleagues note that there is a growing body of public health research “demonstrating the importance of social relationships and networks in the spread of disease, the diffusion of public health messages, the adoption of health behaviors, and the provision of social support” (2011; p. S299). Furthermore, studies have been limited to Western, industrialized nations, yet obesity continues to rise globally. Cross-cultural studies are needed to assess how the spread of obesity patterns are trending (Hruschka et al., 2011). Among this Dominican study population, anti-fat attitudes are on par with those of an industrialized nation (U.S.) and a developing nation (Peru) (Council and Placek, 2015). Elucidating trends will, in turn, facilitate more context-appropriate public health efforts. The goal of this study is to document the social clustering of overweight and obesity in female social networks in a rural Caribbean village.

Methods

Ego-communication network interviews were conducted among 103 subjects. Women aged 18 - 82 are included in the study. Each subject (ego) was interviewed face-to-face (social network interview) and asked to name the women with whom she was in most regular contact (alters). Because kinship, friendship, and workmates overlap in this community, communication networks were elicited in order to capture the variety of female-to-female relationships. Alters younger than 18 were excluded from the final list. Alters residing in the village that did not participate were also left off the final list as
were alters listed who live outside of the village. This women’s intra-village network is therefore a partial representation of the entire network of female villagers. The number of alters included in the study ranges from 1 - 7. Average number of alters is 2.9.

Variables included in the network interviews are the type of relationship between ego and alter [family, extended family (i.e., 'cousin'), in-laws, friend, neighbor, acquaintance and workmate]. 'Cousin' is a disputable relationship in the research site. While almost everyone in the village is related (Quinlan, 2005), 'cousin' is loosely used by residents to describe a relative. Therefore, alters described as cousin are all categorized as second-order relatives.

Anthropometric and demographic data includes age, body mass index (BMI), and clinical weight category based on BMI (underweight, normal, overweight, and obese). Weight was measured using the Omron full body sensor scale (omronhealthcare.com). Stature (height) was measured in meters by the researcher using a portable stadiometer height-rod and entered into the scale. BMI is defined as body weight (in kilograms) divided by the square of body height (in meters) and was calculated by the scale. Clinical weight categories were determined using the standardized cutoff points: underweight (BMI < 18.5), normal weight (18.5–24.9), overweight (25–29.9), and obese (30 and above).

Analysis and Results

Analysis were conducted in UCINET 6 and NetDraw. Figure 1 is a multidimensional scale (MDS) of the network. Nodes are spaced according to geodesic distance. In other words, nodes are spaced so that when they are close together they
have fewer links between them (they can reach each other easily without having to go through anyone else). Nodes toward the center of the diagram are also more central. Nodes with high geodesic distance between them probably do not communicate too much and according to path analysis would have to go through many others in order to contact one another. Next, the lines shown only indicate first and second order relations. First order lines are thicker than second order. Also of note, nodes are larger or smaller according to their BMI, providing a visual representation of body weight.
Concerning ego’s BMI in comparison to the average network's BMI, almost 50% of egos lie in the same BMI category as the average of their network's BMI (i.e., ego and ego's network share the same BMI category). Forty-three out of 88 egos share the same BMI weight category as the average of their network. See Figure 2 for specifics. Twenty-four egos fall one BMI category below their network average while 19 egos are one BMI
category above their network BMI category average. Two egos fall two weight categories below their networks' weight category average (i.e., ego is in the normal weight category while their network average is in the obese category).

**Figure 8: Ego's Weight Category in Relation to Ego's Networks' Weight Category Average (T = 88)**

<table>
<thead>
<tr>
<th>Weight Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same wt. cat.</td>
<td>43</td>
</tr>
<tr>
<td>Below NW wt. cat.</td>
<td>24</td>
</tr>
<tr>
<td>Above NW wt. cat.</td>
<td>19</td>
</tr>
<tr>
<td>2 cats. below NW wt. cat.</td>
<td>2</td>
</tr>
</tbody>
</table>

