Caribbean Agro-Economic Society

Farm & Business

The Journal of the

Caribbean Agro-Economic Society

Theme:

"Mitigating Climate Change Effects to Ensure Food Security"

Vol. 8, No. 1, July 2016

ISSN 1019—035 X

ISSN 1019 – 035 X

CONTRIBUTED PAPERS

An Assessment of the Household Food Security Status and Local Foods Grown in Rural Bahamas

Jeri L. Kelly[1]; Carlisle Pemberton[2]

[1]MSc Graduate, [2]Professor, Department of Agricultural Economics and Extension, Faculty of Food and Agriculture, The University of The West Indies, Trinidad and Tobago.

Abstract

The Bahamas has been faced with an increasing food import bill and a declining agricultural sector. A benchmark of the degree of food insecurity within the country may create the challenge for a national effort to reverse these trends. The focus of this study is to determine a reliable assessment of household food security including the levels of local food availability and access within a rural area of the Bahamas. The paper also seeks to determine whether local food systems have the potential to encourage rural development within The Bahamas.

The USDA Household Food Security Survey Module provided a reliable measure for the estimation of the household food security index for rural East Grand Bahama. ANOVA and regression models determined the associations between the food security index and households' socioeconomic and local food factors. High monthly income was the most significant determinant of a food secure household as income was highly and positively correlated with the household food security index.

The results offer evidence that it is plausible that local food systems, such as farmers' market, community supported agriculture, and community gardens, can have a positive impact on the area's economy.

Keywords – Jeri Leah Kelly; estimation of household food security; local food systems; rural development in the Bahamas

Introduction

The underdeveloped agricultural sector of The Bahamas produces approximately 10% of the food consumed; the remaining percentage is derived from imported food products. Within 2013 the country's food import bill was at approximately US$ 500 million and has increased by approximately US$ 9.8 million each year over the past two decades (McKenzie 2013). The Bahamas, on a national scale, can plausibly be categorized as experiencing transitory food insecurity. This is the temporary inability to access or produce sufficient food to maintain a good nutritional state (FAO 2008). However, the true measurement of the Bahamas food insecurity is uncertain on account of the huge variance of local food supply amongst the many islands.

This study examines the household food security status and local foods grown in rural Bahamas, specifically East Grand Bahama Island (GBI). Its premise is based on the concept of local food systems which relate local food availability and access to the development of food self-sufficiency. Measurements of food security assist with gauging the degrees of food severity for a population to reduce events of food insecurity. For the Bahamas, there is no specified

status of food security at any economic level or a baseline determinant to track further severity or improvements. As a consequence rural areas suffer from the lack of adequate and affordable foodstuffs. Thus, the focus of this study is to determine a reliable measure of household food security and assess the levels of local food availability and access within rural areas. Also to define suitable local food systems that can encourage rural development.

Objectives

The objectives of the study are to:

1. Determine a household food security index for the sample population of East Grand Bahama;
2. Analyze the socioeconomic factors that define a food secure and insecure household;
3. Assess the local foods grown and perceptions of local food systems within the study area.

Hypotheses

1. The household food security status of households in East Grand Bahama Island is food insecure;
2. The socioeconomic factors of East Grand Bahama households determines their household food security status;
3. An increase in the local foods grown within the study area can have a positive effect on the household food security status.

Methodology

Study Area

This study sought to assess the level of household food insecurity within the Eastern rural area of Grand Bahama Island, The Bahamas. This district of Grand Bahama Island is defined as the High Rock constituency, specifically the rural areas of which include fourteen (14) settlements and two (2) cays. The selected area is 28.6 mi2 (74.3km2) and about 9% of the High Rock constituency. The population collectively observed was 1,022 persons with approximately 290 households. Within the study area the population considered refers to the number of households and not individuals living in these households.

Sampling Design and Sample Size

The survey was developed to gather information to determine the level of food insecurity and local food supply available for the population of the targeted area. A list of all the households within the study area was not available therefore block mappings of the study area that were utilized during the national census served as a sample frame. A simple random sampling procedure was then used. This procedure was chosen as it provided an equal probability of selection amongst the households (Israel 2013). The block mappings also aided this procedure by providing the locations of households, which led to gaining an unbiased representation of the study area.

