Assessing Local Produce Procurement Conditions to Improve School Feeding Value Chains in the Eastern Caribbean Island of Nevis

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Abstract

The rising prevalence of childhood overweight and obesity within the Caribbean is a major public health and policy concern because obese children are at risk of developing non-communicable diseases (NCDs) later in life. Unhealthy eating among children, including low intake of fruits and vegetables and high intake of energy-dense processed and ultra-processed foods have contributed to the rising prevalence of childhood obesity within the Caribbean Community (CARICOM). Community-based school meal programmes (SMP) have been identified as being a potentially useful vehicle to address unhealthy eating among children by increasing the availability of locally-grown nutritious food items. Such "farm to school" approaches also have the potential to support agricultural production and reduce CARICOM's reliance on importation of food, especially of processed and ultra-processed food products. The smaller islands in the Eastern Caribbean face particular challenges in dealing with childhood obesity, but the island of Nevis is being viewed as a viable setting for tackling unhealthy eating among children through strengthening the existing SMP.

The objective of this thesis is to better understand the opportunities as well as barriers to enhancing community-based school feeding in Nevis. The research focused on investigating factors related to the organizational structures and social capital among stakeholders and farmers that underpin the procurement of locally-farmed produce for the SMP in Nevis. Based on field data collection involving key-informant interviews (n=66) and focus group discussions with farmers (n=10) and stakeholders (n=5), the study revealed a systemic lack of reciprocal communication between farmers and SMP administration, as well as an absence of contractual agreement between local farmers and the SMP administration for the procurement of locally grown produce. As a result, SMP administrators resorted to procuring most food items from local supermarkets, and these food

items comprised mainly imported foods. Using social network analyses, we found limitations in group organization among farmers, and between school administrators and farmers. The results suggest the need for improved SMP governance to support and sustain local food value chains that are capable of delivering nutritious school meals for children.

Résumé

La prévalence croissante du surpoids et l'obésité parmi les enfants dans les caraïbes est un problème majeur de la santé publique et une préoccupation de politique parce que les enfants obèses sont plus à risque pour le développement des maladies non transmissible (MNT) plus tard dans la vie. Une mauvaise alimentation parmi les enfants, y compris la faible consommation de fruits et de légumes, à une consommation élevée d'aliments transformé riche en énergie, et les aliments ultra-transformé ont contribué à la prévalence croissante de l'obésité des enfants au sein de la communauté des Caraïbes (CARICOM). Les programmes de repas scolaires (PRS) ont été identifiés comme étant un véhicule pour lutter contre la consommation d'aliments peu nutritifs chez les enfants en augmentant la disponibilité des produits alimentaires nutritifs cultivés localement. De telle approches « de la ferme à l'école » ont également le potentiel de soutenir la production alimentaire locale et de réduire l'importation de la nourriture et surtout l'importation des aliments transformés et ultra-transformes. Les iles le plus petite dans l'est des caraïbes se sont affronté aux défis en particulaire qui concerne l'obésité des enfants, mais l'ile de Nevis est considérée comme un endroit viable pour s'attaquer à la consommation d'aliments peu nutritifs chez les enfants par le renforcement de PRS existant.

L'objectif de cette thèse est de mieux comprendre les opportunités ainsi que les obstacles pour améliorer l'alimentation scolaire communautaire à Nevis. La recherche s'est concentrée sur l'investigation des facteurs relatifs aux structures organisationnelles et le capital social parmi les parties prenantes et les agriculteurs qui étaient l'approvisionnement des produits cultivés localement pour le PRS à Nevis. Sur la base de la collecte des données sur le terrain impliquant des entretiens avec des informateurs (n=66) clés et une discussion de groupe avec les agricultures (n=10), et les parties prenants (n=5), les résultats d'étude relèvent un manque systématique de

communication réciproque entre les agriculteurs et l'administration de PRS, ainsi qu'une absence d'un accord contractuel entre les agriculteurs locaux et l'administration de PRS pour l'approvisionnement des produits cultivés localement. En conséquence, les administrateurs des PRS ont eu recours à l'achat de la plupart des produits alimentaire dans les supermarchés locaux, et ces produits alimentaires comprenaient principalement des aliments importés et transformés. En utilisant des analyses de réseaux sociaux, on a trouvé des limitations dans l'organisation du groupe parmi les agriculteurs, et entre l'administration de l'école et les agriculteurs. Les résultats suggèrent la nécessité de l'amélioration de la gouvernance de PRS pour soutenir et maintenir les locales chaines alimentaires de valeur qui sont capables de fournir des repas scolaires nourrissants aux enfants.

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Contribution of Authors

I am the lead author for this thesis. Dr. Gordon Hickey, Dr. Leroy Phillip and Dr. Arlette Saint Ville will be co-authors when the thesis is published as a stand-alone research paper in a peer-reviewed scientific journal. Dr. Hickey assisted with the research design, funding, intellectual input, methodologies, and provided feedback, edits, and writing for this thesis. Dr. Saint Ville provided support with the research design, methodologies, and field research activities. Dr. Phillip assisted with intellectual input, feedback, editing, and writing support for this thesis.

Chapter 1: Introduction

1.1 Background

Obesity has been recognized as a growing global health problem that has increased in the past 50 years, reaching pandemic level and affecting all age groups (Blüher, 2019). Obesity is a major risk factor for diet-related non-communicable diseases (NCDs) (including diabetes, cardiovascular disease and cancer) which account for 71% of global mortality (WHO, 2018). Within the Caribbean, a region comprised of mainly Small Island Developing Sates (SIDS), high rates of obesity and overweight represent serious public health challenges, with the member states of the Caribbean Community (CARICOM) [1] having the highest incidence of NCDs in the Americas (Hospedales et al., 2011). Further, the small size, insularity, remoteness, and proneness to natural disasters make many SIDS vulnerable to food insecurity (Saint Ville et al., 2019). The member nations of CARICOM (see Figure 1.1) are heavily dependent on the importation of foods (Silva et al., 2011; Beckford, 2012; Pye-Smith, 2017), especially those that are processed or ultra-processed which have been associated with obesity (Lin al., 2018). This has contributed to dietary patterns that reveal generally very low levels of fresh fruit and vegetable consumption and an excessive intake of energy-dense foods (Saint Ville et al., 2019; Hickey & Unwin, 2020). Of particular policy concern in the CARICOM are the high rates of childhood overweight and obesity (Lowitt et al., 2018) due to excessive consumption of unhealthy foods, which can lead to obesity later in life and increase the risk of suffering from NCDs (Healthy Caribbean Coalition, 2019; Mumena et al., 2018).

[1] The CARICOM, a grouping of 15 member states in the Caribbean, is faced with several challenges to food and nutrition security due to the small size of many member island nations, their insularity, remoteness, and proneness to natural disasters that impede the stabilization of regional and local food systems (Saint Ville et al, 2019).

Local, arguably healthier, food production systems in the CARICOM have struggled to compete with global markets due to disparities in technology and scale of operation, limited finances, and low levels of institutional support from government (Lowitt et al., 2020). As a result, domestic food production in many SIDS has been steadily declining over the past four decades (Beckford & Rhiney, 2016). Previous research has identified some of the challenges facing regional efforts giving rise to this trend, including legacies of human exploitation and a policy focus on plantation export agriculture that has neglected domestic agriculture, issues related to development capacity and low innovation in small market economies including loss of high-skilled human capital, a lack of strong social cohesion, revenue shortfalls, and the lack of investment (Pye-Smith, 2017; Saint Ville, et al., 2015).

Figure 1.1 Map showing the 15 member nations of the Caribbean Community (CARICOM) coloured in white (Retrieved from Warner & Anatol, 2014)

Although food imports that contain fruits and vegetables are often more affordable than local produce (Connell et al., 2019), their supply can be unstable due to uncertainty in products and price increases, variable arrival times because of remoteness, and inadequate storage facilities (Beckford & Campbell, 2013a; Beckford & Campbell, 2013b; Dorodnykh, 2017). The heavy reliance on imported foods has led to the CARICOM experiencing high levels of food and nutrition insecurity (Beckford & Rhiney, 2016). In response, government policies emerged in the early 2000s to address CARICOM's domestic agricultural needs and to improve regional food and nutrition security including the Jagdeo Initiative (2004) and the Port of Spain Declaration (2007) both of which are further explained in Chapter 2. However, despite high-profile efforts to address food insecurity in the region, there has been limited progress on creating sustainable local food systems that could reduce the reliance on food imports while improving health and nutrition.

Developing local food systems generally involves carefully structuring communication, identifying actors and other parties who need to be involved, integrating food system activities along the value chain to advance food and nutrition security outcomes, identifying the necessary interventions that have the ability to reduce food imports, and determining where new research is needed (Ingram, 2011). Policies therefore need to be coordinated from the local, national, and regional levels in order to prioritize, support and protect desired foods and food production systems. According to Murphy et al. (2020), to enhance health and nutrition, the CARICOM must improve the population's demand for healthy local produce while taxing unhealthy, processed food imports. Such an approach can be supported through the development of nutrition-sensitive value chains that connect local farmers to consumers through institutional food procurement, processing, and preparation systems, also known as 'farm-to-school', 'farm to fork 'or 'farm to table' initiatives (Hickey & Unwin, 2020).

Community-based school meal programmes (SMPs) are a commonly used strategy to transform local food systems and improve food and nutrition security for children using a farm-to-school approach. The aim is to enhance the health and nutrition of schoolchildren by strengthening the capacity of local farmers to supply fresh produce to SMPs (see Lowitt et al., 2018). According to Vallianatos et al. (2004), adopting a farm to school approach can offset obesity and diet-related non-communicable diseases among school-aged children by increasing the availability of healthy local produce in schools. Previous research suggests that key to creating and sustaining such school feeding programmes are government leadership, strong supporting legislation, civil society participation and intersectoral decision making (Sidaner et al, 2013). However, farmers also play a significant role in any farm-to-school approach, requiring a reliable produce procurement system to be in place within schools (Izumi et al., 2010).

Within the Eastern Caribbean, there have been previous efforts in the twin island state of St. Kitts and Nevis[2] to develop farm-to-school approaches by building stronger links between ministries of agriculture, health, and education to deliver nutritious meals in schools based on fresh and nutritious local produce (see Lowitt et al., 2018). While such an approach was found to be possible, it also highlighted the need for improved domestic management of local food value chains, requiring the strong support of, and cooperation and collaboration with farmers, parents, teachers, food service and administrative staff, nutritionists, government actors, and other stakeholders.

The challenge is understanding how best to connect these key actors and encourage them to communicate, coordinate, and collaborate with the aim of building and strengthening a local school feeding nutrition-sensitive value chain (Lowitt et al., 2015a; 2018).

[2] In 2016, the St. Kitts and Nevis population experienced 27.9% prevalence in childhood overweight or obesity (Healthy Caribbean Coalition, 2019).

1.2 Research Gap

While various studies have shown that SMPs can increase healthy eating habits among children (Graham et al., 2004) and that procuring fruits and vegetables from local farmers can help to strengthen local food production systems (Lowitt et al., 2018), there has been relatively little institutionalization of this model in the CARICOM. A key challenge is understanding how existing school feeding value chains operate, and how they can be enhanced through local food procurement to become more nutrition-sensitive.

Previous research conducted in the CARICOM suggests that challenges to developing and sustaining farm-to-school value chains are largely social, involving issues related to communication, coordination and social capital (e.g., trust and reciprocity) (Lowitt et al., 2015a; 2018). This is because building a local and nutrition-sensitive food value chain is complex, comprising a wide range of already established communities of practice[3], including staff from different government agencies, teachers, school kitchen staff, farmers, input suppliers, and students and families among others. It therefore becomes essential to first understand how individuals working in these different communities of practice comprising the desired local food system are already working and learning together, either formally or informally to inform policy options (Lowitt et al., 2015a; 2018). Such an approach has the potential to illuminate the underlying factors affecting collaboration among government ministries, schools, communities, the private sector, farmers and farmer organizations and how these affect a school's ability to systematically procure fresh produce from local farmers.

[3] Wenger (2011) defines a community of practice as "*groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly."*

This thesis presents the case of Nevis, a small island which together with St. Kitts forms the CARICOM member federation of St. Kitts and Nevis. Nevis has identified farm-to-school approaches as a desirable way to enhance childhood nutrition, reduce their reliance on food imports and support livelihoods of local farmers. However, it has been challenged to implement and sustain a community-based local school feeding approach, similar to the situation in other member states of the CARICOM. Further research to better understand the barriers and opportunities to enhancing community-based school feeding value-chains is needed (Lowitt et al., 2018).

1.3 Research Question and Objective

1.3.1 Research Question

Focusing on the case of Nevis, one of the twin-islands of St. Kitts and Nevis in the Eastern Caribbean, and a member of CARICOM, my research question is: *What are the organizational challenges affecting the local supply of fresh and healthy produce to the school meals programme (SMP) in Nevis?*

1.3.2 Research Objective

The broad objective of this thesis is to contribute novel insights on policy efforts to develop a sustainable local food procurement system for the SMP in Nevis.

1.3.3 Rationale for the Research

The twin island state of St. Kitts and Nevis (SKN) is known to rely heavily on imported food items for use in the SMP (Lowitt et al., 2018). In order to help reduce the reliance on imported and processed foods and improve the availability of fruits and vegetables for children participating in the SMP, there is a need to identify the challenges affecting the production and procurement of

produce from local smallholder farmers. This research project focuses on the island of Nevis because the SMP, though partially funded by the government, operates on a decentralized model of governance that promotes community decision making and parental engagement through cost-sharing. We would therefore expect to observe suitable conditions for implementing a community-based 'farm to school' approach.

Chapter 2: Literature Review

Obesity is a serious and growing global health issue affecting people living in high-, middle-, and low-income countries increasing their chances of suffering from diet-related NCDs. Many low- and middle-income countries are faced with a double burden of malnutrition because they deal with undernutrition while also experiencing rapid increases in NCD risk factors such as overweight and obesity (World Health Organization (WHO) 2020). Poor diets are the largest contributors to NCDs, associated with diabetes, cancers, and cardio-vascular diseases, killing approximately 41 million people every year and accounting for 71% of all deaths around the world (WHO, 2018). Globally, the increased consumption of processed food comprised of excess amounts of salt, sugar, and fats is being aggravated by low intakes of healthy foods such as fresh fruits and vegetables, whole grains, and seafood (Hyseni et al., 2017). Children are among those that are affected by this global dietary shift resulting in rising rates of overweight and obesity and making them vulnerable to developing NCDs at a young age, and also during their adult life. In response, school meal programmes (SMPs) have become a globally recognized initiative to help promote healthy eating and nutrition among school-aged children (Drake et al., 2017).

