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Determinants of Food Security among Low Income Households in North-East Trinidad.

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Abstract

This study examined the determinants of the food security status of low income households in North-East Trinidad. Food security status was assessed using the 18-item U.S. Household Food Security Survey Module of the United States Department of Agriculture (USDA). The sample consisted of caregivers of primary school children aged 7-12 years who reside in two regions (St. Andrew-St. David and St. George East) in North-East Trinidad. There were 304 respondents, 90.13% female and 9.87% male. Multiple linear regression analysis was used to determine the relationship between food security status and household socio-demographic characteristics. Results show gender, marital status and income were the only three useful predictors of household food insecurity.

Gender and marital status were both positive and significant at the 0.05 significance level. The coefficient for income was negative and significant at the 0.05 significance level. This study found that more female-headed households participated in the study and were more food insecure as compared with male-headed households; additionally, females were more likely to experience mild and moderate food insecurity with hunger.

More female headed households participated in the study and were found to be more food insecure as compared with the male headed households.

Keywords: Gender, Household, Food Security, Food Insecurity, Trinidad

Introduction

Food security is conceptualized in different ways. In 1996, the World Food Summit determined food security to be present when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO 1996). More recently, Iram and Butt (2004) highlighted that food security is dependent on factors such as food accessibility and the nature, quality, and safety of the food supply. Therefore, food insecurity can be characterized as the limited or uncertain availability of nutritionally adequate and safe foods, or the ability to acquire suitable foods in socially acceptable ways (Gulliford et al. 2003).

Food insecurity has a temporal dimension and is generally classified as either transitory or chronic. According to Chung et al. (1997), food insecurity is defined as transitory when a person suffers from a temporary decline in food consumption and chronic when a person is continuously unable to acquire sufficient food. During transitory food insecurity a household may adopt several strategies in order to regain food security; however, poorer households may unintentionally deplete their productive assets resulting in chronic food insecurity.

 "An adequate supply of food at the national or international level, does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives." (FAO, 2008). In a similar vein, according to UNICEF determinants of the physical and economic access to food include transport and market infrastructure and the purchasing power and income of the population.

Currently, policy makers, practitioners and scientists are challenged with various issues of global food security such as food availability and accessibility, eliminating health disparities, promoting health education and encouraging more sustainable agricultural practices. At the household level, Gulliford et al. (2003) examined food insecurity using the short form U.S. Household Food Security Scale (HFSS). The study found that 25 percent of households were food insecure, with food insecurity being associated with low household income, members' physical limitations and low educational attainment.

At both the individual and household levels, studies have shown that gender plays a unique role in the phenomenon of food security. As reported by Carter et al. (2010), the prevalence of food insecurity is consistently found to be higher in females than males. In the United States, Hispanic and black households are at a higher risk of food insecurity as well as households located within central cities and those headed by single, female parents (single mothers) (Carter et al, 2010).

In Canada, approximately 32% of single mother households were food insecure to some extent and 28% reported a compromised diet (Che and Chen, 2001). In contrast, households headed by male single parents had rates which were about half as high (17% and 13% respectfully) (Che and Chen, 2001). Among divorced or separated people, more than one in five persons, lived in households that had experienced food insecurity at least once in the past year. When factors such as household income and household type were taken into account, the odds that divorced or separated people would experience food insecurity were about one and a half times the odds for married people; however, for single people, the odds were actually significantly low (Che and Chen, 2001).

In CARICOM countries, food security has been affected by an increase in global food prices and rising regional food imports (over four billion USD annually) (Løvendal, et.al, 2007). Kelly and Pemberton (2016) found that income was a major determinant of the level of food security of households in Grand Bahama in the Bahamas. In another study, Ramdhanie, Granderson and Pemberton (2017) found that ethnicity, monthly household income and the age of household's head affected the expenditure on different food groups in a sample of the households of primary school children in North East Trinidad. This study follows up on the work

of Ramdhanie, Granderson and Pemberton (2017) and had as its objective to examine and determine the characteristics of low-income households in North-East Trinidad which determine or influence the household food security score.

