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Agricultural Information Needs and Food Access in the Stann Creek District of Belize

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Cover Page Footnote

Sam Harris is a 2018 honors program graduate with a major in Agricultural Business and a minor in Agricultural Leadership Donna L Graham is University Professor in the Department of Agricultural Education, Communication and Technology.

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Meet the Student-Author

Sam Harris

I graduated in 2015 with highest honors from Greenbrier High School in central Arkansas. I graduated from the University of Arkansas Dale Bumpers College of Agricultural, Food and Life Sciences with a degree in Agricultural Business Pre-Law and a minor in Agricultural Leadership. This research was conducted as part of an Honors College Research Grant in Dangriga, Belize during the summer of 2017. During my time at the U of A, I have evaluated extension services in rural India, lead community development programs in Vietnam, and studied information access and agricultural enterprise opportunities for smallholder farmers. I served as President of Students Organization Outreach Involvement Experience, Assistant Director of Sponsorship for the Student Alumni Board, and an active member of the of FFA Alumni Association. In April of 2017, I was named a recipient of the 2017 Harry S. Truman Scholarship because of interest and commitment to leadership and a career in public service. Determined to alleviate global food insecurity through international development and public policy, upon graduation I plan to pursue a master's degree in Development Studies before going to law school. I am thankful to Dr. Donna Graham for her assistance throughout this research project as well as Drs. Jennie Popp, Amy Farmer, and Don Edgar for their guidance throughout this process.

Research at a Glance

- Farmers in Belize often consult with the Extension officers for information.
- The lack of new technology use by farmers in the Stann Creek District of Belize has serious implications for farm productivity and regional food security and poverty alleviation.
- The influx of foreign investment into the grocery sector has potentially negative effects for building local commerce and opening market activity for local producers in Stann Creek.
- Smallholder farmers and the general public have very similar levels of food access and availability; both groups reported mild to severe food insecurity.

Sam Harris alongside Belize Ministry of Agriculture extension officers while collecting data in Dangriga, Belize.

Agricultural information needs and food access in the Stann Creek district of Belize

Sam E. Harris[*] *and Donna L. Graham*[†]

Abstract

The purpose of this study was to describe agricultural information sources available to farmers and to describe food access and availability for the people of Dangriga, Stann Creek, Belize. This study used descriptive survey research methods with convenience sampling of the general public (n = 22) and of farmers (n = 38) in the summer of 2017. Farmers use a variety of agricultural information sources with the extension service cited most often, followed by friends and fellow farmers. Weather, lack of information, pests, and inadequate access to capital were of primary concern for farmers. Face-to-face meetings were used most often by extension officers for disseminating agricultural information. Smallholder farmers and the general public have very similar levels of food access and availability. No significant difference was found between the smallholder farmers and the general public on food insecurity with both groups reporting mild to severe food insecurity. Recommendations focused on practical operational strategies for the local Department of Agriculture, as well as the Belize Ministry of Agriculture to eradicate hunger and increase overall food access and availability throughout Belize.

[*] Sam Harris is a 2018 honors program graduate with a major in Agricultural Business and a minor in Agricultural Leadership.
[†] Donna L Graham is the faculty mentor and a University Professor in the Department of Agricultural Education, Communication and Technology.

Introduction

Located on the Caribbean coast of Central America, Belize has a small, essentially private enterprise economy based primarily on agriculture, agro-based industry, and merchandising, with tourism and construction recently assuming greater importance (United Nations Development Programme [UNDP], n.d.). Agriculture employs over one-third of Belize's workforce, over 23% of the nation's gross domestic product. Sugar cane is the largest agricultural export accounting for nearly half of arable land use (UNDP, n.d.). Small-scale operations exist across the country with 74% of farms in the country occupying less than 20 hectares (~49 acres) (UNDP, n.d.).

Forty one percent of the country's population lives in poverty, with a per capita income of $4681 (Statistic of the Nation, 2017). The National Poverty Assessment of 2002 indicated Belize's agricultural workers are poorer than non-agricultural laborers, with most rural producers farming for subsistence only, using very little technology because of lack of resources and information. As a result, their levels of production are very low (Rural Poverty in Belize, n.d.). Traditionally, farmers who receive technical support produce more and profit more; however, agricultural research and extension services have been reduced over the past two decades (Obidike, 2011). Balit et al. (1996) pointed out the least expensive input for improved rural agricultural development is adequate access to knowledge and information. However, there have been shortcomings of traditional print and library-based methods providing agricultural information to rural farmers who are largely illiterate and relatively removed from formal sources of information (Van and Fortier, 2000). As the poverty rate continues to rise because of adverse economic conditions, climate change, and corporatization of farming operations, the prevalence of food insecurity rises across Belize (Rural Poverty in Belize, n.d.).

