

Coping Strategies, Their Relationship to Weight Status and Food Assistance Food Programs Utilized by the Food-Insecure in Belize

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Abstract. Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Food insecurity is a phenomenon that occurs not only in developing countries but also in developed countries and is recognized as a major public health concern. According to the Global Hunger Index, a measure of food insecurity, Belize is still considered a moderate hunger country. This study assessed the most common coping mechanisms of food insecure in Belize using validated indexes and evaluated the relationships between coping mechanisms, food insecurity level and body weight. Further, an assessment of food assistance programs available in the community was also conducted. This study found a high prevalence of food insecurity, 56%, in the Cayo District of Belize. The coping mechanisms utilized to increase food supply included incorporating dense food, pooling resources with family and relatives, divine intervention and purchasing discount foods. There were marked differences in the coping strategies employed by low food-insecure (LFS) families versus very low, food-insecure (VLFS) families; specifically, VLFS families utilized more irreversible, nutritionally-negative coping mechanisms. Differences in coping strategies may contribute to differences found in overweight and obesity percentages. Additionally, these coping strategies may predict prevalence and management of chronic diseases such as diabetes. Government and NGO food assistance programs need to be expanded and incorporate foods and education to improve health status.

Keywords: Food insecurity, nutrition transition, coping strategies, obesity

1. Introduction

Food security exists “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” [1]. Food security rests on four pillars – food availability, access, utilization and stability [2]. Household food insecurity occurs when food is not available or cannot be accessed with certainty in terms of quality, quantity, safety and culturally acceptable ways [3]. Food insecurity is a phenomenon that occurs not only in developing countries but also in developed countries and is recognized as a major public health concern [4].

One in every eight people, or a total of 842 million, worldwide in 2011–13 were estimated to be food insecure [5]. Africa remains the region with the highest prevalence of food insecurity [5]. Significant improvements have been made on hunger and food insecurity in Latin America and Caribbean countries. However, according to the Global Hunger Index, a measure of food insecurity, Belize is still considered a moderate hunger country [5]. Because food insecurity is strongly associated with poverty, the prevalence of food insecurity is believed to be above country averages in districts with higher poverty rates.

Traditionally, food insecurity has found to be one of the key factors causing undernutrition [6], [7]. Chronic undernutrition results in stunted growth, nutrient deficiencies and depressed immunity. Worldwide, malnutrition accounts for 21% of deaths in children under 5 years of age [8]. In this way, food insecurity and

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undernutrition are linked to disease in a vicious cycle. Inadequate food consumption heightens vulnerability to infectious diseases. In turn, infections can further depress intake and decrease absorption of nutrients consumed [8]. In children, food insecurity and undernutrition also impairs cognitive development. The FAO estimates that 2-11% of a country's gross national product is lost to malnutrition [9].

In resource-rich countries such as the US, chronic food insecurity is associated with obesity [10]-[12]. In fact the concurrent prevalence of obesity and food insecurity is often referred to as the hunger-obesity paradox [13], [14]. Additionally, poor dietary intake resulting from household food insecurity has been associated with numerous health problems, including diabetes, stress, depression and hospitalization [15]-[18].

Belize is a country experiencing the nutrition transition or significant changes in traditional dietary and activity patterns. Wright *et al.* [19] found that dietary patterns in Belize are changing dramatically; moving from high-quality, traditional foods such as corn and beans to poorer-quality, "westernized" foods such as hamburgers, noodles and sugar-sweetened beverages. The study also found a significant increase in obesity rates in Belize, reaching levels seen in developed countries such as the United States. These findings are suggestive of a nutritional transition in Belize. As a result of the nutrition transition, one generation can experience undernutrition as a child and obesity as an adult both as a result of food insecurity.