An appropriate population standard deviation for the calculation of the sample size as in most cases was unknown. A sample size of 170 households was selected. Given its population

of about 286 households this sample is approximately 60% of the households within the study area. Of the 170 households randomly chosen, 156 responded to the survey questionnaire yielding a nonresponse rate of about 8%. Hence, the final sample size of 156 represented approximately 55% of the targeted population.

Method of Data Collection

The survey of households in the study area was collected during the month of May 2014. The method of data collection was by questionnaire (Appendix 1). Questionnaire completion by the respondents themselves was supervised by the trained enumerator, a graduate student of The University of the West Indies, St. Augustine. In some settlements with low literacy rates the enumerator assisted the respondents by conducting an interview to complete the questionnaire. Prior to conducting the survey, each respondent was asked to sign a consent form (Appendix 2) to allow for the use of the information obtained from the survey.

Design of Questionnaire

The objectives of the survey were to:

- Obtain information on food consumption and accessibility to determine the severity level of household food insecurity;
- Collect socioeconomic data to identify the major factors that affect the level of household food insecurity;
- Identify the availability and access to local foods supply; and
- Gather the perceptions on local food systems from those within the study area.

In Section 1 of the questionnaire (Appendix 1), data were collected on the household heads' gender, age, education level, size of household, monthly income and receipt of government food assistance. This provided the general background information required for further data analysis. Section 2 of the questionnaire presented the United States Department of Agriculture (USDA) 18-question food security core module which is usually conducted as the Food Security Supplement to the U.S Current Population Survey (CPS) (Bickel et al. 2000). The question set is formally recognized as the Household Food Security Survey Module (HFSSM) (Bickel et al. 2000). In short it is referred to as the "core module" of food security questions and includes all levels of food insecurity indicators that may persist for households with and without children. Its contents include 15 questions plus three skip-pattern follow-up questions which ask the respondents how often a food insecurity condition has occurred within the past 12 months. The question set focuses on four types of probable situations or events related to the general definition of food insecurity, the household's food supply and the household members' behavioral and psychological responses. These questions are further characterized by levels of severity to assist with the precise scoring and defining of the household food security status.

It is noted that the questions used within this study's questionnaire were taken directly from the USDA Household Food Security Survey Module and are not altered. This is to provide accuracy and precision in ensuring the use of a globally accepted and validated food security measurement. However, two phrases were interpreted to provide clarity of their definition. The first was the phrase "a balanced meal". The following explanation was placed by the survey response options for this question item: "a balanced meal may contain a starchy food like rice or bread; a protein-rich food like meat or fish; and a fruit or vegetable". The other phrase was "low-cost foods" and was defined as: "inexpensive low-quality foods that have low nutritional values

like corned-beef and other processed foods". These definitions were agreed on by a local nutritionist (Bowe, 2014).

In Section 3, data were collected on the households' access to local foods. Households were asked whether or not they had food-bearing trees and plants in their backyards, the types of crops grown and if they can rely on the produce to feed the household. They were also asked if they engaged in livestock or dairy production. Households were then questioned if they had access to a community garden and where the households obtained their seafood as other means to acquiring local food. Perceptions on the different sources of local food systems were also obtained through questions about interests in becoming a member of a community supported agriculture and frequency of purchases from a farmers' market. The final question asked the respondents whether or not they would engage in food production once provided with arable land.

Data Analysis

Descriptive Statistics

The households' background data comprised of the following socioeconomic factors geared towards the household head: gender, age, educational level, household size, receipt of government assistance and monthly income. The receipt of government assistance incorporates any financial aid from the government subject to disabilities, unemployment, pension and so forth. It is not limited to financial assistance for food. Notably, the monthly income values were received based on Bahamian currency which equates the United States dollar—US$ 1.00 = BS$ 1.00. However, within this study these values are reported as US currency. The background information gathered was used to draw inferences about the households' food security statuses and the foods locally grown. Descriptive statistics measuring the frequency of responses were calculated and reviewed for each household socioeconomic factor.