2.1 School Meal Programmes (SMPs)

School meal programmes (SMP) generally target populations that are food insecure and operate in communities where a high proportion of families have low socioeconomic status, or where schools deal with poor attendance and enrolment of students (Lawson, 2012). They were initially designed to improve school attendance, academic performance and achievement, physical growth, and other nutritional and health outcomes (Kristjansson, et al., 2007). Nutrition education in the curriculum is considered an essential element to promoting healthy eating and exercise and should actively involve teachers, family, and other community representatives (Pérez-Rodrigo & Aranceta, 2001). Children who are taught healthy eating habits at a young age have the potential to reduce the impact of NCDs in adulthood (Pérez-Rodrigo & Aranceta, 2001). The source of healthy foods is also important and SMPs would ideally aim for locally-farmed fruits and vegetables for school meals where possible (Lowitt et al., 2018). One common approach to achieving this is through school gardens which has been reported to positively impact children's food choices, increase their consumption of produce, and provide another avenue for children to learn healthy eating habits, while gaining an opportunity for hands-on nutrition education (Graham, et al., 2005). However, there are multiple challenges that schools face when implementing school gardens, mainly related to limited financial resources, employees, and time (Ozer, 2007).

Farm-to-school approaches are another common strategy to enhance healthy school meals. Here the aim is to connect schools with local and regional farmers for mutual benefit, involving several activities promoting the inclusion of local foods in school meals, including assisting with school gardens, field trips to farms, and hosting community events (Vallianatos et al., 2004; Botkins & Roe, 2018). This approach can help develop and promote local food systems because schools offer a reliable market for local farmers and the children will have healthier, nutritious foods available

in their school meals (Vallianatos et al., 2004). Agriculture and health are being increasingly recognized as being inherently related due to converging public concerns on child obesity trends and the risk of diet-related diseases accompanied with globalization and distancing from local food systems (Teo, 2018; Bagdonis et al., 2009). There are several benefits to eating locally produced food, namely, it contains more nutrients than imported foods due to less travel time to the consumer, it supports the local economy since money spent with local farmers stays in the community, and it benefits the environment (Klavinski, 2013).

While there are a number of benefits associated with SMPs, there are also several limitations and threats that challenge their success. The most critical threats, particularly in developing countries, are related to the development and implementation of school feeding policies, planning management with governments, schools, farmers and the community, the lack of financial and tangible resources, and poor capacity-building of school meal staff (Badri, 2014). A study conducted by Reeve et al. (2018) in the Philippines previously identified some of the barriers to effective school food policy development and implementation. Despite having a strong policy mechanism for healthy food provision and marketing, the lack of financial and human resources for implementation, monitoring and policy enforcement, and vague guidelines for actors' responsibilities hampered its impact effectiveness (Reeve et al., 2018). Their findings suggested that countries should facilitate implementation planning processes during development to establish goals, targets, and activities, and provide measures for accountability and resource allocation (Reeve et al., 2018). These challenges have also been reported in the CARICOM due to multiple factors related to their history, environment, food systems, and policies (Lowitt et al., 2018; Saint Ville et al., 2015; Perry, 2020; Murphy et al., 2019).

2.2 The Caribbean Community (CARICOM) Food System

The Caribbean Community (CARICOM) is a grouping of 15 member states, primarily Small Island Developing States (SIDS), that integrated to improve security, economic stability, foreign policy, and human and social development (Hassanali, 2020). They face context-specific challenges due to their small size, insularity, geographic location, and proneness to natural disasters, limited resources, and general over-dependence on imports (Connell et al., 2020). While this region faces a variety of social-ecological vulnerabilities, their unique characteristics have shaped them into a major international tourist destination, with tourism one of their largest economic activities (Saint Ville et al., 2017; Thomas, 2015). Additionally, agriculture plays a pivotal role in rural areas where smallholder farms (less than 2 hectares) account for 90% of farmers utilizing about 55% of the farmland (Saint Ville et al., 2017; Lowder et al., 2016). While smallholders dominate the agriculture sector in the CARICOM, these farmers are met with several challenges that limit their contribution to domestic agriculture and local food systems (Lowitt et al., 2015b).

During late 1980s, the CARICOM shifted from being a large global exporter of plantation crops such as bananas, sugar, and cocoa to becoming net food importers (Lowitt et al., 2020; Foster, 2020). This was largely due to globalization and trade liberalization, causing the institutions that once supported the development, production, and marketing of these plantation crops to collapse. Farmers struggled to compete with global markets as they were faced with disparities in technology, operation of scale, and support from their local governments (Lowitt et al., 2020; Saint Ville et al., 2017). Historically, plantation agriculture in the Caribbean was an exploitative and controlling system that used land and slave labor for the highest extraction of profit (Saint Ville et al., 2017). Plantation relations were therefore based on force and fear, however enslaved persons

were given one day a week to nurture their gardens and to exchange surplus produce which gave rise to subsistence farming becoming a key element of family and community life (Saint Ville et al., 2015). This dynamic established strong informal institutions around subsistence farming that continue to support domestic agricultural production and weekly farmers markets today (Saint Ville et al., 2015).

After the emancipation of slavery, plantations became less competitive and the need to appease landless farmers led the colonial administration to implement land settlements that included carving less-productive plantation lands and marginal lands into farms of less than two hectares (Saint Ville et al., 2015). This had the effect of creating non-economically viable farm units, and with the limited access by smallholder farmers to financial and physical capital and technology, despite land and their labour being available, these factors kept farm production low. In addressing only the access to natural capital at a minimum and failing to address the necessary human capital and social capital considerations, farmers lacked the knowledge to implement and sustain technical and business operations. The natural capital of marginal lands also limited production and gave rise to heightened land degradation. Further, local elites who had conflicting economic interests in food import and distribution businesses had little interest in coordinating and supporting domestic smallholder production, which led to neglect in business investments (Saint Ville et al., 2015). Over time, as the plantation export crop system declined, combined with the abandonment of domestic agriculture, the Caribbean became a net food importer with increasing rates of food insecurity (Barry, 2020).

2.3 CARICOM Policies to Address Food and Nutrition Security

According to Lowitt et al., (2015b), "the need for domestic smallholder farming systems to better support food and nutrition security in the Caribbean is a pressing challenge" (pg. 1367). From its definition, food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2006). There are four dimensions of food security: food availability (the supply of food which is influenced by food production, trade, etc.,); food access (the ability of individuals and households to purchase food); utilization (consumption patterns and behavior that impacts nutritional status, health, and productivity); and stability (long-term consistency in the other three pillars periodically, seasonally, temporarily, or permanently) (Aladjadjiyan, 2012). The main factors driving food insecurity in the CARICOM, based on the four dimensions, are: 1) *food availability* - food import dependency, loss of foreign exchange and increased consumption of processed foods because of market access liberalization and increased availability of cheaper imported products, 2) *food access*- persistent poverty and income inequality that constrains food accessibility for some groups of the population, 3) *utilization*- there is a strong acquired taste and preferences for food items that are not imported which is associated with the high levels of obesity and non-communicable diseases observed in the region, and 4) *stability*- market instability due to uncertainty of supplies and increasing prices which can result in food shortages, seasonality of the tourism industry, the high occurrences of natural disasters, and the constraints to pay for food imports (Dorodnykh, 2017). The very high and escalating reliance on food imports continues to be a pressing policy issue related to food and nutrition security in the CARICOM region (Thompson, 2019; Hickey & Unwin, 2020).

Over half of the CARICOM's SIDS import more than 80% of their food, much of it nutritionally dense and highly processed, which has been a key driver of high levels of obesity, food insecurity, and NCDs (Murphy et al., 2020). Dorodnykh (2017) suggested that the issue of food-import dependency and its contribution to food security should acknowledge the needs of development-relevant domestic policies and social programmes in order to enhance domestic food production, promote nutritional education, and increase access to affordable, healthy food items. In line with this observation, several policies and initiatives have been introduced by the CARICOM to enhance regional food and nutrition security, with the two most prominent examples described below.

In 2004, the "Jagdeo Initiative" was a strategy proposed by the former president of Guyana as a regional effort to reframe CARICOM agriculture policy to address both food insecurity and support domestic agricultural production (Lowitt et al., 2020). This initiative identified several production constraints and associated interventions (Chintamanie & Dass, 2013; Lowitt et al., 2020). Constraints included: limited access to finances, uncoordinated and insufficient risk management measures, inadequate research and development, inefficient agricultural health and food safety systems, inadequate land and water distribution and management, weak information and intelligence systems and services, poor marketing, and a lack of skilled human resources (Chesney, 2005). Additionally, non-communicable diseases related to unhealthy diets and physical inactivity, leading to high rates of obesity, diabetes, and hypertension, were identified as needing attention (Hospedales et al., 2011; Samuels & Unwin, 2018).

In 2007, the heads of government in the CARICOM hosted the world's first summit devoted to NCDs in Port-of-Spain, Trinidad and Tobago. During this assembly, the landmark *Declaration of Port of Spain* came to fruition calling for unity to stop the epidemic of NCDs (Kirton et al., 2019).

The declaration identified that the burden of NCDs must be addressed through comprehensive and integrated strategies at various levels from individual to regional (Lowitt et al., 2018). CARICOM SIDS had less capacity to improve food and nutrition security and this declaration called for regional and global support to surmount capacity issues (Hospedales et al., 2011). Despite this, a recent review found that due to their low level of resources, SIDS may still not have the capacity to meet the policy demands involved in implementing diet-related regulatory interventions (Foster et al., 2018). The CARICOM also published the Regional Food and Nutrition Security Policy in October 2010. The policy's goals are to promote increased production and access to safe and nutritious food products to reduce the region's susceptibility to NCDs, natural disasters and socioeconomic shocks, however, its implementation has been limited (Murphy et al., 2020). The Port of Spain declaration specifically identified schools as an important area of intervention, aimed at providing children healthy school meals and promoting healthy eating (Kirton et al., 2015). Nevertheless, one in three children in the CARICOM remain overweight or obese (Healthy Caribbean Coalition, 2019).

2.4 School Meal Programmes (SMPs) in CARICOM SIDS

SMPs in the CARICOM are expected to contribute to the eradication of hunger, food insecurity, and the burden of malnutrition, especially among vulnerable children, decrease rural poverty, improve the development of healthy eating lifestyles by children and others, and promote and expand the efficiency of agriculture and food systems (Patterson-Andrews, 2019). However, these programs depend on building stronger connections between agriculture, health, and education to increase the availability and consumption of healthy foods in schools (Lowitt et al., 2018). Previous research suggests that a more systematic farm-to-school approach is needed in CARICOM, which involves procurement coordination with key stakeholders to supply schools

with local fruits and vegetables, thereby improving nutritional quality of school meals, providing a market outlet for local farmers, and reducing societal dependence on imported foods (Phillip et al., 2014).

Although a farm-to-school approach has the potential to positively impact child nutrition, local farmers, and local food systems (Lowitt et al., 2018), there are major challenges with realizing the potential of local food value chains in the CARICOM SIDS. These include difficulties with ensuring sustainable produce supply from local farmers and a general lack of school meal policies throughout the CARICOM (Phillip et al., 2014; Ramdath, 2014). A recent case study in the island state of St. Kitts implemented a farm-to-school approach between 2011 and 2014 in an effort to create a reliable market for local smallholders while improving child nutrition and reducing obesity. Its goal was to establish mechanisms for coordinating produce procurement with local farmers to initiate an institutional local food procurement system for school meals. While local farmers were able to supply healthy produce to the SMP, farmers were unable to meet the full needs of the programme due to challenges with crop planning schedules, water shortages since most crops are rain-fed, and a lack of overall management capacity (Lowitt et al., 2018). This intervention highlighted the need for improved school feeding value-chains encompassing the strong support of, and cooperation with, administrative staff, parents, teachers, farmers, nutritionists, government, and other stakeholders. Another recent study in Dominica underscored the need for documenting the crops grown, yield quantities alongside children's consumption patterns from school gardens and local farms to increase knowledge on local and sustainable food production and determine what is needed to eat healthfully (Wall-Bassett et al., 2012). These findings are supported by lessons learned through the Brazil School Feeding Programme, which

requires the collaboration of multiple actors including local governments and farmers to purchase 30% of produce for the SMP from local family farms. (Sonnino et al., 2014; Sidaner et al., 2013).

2.5 Social Capital and Local School Feeding Value Chains

Social capital is defined as "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995). It is developed by investing in social relationships entailing trust, shared identities, and values (Folke et al., 2005; Waddock, 2001). There are three commonly identified types of social capital that can contribute to, or hinder, mutually beneficial collective actions (Andriani & Christoforou, 2016): 1. *bonding* social capital, refers to horizontal connections between homogenous members; *bridging* social capital refers to vertical linkages with people from dissimilar social backgrounds; and *linking* social capital refer to vertical interaction between formal and institutionalized power or authority (Poortinga, 2006; Woolcock, 2001). The concept of social capital is relevant when seeking to implement and sustain local school feeding value chains because it can increase the capacity of community members (farmers, governmental staff, parents, etc.) to contribute to, and collaborate with, local SMPs (Borish et al, 2017).

Trust is a key component to social capital because it can enable individuals and groups to cooperate and work together effectively while being open to new opportunities that support shared goals (van Rijn et al, 2012; King et al, 2019). Previous research in the CARICOM SIDS region has indicated that low levels of trust between local smallholder farmers, institutions, and other actors can hamper the possibility of collective action towards building and sustaining local school feeding value chains (Lowitt et al, 2015a; 2018). Collective action occurs when two or more individuals make the efforts needed to accomplish an outcome (Sandler, 2004), and relies heavily on the social relations captured in bonding, bridging, and linking social capital research (Dahal & Adhikari,

2008). Sidaner et al (2013) highlighted that strong government leadership, intersectoral decision-making processes, and political pressure by civil society organizations are key factors affecting the success of school feeding programmes. However, without adequate social capital, the multiple actors involved in the local food value chain will be unable to effectively navigate the complex procurement and coordination issues that arise (Borish et al., 2017; Kretschmer et al., 2014, see also Lowitt et al., 2018).

Chapter 3: Methodology

3.1 Study Setting

The study was conducted on the Eastern Caribbean Island of Nevis, part of the twin-island Federation of Saint Kitts (168 km^2) and Nevis (93 km^2) located between the Atlantic Ocean and Caribbean Sea (Griffiths, 2020). Approximately 23% of the land in St. Kitts-Nevis (SKN) is classified as arable (World Bank, 2018). The Federation has a population of 52,834 people (World Bank, 2019) and is a member state of the CARICOM. Both islands rely heavily on tourism for economic development, and over 90% of the food consumed in SKN is imported. As a result, the SMP operating on both islands relies heavily on imported food items for the preparation of school meals (Trotman, et al., 2009; Lowitt, et al., 2018).

My research was undertaken in Nevis to build on, and complement, previous research conducted in St. Kitts seeking to develop farm-to-school approaches in the Caribbean (Lowitt et al., 2018). The Nevis SMP was identified by local policy actors as being particularly suitable for expanding research into community-based school feeding in the Eastern Caribbean because of the significant role that parents play in the functioning and funding of the SMP. The SMP administration in Nevis

has shown strong commitment to delivering high quality meals to children by investing in the upgrade of the decentralized kitchen infrastructure at certain primary schools on the island, by recruiting a professional chef to lead efforts to improve meal service for children, and embracing the role of school gardens and local farmers for produce procurement and student engagement in food and nutrition. Although the Nevis SMP aims to boost the availability of locally-sourced fruits and vegetables in school meals the extent to which this goal is being achieved is unclear. The programme is mandated and mainly funded by the Ministry of Education of Nevis, with 12 schools participating, comprising both preschool and primary schools serving children aged between 3 to 12 years old. Child participation in the SMP is voluntary and parents are charged between or $7.40-$9.25 USD [$20-$25 XCD (Eastern Caribbean Dollar)], a week (2019) in a cost-sharing arrangement with the government. This is designed to stimulate and maintain parental involvement in the programme. A single School Meal Coordinator is responsible for addressing school needs across the island, setting standards, and establishing relationships with other actors to realize common goals of the SMP. Unlike St Kitts where there is a centralized infrastructure for the preparation of school meals, in Nevis, kitchen staff at each school are supervised by a kitchen manager and/or the school principal whose role is to procure necessary food items and handle billing. There is a Head Chef for the Nevis SMP, employed by the Ministry of Health, who ensures kitchen staff are following appropriate health and food safety protocols including using nutritious ingredients, correct portion sizes, healthy cooking techniques (steaming/baking instead of frying) and assisting cooks with preparing and cooking meals when needed.