**Discussion**

Similar to Christakis and Fowler’s (2007) findings in Massachusetts [or the U.S.A.], overweight and obese individuals are more likely to have overweight and obese friends and relatives. Previous studies have attempted to pinpoint the exact psychological, cultural, and social mechanism(s) responsible for the social clustering of obesity. Hruschka and colleagues (2011) determined that shared body norms accounted for a small portion (up to 20%) of the social clustering of overweight/obesity. Yet the exact role of social norms in the social clustering of obesity remains poorly understood.
Instead of shared norms, social modeling may account for similarity of health behaviors. Cunningham and colleagues offer a literature review of effects of body weight by close social ties (particularly friends) stating that the majority of sixteen studies conclude that there is evidence of influence; however, findings shed "little light" on mechanisms of influence (2012; p. 1175).

The high percentage (49%) of egos that share the same weight category as their networks' weight category demonstrates a general level of shared 'shape' or 'fatness' among female networks, a trend found in U.S.-based study population. Yet, according to social network analysis, it's not clear if homophily or shared environmental effects are responsible for this. Particularly worrisome here is the situation whereby ego is one or two stages below their network's average BMI, are they at risk for weight gain? That is, will ego be 'pulled' or influenced and result in weight gain and a weight category equivalent to their network's average? Regarding the two egos that fell two weight categories below their network average, in the context of rural Dominican social networks this may be considered the 'grandmother' or 'auntie influence.' That is, a younger woman (ego) lists a grandmother or auntie with an extremely high BMI (40 in one of the cases) which has a significant effect on the networks' BMI average.

Turning to socio-cultural trends among rural Dominican female social networks, one of the outcomes of matrifocality is resource sharing - including food and meal preparation and, thus, meal sharing. Largely a display of matrifocality, it's not surprising that female networks are primarily kin-based; this is particularly true for middle-aged and older women. Rural Caribbean residents (Sobo, 1993) such as Bwa Mawegans are known for close consanguineal ties (Quinlan, 2005; Quinlan & Flinn,
2005; Macfarlan & Quinlan, 2008) particularly among women (Quinlan, 2005). Therefore, shared or similar BMIIs among female kin is not surprising; yet teasing apart exact mechanisms remains challenging. In particular, the role of genetics may be indicated in determining weight status. (Genetic analysis is clearly out of the scope of this study yet offers another etiology of obesity to consider.) Shared environmental factors (particularly food resources and sharing among female kin) is yet another pathway of shared levels of overweight/obesity, which complicates findings.

While the multiplicity of causes of obesity is unquestionable (Hammond, 2010), network study is an under-utilized conduit of contagion. Treatment and preventative efforts are also a beneficial route in the preventative, weight loss, and management efforts of the obesity epidemic. Bahr, Browning, Wyatt, & Hill (2009) have put forth promising work demonstrating weight loss and prevention among social networks. Dieting with friends is ineffective in the long term. Yet, dieting with friends of friends may be effective as it forces a shift in cluster boundaries. Concerning intervention and prevention, models also suggest that targeting normal weight and/or influential individuals may arrest the spread of obesity. Indeed, Bahr et al. (2009) advocate for network-driven strategies in the prevention and reduction of obesity.

Specific to rural Dominica, structural changes, namely migration or punctuated urbanism (commuting back and forth from urban to rural centers), may introduce changes and expansion to social networks. As Dirks’ (1972) Caribbean ethnography in Tortola (British West Indies) illustrated, during times of economic uncertainty (depression or recession), market opportunities become either scarce or scattered. In
response to these conditions, networks expand and become more fluid. Under such a set of circumstances, women in the study site who are taking advantage of economic opportunities, are experiencing a newly acquired breadth and range of their networks, moving beyond a traditional interpretation of Caribbean female social networks.