Household Food Security Index

The procedures used for establishing the household food security index were recommended by the United States Department of Agriculture (USDA). The initial operational step was the coding of survey responses. This refers to the inputting of qualitative data as quantitative for the purpose of statistical analyses. In this regard, a response of either "affirmative" or "negative" takes a binary value of "1" or "0" respectively.

The HFSSM contains 18 question items for households with children and 10 question items for households without children therefore a complete response requires 18 or 10 valid answers. Once the data was completed for each household, the number of affirmative responses was totalled. This amount was used to determine the household's food security scale value, or continuous score, which led to the determination of the food security status classification for each household (Bickel et al. 2000). This was conducted by first selecting the column corresponding to the household type (with or without children) in Table 1 and selecting the row corresponding to the total number of affirmative responses. The food security scale value was then obtained. This created the continuous food security index for the study. These values were further classified into respective food security categories which established the categorical food security measurement of the study. For ease of recording the findings and analyzing, the last two categories—"Food Insecure with Hunger, Moderate" and "Food Insecure with Hunger, Severe"—were combined into a single category called "Food Insecure with Hunger".

Table 1: Food Security Scale Values and Status Levels Corresponding to the Number of Affirmative Responses

Number of Affirmative Responses:		1998 Food Security Scale Values	Food Security Status Level	
(Out of 18) Households With Children	(Out of 10) Households Without Children		Code	Category
0	0	0.0		
1		1.0	0	Food Secure
	1	1.2		
2		1.8		
	2	2.2		
3		2.4		
4		3.0		
	3	3.0	1	Food Insecure Without Hunger
5		3.4		
	4	3.7		
6		3.9		
7		4.3		
	5	4.4		
8		4.7		
	6	5.0		
9		5.1	2	Food Insecure With Hunger, Moderate
10		5.5		
	7	5.7		
11		5.9		
12		6.3		
	8	6.4		
13		6.6		
14		7.0		
	9	7.2	3	Food Insecure With Hunger, Severe
15		7.4		
	10	7.9		
16		8.0		
17		8.7		
18		9.3		

Source: Bickel et al. 2000. USDA, Guide to Measuring Household Food Security, Revised 2000.

Internal Consistency Measure

The data from this section, once coded, was also measured for internal consistency using the Cronbach's alpha. This measurement determines how closely related a set of items are as a group.

Households' Socioeconomic Factors

To determine the associations between the food security index and the households' socioeconomic factors, a series of single-factor analysis of variance (ANOVA) models were constructed. The Tukey post-hoc test was used to carry out the multiple comparisons tests of the group means. The dependent variable of the models was the continuous food security index. This index comprised of the households' food security scale value, or score, which ranges from "0" to "10", where "0" is food secure and "10" is food insecure. The independent variable, or single-factor, was the respective socioeconomic factor being analyzed. The results of the models were used to determine any overall significant correlations between the food security index and the households' socioeconomic factors.

An ordinary least squares (OLS) regression analysis was used to further determine the relationship between the food security index and the households' socioeconomic factors. From the analysis, the OLS estimators of the population partial regression coefficients were obtained. They estimated the change in the mean value of the food security index per unit change in the individual socioeconomic factor, ceteris paribus. The estimated OLS results indicated which socioeconomic factors were significant and positively or negatively related to the food insecurity index. A measure of heteroscedasticity referred to as robust standard errors was also conducted to ensure that the variance of the disturbance terms is a constant number equal to the population variance.

The final section of the survey gathered information on the local foods grown in the study area. The types of crop trees grown (fruits, vegetables, grains, and legumes) were examined to draw inferences about the households' biodiversity. Descriptive statistics measuring the frequency of responses were calculated and examined for each local foods assessment factor.