3.2 Methods

This thesis adopts an exploratory case study approach (Yin, 2012) to identify potential avenues to increase the availability and use of locally grown fresh and nutritious produce for the Nevis SMP.

Qualitative research was employed, which seeks an in-depth explanation of "how" and "why" a phenomenon has occurred in its social setting or context (Mohajan, 2018). Exploratory research purposively investigates an unclear case to reach a better understanding of the area being studied (Stebbins, 2001). Grounded theory was used to supplement this approach by allowing the development of substantive theories throughout the process of data collection and exploratory analysis (Hammersley, 2012; Oktay, 2012).

3.2.1 Case Study Research

Case study research involved the use of qualitative methods (Yin, 2012) to understand local farmers and other stakeholder (government, health experts, school staff, and parents) roles in, and perceptions of, the local SMP food value chain. Creswell (2002) defined a case study as "*a problem to be studied, which will reveal an in-depth understanding of a "case" or bounded system, which involves understanding an event, activity, process, or one or more individuals."* A case study is considered useful when addressing a wide-range of questions that ask the why, what, and how of a problem, helping to explore, explain, describe, evaluate and theorize about complex issues in context (Harrison, et al, 2017). Insights and lessons can then be drawn based on what is uncovered during data collection and analysis *(*VanWynsberghe & Khan, 2007).

Nevis offers a case where government and the community are dealing with issues of unhealthy eating, high food imports and high rates of obesity among children, challenges which are similar to other CARICOM SIDS (Lowitt, et al., 2018; Mumena, et al., 2018). An exploratory approach was selected because there is limited formal knowledge available on the SMP in Nevis and extensive empirical research on developing local farm-to-school SMP has not been conducted (Boton & Forgues, 2018).

3.2.2 Data Collection

Data collection occurred in June, July, October and November 2019, involving semi-structured interviews with key informants, consisting of 36 local farm-to-school stakeholders who represented government, health experts, school staff and parent perspectives, and 30 local farmers (total n=66). Semi-structured interviews were selected because they can improve the objectivity and trustworthiness of qualitative research and make the results more credible (Kallio et al., 2016). Magaldi & Berler (2020) defined semi-structured interviews as "*an exploratory interview that usually follows a devised guide focused on a core topic to build structure, and it allows for discovery creating space to follow topical trajectory as the conversation develops".* Even though the interviewer prepares pre-determined questions, the interview becomes more conversational where participants have the opportunity to explore issues they feel are important, which ensures flexibility (Longhurst, 2003).

Participants (stakeholders and local farmers) were purposively selected using a combined snowball sampling and convenience sampling approach. Snowball sampling is a non-probability technique to locate populations potentially 'hidden' from the researcher and relies on referrals from existing sample respondents to other persons in their acquaintance believed to be associated with the research topic; where sampling usually continues until data becomes saturated (Ghaljaie, 2017; Johnson, 2014). Snowball sampling was considered the most appropriate approach for this research because it allowed me to identify participants using other participant's social networks. We also used convenience sampling to identify more farmers to participate in the study. Like snowball sampling, convenience sampling is a type of non-random sampling strategy where members of the target population meet specific practical criteria including geographical proximity, availability at a given time, or willingness to participate in the study (Etikan, 2016). This was

important for my research because it was difficult to identify farmers to interview due to their time-sensitive schedules. We interviewed stakeholders at their place of employment or at home, and interviewed farmers on their farms.

Field data collection was conducted in four schools: Charlestown Primary School, Gingerland Primary School, St James Primary School, and Maude Smith Primary School (see Figure 3.1). Data collection in the schools focused on produce procurement processes. Schensul, Schensul, & LeCompte (1999) defined participant observation as *"the process of learning through exposure to or involvement in the day-to-day or routine activities of participants in the researcher setting."* We observed the school's meal planning and procurement procedures by watching weekly menu plans on kitchen walls, cooks preparing meals, teachers gathering students into the cafeteria, kitchen staff delivering meals to children, and informally assessing how much food children consumed.

We also interviewed farmers participating in local farmer groups to better understand information flow between them and the schools on weekly meal plans, their level of organization and the extent to which they were collaborating on agriculture production and/or supplying produce to the SMP. We interviewed members from four farmer groups: New River, One Love, Nevis Growers, and Cades Bay (see Figure 3.1). One Love is a religious organization that was in the process of becoming a registered farmer group in Nevis and they are considered a farmer group for the purposes of analysis. Two farmer groups, New River and One Love each invited us to attend one of their meetings and we were able to get a better understanding of how meetings are structured and run, how members communicate, how the group discusses the agricultural needs of the farmers in their area, and how they work together to sustain agriculture production in Nevis.

Figure 3.1 Map of Study Sites in Nevis. Retrieved from https://www.ee.co.za/article/sustainable-energy-roadmap-caribbean-launched.html/caricom-map-1_highres

Additionally, we conducted two focus groups with stakeholders (n=5) and local farmers (n=10) and observed food procurement procedures in four schools. A focus group involves gathering a group of people, usually between 6 to 12, who meet in an informal setting to discuss a particular topic set by the researcher allowing the group to explore the subject at different angles of their choosing (Longhurst, 2003). The advantage of focus groups is that they provide an opportunity for a free flow of conversation that may stimulate new ideas and discussion topics (Geography Open Textbook Collective, 2014). Additional data collection included gathering information and documentation on meal planning and produce procurement from the Nevis SMP.

All field research protocols were reviewed and approved by the McGill University Research Ethics Board (REB File #:231-1018) prior to data collection.

3.2.3 Data Analysis

The data collected from semi-structured interviews were handwritten and transcribed using a format that allowed systematic analysis of responses. Upon completing the organization and transcription of the data, I then employed a thematic analysis to interrogate the data. Clarke and Braun (2014) defined thematic analysis as "*a method for identifying and analyzing patterns of meaning (themes) in qualitative data*." Its purpose is to evaluate the different perspectives of participants, focusing on the similarities and differences, and identify unanticipated insights, essentially summarizing key elements in the dataset (Lorelli, 2017). I created themes inductively based on the responses from research participants and coded all themes using the Nvivo software.

A social network analysis (SNA) (Scott, 1991) was then performed to assess farmer perceptions of their social network and associated levels of organization by analyzing their reported affiliation networks. The term affiliation generally refers to membership or participation data where we

assume co-membership in groups or events indicates an underlying social tie (Borgatti & Halgin, 2011). According to Serrat (2017), SNA focuses on the actors and the relationships between them in a social context. The benefit is to better understand relationships and measure and analyze (or evaluate) knowledge flows, providing an opportunity to enhance organizational performance (Serrat, 2017). Therefore, SNA can help to disclose a community's social network structure of direct relationships and provide insights on the relationship between its structure, collaboration planning and processes, and resources rooted in the community (Mandarano, 2009). We used an in-degree centrality measure to identify the farmer(s) with the highest potential to mobilize farmers to increase agriculture production for the school meal programme in Nevis. Degree centrality is measured by the number of direct links with other nodes (Zhang & Luo, 2017), in this case the farmer with the most links directed towards them had the highest centrality scores.

3.2.4 Assumptions and Limitations

There are several assumptions and limitations associated with undertaking qualitative case study research. One common limitation of case study research is that its findings cannot be generalized to populations. Yin (2014) explained case studies are, however, generalizable to theoretical propositions, where findings can provide substantive insights of relevance to approaching the same phenomenon under different conditions (Reis, 2009; Yin, 2014). When conducting semi-structured interviews, a common assumption is key informants will answer honestly and truthfully. We used consent forms to ensure voluntary participation and to guarantee confidentiality which can increase confidence in the process.

Selection bias, defined as *"a concentration on an interest in one particular area or subject"* (Smith & Noble, 2014), was a concern when conducting the field research due to our initial dependence

on local ‘gatekeepers’ to identify potential farmers for interview. However, selected bias can be decreased by random selection of participants (Smith & Noble, 2014). To reduce selection bias, we identified more farmers to interview through convenience sampling (also known as random sampling). One of the greatest concerns to case study research is the potential for lack of rigor because researchers may disregard systematic procedures or have biased views that influence their findings. Another research limitation is the use of SNA. Concerns of this analysis is related to the *observed structure* in a network rather than its *true structure* which might contain errors in measuring their networks validity, reliability, and measurement, especially when participants self-report interactions (Wasserman & Faust, 1994, pg. 56). Researcher bias was managed through peer debriefing and the careful pre-testing of interviews prior to data collection, while potential response bias was mitigated through anonymity and the triangulation of data collected with different groups, in different social settings and using different methods (focus group, observation, interview and documentary analysis).

3.3 Statement of Positionality

Positionality *reflects the position that the researcher has chosen to adopt within a given research study* which influences how research is conducted, its outcomes, and results (Holmes, 2020). It is important to understand how I view my research project and its process, to be aware of my potential influence due to my background, and how I managed my positionality throughout the duration of this study.

Nevis’ population consists of mostly African descendants and being a Black American, I share a very similar racial background. Although my cultural experiences were different, research participants and the greater community quickly accepted me as a student researcher. Since other researchers from McGill had previously conducted studies in Nevis, the local community members

had already met McGill researchers and students. Having Dr. Arlette Saint Ville introduce me to community members and key-stakeholders immensely helped me formulate a professional relationship with the community and stakeholders. Before data collection, I already had preconceived biases on this topic due to my experiences of being food insecure in the United States. This experience helped me be more understanding while interviewing participants and focus on listening rather than sharing my inputs. I recognized everyone's experience and opinion as valid, even if I agreed or disagreed.

When I was an undergraduate student at Michigan State University in 2017, I had the opportunity to participate in a research study abroad in Naitolia, Tanzania to identify the challenges to food security and pastoralism in the Maasai community. This project gave me insights on food security challenges in developing countries and I recognized that food and nutrition security challenges are complex and context specific. Having written a questionnaire for 25 households and a survey for three focus groups, it prepared me to create research questions that were relevant to the context of Nevis. During interviews, my position as a novice researcher posed a threat to asking the most appropriate questions to obtain necessary information for my project. To reduce errors during data collection, I practiced interviewing and probing questions under the supervision of Dr. Arlette Saint Ville who had previous research experience in the CARICOM. After two practice interviews, I felt ready to independently interview research participants and was aware when to probe and when to listen. I was careful in actively listening to research participants and being impartial and understanding of their responses for them to feel comfortable enough to give me honest answers.

Chapter 4: Results

4.1 The Nevis School Meal Programme: Building a Local Food System

From visiting schools, we learned that each school had to use its own resources to plan school meals and procure food items such as fruits, vegetables, meat, fish, oils, etc.[4] Findings showed variation in the meal planning procedures across the selected schools. At the Charlestown and Gingerland Primary Schools meal planning occurred weekly, while St. James Primary School planned for the month. Each kitchen manager, the individual school's head cook, or principal designed their school's meal menu with limited guidance from nutritionists. An informant responsible for creating menus stated how they knew what food schoolchildren need based on a personal assessment.

I like to shop for food. I know what the children needs, I just think of the food I would like to see children eat. (School Informant)

The produce procurement process was similar for all schools, with four main sources of fresh fruits and vegetables identified: local smallholder farmers, the Marketing Division of the Ministry of Agriculture, supermarkets, and their own school gardens. Following menu planning, the procurement process generally began with the person(s) responsible for sourcing produce selecting from a list of known farmers (those who had previously provided produce to the school or farmers within their personal social network) and then calling them, or the Marketing Division of the Ministry of Agriculture who operate as a wholesaler and sales outlet for local smallholder farmers, to request certain fruits and vegetables and giving them 2-5 days to supply those items. Due to a

[4] While these food items are another area of interest and relevant to local farm-to-school SMP, interviews did not cover these specifically, instead focusing on fruits and vegetables.

reported lack of information sharing between the school menu planning process and the producers, combined with the short delivery time given, farmers and the Marketing Division reported often being unable to provide these items within the necessary timeframe. In the absence of these fresh foods being available locally, schools reported procuring fruits and vegetables from the supermarket, most of which are imported. Schools generally did not have a recurring food order with local farmers, making the market unreliable.

"Supplying produce to schools is not constant." (Farmer)

None of the schools reported sharing their school meal menus with local farmers or the Marketing Division. However, as of August 2020 a new school meals menu was developed for all public schools in Nevis which is publicly available.

Kitchen management and food procurement are the focus areas of school staff involved with the SMP. All kitchen managers we interviewed were satisfied with kitchen management, however, procuring food posed challenges. Despite these challenges, all school informants agreed sourcing produce from local farmers was their top preference.

"The challenging part for procuring food is finding it." (School Informant)

School gardens were reported to supplement fresh produce for school meal preparation at schools that had a garden. However, school gardens were also managed differently by different schools. Gingerland and Charlestown Primary Schools hired a part-time employee to oversee their school gardens. In contrast, the St James Primary School's garden was volunteer-run by the 'One Love' farmer group. Through a programme named *One Tire Per Child,* One Love aimed to directly provide an educational component to the school farm by teaching students the importance of consuming fresh and local produce and how to grow food, with classes responsible for taking care

of their own tire plots (see Figure 4.1). While school gardens have the potential to increase the use of local foods in school meals, fruit crops were considered difficult to maintain due to the need for high-quality fencing to deter monkeys and other pests (donkeys). Participants reported a general lack of school resources allocated to the ongoing maintenance of school farms and the need for greater government assistance which makes installing expensive infrastructure for school gardens unlikely.

Figure 4.1 One Tire Per Child program, where farmers regularly visit classrooms to educate children on the benefits of growing local food and support local food systems while teaching them how to grow their own produce.

4.2 Brokering Demand- and Supply-Side Stakeholders

The Nevis School Meals Coordinator was reported to be the main person responsible for overseeing the operations and management of all SMPs. The coordinator's role was to enhance the procurement process by building relationships with farmers, visiting schools to evaluate their operations, and liaising with principals and government agencies to develop school feeding policies.

Several informants acknowledged the need for increased training for cooks, additional kitchen staff, and more operational staff for the SMP. An employee from the Ministry of Education provided updates on the status of staff in the SMP, noting cooks must go through training on food safety and nutrition. However, informants believed more coordinators should be employed to assist with handling day-to-day operations.