Food insecure households exhibit a variety of responses to a decline in access to food. Kempson *et al.* [20] reported multiple coping strategies applied by limited-resource individuals such as participating in food programs (eg. food pantries and church dinners), exchanging resources (eg. sell surplus food), managing personal resources (eg. budgeting), having support system (eg. borrow money, cook with others, praying to God), increasing income (eg. selling items, begging), decreasing expenses (eg. gardening), relocating to increase income (eg. migration), and shopping for low-cost and value foods (eg. bulk food, coupons). In a review of literature, Maxwell *et al.* [1] proposed that coping with food insecurity is patterned and predictable. They propose that households first limit meal size, then reduce the number of meals and consume less preferred foods. If the crisis continues, adults will limit their own intake to protect children in the household. Households will begin to engage in the consumption of wild foods, followed by borrowing food from others and finally utilize credit to purchase food. When these strategies no longer suffice, then households will skip whole days of food consumption, eat into their seed stocks, send family members away and resort to begging. Corbett also conceptualized coping as a process, based on a continuum from reversible to irreversible strategies. The idea, however, that coping strategies occur as a universal sequence has been debated [21], [22]. Coping strategies are also context-specific. In a comparison of coping strategies utilized by food insecure families in 3 developmentally-diverse countries, Wright and Gupta [23] found common strategies utilized globally. However, each country had unique or context-specific coping strategies.

A 2008 country-wide analysis of poverty and food insecurity coping mechanisms in Belize revealed that Belizeans depend more on their own personal networks than on state assistance [24]. Quantitative data revealed the following prominent coping mechanism themes among households living in poverty: 63% of households in Belize rely on divine intervention (through prayer) as the main coping strategy; one in three households 'forgo necessities', like deferring a bill payment; one quarter of all households ask a relative for help; and about 12% said they ask politicians for help [24]. The non-poor households were more likely to use savings, borrow and pawn, while the poor were more likely to seek assistance from relatives [24]. The quantitative data showed also that the coping strategies used by the poor usually do not require repayment [25]. In addition to those coping strategies mentioned above, additional strategies to cope with food insecurity among Belizeans included: rural-urban migration, migration overseas, dependence on remittances, reducing access to basic services (like education or healthcare), crossing the border (into Guatemala or Mexico) for health services, begging, thrifty spending, working multiple jobs, use of a "back garden" with beans and livestock, and the lottery [24]. Among the wide variety of coping mechanisms employed to deal with food insecurity, there seems to be differences in the method used depending on residential area, awareness of personal or public mechanisms, support programs, and/or social connectedness.

A better understanding of the coping mechanisms used by the poor/food insecure and their relationship to the changing health problems in Belize is necessary to develop appropriate and effective policies and

intervention strategies to improve food security. Therefore, the purpose of this study was to assess the most common coping mechanisms of food insecure families in Belize using validated indexes and evaluated the relationships between coping mechanisms, food insecurity level and health status. Further, an assessment of food assistance programs available in the community is also needed.

2. Methods

2.1. Study Population and Design

The study was conducted in a city located in eastern Belize. The population of the city is estimated to be 17,878 [25]. This area was chosen as the site for this study because it is the largest district in Belize and has the most diverse ethnic and multicultural population distribution [25]. Permission was given by the hospital administrator and Belize's Minister of Health. Approval for the study was obtained from the university institutional review board.

To assess the most common coping mechanisms used by food insecure families, a cross-sectional, convenience sample of families receiving medical care at the outpatient clinics of the area hospital were surveyed. Those who volunteered to participate provided verbal consent. One adult from each household was asked to answer the questions on behalf of the family. Participants were asked questions pertaining to: 1) household food security; 2) food insecurity coping mechanisms; 3) health status and demographic information. Additionally, the participants was measured and weighed.

Household Food Security. The six-item short form of the *Household Food Insecurity Access Scale (HFIAS)* was used to assess food security. The HFIAS-short form was developed by researchers at the National Center for Health Statistics and has been shown to identify food-insecure households with reasonably high specificity and sensitivity and minimal bias [26]. The sum of affirmative responses to the six questions in the survey is the household's raw score. The raw score is then classified into one of the following food security statuses: 1) high food security, 0-2 positive responses; 2) low food security, 3-4 positive responses; or 3) very low food security, 5-6 positive responses.

Food Insecurity Coping Strategies. The Coping Strategies Index (CSI) was used as a qualitative tool to determine food insecurity coping strategies. When using CSI as a qualitative tool, Participatory Rapid Appraisal methods are applied to construct the locally relevant coping strategies. First, we began with a generic list of coping behaviors from the CSI Field Methods Manual classified into 4 general categories - dietary change, increase food availability, decrease number of people, and rationing. Focus group interviews were then conducted with members of the local community to develop a list of location-specific coping behaviors in addition to the generic list of coping behaviors. A main set of coping strategies that reflected the consensus view of the group was finalized [1].