Probability of a Food Secure Household

A logistic regression analysis of the survey data collected on the households socioeconomic factors and local foods grown was conducted to determine the probability of a household being food secure. The selected explanatory variables included household heads' gender, age, level of education; household size; receipt of government assistance; monthly income; presence of food-bearing trees in backyard; ownership of more than one type of crop—i.e. fruits, vegetables, grains, and legumes; dependency on foods grown to feed household; personally caught seafood; and access to a community garden. The dichotomous dependent variable was food secure households, where households that were food secure received a value of "1" and those that were not food secure received a value of „0". P-values were used to determine the coefficients that had a significant effect on the probability of a household being food secure. Once the logit model was obtained, the measure of multicollinearity referred to as the variance-inflating factor (VIF) was conducted.

Perceptions on Agriculture and Local Food Systems The perceptions of the respondents on agriculture and local food systems were assessed to gain an insight into the practicality of such productions being sustainable within the area. The responses were categorized into their respective food secure and food insecure groups. Specific attention was given to food insecure households to determine how their perceptions can aid in providing solutions to improve their food security status. Cross tabulations were formulated between the food insecure group and relevant socioeconomic factors. This was conducted to determine significant relationships between the socioeconomic factors and the groups' willingness to be involved in agriculture. Descriptive statistics were obtained to measure the frequencies of responses regarding the three local food markets being reviewed.

Results

Socioeconomic Factors

The survey was randomly distributed to 170 households—of which 156 responded—during the period of May 2014. Of the 156 respondents, 64% of the household heads were males who on average were between the ages of 46-55, headed a household size of less than four and had attained at least a secondary level of education. About 20% of male household heads received government food assistance and 29% earned a monthly income between US$ 2001-4000. In contrast, 29% of the households were headed by females who were in the age range of 56-65, headed a household size of three or less and had attained a tertiary level of education. Approximately 21% of the female heads received government food assistance and 38% earned a monthly income between US$ 2001-4000.

Household Food Security Survey Module

The Household Food Security Survey Module (HFSSM) was measured for internal consistency using the Cronbach's alpha which a value of .911 was obtained. This suggests that 91% of the variability in a composite score of the 18 item data set is internally consistent. A reliability coefficient of .70 or higher is recognized as "acceptable".

The relationship between the households' socioeconomic factors and the food security index was determined by a series of single-factor analysis of variance (ANOVA) models (Table 2). The ANOVA model was replicated, where the continuous food security index was the dependent variable and the individual socioeconomic factor was the independent variable. Of the socioeconomic factors, the education level and monthly income were statistically significant, both with p-values for F below a 0.05 significance level. The ANOVA output regarding the household heads' level of education (F = 13.222, p=.000) shows the significant differences of means between groups, also referred to as treatments. The Tukey post-hoc test revealed that the food security index was significantly related to household heads that have attained a college level education compared to the attainment of other lower education levels. The one-way ANOVA model based on monthly income (F = 13.860, p=.000), also showed significant differences of means between groups. Its Tukey post-hoc test showed that the food security index was significantly related to higher monthly incomes compared to lower monthly incomes earned. The other socioeconomic factors were not significantly related to the households' food security index.

Table 2: Analysis of the Mean Household Food Security Index for the different Socioeconomic Factors

Socioeconomic Factors	Descriptive Statistics		ANOVA	
	Number of items	Mean Square	F statistic	p-value
Gender:			1.110	0.294
Male	100	1.779		
Female	56	2.180		
Total	**156**	**2.2830**		
Age:			1.485	0.198
21-35	16	2.375		
36-45	31	1.648		
46-55	41	1.395		
56-65	42	1.955		
66-75	20	2.565		
>75	6	3.383		
Total	**156**	**1.923**		
Household Size:			1.965	0.144
1-3	87	1.724		
4-6	56	1.955		
7 or more	10	3.230		
Total	**153**	**1.907**		
Education:			13.224	0.000***
Primary	25	3.052^{a}		
Secondary	62	2.215^{b}		
College	52	$0.735^{a,b}$		
None	2	6.800^{b}		
Total	**141**	**1.882**		
Government Assistance:			2.960	0.087
No	116	1.779		
Yes	33	2.558		
Total	**149**	**1.952**		
Monthly Income:			13.860	0.000***
0-500	15	4.473^{a}		
501-1000	26	3.150^{b}		
1001- 1500	17	2.806^{c}		
1501- 2000	35	1.771^{a}		
2001- 4000	50	$0.826^{a,b,c}$		
4001- 6000	12	$0.000^{a,b,c}$		
Total	**155**	**1.935**		

Different superscripts denote the statistically significant mean differences between the socioeconomic factors' categories at P-value < 0.05 ***.

