

Adaptive Strategies to Food Insecurity within the Chuukese Community of Guam

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The nutritional impact of food insecurity (i.e., the reduced quality and accessibility of nutritional foods) is well researched in Guam. However, the adaptive strategies of Guam's food insecure communities, such as the Chuukese community, are not as well explored. This study investigated the adaptive strategies utilized by Guam's Chuukese community, and the strategies traditionally utilized in Chuuk. Such strategies provided insight into the relationship between culture, socioeconomic status, and the bare necessity of food. From a pool of food insecure Chuukese households (identified via the USDA survey module), nine participants were interviewed using basic interpretative qualitative interviews. Results were analyzed using constant comparative methodology, and four main thematic categories were formed. These categories identified adaptive strategies that highlighted the differences between Chuuk's traditional subsistence economy and Guam's cash economy. Participants utilized adaptive strategies that optimized resources outside the household; lowered food costs; used entrepreneurship for supplemental income; and managed food supplies. Due to the emphasis on subsistence culture, and the strain of a western cash economy, findings indicated that food security within the Chuukese community would improve with targeted urban agricultural practices.

Recent studies (Acosta, Barber, Leon Guerrero, 2017, a. b. c. d), utilizing portions of the United States Department of Agriculture's (USDA) standardized food security survey, identified that potentially high numbers of Guam's low-income families experience alarming levels of food insecurity. Food insecurity, as defined by the USDA (2018), is the reduced quality, variety, or desirability, of dietary decisions, with indications of disrupted eating patterns and reduced food intake. In the Pacific Islands, quantifying food insecurity proves difficult, as household sizes are greatly affected by culture, and food security does not always equate to adequate nutrition (Maxwell, 1996; Acosta et al., 2017). Food

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insecurity affects almost every aspect of one's lifestyle, and the impact beyond nutrition alone should be examined.

Although studies of both Guam's individual and family diets have often noted high rates of obesity and cardiovascular disease (e.g., Leon Guerrero et al., 2008; Pobocik et al., 2008), no studies focus on adaptive strategies employed to combat food insecurity. The need and logic behind access to adaptive strategies are clear. Such strategies not only give insight into the level of food insecurity one endures, but also into the experiences and trauma behind hunger (Chilton & Booth, 2007).

Because disadvantaged communities experience the brunt of food insecurity, with little to no available resources (Ahluwalia et al., 1998; Clifton, 2004; Chilton & Booth, 2007; Zenk et al., 2011), documenting and analyzing the adaptive strategies that such communities employ can provide insights into potential policy and outreach strategies to better assist these groups. As the fastest growing migrant population on Guam (Bautista, 2011; Hezel & Levin, 2012), with some of the highest rates of socioeconomic disparities (Hezel & Levin, 2012; Hattori-Uchima, 2017), the Chuukese community in particular provides a noteworthy case for food insecurity studies. Given that the Chuukese migrants retain practices from their native culture following their migration (Rubinstein & Levin, 1992), studying the adaptive strategies of such a community may reveal how culture interplays with food security within a westernized island setting. Research may also reveal unique strategies of food acquisition, cultivation, and gathering and foraging, especially in a cash economy, or in an age of rapid modernization in the regional islands.

Background & Objectives

Adaptive Strategies

Numerous studies on adaptive strategies that are used to cope with food insecurity reveal common obstacles to food acquisition; e.g., lack of transportation, financial trouble, and lack of health and safety knowledge (Ahluwalia et al., 1998; Hamelin et al., 1999; Kempson et al., 2002;

Clifton, 2004; Chilton & Booth, 2007; Beaumier & Ford, 2010; Zenk et al., 2011; Gadhoke et al., 2014). In a study by Zenk, et al. (2011), four common themes in adapting to such obstacles included optimization, settling, advocacy, and proactivity. Moreover, a fifth theme of illegal acquisition emerges when socioeconomic aspects are emphasized (Kempson et al., 2003). Optimization, settling, and illegal acquisition directly involve food itself, while advocacy and proactivity include active changes to one's self or one's environment.

The first theme, *optimization*, is the use of previously acquired food and available resources. It involves shopping at a different retailer for each food item, or frequenting a store outside of one's neighborhood for the lowest prices (Zenk et al., 2011; Fish et al., 2013). It also involves aid from family members or the community, cooking in groups, and even home gardening and fishing (Kempson et al., 2003). Optimizing involves a higher level of planning than other strategies, as food acquisition becomes dependent on time, location, or other people.

The second theme, *settling*, occurs when participants are without resources, and must settle with readily available food or food stores (Zenk et al., 2011). These food environments may be unhealthy or lacking in quality. This theme emerges when transportation, time, and money are exhausted. The implications of this theme often include paying higher prices, settling for low quality foods (Maxwell, 1996; Zenk et al., 2011), salvaging food from the garbage, and purchasing damaged foods at discounted prices (Kempson et al., 2003). This theme precedes severe changes in diet, such as limiting portion size and skipping meals altogether (Maxwell 1996).

The third theme, *advocacy*, involves the active pursuit to bring about change in one's store environments or food products (Zenk, 2011). Communicating concerns about product quality and store upkeep to store owners is a common form of advocacy. Reporting issues with safety to regulatory agencies, such as the police or health inspectors, is also common within this theme.

The fourth theme, *proactivity*, focuses on changes to the consumer during times of food insecurity, rather than the food itself. Proactivity

leads consumers to alter their appearance or demeanor in food stores, or even adjust their shopping time, to better ensure personal safety (Zenk, 2011). Those who utilize proactivity may even shop in certain stores, regardless of the possibility of decreased food quality, to avoid safety and health concerns. This theme also applies to the monetary aspect of food acquisition, like obtaining multiple side jobs, or even selling blood and participating in clinical drug trials, in order to receive more income for food purchases (Kempson et al, 2003).

The fifth and final theme, *illegal acquisition*, involves both social and physical activities that are considered illegal. It is mainly seen in disadvantaged communities where both safety and income are lacking (Kempson et al, 2003; Zenk et al, 2011). Some of the activities within illegal acquisition include selling food stamps, participating in several drug trials simultaneously, writing fraudulent checks, panhandling, shoplifting, and purposely committing crimes to be jailed (Kempson et al, 2003).