Health Status and Demographic Information. Participants were asked basic demographic information including gender, age, race and ethnicity. Participants were also asked if they had been diagnosed with diabetes, hypertension or heart disease.

Anthropometric Measurements. Anthropometric data measured included weight and body mass index (BMI) collected using the Omron Full Body Sensor Body Composition Scale, Model HBF-510. Height was self-reported while weight was measured by the Omron scale. The scale calculated BMI based on the formula $\text{weight}/\text{height}^2$. BMI was classified according to the system used by NIH: 18.5-24.9 kg/m^2 = normal weight; 25-29.9 kg/m^2 = overweight; $\geq 30.0 \text{ kg}/\text{m}^2$ = obesity [27].

To assess the food assistance programs available in this city of Belize, semi-structured interviews were conducted with key stakeholder. Snowball sampling was used with stakeholders. Key stakeholders interviewed included hospital administrators and a social worker, a priest and minister, a director of a community organization, school administrators and a teacher, a Ministry of Health official, a rest home administrator and staff, and business owners. Questions asked included: 1) are you aware of government food assistance programs in the community?; 2) are there any non-government food assistance programs in the community? Respondents were asked to elaborate on positive answers to either question.

Statistical analyses were conducted using SPSS (version 22). Findings on the relationship between food security level, coping strategies and weight status came primarily from a multivariate analysis of covariance. Frequencies and percentages were used to describe coping strategies.

Food Security Level: The responses were coded into binomial category of 0 and 1. The responses of the question 1, 2, and 4 were categorized as “always or sometimes true was given the code of 1”, “never true was given the code of 0”. Similarly, for question 3, 5, 6, the response “yes” was given the code of 1 and the response “no or don’t know” was given the code of zero. The responses were then summed together. Finally, households with zero or 1 affirmative response were classified as food secure, those with 2,3 or 4 affirmative responses were classified as low food secure, and those with 5 or more affirmative responses were classified as very low food secure. **Coping strategies:** Thematic analysis was done [28] to analysis the qualitative data of coping strategies. It is a method to identify, analyze and report themes and patterns of behavior [28]. The verbatim of the respondents were noted and were used to complement the strategies adopted by them. The strategies were also categorized under five main themes described by coping strategy index schedule.

3. Results

3.1. General Findings

A total of 70 families were interviewed. Of those, 68% were female and 32% were male with an average age of 39.18 (s.d.=17.2). Respondents were 90.2% Hispanic, 6.5% Black, and 3.3% Caucasian. Among this group, 46% were food secure and 54% were food insecure (FS). Within the food insecure families, 37% were low food secure (LFS) and 17 % were very low food secure (VLFS).

3.2. Weight and Health Status

Weight status was calculated using BMI and body fat percentage. FS participants were 57% normal weight, 39% overweight and 4% obese. LFS participants were 42% normal weight, 31% overweight and 27% obese. VLFS participants were 33% normal weight, 50% overweight and 17% obese. Because of the small number of VLFS, no statistically significant differences were found between food security level and weight status ($F(1,38)=.037, p>.05$). Health status was obtained from participant self-report of being diagnosed with diabetes, hypertension or heart disease. Seventeen percent of FS participants reported having diabetes, 9% being hypertensive and 9% having heart disease. Twelve percent of LFS participants reported having diabetes, 23% being hypertensive and 16% having heart disease. Half (50%) of VLFS reported having diabetes, 42% hypertensive and 42% having heart disease.

3.3. Coping Strategies Utilized and Relationship to Food Security Level

All food insecure families (100%) reported using the Dietary Change theme. One strategy within this theme used by all families, regardless of level of food insecurity, was purchasing inexpensive but filling “dense foods” such as pasta and rice. Another strategy used within this theme, “eating smaller meals or skipping meals” was used significantly more by VLFS families than LFS families (75.0% VLFS versus 46.2% LFS).

For the next theme, 89.5% (84.5% “low food secure” and 100% “very low food secure”) of families reported using strategies to increase Food Availability. Examples of strategies used to increase food availability included sharing meals with extended family and gardening. Significantly more LFS families used savings to purchase food when there wasn’t adequate food in the home (15.4% LFS versus 8.3% VLFS). Significantly more VLFS families sent children to beg for food (25% VLFS versus 0% LFS) or pawned household items for food money (50% VLFS versus 11.5% LFS).