Table 3: Estimated Regression Analysis of the Households' Socioeconomic Factors and the Food Security Index

Socioeconomic Factors	Household Food Security Index[1] (n=156)			
	Coefficient	Std. Error	t-ratio	p-value
constant	5.06996	1.09145	4.6452	<0.00001
Gender[2]	0.038951	0.35426	0.1100	0.91263
Age	0.0259988	0.153602	0.1693	0.86587
Education	-0.132005	0.348013	-0.3793	0.70511
Household Size	0.576433	0.325398	1.7715	0.07894*
Government Asst.	-0.765299	0.505554	-1.5138	0.13263
Monthly Income	-0.984391	0.158647	-6.2049	<0.00001***

***Significant at 1% level
**Significant at the 5% level
*Significant at the 10% level
[1]R^2 = 0.399; *F* (6, 124) =13.72329
[2]Dummy variable, where '1' = male and '0' = otherwise

The association between the households' socioeconomic factors and the food security index was further analyzed through the use of an ordinary least squares (OLS) regression model (Table 3). The dependent variable was the food security index, which is comprised of the continuous food security scores. The socioeconomic factors were the explanatory variables. The household size and monthly income were found significant at the 10% and 1% levels, respectively. The household size is positively related to the food security index which implies that the food security score increases towards food insecurity by about 0.57 as the household size increase by one. Whereas, the food security score decreases and shifts toward being food secure by about 0.98 as the household head's monthly income increase by a higher income group. The other socioeconomic factors were insignificantly related to the food security index.

Local Foods Grown Assessment

From the 156 survey respondents, approximately 72% reported that they have food bearing trees within their backyards. Of these trees grown, about 62% of the households grew fruits, 39% grew vegetables, 8% grew grains, and 23% grew legumes. Approximately 18% of the households relied on the foods grown within their backyards to feed their families. About 4% of households were involved in livestock production, specifically the rearing of goats, chickens and pigs. Additionally, nearly 45% of the household heads noted that they personally caught their seafood.

The associations between the local foods assessment factors and the households' food security index were obtained from the replication of ANOVA models. The continuous household food security index was the dependent variable and the individual local foods assessment factor was the independent variable within these models. The ANOVA models revealed that there were no statistically significant relations between the household food security index and the local foods assessment factors.

Table 4: Estimated Regression Analysis of the Local Foods Assessment Factors and the Household Food Security Index

	Household Food Security Index[1] (n=156)			
	Coefficient	Std. Error	t-ratio	p-value
constant	1.98834	0.752974	2.6406	0.00921
Own food bearing trees	-2.00776	0.537788	0.2548	0.0428**
More than one type of crop grown	-0.1329	0.120165	-1.1060	0.27062
Rely on own farm to feed household	-0.107517	0.825072	-0.1303	0.89650
Livestock Production	-1.21866	0.863695	-1.4110	0.16045
Dairy Production	-0.702089	0.38792	1.8099	0.07244*
Fisheries: Personally Caught	0.163213	0.565434	0.2887	0.77327

***Significant at 1% level
**Significant at the 5% level
*Significant at the 10% level
[1]$R^2 = 0.199$; $F\ (6, 141) = 5.162353$

Table 4 displays the result of the ordinary least squares (OLS) regression model used to determine the correlation between the local foods assessment factors and the households' food security index. The dependent variable used was the food security index, which is comprised of the continuous food security scores. The local foods assessment factors were used as the explanatory variables. The result revealed that to „own food bearing trees' was negatively related to the household food security index and significant at the 5% level. This indicates that the food security score will decrease and shift towards being food secure by about 2.00 per food bearing tree grown. Dairy production was also negatively related to the household food security index, but was significant at a 10% level. This suggests that the food security score will decrease by about 0.70 as household heads become involved in dairy production. The other local foods assessment factors were not found to be associated with the household food security index.