Methods

- ### *The Survey*

The data utilized in this study is part of a larger longitudinal study, "The CARICOM Food Security Project: From Farm to Fork" conducted during the period March 2011 to August 2015. The subjects of the study comprised 297 primary school children aged 7 to 12 years and their households who will be referred to as research households in two regions (St. Andrew/St. David and St. George East) in North-East Trinidad, who were recruited from eight schools located in two regions (St. Andrew/St. David and St. George East) in North-East Trinidad. The schools selected were Government-run primary schools, with a high proportion of children who consumed the school lunch, which is offered to families in need. Each parent or guardian of the children received a letter requesting their participation in a home interview and other data collection procedures.

Each parent or guardian of the children of the research households received a letter requesting their participation in a home interview and other data collection procedures. Ethical approvals were obtained from the Ministries of Education and Health in Trinidad and Tobago.

Data collection occurred in two phases. Phase one was conducted between January and July 2012 and the second phase from October 2013 to January 2014. A cross-sectional end-point survey of the research households was used to assess their food security. The 18-Item Household Food Security Survey Module (HFSSM) of the United States Department of Agriculture (USDA, 2012) was used.[1] The survey instrument also obtained data on the socio-economic characteristics of the households including gender of the respondent, (92.1% of the respondents were also the heads of the household) and the age, level of education, employment status, ethnicity, and marital status of the respondent as well as the total household income. Eight trained interviewers collected the data in the survey. Prior to data collection, they participated in a one-week workshop conducted by the lead research team members. Through this workshop, the interviewers were trained on the purpose of the study, sampling procedures, ethical considerations in administration of the questionnaire and other field-related factors.

- ### *Analyses Carried Out*

Means and standard deviations were used to describe continuous variables, and frequencies were calculated for categorical variables. The socio-economic factors were also classified by gender of the respondent. Ordinary Least Squares (OLS) multiple linear regression analysis was used to determine the relationship between the household food security status from the 18-Item Food Security Survey Module (as measured by a "Raw Score") and the gender of the respondent and the other socio-economic factors. For the households the following were the raw score categories:

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[1] https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/

- ▪ Raw score zero   High food security
- ▪ Raw score 1-2   Marginal food security
- ▪ Raw score 3-7   Low food security
- ▪ Raw score 8-18   Very low food security

These labels are reported to be "… consistent with recommendations by the Committee on National Statistics, and ERS … (to) be used consistently throughout the U.S. food security monitoring and research effort." (Bickel, et.al, 2000) Higher raw scores were therefore indicative of a higher risk of being food insecure, which is an undesirable status for the households, while lower scores represent households being more food secure.

- • ***Regression Analysis***

Regression analysis using ordinary least squares was used to determine the causal factors of the household food security "raw score". The variables used in the regression model were as given in the following functional form:

Y(Food Security Raw Score) = β_0 + β_1(Gender of respondent) +
β_2(Monthly income of respondent) + β_3(Educational level of respondent) +
β_4(Age of respondent) + β_5 (Total Household Income) + β_6(Martial Status of respondent) +
β_7(Ethnicity of respondent) + β_8(Living Location of respondent) +
β_9(Household Food Growing Activity) +ε_i .

Dummy variables were used for all binary, nominal and ordinal variables in the regression model. The estimated regression model was assessed by post estimation diagnostic tests and analysis including a test for the overall significance of the regression model via the F-test, an analysis to detect the presence of multicollinearity using the variance inflation factors, the Breusch-Pagan test for heteroskesdascity. Tests of significance of the regression coefficients were also carried out.