Previously Identified Food/Nutritional Issues of Diasporic Micronesian Communities

Increasing consumption of sugary and high caloric foods among Micronesian diasporic communities is a topic of concern. It is perpetuated by both the accessibility of such foods, and the lack of land available for subsistence farming. For example, Hirata (2015) reported that the Marshallese traditionally grew native produce, such as coconut and pandanus, and also consumed fresh fish. The native diet was found to be natural, high in fiber, and low in sugar. The nutrition transition experienced by migrants has led to high blood pressure and cardiovascular disease.

Furthermore, without available land to cultivate, migrants navigated to foreign lands without bringing a crucial part of their culture with them. Not only were migrants deprived of their traditional self-harvested foods, they risked the possibility of losing an integral part of their culture. The nutrition transition from healthy and fresh native

foods to fatty and sugary foreign foods was often an instant switch (Hirata, 2015).

The modern Chuukese diet, rich in rice, flour, sugar, fatty foods, and imported goods, gave rise to various nutrition and health issues (Yamamoto, 2013). A decline in health, noted by the increased incidences of cardiovascular disease, diabetes, and obesity, were driven by low incomes, lack of access to adequate foods, growing dependency on store foods, and poor quality of cheap imports (Connell, 2014).

The Guam Bureau of Statistics and Plans (2005) reported that 45% of Micronesian migrants lived below the poverty level. In 2005, about 16% of Guam's homeless population was reportedly of Chuukese ethnicity (Salvation Army, 2005). A 2017 Homeless Point-In-Time Report conducted by the Guam Homeless Coalition and the Guam Housing and Urban Renewal Authority (GHURA) reported that Chuukese represented the second highest number of homelessness, with Chamorros being the first. The Chuukese also represented the greatest percent of homelessness overall, specifically within FSM ethnicities. *Children in Guam* (Census, 2002) reported higher numbers of children living in poverty in areas comprised mostly of recent migrants. A survey conducted by Hezel and Levin (2012) reported that 58% of all FSM migrant households received food stamp benefits.

Due to the statistics, historical food relationship, and notable lack of recent information regarding food security, the Chuukese community of Guam is an ideal population in which to study adaptive strategies to food insecurity in a unique island setting. Affirming such strategies, as reported by the Chuukese community itself, would reveal new relationships to other Guam based communities, cultures, or even public structures, that could aid in the formation of better food security programs.

Study Objectives

Given that numerous studies indicate high levels of government food support and potential food insecurity in the Pacific Islands, the objectives of this study are to explore the following questions:

1. What are the traditional adaptive strategies utilized in Chuuk?
2. What are the adaptive strategies to food insecurity currently in use within the Chuukese community of Guam?
3. How can these adaptive strategies be better incorporated in government and NGO education and support programs to address current issues with food insecurity in the Chuukese community of Guam?

Methods

This study utilized quantitative surveys and qualitative interviews in two separate phases. In the first phase, a quantitative survey instrument was used to identify the participant sample pool (i.e. food insecure Chuukese community members). In the second phase, qualitative methods were used for data acquisition and analysis. IRB Approval numbers for the first and second phases are #CHRS 19-83 and #CHRS 19-188, respectively.

Quantitative Survey Instrument

Sample. In order to establish a pool of food insecure individuals, the USDA 18-Item U.S. Household Food Security Survey Module was disseminated among adult Chuukese residents of Guam who are identified as the main food purchasers/preparers of their household. Surveys were coded and organized according to the USDA *Guide to Measuring Household Food Security* (2000), which outlines four tiers of food insecurity in ascending order: Food secure, food insecure without hunger, food insecure with hunger (moderate), and food insecure with hunger (severe).

A total of 66 participants were surveyed. Of the 66 participants, a total of 52 participants were classified as food insecure. From the 52

food insecure participants, a total of 45 participants indicated a willingness to be interviewed in the qualitative stage. As the USDA survey served only as a screening tool and did not require further quantitative analysis, this number was determined to be sufficient for the purpose of this study.

Qualitative – Semi-structured Interviews

In order to increase the utility of information gained from the sample of qualitative interviews, a method of purposeful sampling, known as criterion sampling, was used. Criterion sampling utilized filters (i.e., household composition and food security) in the selection of interview candidates from the pool identified by the USDA survey.

In order to achieve maximum variation, the household demographic variables of age, Chuuk island of origin, and socioeconomic status were established (Table 1). It is noted that although all genders were allowed to participate in the study's quantitative stage (i.e., USDA survey), the majority of the participants were women. Qualitative interviews were conducted with a total of 9 participants when information saturation (i.e., a point at which no new relevant information is gained; Fusch & Ness, 2015), was reached. Interview guides were designed with flexibility in order to allow participants to deviate from the topic as they desired.

Interview questions were drafted to elicit stories that reveal the nuances between food insecurity, culture, household composition, socioeconomic status and outside assistance (Table 2). Interviews were transcribed in Microsoft Word and coded in the qualitative data analysis and research software, *Atlas.ti*. The defined units of analysis were sentences and paragraphs that conveyed concepts surrounding food insecurity, including but not limited to, hunger, food acquisition, government assistance, adaptive strategies, cultural norms and food itself. Codes were given succinct names to encompass all possible meanings. Code tables were then formed and discussed among research members for clarity and validity.

Detailed reflection notes were also taken during and immediately following the interview in order to create an audit trail. The audit trail was a collection of preliminary descriptions made of the data collection, code development, and data interpretations as the study progressed (Huberman & Miles, 1994). The audit trail ensured that findings are supported by the data collected and not the researcher's biases.

Qualitative Analysis

As a basic interpretive qualitative interview study, the main method of analysis was a form of constant comparative analysis. Using this method, data was examined to identify common themes of behavior, responses, or perspectives that were relevant to the study. Through an iterative process (interview by interview), identified concepts were constantly compared and refined, with new concepts added as necessary, until information saturation was reached.