Logistic Regression Analysis

To examine the effect of the households' socioeconomic characteristics on food insecurity and the probability of a household being food secure, a binary logistic regression model was constructed. The selected socioeconomic characteristics were the explanatory variables of the model. The dependent dichotomous variable was the nature of food security of the households, where Y = "1" for food secure and "0" for food insecure households.

The result of the logistic regression model estimate revealed that out of the 11 factors, 3 variables were found to have a significant influence on the probability of a household being food secure. These variables included the household heads' education, monthly income, and access to a community garden. The coefficients of the education level of the household head and

access to a community garden were statistically significant at a 10% probability level, whereas the monthly income coefficient was statistically significant at a 1% probability level. The coefficients of the other 8 explanatory variables were not statistically different from zero at the conventional levels of significance. The code and variable description and the results obtained from the binary logit model are presented in Tables 5 and 6, respectively.

Table 5: Description of Variables in the Logit Model Estimation

Code	Type	Description
Gender	Dummy	1 if household head is male, 0 otherwise
Age	Continuous	Age of household head
Education	Continuous	Education level of household head
HsehldSize	Continuous	Household size in number
GovtAsst	Binary	Receipt of Government Assistance
MoIncome	Continuous	Monthly Income of household head
LFS1	Binary	Owns food bearing trees
LFS5	Binary	Dependency on foods grown to feed household
LFS4a	Binary	Personally caught seafood
LFS6	Binary	Access to a community garden
LS10a	Binary	Owns more than one type of crop—i.e. fruits, vegetables, grains, and legumes

Table 6: Binary Logit Result for Determinants of Food Secure Households[1]

Explanatory Variables	Coefficient	Standard Error	Z	p-value
constant	-4.86221	1.90578	-2.5513	0.01073
Gender	-0.504404	0.444478	-1.1348	0.25645
Age	0.0866511	0.11383	0.7612	0.44652
Education	0.318345	0.187488	1.6979	0.08952*
HsehldSize	-0.0326067	0.116345	-0.2803	0.77928
GovtAsst	0.169053	0.446772	0.3784	0.70514
MoIncome	0.52371	0.135281	3.8713	0.00011***
LFS1	0.309679	0.454158	0.6819	0.49532
LFS4a	0.10077	0.410485	1.4549	0.14571
LFS5	0.445223	0.582164	0.7648	0.44441
LFS6	1.20176	0.650825	1.8465	0.06482*
LFS10a	0.813142	0.558914	1.4549	0.14571

***Significant at 1% level

**Significant at the 5% level

*Significant at the 10% level

[1] McFadden R^2 = 0.19; Likelihood ratio test: Chi-square (11) = 47.0835

The logit model was tested for multicollinearity between the independent variables, of which there was no significant presence of relations. The McFadden R2 indicated that 19% of the variation in the dependent variable is explained by the independent variables. The likelihood ratio statistic—based on a Chi-square distribution—of 47% states the overall significance of the independent variables within the model.

Perceptions on Local Food Systems

The households have been categorized into two groups, food secure and food insecure. For this analysis the focus was on food insecure households as it is the purpose of the study to determine the possible improvements of this group's food security status through the efforts of local food systems. The food insecure group comprised of 63 households. The group's willingness to engage in agricultural practices was cross tabulated with the household heads' gender, age and education level. Of the food insecure households, 62% responded that they will participate in agriculture.

Three local food systems were reviewed—farmers' markets, community supported agriculture, and community gardens. About 95% of food insecure households responded positively to the question regarding purchasing produce from a farmers' market. In contrast, 70% of the households stated that they will not or were unsure of whether they will participate within community supported agriculture. Additionally, about 91% of the households did not have access to a community garden.