In arriving at conclusions with regard to the significant determinants of the food security scores of households, cognisance was given to the recent pronouncement of the American Statistical Association that scientific conclusions and business or policy decisions should not be based only on whether a p-value passes a specific threshold (Wasserstein and Lazar, 2016). "Practices that reduce data analysis or scientific inference to mechanical "bright-line" rules (such as "p < 0.05") for justifying scientific claims or conclusions can lead to erroneous beliefs and poor decision making" (Wasserstein and Lazar, 2016). They instead recommend that researchers should bring several "contextual factors into play to derive scientific inferences, including the design of a study, the quality of the measurements, the external evidence for the phenomenon under study, and the validity of assumptions that underlie the data analysis" (Wasserstein and Lazar, 2016) . They therefore recommend in addition to mechanical "bright-line" rules (such as significance testing with "p < 0.05"), that conclusions of research should be based on *inter alia,* interpretation of results in context, complete reporting and proper logical and quantitative understanding of data summaries (Wasserstein and Lazar, 2016). These principles were followed in this study.

In this study the data was analyzed using the statistical software STATA version 12 (College Station, TX, USA).

Results

- ***Sociodemographic Characteristics of the Sample***

The characteristics of the respondents and their households are presented in Table 1. A total of 304 respondents, 90.13% female and 9.87% male completed the survey. The mean age of respondents was 40.5 (S.D. = 7.04) years for males and 36.85 (S.D. = 9.71) years for females. Most respondents were of African descent (approximately 48%), 39% were of mixed descent and 13% were of East Indian descent. The highest level of education attained was most commonly "secondary" with about half of female and male respondents acquiring up to secondary-level education.

Most of the female respondents reported that were married (55%), while most of the male respondents reported that they were single (50%) and only one third of them reported that they were married. The respondent reported that 8% were divorced or separated and 1% were widowed. Of the female respondents 69% reported on their employment status with 57% of those reporting claiming to be currently employed and 11% claiming to receive causal or seasonal employment. Only seven of the 30 male respondents reported on their employment status, five of them claiming to be currently employed.

A higher percentage of females (32.8%) reported the utilization of home-grown fruits vegetables or fruits as compared with 23.3% of the male respondents. Most of the respondents (77.67%) claimed to own the dwellings where they lived, but only 39.5% claimed to own land. About 28% of the respondents claimed to be squatting on the land the dwelling was on. The mean total household income in US dollars was 1598.11 (S.D. = 3576.19) for males and 915.47 (S.D. = 1953.66) for females.

- ***Household Food Security Status***

The distribution of the respondents with respect to the 18-item HFSSM is presented in Table 2. About 27% of the households had a high level of food security, while 28.6% of the households had a marginal food security and this same percentage (28.6%) had a low food security. Only 15.6% of the households had a very low food security. Table 2 suggests that a higher percentage of males (70.0%) were in the two higher food security levels, as compared to females (54.3%).

- ***Linear Regression Analysis***

The results of the linear regression analysis are presented in Table 3. The coefficient for the income of the respondent was negative and highly significant, signifying support for the general proposition that income plays a significant role in determining the food security status of the household. It could be noted however that total household income did not have a significant impact on the food security score in the estimated equation.

The coefficient for gender was not significant (p-value 0.271), perhaps a consequence of the highly unbalanced nature of the sample with only 10% of the sample (30 respondents) being male respondents, which may have precluded the observation of any significant relationship. The estimated positive obtained for the coefficient however is consistent with the universal observation that female headed households were less inclined to be food secure as compared to the male.

The results showed that households with married respondents had a higher food security score than households where the respondents were single, divorced or separated. The results

also suggested a tendency for respondents who had a secondary education to have a higher level of food security and for respondents who reported the utilization of home grown fruits vegetables or fruits to have a lower food security, while those of mixed ethnicity tended to have higher level of food security than those of African ethnicity.

With respect to the post-estimation tests, the F-test ($F_{(14, 119)}$ = 1.96; p-value = 0.0079) suggested that the independent variables used in the model significantly predicted the dependent variable. The R-squared value of 0.195 and the adjusted R-squared value of 0.1096 suggests the regression model gave a fair fit to the data. The variance inflation factors (VIF) suggested the absence of multicollinearity. The Breusch-Pagan test suggested the presence of significant heteroscedasticity. (Chi-square 18.63 p-value 0.000), therefore the model was re-estimated to yield robust (corrected) standard errors.