Only 7.9% of families utilized the theme of Decreasing Number of People in the Family; no “low food secure” coped using these strategies while 25% of “very low food secure” did use this coping strategy.

For the final theme, Rationing, 71.1% (57.7% LFS and 100% VLFS) of families reported using strategies within this theme. Examples of strategies within this theme included forgoing necessities, preparing foods in bulk (“big pot of beans that lasts for many meals”) and buying discount foods (eating the same foods “over and over”). No significant differences were found in level of food insecurity and strategies utilized within this theme.

3.4. Coping Strategies Classification

Coping Strategies were further classified as either severe, nutritionally-negative coping strategies or reversible, nutritionally-positive based on principles of health and welfare. Specifically, severe, nutritionally-negative coping strategies were defined as those that compromised nutritional health, fiscal stability or are illegal and are less reversible. Negative coping strategies included consumption of high calorie/low nutrient foods, skipping meals, consuming smaller portions, borrowing or hustling. Reversible, nutritionally-positive coping strategies were defined as those that increase availability of resources and nutritious foods. Examples of positive coping strategies included eating with relatives or friends, gardening, preparing in bulk or thrifty spending. VLFS families tended to utilize more negative, irreversible coping strategies such as “decreasing the number of people in the family,” pawning,” “sending children to beg” and “not eating enough” than LFS families. LFS tended to utilize more positive, reversible coping strategies including “pooling resources,” preparing food in bulk” and “purchasing discount foods.”

3.5. Coping Strategies Utilized and relationship to Body Weight

There was one statistically significant difference found between coping strategy used and weight status. Specifically, pooling resources with family/friends was found to be associated with normal weight status ($\chi^2(1, N=38) = 6.61, p<.01$). No statistically significant differences were found between weight status and the coping strategies of gardening, using discount foods, consuming dense foods or not eating as much.

Table 1: Weight and health status by food security level

	Food secure (n=23)	Low Food Secure (n=26)	Very Low Food Secure (n=12)	Chi-square (N=61)		
				df	value	p
Normal Weight (BMI<25.0, n=28)	57% (n=13)	42% (n=11)	33% (n=4)	4,61	5.67	.225
Overweight (BMI =25.0-29.9, n=23)	39% (n=9)	31% (n=8)	50% (n=6)			
Obese (BMI ≥ 30.0,n=10)	4% (n=1)	27% (n=7)	17% (n=2)			
Overweight & Obese (BMI ≥ 25.0)	43% (n=10)	58% (n=15)	67% (n=8)	2,61	.194	.378
Diabetes	17% (n=5)	12% (n=3)	50% (n=6)	2,61	6.90	.03
High Blood Pressure	9% (n=2)	23% (n=6)	42% (n=5)	2,61	5.20	.07
Heart Disease	9% (n=2)	16% (n=3)	42% (n=5)	2,61	7.04	.05

3.6. Community Resource Assessment

The community was assessed for government and community food assistance programs. No food insecure clients interviewed had participated or knew of the Ministry of Health’s Food Pantry Program. Key stakeholders interviewed reported that the program was not available on a consistent basis and only one small basket of food was provided to a food insecure family each month. In an interview with an official from the Ministry of Health, the Food Pantry program was described as a trial that provides food at a reduced price rather than free food.

Schools in Belize are private with no mandated feeding programs. School administrators interviewed reported that some schools have secured funding to serve lunches but the majority of schools do not; instead,

the majority of schools have “snack shacks” which are private vendors that serve soda, candy, chips, and burritos. One program discovered during interviews with key stakeholders was a breakfast program for children. Cornerstone Foundation, a non-government organization, provides this food assistance program for children during the school year. Approximately 87 children are provided a breakfast before starting the school day. Students are referred to the program by teachers based on need. The program is supported by volunteer donation.

A second program discovered during interviews with key stakeholders is a home delivered meals for the elderly. A consortium of organizations delivers meals to 25 homebound seniors daily during the work week. The meals typically consist of rice and beans, chicken and coleslaw.

Another food program discovered during interviews with key stakeholders is a food basket program for patients receiving dialysis. The social worker and nutritionist at the dialysis center obtained a grant from the Social Security Bureau to fund monthly food baskets for food insecure dialysis patients for a six month time period.