As discussed earlier, the rural horticultural lifestyle is contracting. Women are out-pacing men in terms of modernization. Women obtain higher levels of education compared to men (Quinlan & Quinlan, 2007). Women are more likely to obtain commercial occupation outside of the village. Women migrate at higher rates than men (Quinlan, 2006; Quinlan, 2005). These factors may coalesce and expand women's social networks beyond the traditional notion of West Indian female social networks. This may be particularly true for a younger generation of females as educational, and thus occupational opportunities, have increased compared to middle-aged and older women in the village. Indeed, younger women often listed more alters living outside of the study site. In terms of rates of the social epidemiology of fat distribution, middle and older women may be experiencing downstream effects of the younger generation's modernization via more pre-packaged and convenience foods brought back to the study site. Here, we see the dynamics of the shift away from the horticultural lifestyle and the onslaught of the modern food industry. Regrettably, due to constraints and limitations of field work, alters living outside of the study site were ultimately not included in the study. Future research that is able to expand beyond village residents is recommended.
Conclusion

Trending with other findings (Christakis & Fowler, 2007; Hruschka et al., 2011), overweight and obesity appears to act as a social contagion among rural Dominican women. What's unique among this community is focusing on socio-cultural trends such as matrifocality. While this study lacks some of the analytical sophistication of the Christakis & Fowler (2007) foundational study, it offers another important consideration of network studies — the influence of socio-cultural trends among communities and research populations. The human predisposition and ability to gain deleterious levels of body fat is unquestionable as it is now a global-level health predicament. Population-specific trends offer a promising method in which to focus preventative efforts.
CHAPTER 6
CONCLUDING SYNOPSIS

The state of overweight/obesity in Bwa Mawego

Findings from this study indicate three general patterns among rural Dominican women: 1) rates of overweight and obesity are trending with large, Westernized nations; 2) fat-stigmatizing attitudes parallel attitudes in middle-income nations as well as U.S.-based populations; and 3) overweight and obesity appear to act as a social contagion in social networks (i.e., fat 'spreads' among social networks). The obesity epidemic is complex; there are many drivers working in a synergistic manner that are responsible.

Historically speaking, larger bodies have been favored among rural Caribbean residents (Sobo, 1993); there is a local preference for a woman's body to be 'full up.' Unfortunately, this preference may lead to amounts of body fat now considered deleterious. At the same time, these bodily preferences are interacting with large-scale, upstream drivers. An obesogenic environment, specifically more access to calorically dense and nutritionally poor food in combination with a shift away from the traditional horticultural lifestyle, has resulted in levels of overweight and obese that are known to increase morbidity.

Indeed, the emergence of the overweight and obese body as the modal body type is a "profound biological shift for our species" (Brewis, 2011; p. 125). The upstream drivers mentioned above are largely responsible for this biological shift. As more developing nations continue to take part in a globalized economy, overweight and obesity will continue to rise for such nations. Dominica serves as a case in point.
Government and non-governmental agencies such as the Center for Disease Control and the World Health Organization are giving obesity studies its due attention as obesity has been defined as one of the major global public health issues (A. A. Brewis, 2011). As well, in 2013, the American Medical Association officially deemed obesity as a “disease” (Fitzgerald, 2013). This disease classification is rooted in (Western) biomedicine, and, as biomedicine predominates global health discourse, it heightens and shapes the response to the worldwide emergence of obesity. Returning to a social epidemiological approach, treating culture as a dynamic process is necessary in effective obesity interventions (Emmons, 2000). Obesity is a complex physiological issue; its etiology is multifactorial. Incorporating socio-cultural dynamics into public health interventions is paramount to success.