"More persons need to be there to supervise the program in order for it to be effective. One person alone cannot do a job effectively so if ... more support from the administrative level, the program would be more effective." (School Informant)

Each of the schools' representatives appeared impuissant to improve local food procurement for the SMP. As part of informal efforts to set integral targets for local food procurement, the school meal programme's Head Chef shared his personal stated goal was to procure 70% of fresh food produce from local farmers and 30% from food imports. However, at the time of our fieldwork this goal was not stated in formal guidelines. Based on data made available by one school, ~10% of SMP produce was being sourced from local farmers and ~90% from the supermarket. While some of the supermarket produce came from local smallholder farmers, the proportion of these local fresh foods were less than 10% for the crops purchased by the school (broccoli, carrot, onion.

cauliflower, sweet peppers). Several barriers to enhancing and sustaining the contribution of local foods to healthy school meals in Nevis were subsequently identified.

Despite procurement challenges, all schools reported some level of difficulty in their efforts to feed children vegetables. The kitchen staff described how they disguised certain vegetables because some children refused to eat them if they were visible in meals. School informants expressed the necessity for parents to become more involved in encouraging children to eat vegetables and become more knowledgeable about the SMP. Informants suggested children are not consuming vegetables at home, which discourages them from eating vegetables at school because of their lack of food familiarity. All parents interviewed who had children participating in the SMP stated that they encouraged their children to eat vegetables at home and most were satisfied with the programme. However, a few mentioned their children did not like the taste of the meals (because of too many vegetables) and the smaller portion sizes (because of the lesser food volumes compared to the amounts they were accustomed to from home meals). A health sector informant believed some parents may not be aware of the implications of the SMP based on their work-related interactions with parents. Many key informants reported that the education system needs to promote healthy eating and teach nutrition as part of the school's curriculum. They mentioned that this would help students become more aware of the benefits of eating fresh fruits and vegetables and learn how poor eating habits can affect their overall health over time.

"The earlier you give them healthy food, the better they can do it." (Farmer)

Healthcare informants expressed the crucial need for nutritionists to be more actively involved with the SMP to help ensure schools are consistently providing well-balanced nutritious meals.

The Ministries of Education and Health were the only government agencies formally involved with operating the Nevis SMP. Some of our informants identified that other agencies. particularly the Ministry of Agriculture[5] needed to be more formally involved.

"Running the school meal programme should be a collaborative effort with each Ministry. All sectors should be involved with drafting legislation, providing awareness to citizens, and supporting local farmers." (Government Informant)

During stakeholder interviews, we found little evidence of regular communication among stakeholder groups, including the Ministry of Agriculture, to discuss school meal planning and coordination[6].

The general lack of engagement with other actors in the local food value chain led to barriers to schools procuring produce from local farmers. One central actor speculated that there is no school meal policy on purchasing fruits and vegetables from local farmers because it is easier to call the supermarket than to make meaningful connections with local farmers. Many farmers suggested that schools needed to initiate communication, so farmers are aware of the SMP's needs and were able to identify strategies on information exchange and involvement.

[5] During our time in the field, a national school meal policy was in the process of being developed, aiming to provide nutritional standards for school children, guide the roles of people involved with the SMP, and formalise the purchase of fruits and vegetables from local farmers.

[6] After data collection, an employee from the Ministry of Education reported the formation of a *stakeholder group* which included representatives from the Ministry of Agriculture, the Ministry of Finance, the Ministry of Health and Gender Affairs, and several other sectors. Meetings had been scheduled and expected to occur once per month to facilitate effective planning for the SMP. We also witnessed a coordinated local food system intervention by the Ministry of Education and the Ministry of Agriculture to increase child nutrition while supporting local farmers, replacing sugar-sweetened, processed popsicles being sold on school premises with popsicles made of local fruits processed by the agro-processing facility of the Department of Agriculture.

"The school meal programme would need to liaise with farmers, need to talk and crunch numbers. Identify the number of children the programme feeds with a dietitian to look what a balanced meal looks like and identify a plan with produce pricing for the schools." (Farmer)

"Give school subsidies, these are public schools, and they are operating like independent restaurants. Unless you have a good rate with farmers, schools are paying the same price for local produce as you and I." (Chef in the School Meal Programme)

Due to the absence of contractual agreements between farmers and the SMP, coordinated pricing on produce had not been established, which is essential for schools to adequately budget and plan school meals. Some farmers reported providing discounts to schools, ranging from $0.19 USD ($0.50 XCD) off per pound of the retail costs to a 50% reduction. Table 4.1 provides an example of the different prices farmers reported offering schools for two main food crops, bananas and sweet potatoes. Farmers concluded that measures are needed to support discounted produce through governmental assistance.

"This is a government level program. The government can help with inputs and crop planning." (Farmer)

Table 4.1 Produce Price Comparison (United States Dollars)

	Farmer 20 (New River Farmer)	**Farmer 21** (One Love Farmer) **	**Farmer 30** (Government Farmer)
Bananas Price per Pound (USD)	$1.48	$1.30	$1.11
Sweet Potatoes Price per Pound (USD)	$1.85	$1.48	$1.48

***School discount*

"The government should be more involved. Farmers work more and have different jobs and less time on the farm." (Farmer)

Many farmers also mentioned how pests, climate change, the lack of water resources, and natural disasters threatened their crop production. Of these, farmers identified pests (particularly monkeys) as the most detrimental factor since they consume and damage their fruit crops. While they had limited control over these agriculture production issues, farmers identified other problems that made it difficult to supply fresh produce to the SMP. The most frequently reported barrier was commitment, with many farmers working part-time and holding at least one other job, which did not allow for enough time to focus on the SMP.

"Farmers need to be producing enough for the local market before supplying to a special niche." (Farmer)

Farmers also reported gaining larger profits from supplying other markets (especially hotels and restaurants) than the SMP, making the SMP market less desirable. Additionally, most farmers reported they work independently and there is minimal organization for agricultural production in Nevis.

4.3 The Role of Social Networks

The absence of contractual agreements between farmers and the SMP was reported to contribute to an unstructured local produce procurement system. Despite this, we found some level of organization with schools participating in the SMP and local farmers, as shown in the school-farmer affiliation network (Figure 4.2). Of the 30 farmers we interviewed, 19 of them supplied fresh produce to 9 of the 12 schools participating in the SMP. This network illustrates individual school's linkages to farmers. Earlier, we summarized the produce procurement procedure where

school staff members responsible for sourcing produce for meals called a number of local farmers in their social network, which is supported by the school-farmer affiliation network. This can be seen in the multiple farmers supplying fresh produce to individual schools with limited coordination with schools.

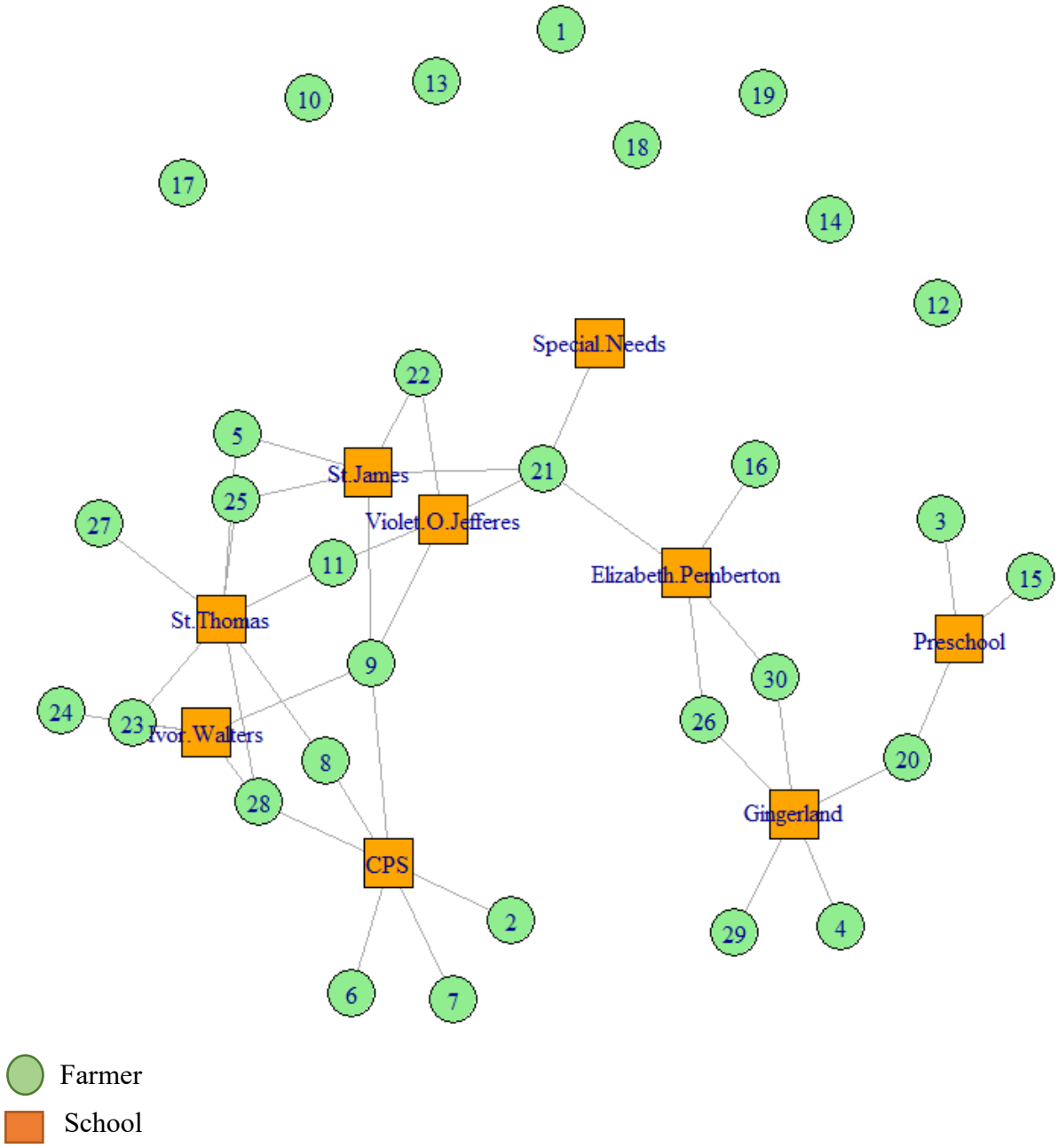


Figure 4.2 School Affiliation Network in Nevis. This figure shows the individual school's network of farmers. All schools in this figure are primary schools except for the Preschool and Special Needs schools.

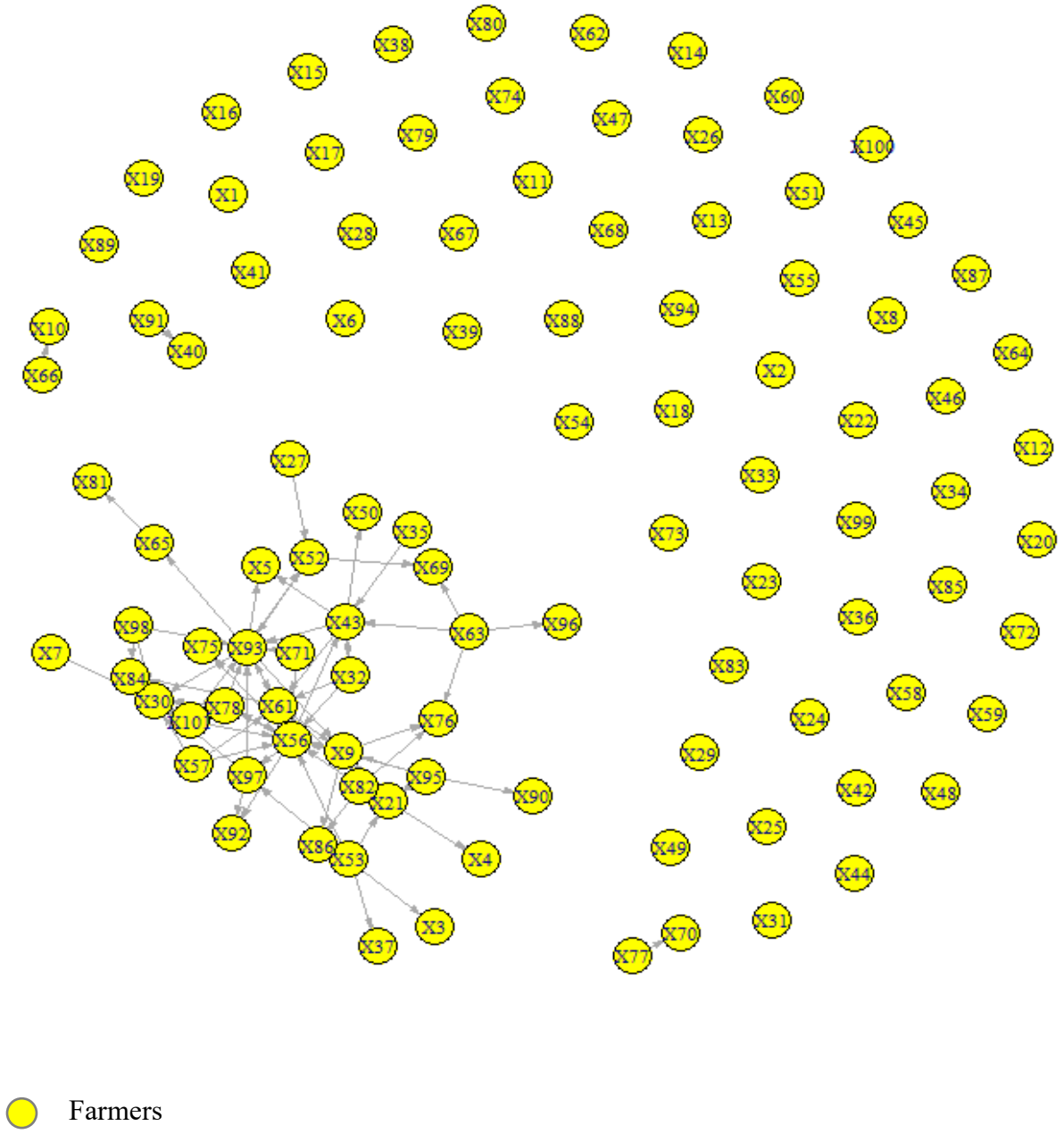
"*There needs to be an understanding of togetherness to decide what crops we should organize for the betterment of the community*." (Farmer)

The fruits and vegetables that farmers supplied to schools are listed in Table 4.2. In some instances, farmers supplied the same crop to the same school without coordinating with other farmers. For instance, Gingerland Primary School had five farmers in their social network supplying produce to them. Farmers 4 and 20 supplied green beans, farmers 4 and 26 supplied tomatoes, and farmers 20 and 26 supplied cucumbers (see Figure 4.2 and Table 4.2). Many farmers noted the need for a more strategic plan for supplying produce to schools in order to determine rotation schedules. Farmers acknowledged this cannot be done without the guidance and support of the Department of Agriculture.

Since farmers reported not possessing the capacity to organize agriculture production for the SMP alone, we wanted to better understand the social capital existing within farmer's social networks which may be helpful if trying to mobilize farmers for the SMP. During interviews, we asked farmers to name other farmers from whom they requested knowledge and/or support relating to their farms, and we used this as a proxy for some degree of rational trust (Stern and Coleman, 2015). We then created a Knowledge Network (Figure 4.3) representing all documented farmers in Nevis (based on a recent farmer's list provided by the Ministry of Agriculture) and used an in-degree measure to determine which farmer(s) had the highest centrality score to potentially facilitate organization for the SMP. Based on this analysis, we identify farmers 93 and 56 as having the highest centrality scores of 7. These high in-degree centrality farmers were also employed by the Ministry of Agriculture which indicates a high possibility that they possess the necessary social capital and technical understanding of the need to mobilize farmers to better coordinate agriculture production for the purpose of suppling healthy produce to the SMP.