The FAO (2017) concluded the dimensions of the experience of food insecurity appear to be common across cultures. A person is food insecure when he or she does not have access to enough food for an active, healthy life (Smith et al., 2000). Furthermore, a household is considered food secure when their food supply is sufficient, secure, and sustainable (Maxwell, 1996). Ultimately, all factors of food insecurity can be summarized by two general causes: insufficient national food availability and insufficient access to food by individuals and households. Because of the country's small size and population, little research exists regarding food availability, especially protein sources, as well as the common sources of agricultural information rural farmers are most likely to access for improving production practices.

The research objectives were to:

- Identify what information sources farmers utilize for agricultural knowledge.
- Identify the food production concerns or barriers faced by farmers in Stann Creek.
- Describe food security regarding food availability and access for farmers and the general public.
- Determine community interest and opportunities for future small agricultural operations for farming and non-farming families.

Materials and Methods

This study used a descriptive survey research design including face-to-face interviews and observation. The data collected were based on a convenience sample of smallholder farmers and the general public. Initial contact for the study occurred during the summer of 2017 arranged by Peacework and the Belize Ministry of Agriculture Department.

For contact with smallholder farmers, the researcher attended various cooperative meetings with extension officers and visited farmers engaged in a variety of production areas. The general public survey data were collected via street interviews in Dangriga Town (Stann Creek District). The researcher informed each respondent of the privacy policies protecting their responses as noted in the policies approved by the University of Arkansas Institutional Review Board.

Instrumentation

Two forms of instruments administered in face-to-face interviews were used for data collection. The General Public instrument consisted of 24 questions directed toward measuring food security as well as the demographics of the public interviewed. The Farmer Questionnaire consisted of 28 questions that directly targeted existing access to agricultural information and how farmers in Stann Creek utilize these outlets. Both of the instruments included the Food Insecurity Experience Scale (FIES) developed by the Food Agricultural Organization (FAO, 2017) to gauge food security and access. The FIES instrument consists of 8 questions focused on food-related behaviors and experiences associated with accessing food and resource constraints to measure mild to severe food insecurity (Table 1).

Results and Discussion

Smallholder Farmers

For the local farmers (n = 38), 92.1% were male with 47.4% between the ages of 40 and 59 years of age. An equal number was under 30 years old or over the age

of 60 years representing 26.3% each of the respondents. There was variation in the education of farmers with a majority (57.9%) having a high school (34.2%) or post-secondary education (23.7%). Families varied in size with households ranging from 1 to 3 members (36.8%); 4 to 6 members (39.5%) or over 7 members (23.7%) living in the household. Some 28.9% reported being engaged in farming less than 10 years, but 68.4% of the farmers surveyed had been farming over 11 years. Finally, over 31.6% of farmers reported farming for 31 years or more.

Objective 1

Farmers (n = 38) were asked what information sources they used regarding their operation. Over 20.0% of farmers reported they rely on extension workers or the Ministry of Agriculture on-farm training seminars, while slightly over 17.0% report they also get information from friends and surrounding farmers in the area. The radio, internet, and family members were each reported as an information source by more than 10% of respondents.

Over 70.0% of the farmers (n = 38) indicated they had not implemented any new technologies into their operations in the last 10 years of production, but for the 28.9% (n = 11) who had added some new technology, the source of learning about this technology was from mass media (57.9%). The extension officers were the least frequently cited source for learning about new technology.

Objective 2

Of the farmers (n = 37), 56.8% maintained row crop operations, while over 35.1% reported operations with both row crops and animal production. Of the row crop farmers, the majority of respondents reported rice as their main cash crop. Farmers were asked to identify their interest in diversifying or expanding their operations. For respondents who answered "No," (n = 10) over 66.0% of farmers had considered expanding their operations while 51.8% reported capital was the largest barrier to diversifying they faced.

Over 55.0% of producers indicated their farm productivity had decreased as opposed to 44.4% reporting an increase. More than two-thirds indicated they had considered diversifying their crop or animal production to alleviate production decreases, but the financial means (51.9%) to diversify was listed as the main reason preventing this from occurring.

Table 1. Global food insecurity experience scale questions and response totals.