Through the first step of qualitative data analysis – coding - data from the interviews were extracted from the original context while still retaining original meaning. Segmented data were categorized and re-sorted by the thematic meaning under a common code. Although *in vivo* coding, which emphasizes the spoken words of the participants as codes (Manning, 2017), was primarily used throughout the coding process, it became evident that Western English phrases held different meanings to the Chuukese community and would thus be potentially misused in the formation of study findings. For example, the initial *in-vivo* code “food budget” was formed to describe the process of budgeting food portions among household members. The code was later changed to appropriately reflect the act of food portioning or rationing, rather than the assumption of monetary budgets for food pricing. In such cases, more appropriate code names were drawn from the literature as necessary.

Transcripts were uploaded into *Atlas.ti* for coding organization and processing. Initial codes were determined during transcription review. Code categories and subcategories were added as analysis of multiple

interviews progressed, and modified to reflect nuances in the data accordingly (Taylor-Powell & Renner, 2003). Code families and code tables were reviewed by research members periodically. In this review

Table 1. Participant Demographics

Pseudonym	Main/Outer Islands	Gender	Age Range	No. of People in Household	Food Insecurity Insecurity Category
Amelia	Main Islands	Female	20-29	5	Food Insecure without Hunger
Epot	Main Islands	Female	30-39	5	Food Insecure with Hunger (Severe)
Kisha	Outer Islands	Female	30-39	3	Food Insecure with hunger (Severe)
Laila	Main Islands	Female	20-29	2	Food Insecure with Hunger (Moderate)
Lorna	Main Islands	Female	20-29	6	Food Insecure without Hunger
Mary Ann	Outer Islands	Female	50-59	3	Food Insecure with Hunger (Moderate)
Robert	Main Islands	Male	50-59	2	Food Insecure with Hunger (Moderate)
Sally	Main Islands	Female	40-49	6	Food Insecure without Hunger
Tritee	Main Islands	Female	50-59	1	Food Insecure with Hunger (Moderate)

Table 2. Purposes and Probes of Interview Question Guide

Question	Purpose
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Can you tell me about yourself and your household?

<u>Probes</u>	Any kids? Do the people staying there change? (visitors, relatives, etc.)	Demographics
	How do meals go? Does everyone eat together? Who prepares and serves the meals?	Establishes the head of household meals dynamics
	Can you tell me about your favorite things to eat?	Demographics; eases participant into interview

	Can you tell me about a period in time (or period in your life when you felt like you had enough food to eat/times of plenty)?	Establishes contrast for times of food insecurity; identifies factors that aid in food security
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<u>Probes</u>	What was going on in your life that made the food plenty?	Establishes context
	What kind of foods? Where did they come from?	Establishes contrast for foods consumed when food insecure
	If story is on Guam, ask about Chuuk or reverse.	Location qualifier

	In your opinion, what do other Chuukese do in these situations?	Identifies knowledge of communal networks and existing strategies
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<u>Probes</u>	Experiences, knowledge of aid/programs? If story is on Guam, ask about Chuuk or reverse.	Establishes details Location qualifier
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	Are there any traditional ways of acquiring food in your culture that you know of/are familiar with/regularly practice/which you would practice if you could?	Identifies traditional adaptive strategies and barriers to practices in Guam
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	Are there any other questions you think I should've asked? Anything I missed?	Ends the interview
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process, code definitions, descriptions, and quotes were articulated into a code table. This table, supported by quotes, constituted the key output of the study. Analysis of code groups led to an exploration of how codes and categories related to not only the original data, but to other data and

theoretical ideas as well, as the data was recontextualized back to the whole investigated context.

In order to increase the validity of the data collected, triangulation of the data via member checks were conducted. Investigator triangulation was achieved through research team review. Additional insights and feedback were provided to ensure that codes were appropriately described to fit the experiences expressed by the participants, and that code analysis was supported by appropriate quotations of rich descriptions. As a final measure to increase the study's validity, the code table and quotes are reported in Jugo, 2020 (Appendix IV).

Findings

Four main thematic categories arose from the interview data and are further discussed: Optimizing resources outside the household, cash economy, entrepreneurship, and managing food supply.

Optimizing resources outside the household

The first thematic category, optimizing resources outside the household, is comprised of two main code families: *“Local Food”* – i.e., abundant in Chuuk; and *External Aid* (Figure 1). Within the two code families are the literal codes formed from the extracted interview data.

Strategies that optimize resources outside the household require participants to actively pursue or make use of readily available resource pools. These resource pools were subsistence in nature, or relied on communal networks. For example, the first code family, *“Local Food” Abundant in Chuuk*, illustrates the differences between adaptive strategies utilized in Chuuk and of those utilized in Guam. As such, subsistence-based activities (i.e., farming, gathering/foraging, and fishing) were common codes shared among many of the participants.

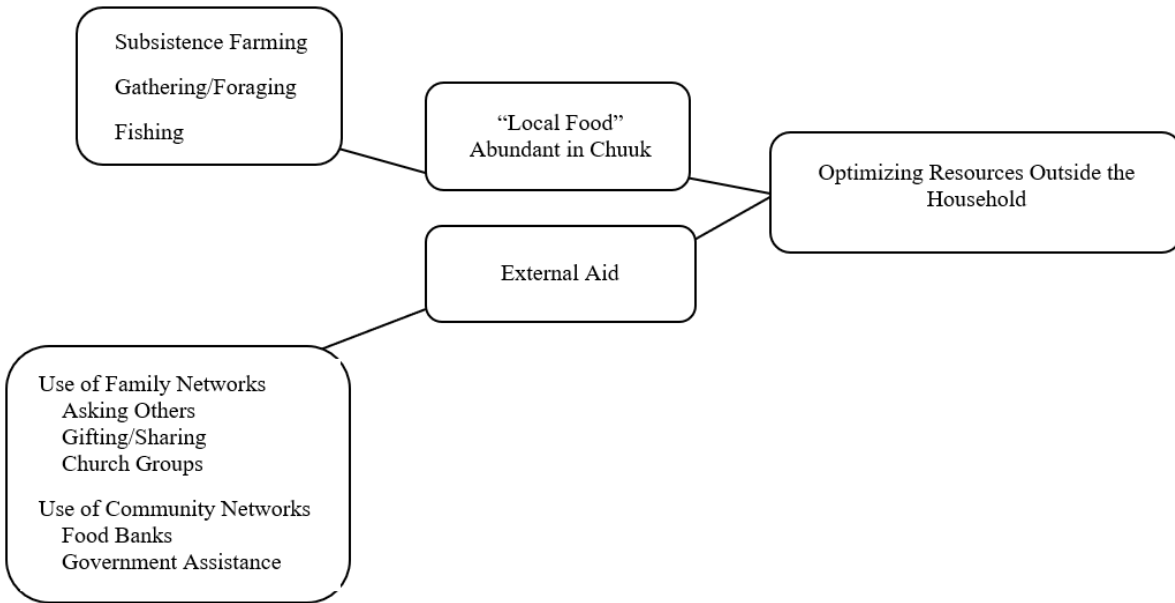


Figure 1. Optimizing Resources Outside the Household code tree dendrogram.