The global and the local

In the context of the Caribbean, Dominica is marginalized. Dominica's rugged and mountainous environment is the primary contributor for this historic and contemporary reality (Honychurch, 1984). The sugar industry came late to the island and was diminutive compared to other 'sugar islands'. Other large-scale industries that are major economic drivers in the Caribbean, namely tourism, play a very minor role in Dominica’s economy. More, the research site is considered rural even by Dominican standards, such that Dominicans refer to travelling ether as "going up country." In the recent past, residents have largely been considered horticulturalists (M. B. Quinlan, 2004). Traditionally speaking, horticulturalists are known for high caloric expenditure (O’Keefe et al., 2010).
Regarding health profiles, rural Dominicans have traditionally enjoyed a relative lack of infectious disease in comparison to other Caribbean nations due to a lack of water-borne diseases (M. B. Quinlan, 2004). In spite of this ecological and economical protection, the forces of globalization and development now appear to be taking a toll on Dominicans' health, even in the most remote villages. These macro-processes are transitioning health conditions for rural Dominicans. The results from this body of research indicate that Bwa Mawegan women are no longer living in relative isolation, buffered by their 'traditional' lifestyle. Local patterns are reflecting global patterns of overweight and obesity. Because rates of overweight and obesity are trending with industrialized nations, the ability of the Dominican Ministry of Health to properly deal with this health predicament is of particular concern. The economic and health costs of obesity are a threat to entire national economies (Barry M. Popkin, 2009). Moreover, the economic costs of NCDs are certainly a major threat to Dominica's Ministry of Health, not to mention the personal and familial suffering of the residents inflicted with hypertension and TTDM. Beyond the physical and economical costs of obesity, anti-fat attitudes are also trending with other middle-income developing nations as well as U.S.-based research populations. Psychological effects of fat stigma may lead to other health consequences such as depression. In an environment experiencing economic uncertainty, exacerbating depression levels could further erode health. Finally and unsurprisingly, fat appears to act as a social contagion as found in other U.S.-based study populations. The role of Facebook in fat stigmatizing attitudes provides support for the ever shrinking gap between the 'global and the local' or the 'West and the rest.' Rural Dominican women may live in relative isolation yet globalization and
development have been the agents of tremendous social change. The range of findings from this research indicate that globalization and development are resulting in deleterious health in terms of overweight/obesity levels as well as fat-stigmatizing attitudes.

**Contributions to medical anthropology**

Former contributions of studies on body weight generally, and body fat specifically, have primarily rested within the domains of cultural anthropology. Research from Sobo (1993), Becker (2004), and Anderson-Fye (2003) have greatly contributed to work in the cultural representation of large bodies, highlighting culture and psychology as iterative processes.

The goal of this research was to begin the project with a firm footing in cultural anthropology yet shift into an applied medical anthropological examination. Using a biocultural perspective provided such a framework. Based on the applied anthropological tenet of 'using anthropological tools to solve real world problems' the ultimate goal here is to inform public health efforts in the prevention of obesity. In tandem, this research highlights the role and the contribution that a biocultural framework affords for the study of global-level health problems such as obesity. Specifically, applying an anthropologically informed approach allows for a contextualization of data (Sobo, 2009). In terms of successful obesity interventions, incorporating culturally targeted and culturally tailored interventions work best (see Wilson, 2009).
Contributions to public health

The findings presented here underscore the critical role that medical anthropology plays in public health efforts (Sobo, 2009). Biomedical hegemony is certainly an issue to consider here, particularly in terms of the medicalization of body fat and obesity studies. A medical anthropological perspective helps to critically inform public health efforts. Specifically, biocultural ethnography offers locally-driven conceptions about the body and is augmented by an epidemiological snapshot of overweight and obesity. Recognizing the critical role that pan-Caribbean socio-cultural trends play in the Bwa Mawegan social fabric also augments understanding of the local situation. Pushing beyond local models of body fat, the epidemiological snapshot provides evidence of the rather surprising high levels of overweight and obesity. Johnston & Harkavy (2009) advocate for obesity interventions that "thinks globally but acts locally" (Brewis, 2011; p. 129). One specific direction that public health efforts may take into consideration are the affects that social media are having on anti-fat attitudes, particularly among young women. Targeted education through social media is one such suggestion.

The variety of costs of obesity on public welfare are enormous. There are a multitude of health, psychological, and economic consequences. It's crucial for public health efforts to incorporate contributions from medical anthropology (Campbell, 2011). Traditional weight loss interventions and dieting strategies are not effective in the face of a new, non-traditional obesogenic environment, as evidenced by the behemoth that is the weight loss industry. Therefore, network dynamics may be of great value. Indeed, an upshot of the utility of investigating the social contagion of obesity is, alternatively, the
spread of weight loss and/or weight maintenance (Bahr et al., 2009). If risky behaviors (i.e., smoking, alcohol consumption) are known to spread in social networks, behavior that positively effects health may as well. "Simulations show that changing the BMI of an individual in the center of a cluster is very difficult because surrounding neighbors will pull the individual back to their original weight; and because of this cluster-based inertia, our simulations demonstrate the ineffectiveness of interventions targeted toward obese individuals without regard to their social network" (Bahr et al., 2009; p. 723). Taking a woman's social network into consideration may be paramount to comprehensive weight-loss and weight-maintenance public health efforts.