Table 4.2 Fruits and Vegetables Farmers Supplied to Schools in Nevis. Farmers are shown in Figure 4.2.

Farmer	Farm Location	Crop	School
F2	New River	Honey Dew and Lettuce	Charlestown Primary
F3	New River	Green beans and Watermelon	Preschool
F4	Gingerland	String beans, Cabbage, Tomatoes, Thyme, Spinach, Green Beans	Gingerland Primary
F5	Cades Bay	Pumpkin	St James
F6	New River	No Response	Charlestown Primary
F7	New River	No Response	Charlestown Primary
F8	Cades Bay	Cucumber, Lettuce, and Tomatoes Lettuce and Okra	Charlestown Primary St Thomas
F9	Pot Works	Squash and Tomatoes	Charlestown Primary Violet O. Jeffers St James Ivor Walters
F11	Cades Bay	No Response	St Thomas Primary Violet O. Jeffers
F15	New River	Eggs	Gingerland Preschool
F20	New River	Sweet Potatoes, Carrots, String Beans, Cucumber, Pumpkin, Yams, Green Beans	Gingerland Primary Gingerland Preschool
F21	Church Ground	Bananas, Plantains, Sweet Potatoes, Pumpkin, Squash	Elizabeth Pemberton Ceal Brown Special Needs
F22	Nesbit Estate Castle	Bananas and Mangos	St James Primary Violet O. Jeffers
F25	Cades Bay	Watermelon	St Thomas
F26	Gingerland	Lettuce, Tomatoes, and Cucumbers	Gingerland Primary Elizabeth Pemberton
F27	Cades Bay	Pumpkins and Melons	St Thomas
F28	Pinkney's	Potatoes, Pumpkin, Melon, Limes, and Soup Apple	Charlestown Primary Prospect Primary St Thomas
F29	Gingerland	Herbs and Green Onions	Gingerland Primary
F30	Prospect	Sweet Potatoes, Pumpkin, Sweet Peppers, Cucumber, Seasoning Peppers, Yams, Bananas, Plantains, and Tomatoes	Gingerland Elizabeth Pemberton



Farmers

Figure 4.3 Knowledge Network in Nevis. This figure displays farmers directed ties to other farmers. When a farmer pointed to a farmer, we infer they receive knowledge or support from their farms.

We then asked farmers to describe the results of organizing in their farmer groups and requested general information about meeting times and frequencies, meeting topics and discussions, and their roles in order to assess the potential for existing groups to facilitate collective action in support of sustainably suppling fresh foods to the SMP. Figure 4.4 presents the resulting Farmer Group affiliation network to determine if farmers within these groups have linkages. We see that 25 of the 30 farmers interviewed are involved with a farmer group and there are two distinct clusters. While New River farmers reported ties to Nevis Growers farmer group and a One Love farmer had ties to the Cades Bay farmer group, that does not provide an indication that enough social capital is resident to build collective action in supplying produce to the SMP. Importantly there appear to be a lack of suitable brokers[7] in the network, with the four identified farmer groups lacking the capacity to facilitate the level of cooperation considered necessary to support the SMP due to the lack of social ties among members.

[7] A broker transfers information from one group to another and without the broker, these farmer groups lack connection (Kadushin, 2002; Haythornthwaite, 1996).

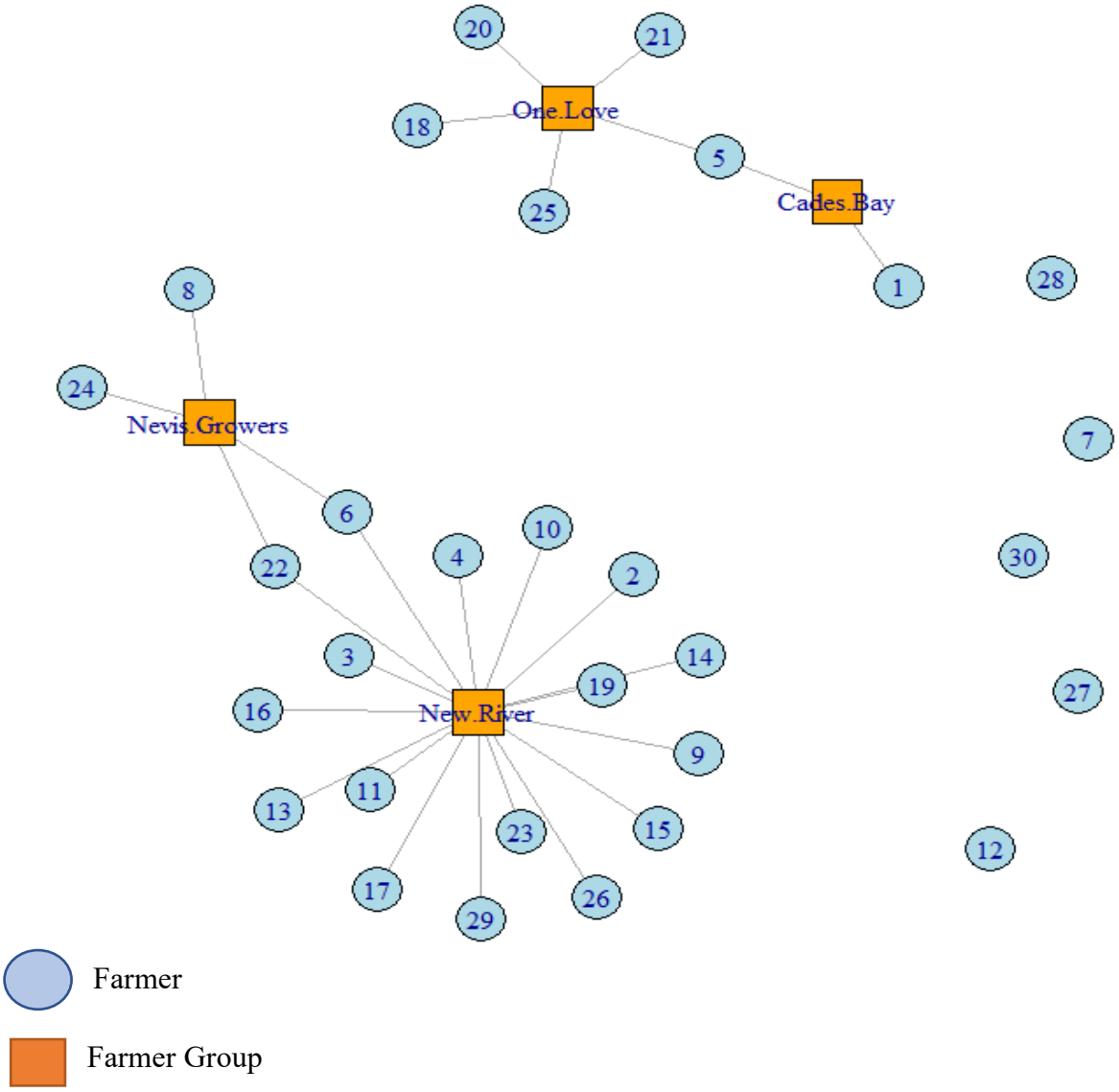


Figure 4.4 Farmer Group Affiliation Network in Nevis. This figure shows farmers who are an active member in a farmer group in Nevis.

4.4 Policy Support for the Local SMP Food Supply Chain

"There is not enough investment for smallholder farmers in Nevis" (Government Informant)

Farmers and farmer groups emphasized the importance of support from the Department of Agriculture and how their engagement can help increase their ability to supply produce to the SMP. Providing farmers with better access to essential resources such as equipment (drip lines, fencing, etc.), crop subsidies, loans, and/or better access to water was identified as being necessary for their farms to sustainably produce for the SMP. However, many farmers reported their trust with the Ministry of Agriculture as being compromised.

"The ministry needs to restructure their relationship with farmers because the department competes with them." (Government Informant)

The Department of Agriculture should organize more programs to bring farmers closer, workshops are more helpful." (Farmer).

Farmers reported that the Ministry of Agriculture held regular meetings where they shared new technologies, facilitated workshops pertaining to crop production, and discussed other crop-related activities with government and non-government famers. Though these meetings provided farmers opportunities to bridge social capital through education and knowledge transfers, farmers reported that relationship building was not present during these meetings which farmers believed could help strengthen farmer organization.

If farmers had more assistance from institutions, we would be better organized and can primarily focus on producing for the island. (Farmer)

Interviewees noted that some employees from the Ministry of Agriculture, including extension officers, are also farmers. They perceived that this led to many unfair advantages and conflicts of

interest including easier access to loans and land, discounted fertilizer, and free access to tractors and other transport vehicles which allowed them to sell produce at lower prices (see Table 4.1). Also, farmers speculated that the younger extension officers only visited their farms to acquire knowledge and ideas in order to benefit their personal farms. This intensified distrust among farmers and employees from the Ministry of Agriculture; some farmers even declared they barred young extension officers from their farms.

"*Extension officers are doing their own production. I tell them not to come to my farm, they're looking for information for their personal farm."* (Farmer)

There is a need for more participation, farmers change their ways when they see what they are doing is to benefit them." (Farmer)

Not only did we find trust lacking between farmers and the Ministry of Agriculture but also within the farmer groups. Through our fieldwork, we learned that two of the four farmer groups we interviewed were not actively operating in a transparent manner and as a result were undermining efforts to coordinate members and enhance local food systems (see also Figure 4.4). Respondents who were members of these groups disclosed that a meeting had not been held in at least six months and that they felt their group lacked leadership, suffered from top-down communication, and offered minimal support to farmers who needed it most. In contrast, two farmer groups were reported to be functioning well due to an existing level of procedural trust, leading to the sharing of resources, joint applications for available grants, and a shared commitment to sustaining food production in their areas. This suggests farmer groups in Nevis do have the potential to organize when administrative elements are in place, and if provided with the supportive measures that helps farmers to gain trust, access financial resources, and other tangible resources.

Make communication for all farmer organizations that encompass all farmers. See demands on a collective point of view. One farmer might have a problem, another might have the solution. We need assistance and can help each other collectively." (Farmer).

Stakeholders shared ideas for other supportive policies for farmers and the SMP. Several suggested purchasing fruits and vegetables from local farmers must become a school priority. In order to increase the availability of local produce, each school should also have a school garden with a dedicated farmer to ensure it will be taken care of. An employee from the Ministry of Education reported that this idea was under consideration. As part of efforts to increase the consumption of healthy produce, informants also conveyed a need for increased education on nutrition for both children and parents, so they can become more aware of how dietary patterns can affect health. They also expressed the need for existing policies to be strictly enforced by dedicating more staff to the SMP. Further, farmers asked for a system where they can supplement produce on a continuous basis all year round, but that the Ministry of Agriculture would need to orchestrate that conversation with farmers and the SMP.

"If more hands were on deck, more people will participate with the same goals/objectives in mind. We are all working towards the goal of feeding people. We need tolerance for each other and must be synchronized." (Farmer)

Chapter 5: Discussion

To our knowledge, this is the first study that has examined the organizational barriers to developing and sustaining nutrition-sensitive local food value chains for school feeding in Nevis, and one of the few to do so in the CARICOM more broadly. A number of important produce procurement challenges were identified that are consistent with previous research highlighting the importance

of coordination mechanisms to better connect SMP administrative staff and local farmers (see Lowitt et al., 2015; 2018; Shrestha et al., 2020). For example, a recent study in Nepal emphasized the need to improve the linkage between their SMP and locally-produced vegetable supply chains and urged for contracts with local farmers to improve the consistency of nutritious produce in school meals (Shrestha et al., 2020). However, for the Nevis SMP, several additional factors were identified as contributing to the challenge of implementing a farm-to-school approach.

First, the lack of a formal contractual agreement between farmers and the SMP was found to cause an unstructured and informal procurement process which was both opportunistic and confusing for farmers. Specifying the obligations of suppliers (farmers or groups of farmers) and buyers (schools) as business partners can potentially improve market access and resolve market failures (Wuepper & Sauer, 2016). Farmers did not receive advanced information concerning the food items required by the SMP so their ability to engage in crop production planning and timely delivery of produce was hamstrung. An unstructured produce procurement system characterized by the lack of coordination between farmers and the SMP contributed to inconsistency and inadequacy in the supply of locally farmed food items. This resulted in SMP administrators procuring food items, which were reported to be mainly imported foods, from local supermarkets. School staff reported lacking the capacity to manage activities to locally-source fresh foods for school feeding on their own, contributing to inadequate produce procurement. Insufficient staff to coordinate and support the SMP across different school sites was seen as exacerbating the situation, limiting the potential for other actors in the local food supply chain to contribute.

Several informants highlighted the need for complementary nutrition education programmes in schools. Stimulating healthy eating habits early in life is a way to obviate the onset of diet-related diseases (Schwartz et al, 2011) as eating habits at home is predictive of youth eating behaviors

(Reicks, 2015). In addition to incorporating nutrition education in the curriculum, several activities to educate children on food choices were suggested, including children being involved with school gardens, workshops for parents to better understand the farm-to-school process and philosophy, and guided farm field trips to speak with farmers and learn where food comes from. Although the Nevis SMP aims to provide well-balanced nutritional meals to schoolchildren, providing parents with knowledge on nutrition can help with meals prepared at home (Halder & Kejriwal, 2016). The need for nutritionists to become more involved with the SMP was also highlighted, potentially aiding the prevention of diet-related illnesses among schoolchildren (Ramalho et al, 2019).

Establishing and cultivating reciprocal communication among the key stakeholders involved in developing the farm-to-school approach will increase the probability of success (Buhl, 2010). In Nevis, the absence of SMP communication with farmers groups requires attention, with SMP administrators unable to effectively bridge local farmers to the SMP. This raises an important policy question: *how* to make the connection between farmers and schools? Our results suggest there is an opportunity for government representatives to better broker the supply- and demand-side stakeholders working along the farm-to-school local food value chains to enhance policy success. In particular, the Ministry of Agriculture was viewed as having high potential to better coordinate the farmers and provide incentives for them to focus on agriculture production for the SMP in consultation with the Ministry of Education. One option could be to establish new SMP-affiliated farmer groups, such as clusters or through cooperatives or associations, which can help farmers to achieve common goals, shown elsewhere to improve domestic agriculture and local food systems (Lutz, Smetchka, Grima, 2017). Collective action through farmer groups has the potential to enhance local food systems through bridging social capital in the form of capacity building, information exchange, and innovation (Fischer & Qaim, 2014; see also de Krom, M,

2017). According to Ostrom (2000), national and regional governmental institutions strongly affect the levels and types of social capital available to individuals to pursue long-term developmental efforts, requiring high levels of trust, social interaction, engagement, and effective collective action. (Putnam et al., 2004; Uphoff & Wijayaratna, 2000).