The second code family, *External Aid*, illustrates the use of various familial and communal networks to obtain food. Common codes found within the interviews described the use of familial networks, in which asking for aid or gifting/sharing one’s food was utilized. Chosen networks, such as church groups, as well as public networks, such as food banks and government assistance programs, were also discussed.

Unlike Chuuk, where many participants and their extended families practice subsistence farming, participants had to seek permission from others who owned private plantings to obtain locally grown produce in Guam. Some also noted foraging plantings located on public land. However, given that networks are less extensive in Guam as compared to that of Chuuk, options for access are limited.

One participant, “Robert”, described foraging for breadfruit within the War in the Pacific National Park in the village of Asan.

Oh- uh- sometimes the- (coughs) in Piti? Those like, big- you see the big bomb? Is that a bomb or like, the one in- the one where they go jogging?... You see the- and then there's a lot of breadfruit trees? Some- Sometimes- sometimes we go there and we're just pretending that nobody is (laughs) back there.

Another participant, "Mary Ann", described using opportunities to visit more established friends and family for access to fruits grown on their property.

Oh, even uh, you know the tree? Mangos tree? Oh, if I see my friends, my relative, they have mango beside their house? I will go and ask, can I have some?... Um, when I go there. When I uh, I want to go to my friend. So when I go there wi- uh, in their home? I'm looking. Oh, no more. So if I go there, I see mango tree, apple tree, can I have some.

Participants also emphasized that subsistence farming, gathering and foraging, and fishing were strategies much more commonly practiced in Chuuk that did not burden others significantly. They noted, traditional ("local") food is abundant at no financial cost (often described as "free"), and is easily accessible when one actively seeks it.

"Laila" described the importance of land, as the living conditions of most Chuukese in Guam don't allow for adequate subsistence farming, and the reliance on money to acquire food proves itself a burden.

I would say um... Like, plant- I don't know. Um, 'cuz back home we, like we plant our own food. And we cut the, the taro, the breadfruit, and then we fix it. And here... they have to pay for it. Because um, you don't have land. And it's really hard to get land here. Most Chuukese are just staying in the apartments, you know, and, yeah. I feel like it would be easier if, you know, we have our land here.

Many participants also described asking family members and friends for both food and money as a last resort. The types of food requested were notably cheaper foods, such as canned goods, bulk meats, rice, or packaged ramen. Participants usually asked for only what is needed until the next perceived time of food security, although it is also noted that those whom are asked are sometimes food insecure themselves. Asking for money highlighted a cultural shift in which cash and store bought items displace subsistence food sharing and societal relationships. This level of familial or communal responsibility extended from traditional Chuukese subsistence culture, which relied heavily on collective partnerships. Without the numbers of extended family and community in Guam, strategies that relied on cultural relationships were notably limited.

“Kisha” described asking relatives for food items during times of food insecurity in Guam and noted that requested food items are not excessive but are meant to satisfy the household in the short term.

When they don't have enough food? (clears throat) Um, sometimes calling relatives? And ask for help or, oh no, um... like do you have um, extra rice, can I just get a few cups? Or a pack of chicken... Yeah... 'Cuz even salt, you know? Hey, do you have uh, extra salt?”

Participants described times in which they were gifted food items from family members, friends, and fellow community members. Gifts were usually given or shared with when others take notice of participants' hardships, therefore they were rarely asked for. Gifts were usually food items, though monetary gifts were reported, as well. As such, instances of gifting and sharing primarily occurred during times of plenty. To emphasize the cultural bonds these strategies claim,

participants also described gifting or sharing with others when they themselves were able to.

“Lorna” described a time when her older sister gifted her and her family with food during their time of need. Upon learning about Lorna’s food insecurity due to a lapse of government assistance, her older sister took it upon herself to buy Lorna’s family food, despite Lorna’s protests.

So my older sister, the one- the one she came? She came to my house and she s- she knows that I don’t, we didn’t have rice. We didn’t- she noticed. Why you didn’t call me and ask me? I’m like, it’s okay. We- we got it. We still got it. Tomorrow, I’ll bring up our ta- our- my (SNAP) papers. She said, no, I’ll- I have to go buy. So she get us food- food. She buy us rice, and then um, can- canned meat for my kids? Oh, thanks a lot. (laughs)

However, participants explicitly expressed how different the acts of gifting and sharing were in Guam as opposed to their home islands in Chuuk. It is noted that the practices were not as common in Guam, ultimately straining many Chuukese households in the process. Common reasons suggested that gifting and sharing were not always feasible in Guam, as limited resources and lack of communal and familial networks were more limiting in Guam than in Chuuk. Simply put, gifting and sharing was difficult when one rarely has anything to gift or share.

“Epot” suggested that the difference in sharing in Guam was because of the amount of “problems” that families face. She suggested that one of those problems may be the lack of resources that are able to support more than one household.

No, I think in Chuuk it’s... uh, in Chuuk, they still, but maybe here, like less. Because we have plenty (laughs) uh, things to do, mm... Like, plenty (indiscernible) plenty problem (laughs)... Like, someone died, party... or, wedding... Yeah, plenty to do... Yeah but, back in Chuuk when they make the

kon? The breadfruit? They cook and they share, too. The family. Even the fish, when they come back from catching fish? They like, share. That's why in Chuuk, they still, but here? I think we don't have enough to share (laughs).

Cash Economy

Participants identified their susceptibility to food insecurity as being directly influenced by the cash economy in Guam. Figure 2 provides a code tree diagram of the Cash Economy thematic category. The first theme, *Lowering Food Costs*, consists of codes that described various strategies that participants used to actively lower the cost of food. Such strategies entailed favoring cheaper foods, such as packaged ramen and rice, specifically purchasing canned goods for their shelf life, and comparing food prices between multiple stores.