Discussion and Conclusion

The focus of this study has been on the determination of a household food security status and assessment of local foods grown within rural East Grand Bahama Island (GBI). The USDA Household Food Security Survey Module (HFSSM) was used as a measurement tool of food insecurity. It was tested for reliability, of which it obtained a Cronbach's alpha of .911. The coefficient is further justified based on other studies in Brazil and Trinidad and Tobago that used the HFSSM. They attained reliability coefficients of 0.910 and 0.915, respectively (Perez-Escamilla et al. 2004; Gulliford et al. 2006).

Ninety-two households (59%) within the study area were food secure. This result did not support the study's hypothesis that the household food security status of East GBI is food insecure. This result can be justified by considering the relative prosperity of the country and the island itself. This is in addition to the HFSSM being primarily based on the affordability of food.

For this study, the household food security index, derived from the HFSSM, was correlated with the respondents' monthly income using single-factor ANOVA and ordinary least squares (OLS) regression models. The results of these models showed that monthly income was significantly associated with the food security index. That is, as monthly income increased, food insecurity decreased (Perez-Escamilla et al. 2004; Gulliford et al. 2006). This is a shared validity criterion of this which was revealed within Brazil and Trinidad and Tobago studies. Table 2 displayed the correlations between the households' socioeconomic factors and the household food security index, as determined by a series of single-factor ANOVA models. Of the households' socioeconomic factors, the household heads' level of education and monthly income were statistically significant. The Tukey post-hoc test, conducted within the ANOVA model, showed that the food security index was significantly related to household heads that have attained a college level education compared to those with lower education levels. This suggests that the increase of knowledge and qualifications allow household heads to avoid and

reduce the incidence of food insecurity through adequate budgeting and allocation of foods. Thus allowing household heads to obtain a more food secure score within the food security index. This is consistent with the study of Burchi and De Muro (2007).

The results of the OLS regression model showed that the respondents' household size is a statistically significant determinant of the food security index. It suggested that the level of food insecurity will increase as the number of household members increase. This is confirmed by the accepted hypothesis within Gebre's (2012) study of food insecurity determinants. The statistically significant socioeconomic factors support the study's hypothesis which suggests that the households' socioeconomic factors are determinants of their household food security status. The local foods grown and agricultural production within the study area were also assessed within this study. Approximately 72% of the household heads indicated that they have food bearing trees within their backyards. The majority of the trees grown were fruits (72%) and vegetables (62%). This might indicate the limited vegetative biodiversity within the study area. Thus possibly placing the study area at risk and prone to plant diseases and pests that can cause the extinction of indigenous plants. This may also suggests that the residents do not have a local food source that can provide a nutritionally adequate supply of foods for a balanced meal. Given the high percentage of households with food bearing trees, it was unexpected that only 18% of the households could rely on the yields of these crops to feed their families. This suggests that these crops are present but may be dormant or the households lack interest in harvesting the produce.

The percentages of households engaged in dairy and livestock productions were lower than 5%. Given the resources of a rural area, the disengagement in livestock and dairy production can be due to the inability to meet the capital requirements to start-up and sustain productions. About 45% of the household heads responded that they caught their own seafood. This was an expected result because this food source is free and readily available within the study area.

Within the logistic regression model, the household heads' education level was a determinant in the probability of a household being food secure. This variable affects the food security status positively and significantly at the 10% probability level. This positive relationship further confirms that the higher the attainment of education by household heads, the lower the incidence of food insecurity. The access to a community garden" also showed a positive and significant (10% probability level) relationship with the probability of being food secure. This implies that the households' food availability increases and the occurrence of food insecurity decreases with the access to a community garden. The monthly income variable showed the highest correlations with the likelihood of obtaining a food secure status. This variable was positive and significant at a 1% probability level. The positive relationship indicates that the higher the income, there is an increase in food access as more food can be purchased, thus the incidence of food insecurity decreases. This reiterates and supports the earlier results of the ANOVA and OLS regression models of the households' socioeconomic factors.