Global Food Insecurity Experience Scale[a] **Now I would like to ask you some questions about food. During the last 12 MONTHS, was there a time when:**	Farmers	Public
Q1. You were worried you would not have enough food to eat because of a lack of money or other resources?	14 No 8 Yes	22 No 16 Yes
Q2. Still thinking about the last 12 MONTHS, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources?	15 No 7 Yes	20 No 18 Yes
Q3. You ate only a few kinds of foods because of a lack of money or other resources?	11 No 11Yes	23 No 15 Yes
Q4. You had to skip a meal because there was not enough money or other resources to get food?	14 No 8 Yes	33 No 5 Yes
Q5. Still thinking about the last 12 MONTHS, was there a time when you ate less than you thought you should because of a lack of money or other resources?	14 No 8 Yes	28 No 10 Yes
Q6. Your household ran out of food because of a lack of money or other resources?	17 No 5 Yes	32 No 6 Yes
Q7. You were hungry but did not eat because there was not enough money or other resources for food?	18 No 4 Yes	33 No 5 Yes
Q8. You went without eating for a whole day because of a lack of money or other resources?	18 No 4 Yes	33 No 5 Yes

[a] The global food insecurity experience scale is a quantitative tool to measure the prevalence of food insecurity in a given population. Food and Agriculture Organization of the United Nations (FAO, 2017). http//www.fao.org/3/a-i7835e.pdf.

Objective 3

To gauge food availability and access, the general public and smallholder farmers were asked where they mainly obtained their food. Respondents selected whether they obtained all, most, some, or none of their food from the options of grocery store, farmers' market, local producers, or other sources. A majority of the general public indicated they purchased most (54.5%) or all (9.1%) of their food from local grocery stores. In comparison, only 13.6% revealed they purchased most of their food from farmers' markets, local producers, or other sources. Over 90.0% of respondents reported grocery stores, farmers' markets, and local producers were all within one mile from their residences.

Each general public respondent was asked to gauge how much protein, dairy, bread/grains, and fruits/vegetables were purchased from each source. Almost 55.0% of the public reported they buy all or most of their protein foods from grocery stores. Similarly, 63.7% purchase all or most dairy products from local grocery stores. For respondents who reported getting food from local farmers' markets, 66.7% reported buying no protein foods from this source. Similarly, 85.7% bought no dairy products from farmers' markets. Fifty percent of the general public (n = 21) indicated they purchased fruits and vegetables from the farmer's market, but very few purchased other foods from local producers in the Dangriga-area.

Participants were asked whether or not meat (protein) was available to eat each day. Over 95.0% of the public reported having access to meat (protein) each day while 85.7% revealed they had access to fresh fruits and vegetables.

When asked about their own food availability, 36.9% of the farmers report they get most or all of their food from their farm or garden, while 28.9% indicated most of their food is purchased at grocery stores. There were 14 farmers (36.8%) who reported they got none of their food from farmers markets or other local producers.

To assess food insecurity prevalence rates, respondents were asked if in the last 12 months a lack of money or other resources meant they were unable to eat enough food or healthy food, ran out of food, were forced to cut portions or skip meals altogether, or were hungry but did not eat (Table 1). The response to the 8 questions on the Food Insecurity Experience Scale (FIES) positions the respondent as experiencing mild to severe food insecurity. Both the farmer and general public respondents have individuals who were experiencing some level of food insecurity (Fig. 1). Some 11–18 farmers have none or little food insecurity reporting 'no' to the food insecurity experience questions (Table 1). However, 4–11 of the farmers and 5–18 of the general public respondents answered "yes" to different questions ranging from mild to severe levels of food insecurity experiences.

To determine the overall level of food insecurity, the "yes" responses were totaled and averaged to produce an average raw score for each group of respondents. The average raw score for the farmer group was 2.1 with five farmers having a raw score above five on the FIES scale (experiencing hunger) while 20 farmers had a raw score of 4 or less (worrying about food and compromising on quality and variety). There were 13 farmers who reported no problems with food insecurity. The average raw score of the general public was 2.5 with 5 individuals of the public having a raw score of 5 or above on the FIES scale (experiencing hunger) while 8 public respondents had raw scores of less than 4 (worrying about food and compromising on quality and variety), and 9 who reported no problems with food insecurity. The Chi Square test revealed a $\chi(1) = 3.79$, $P = 0.73$. Therefore, the groups