The second code family, *Access to Traditional Chuukese Food in Guam ("Local")*, consists of codes that compare the access to traditional Chuukese food in Guam to that in Chuuk (Figure 2). Many participants emphasized the high cost of their traditional foods, as well as the lack of traditional tools needed to cook such cuisine, as the primary barriers to accessibility.

In Chuuk, many participants own land in which they practice subsistence farming, and have tools with which they can catch fish or crabs, all within a web of extensive familial networks. Participants even went so far as to describe the differences between Guam and their home islands, where in Guam all transactions specifically involve money. They often reminisced about their home islands where subsistence farming is still widely practiced and where traditional food is abundant ("free").

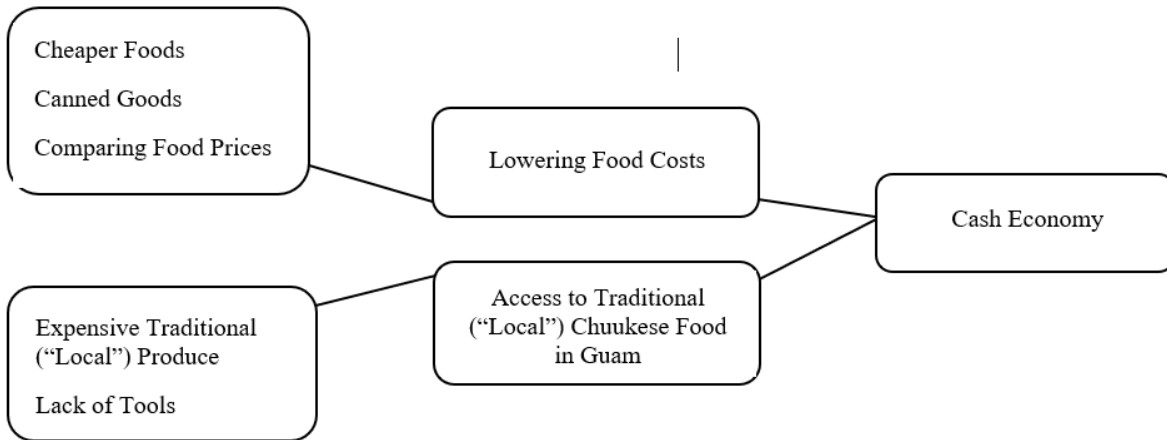


Figure 2. Cash Economy code tree dendrogram.

“Sally” described the contrast in food acquisition between Guam and Chuuk. She described how easily she obtains food in her home island through foraging and family networks. On the other hand, she describes how hard obtaining food in Guam is, given the dependency on a cash economy.

Hard... Yeah, ‘cuz if we- if I work, I have food... ‘Cuz I go buy. But in Chuuk, free. I just stay home and like, think, “Oh, tomorrow, what I’m gonna eat? What I’m gonna give my family?” So I went to the jungle, I pick the stalk. I- like, I- my bro- if I have brother, “Oh, tomorrow I go get the... breadfruit, and you, you go to the water, go catch fish. So tomorrow we’ll barb- barbeque...” Yeah. But over here, hard, because we- we eat with money. We stay with money. We... we go- we go on the road with money... Everything money. But in Chuuk, free.

“Robert” emphasized the cultural impact of a cash economy on Chuukese society, explaining that a loss of culture in almost every aspect occurs when money is relied on too heavily for things like food.

But back home, in Chuuk? Even if you don't work, you still can... go get your own fish, get, you know, make coconut. I mean, the breadfruit... It's not like here that you pay rent, pay... so you- uh, it's- it's- different, you know. But nowadays that you're kind of adopting the... money is everything? So, it's kind of changing now. Kind of lo- loss... the respect... Usually the eld- oldest of the family will be the one that... will be like... be the one that will be respected among all the 'cuz- but now? If the oldest is money-less? (laughs) And the younger has money? And he's the one that will get the respect. Not the older, uh, one. So that's- some families are like that now. In Chuuk.... 'Cuz especially when it comes to like... you're the oldest, right? And my so- my daughter, one guy is asking for marriage, right? And usually, I'm not the one to be say yes. My oldest or my- my oldest sister or my oldest brother will be the one decide yes or no. For my kids... But now? It's changing, now... I think it's just because of the money... Ru- ruining the culture that money... Money is ruining it. Ruining it.

The shift in culture described by Robert shines a light on the difficulties many Chuukese migrants and their families face when adjusting to Guam's cash economy. The reliance on money coupled with the loss of access to land and fishing resources is causing a shift in traditional Chuukese values. When emphasis is placed on money and what it can provide for a food insecure family, a conflict with cultural values that developed under a different resource base arises. A shift from subsistence food to money disrupts familial roles that were traditionally relied upon. Therefore, Chuukese families are pushed to develop strategies to cope with the learning curve necessary to adapt to Guam's cash economy.

Strategies utilized to lower food costs included purchasing cheaper foods and comparing food prices between stores. Participants often

preferred, and most often were forced to, purchase cheaper foods when shopping. Such foods named included canned goods, such as canned mackerel, as well as chicken leg quarters, turkey tails, rice, and packaged ramen. Because of the demands of a cash economy, participants prioritized affordability. Participants also noted that cheaper foods tend to have a longer shelf life, which help extend periods of food security. Such strategies include but are not limited to shopping for low-cost and value foods in the form of bulk foods, inexpensive foods sale items, expired (or possibly soon to be) items and items covered by coupons.

“Robert” described the Chuukese community’s affinity for rice, and compared its price and shelf life to that of pounding *kon*, a traditional Chuukese breadfruit dish, which is much more expensive on Guam and can only feed so many.

Bag of rice is what, twenty five? Twenty six? These- these Chuukese, they don’t really like any other rice than the Diamond G (laughs) I don’t know why (laughs)... And if you get that... three or two *kon*? Sometimes they se- five, dollars, six dollars, so you get four, but you- you only eat those in two days. But the fifty pound rice, for two weeks, one week? And it’s (laughs) everybody share the rice.