The correlations between the local foods assessment factors and the household food security index were determined using a series of ANOVA models and an OLS regression model. The results of the ANOVA models showed that there were no significant relationships between the means of the food security index and the local foods assessment factors. However, the OLS regression result revealed that „owning food bearing trees' and being involved in „dairy production" are significant determinants (at the 5% and 10% levels, respectively) of the food security index (Table 4). This implies that both local foods grown and agriculture production

have a positive effect on the household food security status, thus validating the study's hypothesis.

Specific focus is on food insecure households and their perceptions towards agriculture and local food systems. Of the food insecure households, 62% responded that they were willing to participate in agricultural activities. About 95% of food insecure households expressed great interest in purchasing produce from a farmer's market and approximately 70% were unsure or not willing to participate in community supported agriculture (CSA). This finding was confirmed by Babb (2013) who asserts that low-income families are unsure or will not participate in CSA because of the financial risks. Additionally, food insecure households responded that 6% had access to a community garden. Based on the percentage of persons willing to participate in farming (62%), this suggests that if more community gardens were present there will be an increase in persons growing their own foods.

Conclusion

The USDA Household Food Security Survey Module provided a reliable measure which supported the formation of a household food security index for rural East Grand Bahama. From the index it was determined that 60% of households with children and 69% of households without children were food secure. ANOVA and OLS regression models determined the associations between the food security index and the households' socioeconomic and local foods assessment factors. A logistic regression model was used to estimate the factors which determine the probability of a household being food secure. It was revealed that the household heads' monthly income was the most significant determinant of a food secure household and was highly correlated with the household food security index. Also considering the 62% willingness of food insecure households to participate in agriculture, it is plausible that community food security projects, such as farmers' market, community supported agriculture, and community gardens, can have a positive impact on the area's economy.

References

Babb, A. 2013 "Community Food Security: The Role of Alternative Food Networks in Food Deserts." Master's thesis. Indiana University.

Bickel, G., M. Nord, C. Price, W. Hamilton, and J, Cook. 2000. "Guide to Measuring Household Food Security, Revised 2000." Alexandria, VA: United Sates Department of Agriculture (USDA), Food and Nutrition Service. Accessed July 30, 2014. http://www.fns.usda.gov/fsec/files/fsguide.pdf.

Bowe, Jordanne (Registered Nutritionist, The Rand Memorial Hospital, Freeport, Grand Bahama Island, The Bahamas). 2014. Interview by author, May 19, Grand Bahama Island, The Bahamas.

Burchi, F., and P. De Muro. 2007. *Education for Rural People: A Neglected Key to Food Security*. Rome: University of Roma Tre.

FAO (Food and Agriculture Organization). 2008. "An Introduction to the Basic Concepts of Food Security." FAO Food Security Programme. Accessed October 3, 2013. http://www.fao.org/docrep/013/al936e/al936e00.pdf.

Gulliford, M., C. Nunes, and B. Rocke. 2006. "The 18 Household Food Security Survey Items Provide Valid Food Security Classifications for Adults and Children in the Caribbean." *BMC Public Health* 6: 26-32.

Gebre, G. 2012.*Determinants of Food Insecurity Among Households in Addis Ababa City, Ethiopia*. Ethiopia: Aksum Universiy, Shir Campus.

Israel, G. 2009. "Determining Sample Size." Agricultural Education and Communication Department, University of Florida. Accessed June 5, 2014. http://edis.ifas.ufl.edu/pd006.

McKenzie, Natario. 2013. "85% Food Import Bill „Untenable‟." *The Tribune*, October 24, 2013. Accessed October 31, 2013. http://www.tribune242.com/news/2013/oct/24/85-food-import-bill-untenable/.

Pe´rez-Escamilla, R., A. Segall-Corre, L. Maranha, M. Sampaio, L. Marı´n-Leo´ n and G. Panigassi. 2004. *An Adapted Version of the U.S. Department of Agriculture Food Insecurity Module Is a Valid Tool for Assessing Household Food Insecurity in Campinas, Brazil*. Connecticut, USA: Department of Nutritional Sciences, University of Connecticut