Discussion and Implications

This study examined factors determining the food security score for rural households in North-East Trinidad. The findings suggest that the income level of the respondent was a major determinant of the level of household food security with higher income levels associated with higher levels of food security. This finding is consistent with all the general theory on the importance of income in providing for the access to food to achieve household food security (the access pillar of food security)

In the study a higher percentage of males (70.0%) were in the two higher food security levels, as compared to females (54.3%) suggesting that the gender of the respondent was associated with food security score. This was also supported by the sign of the regression coefficient although the coefficient itself was not significant using the p-value criterion. This finding is consistent with the concerns of gender roles and food insecurity as reported by Matheson and McIntyre (2013) and Osborne (2012).

Differences were also observed with marital status and food insecurity. Households with single, divorced or separated respondents were significantly more prone to being food insecure as compared those headed by married respondents. This finding is consistent with Che and Chen (2001) who found that many lone-parent and unattached households particularly those headed by women, have low incomes and depend on social assistance. The odds that divorced and separated people would experience food insecurity were about one and a half times the odds for married people; this may be due to decreased financial support from spouses, Che and Chen (2001) which points to the possibility that marriage performs a protective function against food insecurity among women in the study area.

The results suggested that education and the utilization of home-grown fruits vegetables or fruits as well as ethnicity may have influenced the food security score among low income households in North-East Trinidad.

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Table 1. Responses to each Sociodemographic Characteristic assessed, according to gender

Socio Demographic Variable	Respondents per variable n (%)	Male n (%)	Female n (%)
Gender	**304**	30 (9.87)	274 (90.13)
Age, years (mean, SD)	**304**	40.5±7.0369.96	36.849±9.7096
Marital Status:	**298**	**30 (10.07)**	**268 (89.93)**
Married	158 (53.02)	10 (33.33)	148 (55.22)
Single	112 (37.58)	15 (50.00)	97 (36.19)
Divorced & Separated	24 (8.05)	5 (16.67)	19 (7.09)
Widowed	4 (1.34)	0 (0.00)	4 (1.49)
Ethnicity:	**298**	**28 (9.40)**	**270 (90.6)**
African Descent	143 (47.99)	18 (64.29)	125 (46.30)
Asian East Indian	38 (12.7)	2 (7.14)	36 (13.33)
Mixed	117 (39.3)	8 (28.57)	109 (40.37)
Highest level of Education attained:	**265**	**25 (9.43)**	**240 (90.57)**
Primary	70 (26.42)	8 (32.00)	62 (25.83)
Secondary	137 (51.70)	13 (52.00)	124 (51.67)
Tertiary	58 (21.89)	4 (16.00)	54 (22.5)
Currently in Employment	**210**	**7 (3.33)**	**203 (96.67)**
Yes	121 (57.62)	5 (71.43)	116 (57.14)
No	67 (31.90)	0	67 (33.00)
Casual /Seasonal Employment	22 (10.48)	2 (28.57)	20 (9.85)
Respondent Income (Mean)		822.88 ±1517.08	1147.43± 1913.43
Total Household Income (Mean)		1598.106±3576.192	915.4675±1953.66
Household Grows Fruits, Vegetables or Herbs	**301**	**30 (9.97)**	**274 (90.03)**
Yes	96 (31.89)	7 (23.33)	89 (32.84)
No	205 (68.11)	23 (76.67)	182 (67.16)
Possession of dwelling:	**215**	**17 (7.91)**	**198 (92.09)**
Owned	167 (77.67)	11 (64.70)	156 (78.79)
Leased	1 (0.47)	0 (0.00)	1 (0.51)
Private Rented	26 (8.55)	5 (29.41)	21 (10.61)
Gov't Rented	6 (2.79)	0 (0.00)	6 (3.03)
Rent Free	4 (1.86)	1 (5.88)	3 (1.52)
Squatted	11 (5.12)	0 (0.00)	11 (5.56)
Possession of Land:	**215**	**17 (7.91)**	**198 (92.09)**
Head of Household:	**304**	**30 (9.87)**	**274 (90.13)**
Yes	280 (92.11)	27 (90)	253 (92.34)
No	24 (7.89)	3 (10)	21 (7.66)
Gov't Rented	18 (8.37)	0 (0.00)	18 (9.09)
Rent free	4 (1.86)	1 (5.88)	3 (1.52)
Squatted	60 (27.91)	3 (17.65)	57 (28.79)