Moreover, participants compared food prices at different stores to obtain the best deals at the cheapest price. This, in turn, required participants to travel to multiple stores when food shopping. Participants also described comparing sale prices at numerous stores in order to obtain the best price, and favoring certain stores for specific food items.

“Sally” explained how she checks the prices of certain foods at different stores, then buys from the most affordable location based on sale offerings.

I go like... I go to [Store A]? It's... the just uh, about the chicken. The case of chicken. Or case of spareribs. Payless, twenty seven. And I oh, I go check, I don't have enough for that one. So I went to the... went to the [Store B]. So that one is twenty seven, [Store B], twenty- twenty four ninety. And I, okay, I buy here 'cuz that's the cheaper one. So the cheap,.. Payless, cheaper. 'Cuz every, sometimes they put down sixty-sixty ninety nine, [Store A] it's thirteen ninety nine. So I check. I re- I go to the other store, go, go to the other one and uh, other store too, so if it's same? But the first one I saw it's cheaper? Next day, I go back to the other store.

Entrepreneurship

Participants utilized strategies that applied entrepreneurial efforts to increase money or food items coming into the household. Some strategies were straightforward in that participants sell handcrafted items or offer traditional homeopathic services, such as the code strategies described within the *Extra Money for Household* code family, while other strategies involved a type of barter system that exchanged lower valued food items for higher valued food items, such as the code strategy described in the Barter System code family (Figure 3).

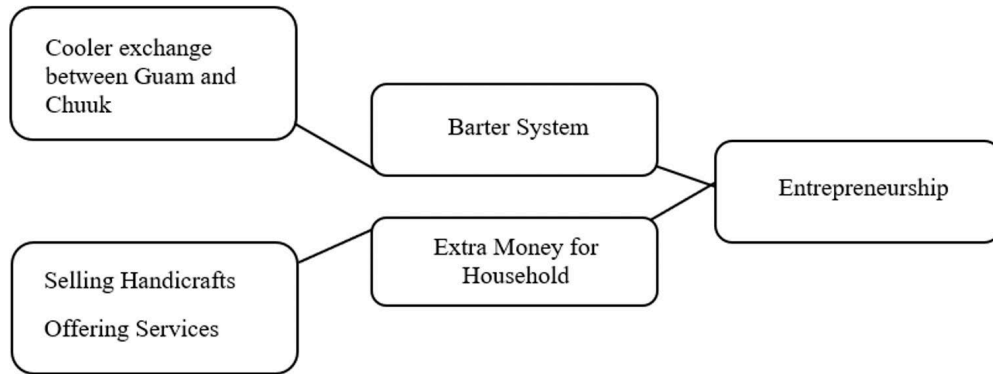


Figure 3. Entrepreneurship code tree dendrogram.

The barter system, in particular, utilized coolers travelling between Guam and Chuuk. Coolers traveling from Guam usually contained Western items, such as potato chips and snack items, while coolers returning from Chuuk usually contained traditional Chuukese cuisine, such as crabs, fish, and local produce. The process was entirely reciprocal, as such exchange items are of high value to each receiver.

This barter system took advantage of the dichotomy between Western cash economy prices and traditional Chuukese subsistence culture prices. The affordability of Western canned goods and the high price of traditional (“local”) Chuukese food in Guam was different in Chuuk, where foods from the grocery store were expensive while local food was easily obtainable. This barter system utilized coolers traveling between Guam and Chuuk.

“Lorna” explained how her family takes advantage of her father’s frequent travels between Guam and Chuuk to request for local Chuukese food. She then described how her sister also sends local food to Guam whenever someone she knows is travelling in exchange for things she needs.

So, we ask our (laughs) we ask our dad to go to Chuuk so he can get us (laughs) local food... Or, ask- 'cuz um, my second sister? She, she went back to Chuuk?... We usually call her and, can you get us food? Local food? It's like, oh I'm gonna give to- just go ask the people, they came out (laughs). They want to travel out to Guam (laughs)... If she found like, if she see somebody to bring? Then, yeah. But if she doesn't know anybody to bring our local food? We ask our dad, can you go Chuuk?... Then we, um, my sisters and my brothers? We have to get the cooler, put stuff, whatever she wants. Like chips (laughs) pancake, the pancake mix... canned meat for her kids... You can bring two cooler. One for fish, one for only the local food... We know that, dad is coming like, today. We all get ready to fix food for dad to eat? The one we cook here? And we're gonna go finish out the (laughs) food in the cooler (laughs)

Other entrepreneurial strategies were more straightforward in that participants sold items or offered services in exchange for money. Items sold were specifically described as cultural adornments, such as traditional Micronesian headpieces called *mwar mwar* or traditional floor mats. Many participants described such sales as helpful in making just enough money to pay for immediate needs, such as bottles of drinking water or household bills.

"Kisha" described creating and selling *mwar mwar*s on social media for extra money. She explained that the money obtained from the sales help cover household expenses, such as water.

And then me, for example, I'm making the *mwar mwar*?... The lei? 'Cuz some people, they like to use it to match to their outfit? Go to church and stuff like that?... So I if- so I made it out of the foam sheets? And then I will sell it... I do that like, and it comes in really, um, good on a- on hand because sometimes when I need water, money for water, it helps also.

Managing Food Supply

Strategies that required participants to manage their food supplies took place with readily available food. Within the *Stretching Food* code family, participants described “stretching” their food stores with specific cooking methods and recipes, while limiting the amount of food purchased (Figure 4). Such strategies maximized food servings and utilized leftovers. Within the Portioning Food code family, participants “portioned” food amounts over a planned time period, usually with the use of bulk items (Figure 4). Such portions varied among household members, which sometimes resulted in certain members eating less than others. Ultimately, the goal of strategies that manage food supply was to ensure that the household has enough food supply to last until the next anticipated time of plenty.