Social networks are known to play an important role in influencing farmer knowledge and decision-making (Saint Ville et al., 2016), but relatively little research has focused on the network of social relations surrounding farmers (Skaalsveen et al., 2020), particularly in the Eastern Caribbean. Despite the SMP lacking a formal farm-to-school procurement structure, the school-farmer network analysis did illustrate a degree of organization among farmers and schools, with a need for school meal planning to be coordinated with crop production and scheduling identified. This coincides with Lowitt's and colleagues (2015) results that the lack of crop planning and scheduling hinders produce procurement from local farmers. Engaging farmers in the school meal planning processes, and school food procurement staff in the planning of agricultural activities may help build and strengthen local agricultural productivity (Goudappa et al., 2016). This is another area where assistance from the Ministry of Agriculture would be helpful to overcome the identified lack of resources, time constraints, and stakeholder capacities. For example, we found that farmers were obtaining their technical information and support principally from two farmers employed by the Ministry of Agriculture, suggesting there may be an opportunity to work through existing social networks to mobilize farmers for the SMP and better coordinate crop planning and scheduling.

Farmers need to communicate more. There is not enough interaction on a one-to-one basis. Certain expertise should be passed down to others." (Farmer)

Building trust through social networks is key for the development of farmer groups (Reed & Hickey, 2016; Saint Ville et al., 2016), but it is also challenging because farmers feel more comfortable working with others whom they share a common history and culture, and there must be mutual engagement and collaboration to achieve common goals (Oreszczyn, 2010). Communication is an essential component of bridging social capital because it facilitates the flow of information and resources among groups (Patulny & Svendsen, 2007). Most local farmers in Nevis reported relying on family and friends for their farming needs suggesting high levels of bonding social capital, potentially limiting effective knowledge transfers through more centralized agricultural extensions services (Eldelman et al., 2004; Steinfield et al., 2009). Here, mistrust and competition were cited as factors that limited communication among famers, hampering efforts to improve farmer organization.

Previous studies have pointed to the need for more decentralized government approaches that can foster stronger relationships between food system actors and institutions to enhance knowledge flows and support regional food and nutrition development in CARICOM (Lowitt et al., 2020). Our results highlight that direct government support is considered crucial for farmer groups in Nevis to succeed, often in the form of interventions such as training, easier access to capital, insurance, and financial support (Garnevska, 2011). In our study, many farmers stated having greater access to extension officers who can educate them on crop management and having more extension officers attend farmer group meetings would improve local food production. It has long been recognized that extension officers can help to improve farmer decision-making, enhance agriculture performance, and create better outcomes (Mudege et al, 2015). For example, a recent study in Ghana found that encouraging farmers, providing them more support, and growing their social interactions during agricultural training can improve self-efficacy and social capital

(Wuepper & Sauer, 2016). Another study in Japan found that extension officers play a critical role for farmers, especially when they collaborate and communicate with farmers because it provides a mechanism to build trust and enhance social capital (Takemura et al., 2014). However, we found a perceived conflict of interest between extension officers and farmers that sparked distrust in Nevis. This may weaken the government's ability to efficiently implement strategies to help farmers organize agriculture production (Myeong & Seo, 2016).

In the Department of Agriculture, they have extension officers, but they do not have the true trust of farmers because many are farmers themselves. (Farmer)

According to Rodwin (2020), a conflict of interest *arises whenever activities or relationships compromise the loyalty or independent judgment of an individual or institution who is obligated to serve a party or perform certain roles* (Rodwin, 2020). Conflict resolution mechanisms to resolve tensions with extension officers and in the functioning of farmer groups is another important area of support that can be provided by government agencies in support of building sustainable and equitable farm-to-school food value chains.

5.1 Future Directions

Our results support the view that farm-to-school value-chains are comprised of numerous communities of practice, and that efforts to recognize how different individuals in these communities are already, informally, working and learning together would be valuable (Lowitt et al., 2015a). Future research could further examine the social ties among individuals within these communities to better understand how they interact on a day-to-day basis in order to achieve individual goals through sharing and leveraging knowledge, identifying individuals' roles, guiding principles and organizational supports which might create opportunities for social learning and

building capacity (Pattinson et al., 2016). In particular, the *One Tire per Child* school garden program offers an interesting case where linking social capital was developed between farmer and school communities with potential lessons for local public policy. In addition, there are other areas identified in this thesis that could benefit from future research:

- The Port of Spain Declaration identified schools as being a focal point in policy efforts to promote health and nutrition among school children. However, many of the school feeding challenges that CAIRCOM SIDS face are complex and context-specific. Adopting more holistic research approaches, such as embedded case studies, in other settings would help with developing a more generalized picture of the challenges to developing localized school feeding value chains in the region and inform local and regional food and nutrition security policy strategies.
- There is a need to further understand community members perception of local food systems to identify strategic leverage points for promoting desired change while also increasing their awareness and engagement in efforts to reclaim food sovereignty.
- Expanding the use of social network analysis in Caribbean food systems research to better understand social ties and relationships in the local agri-food sector would be valuable. Assessing existing social capital may highlight local capacities for relationship building and management, connections between people and institutions in different positions of power, leadership, trustworthiness, and accessing livelihood resources including financial and natural.

Chapter 6: Conclusion

Identifying novel strategies to meaningfully connect local farmers to the SMP will be essential to ensure the level of collective action required to sustain and enhance local school feeding value chains in Nevis. This research has uncovered some barriers to participation that will require further attention and identified important supporting roles for government institutions, particularly the Department of Agriculture. The results suggest that institutional and community-level efforts to re-organize so that local farmers can meet the produce needs of the SMP in Nevis could increase market opportunities for farmers, reduce the island's reliance on imported foods, and potentially improve nutrition outcomes for children by increasing their access to locally farmed, nutritious produce. Given that the SMP in Nevis delivers meals to children that are based largely on imported food items, the research results derive significance for the Caribbean and beyond, by pointing to the need for more integrative public policy development and greater community engagement to coordinate and strengthen the farm-to school approach to reducing reliance on food imports and improving child nutrition.

In Nevis, farmers provided some examples of utilizing bridging and linking social capital that suggests they are capable of organizing agriculture production when there are adequate levels of trust, information sharing and/or jointly obtaining resources, and commonly agreed goals. This raises questions for agricultural policy and research in the region, including how to engage the diverse network of actors working along the farm-to-school food value chain, how to link farmers and form farmer groups to increase local food production, and how to more efficiently recognize and utilize the social capital already resident in the local agri-food system to improve the sustainability of SMP produce procurement.

Areas that could benefit from greater policy attention were also identified, including the establishment of contractual agreements between schools and farmers to better structure and schedule the food procurement process; and incorporating nutrition education in the curriculum as a way to supplement SMP efforts. The need to support reciprocal communication flows between local farmers and schools in Nevis was also identified as being essential to the long-term success of the farm-to-school SMP model, requiring the involvement of the Ministry of Agriculture and the Ministry of Education. Finally, culturally appropriate conflict resolution mechanisms will be necessary for local farmers to more equitably benefit from cooperation while taking greater advantage of available extension services over time.

References

Aladjadjiyan, A. (2012). *Food Production: Approaches, Challenges and Tasks*: IntechOpen.

Andriani, L., & Christoforou, A. (2016). Social Capital: A Roadmap of Theoretical and Empirical Contributions and Limitations. *Journal of Economic Issues, 50*(1), 4-22. doi:10.1080/00213624.2016.1147296

Badri, A. Y. (2014). A review of the progress of school meal programs in the globe. *Sky Journal of Food Science, 36*, 052-060.

Bagdonis, J. M., Hinrichs, C. C., & Schafft, K. A. (2009). The emergence and framing of farm-to-school initiatives: civic engagement, health and local agriculture. *Agriculture and Human Values, 26*(1), 107-119. doi:10.1007/s10460-008-9173-6

Barry, T., Gahman, L., Greenidge, A., & Mohamed, A. (2020). Wrestling with race and colonialism in Caribbean agriculture: Toward a (food) sovereign and (gender) just future. *Geoforum, 109*, 106-110. doi:https://doi.org/10.1016/j.geoforum.2019.12.018

Beckford, C. (2012). Issues in Caribbean food security: Building capacity in local food production systems. *A. Aladjadjiyan, Food Production-Approaches, Challenges and Tasks*, 25-41.

Beckford, C. L., & Campbell, D. R. (2013). Food Imports, Domestic Production, and Food Security in the Caribbean. In *Domestic Food Production and Food Security in the Caribbean* (pp. 183-195): Springer.

Beckford, C. L., & Campbell, D. R. (2013). Tourism, Local Agriculture, and Food Security in the Caribbean. In *Domestic Food Production and Food Security in the Caribbean: Building Capacity and Strengthening Local Food Production Systems* (pp. 197-208). New York: Palgrave Macmillan US.

Beckford, C. L., & Rhiney, K. (2016). Future of Food and Agriculture in the Caribbean in the Context of Climate Change and Globalization: Where Do We Go from Here? In *Globalization, Agriculture and Food in the Caribbean* (pp. 267-295): Springer.

Blüher, M. (2019). Obesity: global epidemiology and pathogenesis. *Nature Reviews Endocrinology, 15*(5), 288-298. doi:10.1038/s41574-019-0176-8

Borgatti, S., & Halgin, D. (2011). *Analyzing Affiliation Networks*.

Borish, D., King, N., & Dewey, C. (2017). Enhanced community capital from primary school feeding and agroforestry program in Kenya. *International Journal of Educational Development, 52*, 10-18. doi:https://doi.org/10.1016/j.ijedudev.2016.10.005

Botkins, E. R., & Roe, B. E. (2018). Understanding participation in farm to school programs: Results integrating school and supply-side factors. *Food Policy, 74*, 126-137. doi:https://doi.org/10.1016/j.foodpol.2017.12.006

Boton, C., & Forgues, D. (2018). Practices and Processes in BIM Projects: An Exploratory Case Study. *Advances in Civil Engineering, 2018*, 7259659. doi:10.1155/2018/7259659

Buhl, A. (2010). Meeting nutritional needs through school feeding: a snapshot of four African nations. *Global Child Nutrition Foundation*, 1-79.

Chesney, H. (2005). *The Invasive Species Safeguarding Strategy Within The Alliance'S Framework For The Repositioning Of Agriculture In The Region-The Jagdeo Initiative*. Retrieved from https://ageconsearch.umn.edu/record/256137/files/Pages%20from%20CFCS_2005_Vol.%2041_No._1-2%20Guadeloupe_3.pdf. doi: 10.22004/ag.econ.256137

Chintamanie, B., & Dass, D. (2013). *The role of the guyana school of agriculture in addressing technical capacity building for agricultural diversification*. Retrieved from

https://ageconsearch.umn.edu/record/253455/files/Chintamanie-Dass.pdf . doi: 10.22004/ag.econ.253455

Clarke, V., & Braun, V. (2014). Thematic Analysis. In T. Teo (Ed.), *Encyclopedia of Critical Psychology* (pp. 1947-1952). New York, NY: Springer New York.

Collective, G. O. T., Green, A., Ettya, A., McPhee, S., Ricker, B., & Temenos, C. (2014). *British Columbia in a Global Context*: BCcampus.

Connell, J., Lowitt, K., Saint Ville, A., & Hickey, G. M. (2020). Food Security and Sovereignty in Small Island Developing States: Contemporary Crises and Challenges. In J. Connell & K. Lowitt (Eds.), *Food Security in Small Island States* (pp. 1-23). Singapore: Springer Singapore.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*: Sage publications.

Dahal, G. R., & Adhikari, K. P. (2008). *Bridging, Linking, and Bonding Social Capital in Collective Action: The Case of Kalahan Forest Reserve in the Philippines*. Retrieved from https://ageconsearch.umn.edu/record/44352/files/capriwp79.pdf

de Krom, M. P. M. M. (2017). Farmer participation in agri-environmental schemes: Regionalisation and the role of bridging social capital. *Land Use Policy, 60*, 352-361. https://doi.org/10.1016/j.landusepol.2016.10.026

Dorodnykh, E. (2017). *Economic and social impacts of food self-reliance in the Caribbean*: Springer.

Dorodnykh, E. (2017). Import Dependency, and Food and Nutritional Security in the Caribbean. In E. Dorodnykh (Ed.), *Economic and Social Impacts of Food Self-Reliance in the Caribbean* (pp. 15-33). Cham: Springer International Publishing.

Drake, L., Fernandes, M., Aurino, E., Kiamba, J., Giyose, B., Burbano, C., . . . Gelli, A. (2017). School Feeding Programs in Middle Childhood and Adolescence. In *Disease Control Priorities, Third Edition (Volume 8): Child and Adolescent Health and Development* (pp. 147-164): The World Bank.

Edelman, L. F., Bresnen, M., Newell, S., Scarbrough, H., & Swan, J. (2004). The Benefits and Pitfalls of Social Capital: Empirical Evidence from Two Organizations in the United Kingdom *. *British Journal of Management, 15*(S1), 59-69. doi:https://doi.org/10.1111/j.1467-8551.2004.00400.x

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics, 5*(1), 1-4.

FAO. (2006). Food Security. *Food and Agriculture Organization*. Retrieved from http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf

Fischer, E., & Qaim, M. (2014). Smallholder farmers and collective action: what determines the intensity of participation? *Journal of Agricultural Economics, 65*(3), 683-702.

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). ADAPTIVE GOVERNANCE OF SOCIAL-ECOLOGICAL SYSTEMS. *Annual Review of Environment and Resources, 30*(1), 441-473. doi:10.1146/annurev.energy.30.050504.144511

Foster, N. (2020). International trade and childhood obesity: A Caribbean perspective. In *Ending Childhood Obesity*: Edward Elgar Publishing.

Foster, N., Thow, A. M., Unwin, N., Alvarado, M., & Samuels, T. A. (2018). Regulatory measures to fight obesity in Small Island Developing States of the Caribbean and Pacific, 2015 - 2017. *Pan American journal of public health, 42*, e191-e191.

doi:10.26633/RPSP.2018.191

Garnevska, E., Liu, G., & Shadbolt, N. M. (2011). Factors for successful development of farmer cooperatives in Northwest China. *International Food and Agribusiness Management Review, 14*(1030-2016-82904), 69-84. Doi: 10.22004/ag.econ.117603

Ghaljaie, F., Naderifar, M., & Goli, H. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in Development of Medical Education, 14*(3).

Goudappa, S. B., Surekha, S., Reddy, B. S., & Benki, A. M. (2016). Extent of participation of farmers in planning and implementation of community based tank management project in Raichur district. *Indian Research Journal of Extension Education, 12*(2), 272-276.

Graham, H., Beall, D. L., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of School Gardens in Academic Instruction. *Journal of Nutrition Education and Behavior, 37*(3), 147-151. doi:https://doi.org/10.1016/S1499-4046(06)60269-8

Graham, H., Feenstra, G., Evans, A., & Zidenberg-Cherr, S. (2004). Davis school program supports life-long healthy eating habits in children. *California Agriculture, 58*(4), 200-205.

Griffiths, A. (2020). St. Kitts and Nevis (Federation of St. Kitts and Nevis). In A. Griffiths, R. Chattopadhyay, J. Light, & C. Stieren (Eds.), *The Forum of Federations Handbook of Federal Countries 2020* (pp. 301-314). Cham: Springer International Publishing.

Halder, S., & Kejriwal, S. (2016). Nutritional awareness of mothers in relation to nutritional status of the preschool children. *Early Child Development and Care, 186*(9), 1366-1377. doi:10.1080/03004430.2015.1094655

Hammersley, M. (2012). *What is qualitative research?* : A&C Black.