Because medical anthropology is poised to aid public health efforts, findings from this research may augment the Dominican Health Ministry's efforts in obesity intervention and prevention. Public health efforts are primarily limited to Roseau, the capital of Dominica, and its environs. Therefore, for rural Dominicans, health campaigns are largely limited to poster and radio advertisements encouraging local populations to "Get healthy." Cleary these efforts are unhelpful and, frankly, unrealistic and ineffective. Results may help to inform Dominica’s Ministry of Health that their obesity problem is, in no uncertain terms, not limited to their urban population. Indeed, rural Dominicans' weight categories are trending with urban populations and a context-dependent circumstance must be considered.

**Study Limitations**

The use of the BMI is not without critique. Largely criticized for a lack of consideration of the composition of body fat versus muscle, the BMI only accounts for
overall weight. For example, athletes with high muscle versus low fat composition score indicate a higher BMI (possibly placing them in clinically overweight or obese categories). Further, the BMI does not account for the distribution of body fat. Because peripheral fat does not confer the same metabolic risk as centripetal fat, use of the BMI may lead to erroneous statistics on levels of body fat considered risky. This may be particularly concerning in this study population as women may 'carry' their fat in their hips, thighs, and buttocks. Yet another line of critique asserts that population-specific BMI cut-offs would better suit genetically similar populations. With any diagnostic criteria, shifting cut-off points has major ramifications on prevalence rates.

Other methods exist - dual X-ray absorptiometry (DXA), magnetic resonance imaging (MRI), body volume 3D scanning, and bioelectrical impedance. The former three are costly and inappropriate for field research while the later is not yet in widespread use. The Omron sensing scale used in this study provides body fat percentage scores. Yet for purposes of comparison, the BMI is currently the most accessible in terms of other data sets. At this time, there is a lack of cross-cultural data of weight categories using body fat percentage.

Concerning the study population, this research focuses on women and does not include men. While males can and do experience overweight and obesity, it does not appear to be an issue in the study site. The strenuous work associated with a horticultural lifestyle may act as a protective mechanism for the males in this community.

Specific to the ATOP study, findings were limited by relying primarily upon categorical data (e.g. Council and Placek's measure for Facebook as a presence/absence
variable). Also, Bwa Mawegans may reckon the biomedical category of obese and overweight as normalized or even preferred. To evoke "obesity" or "obese people" in a questionnaire may bring to mind extreme versions of corpulence. This very issue was referenced in Baglar's (2013) recent work, noting the discrepancy between biomedical categories of overweight/obese and patient's recognition of risky adiposity. Indeed, although a third of village women are clinically obese, participants will emphatically claim that there are not many obese people in the village and that it's "not a problem." There is, in fact, no class III obesity present (BMI ≥ 45), i.e. no super-obese). This perspective may create an 'us' and 'them' dichotomy in villagers' attitudes and, hence, may bias responses. This speaks to the potential discrepancy in cultural models of body fat (McCullough and Hardin 2013). Also, men were not included in this study. This data may not be generalizable to the male population as men may or may not have similar ATOP scores to women. The model of [which combined factors?] explained 22% of the variance in ATOP scores, which is promising in social science, and yet 78% of anti-fat attitudes remain unexplained. While this study did not include other factors, it does set the stage for future research.

Regarding the network study, a network analysis among a tightly-knit rural Caribbean community produces inherent difficulties in determining exact routes and causes of the spread of overweight and obesity. Technically speaking, "shared environmental factors can cause the appearance of social network effects" (Cohen-Cole & Fletcher, 2008; p. 1386). Beyond analytic critique, genetic influence on overweight and obesity may also be a factor. The fact that rural Dominican female network largely overlap with first and second order relatives may exacerbate a possible genetic
confound. Consideration of genetic influences is, however, out of the scope of this research.