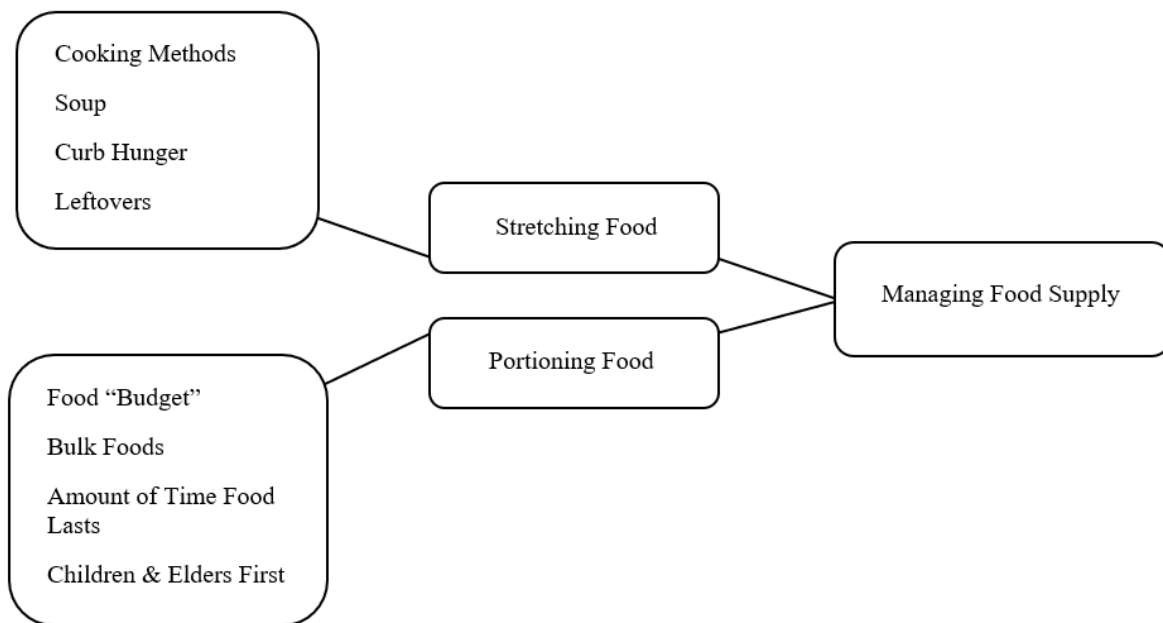


Figure 4. Managing Food Supply code tree dendrogram.

One way participants stretched the amount of food they have in order to last during times of food shortage was by cooking specific meals

or using specific recipes that not only utilized less food, but also stretched what little they have. Participants in this study described a similar process of cooking “soup” with rice and whatever meat is available. As rice was a cheaper food that can be purchased in bulk, it was commonly found in food insecure households. By adding more water to rice, a type of “soup” was created from a relatively small portion that is thus stretched to satisfy the entire household. To improve the taste, participants described adding various condiments, such as soy sauce or sugar.

“Mary Ann” described her cooking process for soup, which involves the rice cooker. She also described the consistency she aims for.

Um, when I cook the rice?... The rice cooker, four cup, four water. Four rice, four water. So me? I will take two cups, four water. It means, soup! The rice is getting bigger... That, I eat... Soup. (laughs) The soup, only the rice? Um, the water? I think it's two cup rice? Two cup rice. The cooker cup? It's too little. So I will use the cup rice? Four water. Two cup rice and four water. Match, then put on the stove. Then the rice, it's getting bigger. Bigger than the rice cooker I put four cups, four water. So, two cup rice, four cup water, join together, it's very big. So it's soup. Not hard. Uh, it's soft. Yeah. So, you know the bread? The flour. The flour? I will cup, one cup rice? And, um, two cup water. Put in the pot. So when it's uh, what's that? Cook! So, I will cup the flour? Only one? And put inside? So, the rice, it's not soft. It's very big, but it's um, little hard. Because the flour. Mix together with the rice. So it's soup but it's not soft. It's not too much water.

Participants intentionally portioned food amounts based on specific time periods, such as the amount of days until the next pay day. The portioning process began with participants estimating, or calculating, how much food they must consume (and save) daily until

they can acquire more food. Participants described this calculation as a food “budget,” which pertained to the food itself rather than a budget of financials. It is noted that participants did not describe budgeting their financials.

The food item’s shelf life dictated its potential to be portioned and saved. That is, if instant ramen can be kept for several months, participants mentally noted that a box of it can last the household until the next time of plenty. From that point of mental calculation and preemptive planning, buying low priced packaged food in bulk and forming a stockpile (when possible) was determined to be the most economic decision.

“Robert” compared the price and shelf life of rice to that of pounding *kon*, a traditional Chuukese breadfruit dish, which is not only more expensive on Guam, but is also limited in portions.

Bag of rice is what, twenty-five? Twenty-six?... And if you get that... three or two *kon*? Sometimes they se- five, dollars, six dollars, so you get four, but you- you only eat those in two days. But the fifty pound rice, for two weeks, one week? And it’s (laughs) everybody share the rice.

Finally, participants also planned ahead by purposely purchasing bulk items of cheaper foods, such as canned mackerel, sausage, and instant ramen, to not only increase the amount of food within the household, but to also capitalize on sale prices often offered for such items. As times of plenty usually corresponded with pay days or government assistance schedules, purchasing in bulk ensured that the household had enough food to last until the next time of economic inflow. It was common that when bulk items were purchased, they too were portioned according to household anticipated needs.

“Laila” described she and her sister’s preference for instant ramen, which tended to last them a couple of weeks. She said, “Mm. Like... we just eat, like, ramen? ‘Cuz usually that’s what we get, because, you know, like box of ramen. So it can last more. More than two weeks (laughs)”

Households with children, elders, or even visitors showed high levels of portioning, as these individuals were given special consideration. As such, many household members who did not fall in those three categories sometimes went without eating or reduced the amounts they ate in order to preserve food portions. A similar strategy is found in the study conducted by Kempson et al. (2003), where participants reported restricting personal food intake by depriving themselves for others, going completely without food, or limiting number of eating occasions. However, other strategies that are described by Kempson et al. (2003) were not echoed in this study, such as overeating, eating expired food, obtaining free samples, or roadkill, or eating on a monthly cycle that limited foods near the end of the month.

“Sally” described purposely portioning food specifically for her dad, regardless of his protests to save more for her own family. This statement may lead to the assumption that food portions may extend beyond the immediate household, given cultural ties to family.