Harrison, H., Birks, M., Franklin, R., & Mills, J. (2017). *Case study research: Foundations and*

methodological orientations. Paper presented at the Forum Qualitative Sozialforschung/Forum: Qualitative Social Research.

Hassanali, K. (2020). CARICOM and the blue economy–Multiple understandings and their implications for global engagement. *Marine Policy, 120*, 104137.

Haythornthwaite, C. (1996). Social network analysis: An approach and technique for the study of information exchange. *Library & Information Science Research, 18*(4), 323-342. https://doi.org/10.1016/S0740-8188(96)90003-1

Healthy Caribbean Coalition. (2019). Preventing Childhood Obesity in the Caribbean. Retrieved from https://www.healthycaribbean.org/wp-content/uploads/2019/08/HCC-COP-Fact-Sheet-St-Kitts-and-Nevis-Aug-2019.pdf

Hickey, G. M., & Unwin, N. (2020). Addressing the triple burden of malnutrition in the time of COVID-19 and climate change in Small Island Developing States: what role for improved local food production? *Food Security, 12*(4), 831-835. doi:10.1007/s12571-020-01066-3

Holmes, A. G. D. (2020). Researcher Positionality--A Consideration of Its Influence and Place in Qualitative Research--A New Researcher Guide. *Shanlax International Journal of Education, 8*(4), 1-10.

Hospedales, C. J., Samuels, T., Cummings, R., Gollop, G., & Greene, E. (2011). Raising the priority of chronic noncommunicable diseases in the Caribbean. *Pan American Journal of Public Health, 30*, 393-400.

Hyseni, L., Atkinson, M., Bromley, H., Orton, L., Lloyd-Williams, F., McGill, R., & Capewell, S. (2017). The effects of policy actions to improve population dietary patterns and prevent diet-related non-communicable diseases: scoping review. *European Journal of*

Clinical Nutrition, 71(6), 694-711. doi:10.1038/ejcn.2016.234

Ingram, J. (2011). A food systems approach to researching food security and its interactions with global environmental change. *Food Security, 3*(4), 417-431. doi:10.1007/s12571-011-0149-9

Izumi, B. T., Wynne Wright, D., & Hamm, M. W. (2010). Market diversification and social benefits: Motivations of farmers participating in farm to school programs. *Journal of Rural Studies, 26*(4), 374-382. doi:https://doi.org/10.1016/j.jrurstud.2010.02.002

Johnson, T. P. (2014). Snowball sampling: introduction. *Wiley StatsRef: Statistics Reference Online*.

Kadushin, C. (2002). The motivational foundation of social networks. *Social Networks, 24*(1), 77-91. doi:https://doi.org/10.1016/S0378-8733(01)00052-1

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced nursing, 72*(12), 2954-2965.

King, B., Fielke, S., Bayne, K., Klerkx, L., & Nettle, R. (2019). Navigating shades of social capital and trust to leverage opportunities for rural innovation. *Journal of Rural Studies, 68*, 123-134. doi:https://doi.org/10.1016/j.jrurstud.2019.02.003

Kirton, J., Bracht, C., Kulik, J., & Koch, M. (2015). Charting Compliance with the Commitments of the 2007 Port of Spain Summit on Non--communicable Disease.

Kirton, J., Knight, W. A., Hospedales, C. J., Hippolyte, D., & Kulik, J. (2019). Regional and global impacts of the 2007 Port-of-Spain Declaration on noncommunicable diseases. *Pan American journal of public health, 42*, e194-e194. doi:10.26633/RPSP.2018.194

Klavinski, R. (2013). 7 benefits of eating local foods. *Michigan State University Extension*.

Retrieved from https://www.canr.msu.edu/news/7_benefits_of_eating_local_foods

Kretschmer, A., Spinler, S., & Van Wassenhove, L. N. (2014). A school feeding supply chain framework: Critical factors for sustainable program design. *Production and Operations Management, 23*(6), 990-1001. https://doi.org/10.1111/poms.12109

Kristjansson, B., Petticrew, M., MacDonald, B., Krasevec, J., Janzen, L., Greenhalgh, T., . . . et al. (2007). School feeding for improving the physical and psychosocial health of disadvantaged students. *Cochrane Database of Systematic Reviews*(1). doi:10.1002/14651858.CD004676.pub2

Lawson, T. M. (2012). *Impact of school feeding programs on educational, nutritional, and agricultural development goals: a systematic review of literature.* Michigan State University, East Lansing. doi:10.22004/ag.econ.142466

Lin, T. K., Teymourian, Y., & Tursini, M. S. (2018). The effect of sugar and processed food imports on the prevalence of overweight and obesity in 172 countries. *Globalization and Health, 14*(1), 1-14. https://doi.org/10.1186/s12992-018-0344-y

Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography, 3*(2), 143-156.

Lorelli, S. N., Jill, M. N., Deborah, E. W., & Nancy, J. M. (2017). Thematic Analysis. *International Journal of Qualitative Methods*. doi:10.1177/1609406917733847

Lowder, S. K., Skoet, J., & Raney, T. (2016). The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development, 87*, 16-29. doi:https://doi.org/10.1016/j.worlddev.2015.10.041

Lowitt, K., Gray-Donald, K., Hickey, G., Saint Ville, A., Ganderson, I., Madramootoo, C., & Phillip, L. (2018). The obesity pandemic & food insecurity in developing countries: A

case study from the Caribbean. *Food and Public Health: A Practical Introduction*, 255-279.

Lowitt, K., Hickey, G. M., Ganpat, W., & Phillip, L. (2015). Linking Communities of Practice with Value Chain Development in Smallholder Farming Systems. *World Development, 74*, 363-373. doi:https://doi.org/10.1016/j.worlddev.2015.05.014

Lowitt, K., Hickey, G. M., Saint Ville, A., Raeburn, K., Thompson-Colón, T., Laszlo, S., & Phillip, L. E. (2015). Factors affecting the innovation potential of smallholder farmers in the Caribbean Community. *Regional Environmental Change, 15*(7), 1367-1377. doi:10.1007/s10113-015-0805-2

Lowitt, K., Hickey, G. M., Saint Ville, A., Raeburn, K., Thompson-Colón, T., Laszlo, S., & Phillip, L. E. (2020). Knowledge, Markets and Finance: Factors Affecting the Innovation Potential of Smallholder Farmers in the Caribbean Community. In *Food Security in Small Island States* (pp. 179-197): Springer.

Lutz, J., Smetschka, B., & Grima, N. (2017). Farmer Cooperation as a Means for Creating Local Food Systems—Potentials and Challenges. *Sustainability, 9*, 925. doi:10.3390/su9060925

Magaldi, D., & Berler, M. (2020). Semi-structured interviews. *Encyclopedia of personality and individual differences*, 4825-4830.

Mandarano, L. A. (2009). Social Network Analysis of Social Capital in Collaborative Planning. *Society & Natural Resources, 22*(3), 245-260. doi:10.1080/08941920801922182

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People, 7*(1), 23-48.

Mudege, N. N., Chevo, T., Nyekanyeka, T., Kapalasa, E., & Demo, P. (2016). Gender Norms and Access to Extension Services and Training among Potato Farmers in Dedza and

Ntcheu in Malawi. *The Journal of Agricultural Education and Extension, 22*(3), 291-305. doi:10.1080/1389224X.2015.1038282

Mumena, W. A., Francis-Granderson, I., Phillip, L. E., & Gray-Donald, K. (2018). Rapid increase of overweight and obesity among primary school-aged children in the Caribbean; high initial BMI is the most significant predictor. *BMC Obesity, 5*(1), 4. https://doi.org/10.1186/s40608-018-0182-8

Murphy, M. M., Guariguatax, L., & Samuels, T. A. (2020). A COVID-19 opportunity: Applying a systems approach to food security and noncommunicable diseases. *Pan American journal of public health, 44*, e84-e84. doi:10.26633/RPSP.2020.84

Murphy, M. M., Unwin, N., Samuels, T., Hassell, T. A., Bishop, L., & Guell, C. (2019). Evaluating policy responses to noncommunicable diseases in seven Caribbean countries: challenges to addressing unhealthy diets and physical inactivity. *Pan American journal of public health, 42*, e174.

Myeong, S., & Seo, H. (2016). Which Type of Social Capital Matters for Building Trust in Government? Looking for a New Type of Social Capital in the Governance Era. *Sustainability, 8*(4), 322. Retrieved from https://www.mdpi.com/2071-1050/8/4/322

Oktay, J. S. (2012). *Grounded theory*: Oxford University Press.

Oreszczyn, S., Lane, A., & Carr, S. (2010). The role of networks of practice and webs of influencers on farmers' engagement with and learning about agricultural innovations. *Journal of Rural Studies, 26*(4), 404-417. doi:https://doi.org/10.1016/j.jrurstud.2010.03.003

Ostrom, E. (2000). Social capital: a fad or a fundamental concept. In P. Dasgupta & I. Serageldin (Ed.) *Social capital: A multifaceted perspective, 172*(173), (pp. 195-198). World Bank.

O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: A metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New York, NY: Springer.

Ozer, E. J. (2007). The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. *Health Education & Behavior, 34*(6), 846-863.

Patterson-Andrews, H. (2019). Holistic Diagnosis of the School Feeding Programs in 14 Countries of the Caribbean Community–A Report. *Farm and Business-The Journal of the Caribbean Agro-Economic Society, 11*(533-2020-960), 4-6. Doi: 10.22004/ag.econ.303033

Pattinson, S., Preece, D., & Dawson, P. (2016). In search of innovative capabilities of communities of practice: A systematic review and typology for future research. *Management Learning, 47*(5), 506-524. https://doi.org/10.1177/1350507616646698

Patulny, R. V., & Svendsen, G. L. H. (2007). Exploring the social capital grid: bonding, bridging, qualitative, quantitative. *International Journal of Sociology and Social Policy*.

Pérez-Rodrigo, C., & Aranceta, J. (2001). School-based nutrition education: lessons learned and new perspectives. *Public Health Nutrition, 4*(1a), 131-139. doi:10.1079/PHN2000108

Perry, K. K. (2020). Structuralism and Human Development: A Seamless Marriage? An Assessment of Poverty, Production and Environmental Challenges in CARICOM Countries. *International Journal of Political Economy, 49*(3), 222-242. doi:10.1080/08911916.2020.1824735

Phillip, L., Johnston, D., & Granderson, I. (2014). A farm to fork approach for nutritious school meals: tackling childhood obesity in the Caribbean. *Stories of change*.

Poortinga, W. (2006). Social relations or social capital? Individual and community health effects

of bonding social capital. *Social Science & Medicine, 63*(1), 255-270. doi:https://doi.org/10.1016/j.socscimed.2005.11.039

Putnam, R., Light, I., de Souza Briggs, X., Rohe, W. M., Vidal, A. C., Hutchinson, J., . . . Woolcock, M. (2004). Using Social Capital to Help Integrate Planning Theory, Research, and Practice: Preface. *Journal of the American Planning Association, 70*(2), 142-192. doi:10.1080/01944360408976369

Putnam, R.D. (1995). Bowling Alone: America's Declining Social Capital. *Journal of Democracy 6*(1), 65-78. doi:10.1353/jod.1995.0002.

Pye-Smith, C. (2017). *Strengthening local food production and trade in the Caribbean*: CTA.

Ramalho, R., Medeiros, M., Caldeira, J., Órfão, F., Alves, P., & Pereira, P. (2019). The reality of elementary schools: a call for urgent community nutrition programs. *Annals of Medicine, 51*(sup1), 152-152. doi:10.1080/07853890.2018.1561995

Ramdath, D. (2014). Policy Implementation for Better Health Outcomes: Grabbing the Low Hanging Fruits. In: University West Indies Faculty Medical Sciences Mona Campus, Kingston 7, Jamaica. https://doi.org/10.1080/07853890.2018.1561995

Reed, G., & Hickey, G. M. (2016). Contrasting innovation networks in smallholder agricultural producer cooperatives: Insights from the Niayes Region of Senegal. *Journal of Co-operative Organization and Management, 4*(2), 97-107. doi:https://doi.org/10.1016/j.jcom.2016.09.001

Reeve, E., Thow, A. M., Bell, C., Engelhardt, K., Gamolo-Naliponguit, E. C., Go, J. J., & Sacks, G. (2018). Implementation lessons for school food policies and marketing restrictions in the Philippines: a qualitative policy analysis. *Globalization and Health, 14*(1), 1-14.

Reicks, M., Banna, J., Cluskey, M., Gunther, C., Hongu, N., Richards, R., . . . Wong, S. S.

(2015). Influence of parenting practices on eating behaviors of early adolescents during independent eating occasions: implications for obesity prevention. *Nutrients, 7*(10), 8783-8801. https://doi.org/10.3390/nu7105431

Reis, R. (2009). Strengths and limitations of case studies. *Stanford University*. *Retrieved from* https://tomprof.stanford.edu/posting/1013

Rodwin, M. A. (2020). WHO's Attempt to Navigate Commercial Influence and Conflicts of Interest in Nutrition Programs While Engaging With Non-State Actors: Reflections on WHO Guidance for Nation States; Comment on "Towards Preventing and Managing Conflict of Interest in Nutrition Policy? An Analysis of Submissions to a Consultation on a Draft WHO Tool". *International Journal of Health Policy and Management*, -. doi:10.34172/ijhpm.2020.162

Saint Ville, A., Phillip, L. E., & Hickey, G. M. (2019). Addressing Food and Nutrition Insecurity in the Caribbean Through. *Food Security in Small Island States, 15*(7), 157.

Saint Ville, A. S., Hickey, G. M., Locher, U., & Phillip, L. E. (2016). Exploring the role of social capital in influencing knowledge flows and innovation in smallholder farming communities in the Caribbean. *Food Security, 8*(3), 535-549.

Saint Ville, A. S., Hickey, G. M., & Phillip, L. E. (2015). Addressing food and nutrition insecurity in the Caribbean through domestic smallholder farming system innovation. *Regional Environmental Change, 15*(7), 1325-1339. doi:10.1007/s10113-015-0770-9

Saint Ville, A. S., Hickey, G. M., & Phillip, L. E. (2017). Institutional analysis of food and agriculture policy in the Caribbean: The case of Saint Lucia. *Journal of Rural Studies, 51*, 198-210. doi:https://doi.org/10.1016/j.jrurstud.2017.03.004

Samuels, T. A., & Unwin, N. (2018). The 2007 Caribbean Community Port-of-Spain Declaration

on noncommunicable diseases: an overview of a multidisciplinary evaluation. *Pan American journal of public health, 42*, e193-e193. doi:10.26633/RPSP.2018.193

Sandler, T. (2004). *Global collective action*: Cambridge University Press.

Schensul, S. L., Schensul, J. J., & LeCompte, M. D. (1999). *Essential ethnographic methods: Observations, interviews, and questionnaires* (Vol. 2): Rowman Altamira.

Schwartz, C., Scholtens, P. A. M. J., Lalanne, A., Weenen, H., & Nicklaus, S. (2011). Development of healthy eating habits early in life. Review of recent evidence and selected guidelines. *Appetite, 57*(3), 796-807. doi:https://doi.org/10.1016/j.appet.2011.05.316

Scott, J. (1991). Methods of Network Analysis. *The Sociological Review, 39*(1), 155-163. doi:10.1111/j.1467-954X.1991.tb02974.x

Serrat, O. (2017). Social network analysis. In *Knowledge solutions* (pp. 39-43): Springer.