Closing considerations

This body of research indicates that levels of overweight and obesity among rural Dominican women are trending with large, Westernized nations. With the exceptions of some South Pacific nations where obesity is a population-based health issue (A. A. Brewis, 2011), the obesity epidemic writ-large began in large, Westernized nations. Of particular concern is that rural Dominica, as a middle-income developing nation, is trending with these larger, industrialized populations. Indeed, Dominica is decades behind in economic development when compared to developed nations. Of greater concern is the ability of public health entities to appropriately deal with the onslaught of NCDs, as greater obesity levels no doubt contribute to rising levels of hypertension, TTDM, and heart disease. As discussed earlier, rural Dominicans typically do not seek biomedical care until there is a health episode whereby they are diagnosed with an NCD. Preventative and health maintenance efforts must be advanced.

Because rural Caribbean populations are known for certain socio-cultural trends such as matrifocality, it is vital for public health efforts to consider such trends in their preventative and health maintenance efforts. The final piece of network research exemplifies how incorporating such socio-cultural trends may serve as a fitting model in which to engage in appropriate public health campaigns. Utilizing network affects — the largely matrifocal paths of social support, idea sharing and food sharing, may be a method through which medical anthropology appropriately informs public health. It is
this researcher's hope that this body of research clarifies the myriad ways in which a medical anthropological lens stands to benefit public health.
**BIBLIOGRAPHY**


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APPENDIX

Attitudes Toward Obese Persons Scale
Please mark each statement below in the left margin, according to how much you agree or disagree with it. Please do not leave any blank. Use the numbers on the following scale to indicate your response. Be sure to place a minus or plus sign (- or +) beside the number that you choose to show whether you agree or disagree.

-3  -2  -1   +1   +2   +3
I strongly agree  I moderately agree  I slightly agree  I slightly disagree  I moderately disagree  I strongly disagree

1. ______ Obese people are as happy as nonobese people.
2. ______ Most obese people feel that they are not as good as other people.
3. ______ Most obese people are more self-conscious than other people.
4. ______ Obese workers cannot be as successful as other workers.
5. ______ Most nonobese people would not want to marry anyone who is obese.
6. ______ Severely obese people are usually untidy.
7. ______ Obese people are usually sociable.
8. ______ Most obese people are not dissatisfied with themselves.
9. ______ Obese people are just as self-confident as other people.
10. ______ Most people feel uncomfortable when they associate with obese people.
11. ______ Obese people are often less aggressive than nonobese people.
12. ______ Most obese people have different personalities than nonobese people.
13. ______ Very few obese people are ashamed of their weight.
14. ______ Most obese people resent normal weight people.
15. ______ Obese people are more emotional than nonobese people.
16. ______ Obese people should not expect to lead normal lives.
17. ______ Obese people are just as healthy as nonobese people.
18. ______ Obese people are just as sexually attractive as nonobese people.
19. ______ Obese people tend to have family problems.
20. ______ One of the worst things that could happen to a person would be for him to become obese.
ENDNOTES

i For a discussion on the critiques and limitations of BMI, see Reynaldo Martorell (2004).

ii Unless otherwise noted, discussion is taken from Quinlan (2004).

iii The term "bush medicine" is commonly found throughout the Caribbean (Laguerre 1987).

iv See Foster (1994) for a full discussion humoral theory.

v Based on the 9 female silhouette drawings representing body sizes ranging from very thin to morbidly obese (Stunkard et al., 1983).

vi The authors note that the directionality of the correlation findings is unclear. Barbadian women may have smaller body size preference due to the influence of beauty images seen on television or it may be that those who prefer smaller sizes have more access to televisions.

vii A modified version of this chapter is currently in press. Sarak K. Council and Caitlyn D. Placek, "Cultural Change and Explicit Anti-fat Attitudes: A Case Study in rural Dominica" Social Medicine.

viii The authors note that the findings are unclear. Barbadian women may have smaller body size preference due to the influence of beauty images seen on television or it may be that those who prefer smaller sizes have more access to televisions.

ix Hruschka et al. (2011) confirmed the basic findings that obesity clusters socially.