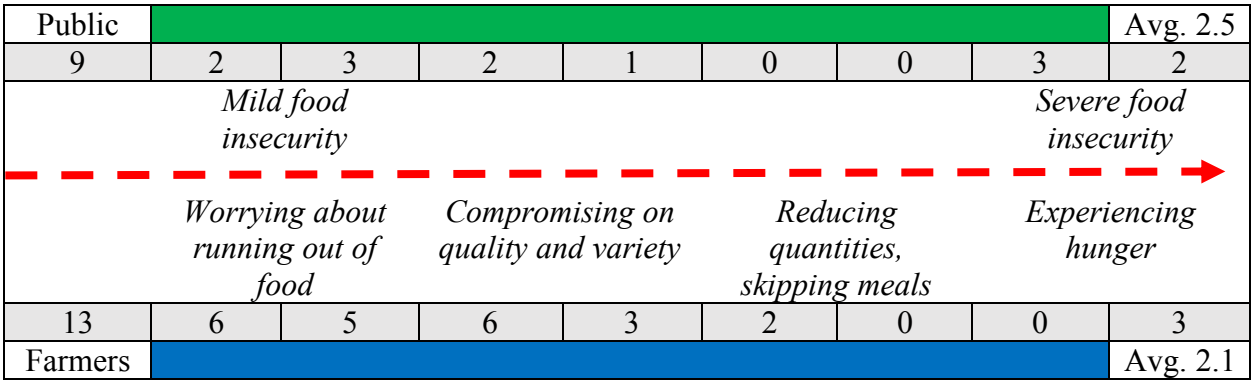

Fig. 1. The level of food insecurity from the public sector (n = 22) and farmers (n = 38) based on raw score totals of 8 questions from the FIES scale. Each cell (from left to right) represents the number of respondents in each category of food insecurity from none followed by 1 = mild food insecurity to 8 = severe food insecurity. An average is shown in the far right column of the Public sector and Farmers rows.

were not different and no comparisons could be made of the results gained.

Objective 4

While living in an area where agriculture employs over 20% of the population and large-scale production occurs, when asked if they had any exposure to food production, almost 41.0% reported they had at least some exposure. When asked whether or not they had considered growing their own food for self-consumption, as well as for additional income, 45.5% report they had considered growing food for additional income. A majority (54.5%) reported that they would consider growing food for self-consumption. Less than half (45.5%) of the respondents indicated they are open to raising backyard poultry. Access to capital was reported as the number one reason for not producing their own foods reported by 91.3% of respondents.

Many farmers reported they obtained information through the extension services but also contacted fellow farmers and friends for agriculture-related assistance. However, the Ministry of Agriculture did not use an organized system for utilizing "contact farmers". As noted by Kipkurgat (2015), contact farmers, respected leaders and producers within a geographic area, are effective vehicles for disseminating information to rural farming communities because of the existing trust and lack of competition among farmers in homogenous regions. The use of opinion leaders would be perfect points-of-contact for the Department of Agriculture in Stann Creek to utilize when sharing information in a way that is quick, effective, and applicable.

Implementing a system for contact farmers to help with the transfer of vital production information could be an effective way to make contact more consistent, thus increasing the relevancy of extension services. It was observed that most farmers, even those in the most remote areas, had access to cell phones and mobile broadband technology. Knowing this, the Department of Agriculture could utilize these devices to get information to farmers in real time. With mobile technology, extension officers could equip farmers across Stann Creek with weather updates and warnings, current market prices, and other input-related information. Utilizing this channel of communication could create potential partnerships between private companies and the Department of Agriculture to get product-specific information to farmers.

It seemed most farmers grew similar commodities because of the lack of local competition. The consuming public is obtaining their food from foreign owned grocery stores more frequently than from local producers (refer to objective 3). Therefore, local farmers can produce the same products and still access export markets. This phenomenon should highlight the Agriculture Department's opportunity to expand their reach beyond local producers and begin communicating with the general public to build a connected food system within Stann Creek.

The results of the food security assessment portion of the study raises questions as to why Stann Creek locals depend on foreign retailers to provide their food when local producers are available near most major communities and villages. For the general population, it appears access to healthy foods such as protein and fresh fruits and vegetables were not of major concern. With food access closely tied to proximity to grocery stores and other food retailers (FAO, n.d.), it is interesting that both smallholder farmers and the general public report living less than one mile from a food retailer even though national statistics suggest the country is off target at eradicating extreme hunger and reducing food insecurity (MDG, 2016). The limitations of financial resources should be investigated further.

When comparing the raw scores of the two populations, there was no significant difference regarding food insecurity. Both groups had experienced food insecurity in the last 12 months. By emphasizing the importance of nutritional quality and local food access, agriculture workers and government officials could consider promoting a more localized food system and provide realistic alternatives for attaining enough food to live a healthy and active lifestyle. Chen et al. (2010) report bridging food insecurity with an increased opportunity for local production has real potential to alleviate hunger and improve the quality of life of numerous people.

Conclusions

Farmers in the Stann Creek District of Belize face a variety of agricultural issues ranging from pest management to market access. Farmers continue to utilize a variety of agricultural information sources, with extension services being the number one resource for on-farm assistance. Regarding food security and access, there was a marginal difference between smallholder farmers and the general public. Both groups displayed mild food insecurity, with a few participants reporting severe food insecurity. The Belize Ministry of Agriculture and other stakeholders should focus on strengthening local communication channels and establishing a sustainable method for disseminating vital agricultural production information to farmers. This continued development could have lasting effects on productivity, food security, and access throughout the region.

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