Key stakeholders also reported that during holidays and campaigns, local government officials will give turkeys and hams to the poor. A final area of food assistance investigated was churches. Interviews with church leaders revealed some churches have a communal meal once a week connected with service or mass, some churches provide meals for the food insecure at holidays, and one church delivered food baskets to the food insecure on an on-needed-basis.

4. Discussion

Belize’s is highly vulnerable to food insecurity due to a combination of factors including high levels of poverty, the economy’s exposure to natural disasters, and certain economic and fiscal vulnerabilities. The aim of the study was not to give prevalence rates as the number of families interviewed was small; however 54% of the families interviewed were food insecure, demonstrating a significant public health issue in this area of Belize.

When asked “What do you do when you don’t have adequate food and don’t have the money to buy food?” we found a range of coping strategies utilized to maintain the food supply. The most common coping strategy reported was using dense foods. Many cultural staples of Belize are dense foods such as rice and beans but respondents reported they ate the same “filling foods” over and over and would rather purchase more meats and vegetables if they had the resources. The second most common strategy reported was pooling resources with family and friends. Though Henry & Ballayram [24] reported divine intervention as the main coping strategy in their study of Belizeans, this was the third most common strategy reported in our sample. The fourth most common strategy, which was more commonly used than Henry & Ballayram [24] findings, was purchasing discount foods. We found two unique coping strategies used by our sample – pawning and preparing food in bulk. Although Henry & Ballayram [24] found 12% of their respondents asked politicians for help, none of our respondents utilized this coping strategy. Additional strategies to cope with food insecurity found that were similar to previous reports included foregoing necessities and gardening [24].

Watt [29] and Maxwell & Caldwell [1] found a logic to the sequence of coping behaviors based on their reversibility and commitment of domestic resources. We too found a sequence based on severity and nutritional impact. Specifically, VLFS families utilized more severe, nutritional-negative strategies, such as eating less and forgoing necessities, than LFS families. While there may be a tendency toward universal patterning of coping strategies, specific coping responses have health implications for nutritional status and chronic disease incidence and management. For example, not only did we find that VLFS families utilized more severe, nutritionally-negative coping strategies but we also found a higher prevalence of both diabetes and heart disease among VLFS, buttressed by a trend toward a greater prevalence of high blood pressure among VLFS (see Table 1). The use of more severe, nutritional-negative strategies may predict health consequences. For example, foregoing necessities such as medical visits or erratic eating patterns may result in poor management of diabetes and disease progression.

This study did not find a statistically significant differences between food security level and weight status. This is attributed to small numbers in the VLFS group. However, in reviewing trends in the percentages of overweight and obesity among the food insecure in this study, the hunger-obesity paradox seems to be developing. As seen in the United States, there was a higher prevalence of overweight/obesity among food insecure. We also found the percentages of overweight/obesity increased significantly as food security level declined. This finding is supported by the recently documented nutrition transition in Belize [19] and could worsen as the population moves away from cultural staples such as beans and rice to more processed, energy dense foods.

Cajanus [30] found that there is a low awareness and access by Belizeans of government food relief programs. Our results were similar, finding only a small number of government food assistance programs and little awareness of such programs. In contrast, we found a strong non-government agency response to food insecurity in the Cayo District of Belize. The programs, including a breakfast program for school children, home-delivered meals for seniors and food baskets for families from churches, appeared to be very organized but financially vulnerable. These findings have strong implications for public policy. Given the high levels of poverty and income inequality, investments need to be directed to improving livelihoods. It is also imperative to include health foods and nutrition education to promote healthy body weights and chronic disease prevention.

5. Conclusion

This study found a high prevalence of food insecurity in the Cayo District of Belize. The coping mechanisms utilized to increase food supply included incorporating dense food, pooling resources with family and relatives, divine intervention and purchasing discount foods. There were marked differences in the coping strategies employed by LFS families versus VLFS families; specifically, VLFS families utilized more severe, nutritionally-negative coping mechanisms. Differences in coping strategies may contribute to differences found in overweight obesity percentages. Additionally, these coping strategies may predict prevalence and management of chronic diseases such as diabetes. Government and NGO food assistance programs need to be expanded and incorporate foods and education to improve health status.

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