Table 1. *Continued……*

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Breusch-Pagan / Cook-Weisberg test for
heteroskedasticity
Ho: Constant variance
Variables: Fitted values of Food_afirm
chi2(1)     =    18.63
Prob >      =    0.0000
chi2
```

Table 1. *Continued -* **Collinearity Diagnostics**

Variable	VIF	SQRT VIF	Tolerance	R-Squared
Respondent_Gender	1.15	1.07	0.8688	0.1312
Income of Respondent	1.22	1.11	0.8187	0.1813
Education	1.27	1.13	0.7872	0.2128
Age of Respondent	1.15	1.07	0.8701	0.1299
Household_Income_US	1.09	1.04	0.9203	0.0797
Martial_Status	1.08	1.04	0.9286	0.0714
Ethnicity	1.18	1.09	0.8493	0.1507
Location	1.38	1.17	0.7265	0.2735
Household Grows	1.12	1.06	0.8903	0.1097
Mean VIF	1.18			

Table 2: Prevalence of different levels of household food insecurity in North-East Trinidad by gender

Food Security Status Level	Total N = 301 n (%)	Male n = 30 n (%)	Female n = 271 n (%)
High food security	82 (27.2)	10 (33.3)	72 (26.6)
Marginal food security	86 (28.6)	11 (36.7)	75 (27.7)
Low food security	86 (28.6)	7 (23.3)	79 (29.2)
Very low food security	47 (15.6)	2 (6.7)	45 (16.6)

Table 3. Results of the Regression

Linear regression						
Number of observations	= 147		R-squared	= 0.1950		
F (13, 132)	= 2.26		Root MSE	= 3.5262		
Prob > F	= 0.0079		Adj. R-squared	= 0.1096		
Dependent Variable: Food Security Raw Score	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
Respondent_Gender (Male)						
Female	1.1373	1.0284	1.11	0.271	-0.8969	3.1715
Income of Respondent	-0.0004	0.0001	-3.52	0.001	-0.0006	-0.0002
Education (Primary)						
Secondary	-1.3386	0.8922	-1.50	0.136	-3.1035	0.4263
Tertiary	-0.5174	0.9349	-0.55	0.581	-2.3668	1.3319
Age of Respondent	-0.0392	0.0457	-0.86	0.392	-0.1295	0.0511
Household_Income US $	0.0000	0.0000	-0.35	0.724	-0.0001	0.0001
Martial_Status (Married)						
Single	1.8234	0.6274	2.91	0.004	0.5823	3.0645
Divorced	3.5451	1.5380	2.31	0.023	0.5028	6.5875
Separated	2.9137	1.6077	1.81	0.072	-0.2665	6.0940
Widowed	-0.5169	1.4065	-0.37	0.714	-3.2991	2.2652
Ethnicity (Africa)						
East Indian	-1.1245	1.0566	-1.06	0.289	-3.2145	0.9655
Mixed	-1.0491	0.6974	-1.50	0.135	-2.4286	0.3304
Location (San Juan / Laventille)						
St. Andrew/St. David	0.6635	0.7714	0.86	0.391	-0.8623	2.1894
Household Grows (No)						
Yes		0.6846	1.40	0.164	-0.3959	2.3125
_constant	4.3521	2.0885	2.08	0.039	0.2208	8.4833
Note: Reference category in parentheses						