Because I cannot eat without my dad... So if- if like, very small the... food. So I cannot eat... only me and my kids and my boyfriend? And I, oh, nevermind my dad ‘cuz my dad very strong. No. (laughs) I, I share ‘cuz I really uh, love my dad to just whatever me and my kids and my boyfriend eat? We just share with my dad... Sometimes my dad don’t eat and I ask him, oh, you- did you eat? Oh, no, I save for your kids. No, you come, you eat. If we eat, uh, you have to eat with them. No, ‘cuz not enough. No, no, you come, I give you. You eat (laughs).

Conclusions and Recommendations

From the findings of this study, it is apparent that key recommendations for improving food security within the study community should be based on supporting agricultural practices with which migrants are familiar. Subsistence practices, such as farming, foraging, gathering, and fishing, were not only reminisced of by participants as common practices in their home island, but also noted to be the preferred methods of achieving food security in Guam. However, because of a lack of access to land, participants almost always followed their description of subsistence practices with reasons as to why it is difficult to achieve. The following recommendations seek to address such barriers to subsistence practices in Guam.

The desire to practice subsistence farming in Guam was echoed by every participant. In addition to the desire to engage in subsistence production, the participants also possessed the knowledge and experience to do so. A majority of participants described not only utilizing private plantings in Chuuk to support their households, but also relying on such resources when purchased foods were unobtainable. Studies show that investing in subsistence practices and local production improves the food environment in under-resourced communities (Drescher et al., 2006; Zenk et al., 2011).

The primary barrier to subsistence practices identified by the participants was the lack of access to available land. To support the subsistence aspirations of the participants and to address the barriers identified, one recommendation is accessible land plots via community allotment gardens. Originating in Europe, allotment gardens are a component of urban agriculture that allocates parcels of land to households for subsistence use (Drescher et al., 2006). Unlike community gardens, which are managed by several households within a community, allotment gardens are allocated by government or private entities and are each individually tended to by a household (Holmer et al., 2003; Drescher et al., 2006). As transportation and time were not indicated as hindrances by participants, the availability of land may not

be limited by proximities, but by sufficient space and water access. Although, the closer the land is to the household, the better for all parties involved.

Often, due to the advocacy and collaboration between authorities, interest groups, and residents, community empowerment becomes a relevant output of allotment gardens (Drescher et al., 2006). Successful implementation of subsistence practices within low-income and low-resource communities refocuses food production and consumption from corporate, or cash driven, food supply, to local food economies (Allen, 2010; Meenar & Hoover, 2012). Given that many participants expressed difficulties in navigating Guam's cash economy in terms of food acquisition, in contrast to their lived experiences with a subsistence economy, enabling these individuals to engage in subsistence practices would allow these communities to draw on their intrinsic resources to dramatically increase their food security.

A similar recommendation is the implementation of urban agroforestry (food forests) via small-scale edible landscapes in public spaces. Urban agroforestry combines the elements of urban agriculture, urban forestry, and agroforestry with the use of perennial food-producing trees and shrubs (Clark & Nicholas, 2013). As green infrastructure programs, such as urban forestry, are usually large scale endeavors and involve the collaboration of numerous stakeholders (McClain et al., 2012), small-scale edible landscapes in public spaces may be easier to implement and maintain in Guam. Such edible landscapes can fill a number of landscape functions. For example, parking lot perimeters lined with fruit and food producing trees, shrubs, and herbaceous perennials would satisfy urban agroforestry standards.

For shade, fruit trees such as breadfruit, mango, avocado, Malungay (*Moringa oleifera*) and coconuts are excellent locally adapted trees. Shrubs and perennials that produce food (fruit, tubers or leafy greens) can be used as barrier plantings and hedges. Some species suitable for urban hedges include casava, chaya, and edible hibiscus (*Abelmoschus manihot*). For barrier plantings or windbreaks, fruit trees such as

soursop, citrus, and fig thrive in island climates. Sweet potato is also commonly used as a low traffic area ground cover, while bananas and sugar cane are used as barrier plantings. All previously listed plantings can replace current non-native ornamental landscapes that dominate government spaces.

Regulations can also be developed to promote proper cultivation and management of urban agroforestry. Such regulations would focus on a harvest ethos centered on sustainability, and would establish proper precautions to ensure low-resource households have controlled access to fruits and leafy greens. Since many participants described foraging and gathering practices in Guam, institutional plantings would increase access to local produce in a process already practiced by low-resource households. Public landscapes maximized for low maintenance sustainable agro-forests not only integrate multiple ecosystems, but also improve urban resiliency and well-being (Clark & Nicholas, 2013). Elevitch (2015), provides an excellent resource of ideas and species to help a community program establish Agroforestry Landscapes.

Other agriculturally backed recommendations focus on the gardening limitation of Guam's government housing entity, the Guam Housing and Urban Renewal Authority (GHURA). One simple policy recommendation is for GHURA to encourage selective planting by its clients. Although government housing communities may be limited by space, planting shade giving fruit trees in an organized manner would provide both shade and fruit for residents. If managed correctly, fruit trees support community beautification guidelines. GHURA regulations may be put into place to ensure that housing residents are the sole receivers of the fruit produced.

Low-resource households residing in Section 8 housing offer a different set of obstacles in practicing subsistence agriculture. Residents in Section 8 housing are not only limited by GHURA regulations, but also that of their land lords as well. Therefore, a policy recommendation for both Section 8 housing and GHURA communities alike is to allow the use of container gardens beside each residence. Container gardens mitigate

the lack of available land resources. Although container gardens may not be optimal for growing fruit trees, other popular subsistence crops such as taro and sweet potatoes could be easily cultivated by residents. Container gardens may be adjusted to fit the requirements of many housing arrangements, adding to its diversity and ease of application.

The final recommendation focuses on the need for further research on this topic. As the USDA 18-Item Household Food Security Survey Module was used solely as a filtering tool for the qualitative phase of this study, no further statistical analyses were conducted. However, preliminary results of the survey not only placed participants in their respective food insecurity categories, but also indicated the collective presence of food insecurity within the study community overall. The need for expansion on previous efforts would be accomplished by implementing further studies utilizing the USDA Module to quantify levels of food security among multiple populations using appropriate sample sizes. Further investigations of various communities' levels of food insecurity would create a tangible outlook on the relationships between Guam's resident communities and their accessibility to nutritious food. Having a clearer view of such a landscape would lead to the implementation of policies and practices that would best suit each unique community.

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