Shrestha, R. M., Schreinemachers, P., Nyangmi, M. G., Sah, M., Phuong, J., Manandhar, S., & Yang, R.-Y. (2020). Home-grown school feeding: assessment of a pilot program in Nepal. *BMC Public Health, 20*(1), 28. doi:10.1186/s12889-019-8143-9

Sidaner, E., Balaban, D., & Burlandy, L. (2013). The Brazilian school feeding programme: an example of an integrated programme in support of food and nutrition security. *Public Health Nutrition, 16*(6), 989-994. doi:10.1017/S1368980012005101

Silva, S., Tefft, J., Smart, M., & Best, R. (2011). *Reducing the CARICOM Food Import Bill and the Real Cost of Food: Policy and Investment Options*: FAO/UN.

Skaalsveen, K., Ingram, J., & Urquhart, J. (2020). The role of farmers' social networks in the implementation of no-till farming practices. *Agricultural Systems, 181*, 102824. doi:https://doi.org/10.1016/j.agsy.2020.102824

Smith, J., & Noble, H. (2014). Bias in research. *Evidence Based Nursing, 17*(4), 100. doi:10.1136/eb-2014-101946

Sonnino, R., Lozano Torres, C., & Schneider, S. (2014). Reflexive governance for food security: The example of school feeding in Brazil. *Journal of Rural Studies, 36,* 1-12. doi:https://doi.org/10.1016/j.jrurstud.2014.06.003

Stebbins, R. A. (2001). *Exploratory research in the social sciences* (Vol. 48): Sage.

Steinfield, C., DiMicco, J. M., Ellison, N. B., & Lampe, C. (2009). *Bowling online: social networking and social capital within the organization.* Proceedings of the fourth international conference on Communities and technologies, University Park, PA, USA. https://doi.org/10.1145/1556460.1556496

Takemura, K., Uchida, Y., & Yoshikawa, S. (2014). Roles of extension officers to promote social capital in Japanese agricultural communities. *Plos One, 9*(3), e91975. . https://doi.org/10.1371/journal.pone.0091975

Teo, C. R. P. A. (2018). The partnership between the Brazilian School Feeding Program and family farming: a way for reducing ultra-processed foods in school meals. *Public Health Nutrition, 21*(1), 230-237. doi:10.1017/S1368980017002117

Thomas, D. (2015). The Caribbean Tourism Industry in the 21st Century: An Assessment. *Kimberley Green Latin American and Public Affairs; Caribbean Center: Miami, FL, USA*.

Thompson, M. S. (2019). Still searching for (food) sovereignty: Why are radical discourses only partially mobilised in the independent Anglo-Caribbean? *Geoforum, 101,* 90-99. doi:https://doi.org/10.1016/j.geoforum.2019.02.028

Trotman, A., Gordon, R. M., Hutchinson, S. D., Singh, R., & McRae-Smith, D. (2009). Policy

responses to GEC impacts on food availability and affordability in the Caribbean community. *Environmental Science & Policy, 12*(4), 529-541. https://doi.org/https://doi.org/10.1016/j.envsci.2009.02.001

Uphoff, N., & Wijayaratna, C. M. (2000). Demonstrated Benefits from Social Capital: The Productivity of Farmer Organizations in Gal Oya, Sri Lanka. *World Development, 28*(11), 1875-1890. doi:https://doi.org/10.1016/S0305-750X(00)00063-2

Vallianatos, M., Gottlieb, R., & Haase, M. A. (2004). Farm-to-School: Strategies for Urban Health, Combating Sprawl, and Establishing a Community Food Systems Approach. *Journal of Planning Education and Research, 23*(4), 414-423. doi:10.1177/0739456X04264765

van Rijn, F., Bulte, E., & Adekunle, A. (2012). Social capital and agricultural innovation in Sub-Saharan Africa. *Agricultural Systems, 108*, 112-122. doi:https://doi.org/10.1016/j.agsy.2011.12.003

VanWynsberghe, R., & Khan, S. (2007). Redefining Case Study. *International Journal of Qualitative Methods, 6*(2), 80-94. doi:10.1177/160940690700600208

Waddock, S. (2001). How companies build social capital. *Reflections-Society for Organizational Learning, 3*(1), 18-24.

Wall-Bassett, E. D., Vander Mey, B. J., & Guiste, P. (2012). Food Security in Three Regions of Dominica: Baseline Data and Social Epidemiological Exploration. *Journal of Hunger & Environmental Nutrition, 7*(2-3), 224-238. doi:10.1080/19320248.2012.704659

Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications.

Wenger, E. (2011). Wenger, E. (2011). Communities of practice: A brief introduction. National Science Foundation.

WHO. (2018). Noncommunicable diseases. *World Health Organization*. Retrieved from https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

WHO. (2020). Obesity and overweight. *World Health Organization.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight#:~:text=Worldwide%20obesity%20has%20nearly%20tripled,%2C%20and%2013%25%20were%20obese.

WorldBank. (2018). Agricultural land (% of land area) - St. Kitts and Nevis *The World Bank* Retrieved from https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=KN

Wuepper, D., & Sauer, J. (2016). Explaining the performance of contract farming in Ghana: The role of self-efficacy and social capital. *Food Policy, 62*, 11-27. doi:https://doi.org/10.1016/j.foodpol.2016.05.003

Yin, R. (2014). Case study research: Design and methods Los Angeles: Sage.

Yin, R. K. (2012). Case study methods. In *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.* (pp. 141-155). American Psychological Association. https://doi.org/10.1037/13620-009

Zhang, J., & Luo, Y. (2017). *Degree centrality, betweenness centrality, and closeness centrality in social network.* Paper presented at the 2017 2nd International Conference on Modelling, Simulation and Applied Mathematics (MSAM2017). https://doi.org/10.2991/msam-17.2017.68

Appendix 1. Consent Form and Semi-Structured Interview Guide for Stakeholders

KEY INFORMANT INTERVIEWS - CONSENT TO PARTICIPATE

Study title: How can schools in Nevis better engage with the local community to improve the food planning and procurement systems in school feeding programmes?

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DESCRIPTION: This research activity seeks to understand how schools in Nevis can increase local community engagement to improve the food planning and procurement system in Nevis. The question focus will be on existing and potential activities to improve coordination between the SFP to reduce incidences of childhood overweight and obesity in Nevis. Questions will focus around the roles of different community members in the SFP, how schools are currently engaged with the community, and changes that must be made to disseminate the importance of food and nutrition security in Nevis.

HOW THE STUDY IS DONE: You are being invited to participate in an individual interview because of your role as a participant or involvement in the community as a stakeholder with the school feeding program in Nevis. This interview will focus on engagement with the SFPs, and between the SFP and community.

RISKS AND BENEFITS: You will receive no direct compensatory benefit from participating in this survey, except for the satisfaction of contributing to a better understanding of how improved engagement can improve SFPs. We believe any potential risks and discomforts from participating in the study are minimal.

COSTS AND PAYMENTS: There are no costs to you from participation in this interview other than your time. You will receive no financial compensation for your time.

CONFIDENTIALITY: All records and information pertaining to your involvement in this research will be stored in a locked file cabinet in the Department of Natural Resources at McGill University. Data and records, including identifying information, will only be accessible to the investigators listed on the front page of this document. This information will be handled in a confidential manner and you will not be specifically identified in any publication of research results. The data, but never any information that identifies participants, may be made available to other researchers as a requirement for publishing research results, presented at academic, professional, and government conferences, and included in publications. All electronic information will be kept in password protected files.

RIGHT TO WITHDRAW: You are under no obligation to take part in this research study and, should you change your mind, you may withdraw from this study at any time. You may also refuse to answer any questions asked of you. If you chose to withdraw from this study, this decision will not have any effect on any services you or your children may be receiving.

DISSEMINATION OF THE RESULTS: Research findings will be disseminated through academic publications, conference presentations, and a final research report to the IDRC.

VOLUNTARY CONSENT: By signing this form, you agree to participate in this study. You understand that future questions you have about this research will be answered by the investigators listed on the first page of this consent document at the telephone numbers given. If you have any questions or concerns about your rights or welfare as a participant in this research study, please contact the McGill Ethics Officer at +1 514-398-6831.

I wish to be identified in the report/s ____YES ___NO

I have read the above information and I agree to participate in this project

Signature: _____ Researcher's signature: _____

Name: _____ Date: _____

Note: This signed consent form will be collected from you on the day of the interview

STAKEHOLDER INTERVIEW GUIDE

Name: Date:

Role:

Stakeholder group represented:

Number of years in the position:

Location: Time start: Time end:

***School Coordinate with the Local Community*: This section will ask questions about yourself and role you play in the community**

1. What is your role/position?

2. How long have you been in this position?

3. What do you do in your role/position?

4. How are you connected/engaged with the SFP?

5. Why aren't you involved? Probe: Not interested? No time? Not part of your job?

6. Should you be involved? Probe: Why?

7. Are there any polices that guide your involvement or non-involvement? Probe: If there is no policy. Is there any reason why you think there is no policy guiding how you should engage with the SFP?

If policy exists: What does the policy entail about your stakeholder group/your position and the SPF? Probe: When was the policy developed? What factors led to it being developed?

8. Is school feeding discussed in any national-level coordination body (technical working group, task force, or the like) that deals with education, school health and nutrition, agriculture, food

security, nutrition?

9. Is there a specific ministry or institution with the mandate of managing and implementing the school feeding program?

10. Is there a specific unit at the national level in charge of the overall management of the coordination of school feeding within the lead institution and responsible for coordination between the national, regional/local (if applicable) and school levels?

11. Does the responsible unit in charge of implementing school feeding have a sufficient amount of staff given the responsibilities that the unit has been given? Probe: How many people work in the national unit responsible for school feeding? Does the unit have staff that are fully trained and knowledgeable on school feeding issues?

12. Can I have a copy or look at the existing policies?

School Engagement with the Local Community: In **this section we would like to ask questions about engagement and interaction with the community**

1. Are you working in the community? Yes No

2. Is it necessary for you to work in the community?

3. What are you doing in the community?

4. What is the nature of your involvement with the community? Probe: Can you specify any recent examples of your involvement?

5. When do you meet with the community? Probe: How often? Where do you meet?

6. With who in the community? Probe: How did they start meeting? Who attends these meetings?

7. Are there school committees that involve parents, teachers, and local community in the implementation of the school feeding programme?

8. What are the issues of discussion during these meetings?

9. What/why made this group start meeting?

10. Is the way you are connected and working together productive? Probe: Are there any issues with the way things work currently? Probe: What would you change?

***School Planning and Procurement*: In this section we would like to ask questions about the schools' food planning and procurement activities? And how these activities connect with the local community**

13. What is involved with the food planning and procurement? Probe: Is this done at the kitchen level, school-level, ministry-level, national level? What guides this practice? Is this how it has always been done?

14. Who is involved? Probe: Ministry of Education? Ministry of Health? Ministry of Agriculture?

15. Are any non-government partners involved? Probe: Who should be involved? Why is the person(s) not involved?

16. Is there a planning existing procurement procedure? Probe: Is there a procurement system or policy currently in place? Does the policy say who should be involved? How is it operated?

17. When do you meet? How often? Probe: What is discussed during meetings?

18. Why are you involved? Probe: Do you think your involvement in its current form in meaningful? Why Is it working?

19. What would you change?

Appendix 2. Consent Form and Semi-Structured Interview Guide for Farmers

KEY INFORMANT INTERVIEWS - CONSENT TO PARTICIPATE

Study title: Understanding smallholder farmer social capital and social networks to assess their readiness for group marketing and engagement in clusters to increase fresh food production for the SFP

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DESCRIPTION: This study seeks to understand the social capital embedded within farmer knowledge networks in Jamaica, Saint Kitts and Nevis and St. Vincent and the Grenadines, and the implications for smallholder famer cluster groups to be formed among farmers. These groupings are expected to help in better organizing the value chain by linking farmers together.

Your participation in the study will involve completing a key informant interview on your farm and production, history with the school feeding programme, values, social capital and knowledge network. You may also be invited, if interested, to take part in a focus group conducted by myself and local research

assistants. This interview will cover basic information about you and your household on (a) foods produced for the SFP, (b) challenges involved in producing for the SFP (c) opportunities involved in connecting with other smallholder farmers to better organize production for the SFP.

Rationale for inviting participation in this research project: You have been invited to participate in this research because of your role in producing agricultural commodities for the SFP in this community.

RISKS AND BENEFITS: You will receive no direct compensatory benefit from participating in this survey, except for the satisfaction of contributing to a better understanding of food security among the CARICOM population. We believe any potential risks and discomforts from participating in the study are minimal.

COSTS AND PAYMENTS: There are no costs to you from participation in this interview other than your time. You will receive no financial compensation for your time.

CONFIDENTIALITY: All records and information pertaining to your involvement in this research will be stored in a locked file cabinet in the Department of Natural Resources at McGill University. Data and records, including identifying information, will only be accessible to the investigators listed on the front page of this document. This information will be handled in a confidential manner and you will not be specifically identified in any publication of research results. The data, but never any information that identifies participants, may be made available to other researchers as a requirement for publishing research results, presented at academic, professional, and government conferences, and included in publications. All electronic information will be kept in password protected files.

Where interviewees have consented for the use of an audio recorder, audiotapes will be destroyed following the end of the project after 42 months.

RIGHT TO WITHDRAW: You are under no obligation to take part in this research study and, should you change your mind, you may withdraw from this study at any time. You may also refuse to answer any questions asked of you. If you chose to withdraw from this study, this decision will not have any effect on any services you or your children may be receiving.

DISSEMINATION OF THE RESULTS: Research findings will be disseminated through academic publications, conference presentations, and a final research report to the IDRC.

VOLUNTARY CONSENT: By signing this form, you agree to participate in this study. You understand that future questions you have about this research will be answered by the investigators listed on the first page of this consent document at the telephone numbers given. If you have any questions or concerns about your rights or welfare as a participant in this research study, please contact the McGill Ethics Officer at +1 514-398-6831.

I have read the above information and I agree to participate in this project

I agree for the interview to be recorded by an audio recorder ____YES ___NO

Signature: _____ Researcher's signature: _____

Name: _____ Date: _____

Note: This signed consent form will be collected from you on the day of the interview.

LOCAL FARMER INTERVIEW GUIDE

Name: Date:

Location:
Referral: Time start: Time end:

***Interests and Motivations for organizing*: This section asks questions about yourself, how long you have been involved in farming, and why you are farming.**

1. How long have you been a farmer? Probe: why did you become a farmer?

2. What crops do you produce? Why? Probe: What is your main crop and why?

3. Is your family involved? Probe: What roles do they play?

    a. Wife

    b. Children

    c. Husband

    d. Others

***Farmer History with the SFP*: In this section we're going to ask questions about your involvement with the SFP**

4. What past involvement do you have with the SFP? Probe: Why do you supply food to the SFP?

5. Which school? Probe: How long has this arrangement been in operation?

6. How often do you deliver produce to the SFP? Probe: W/hat is the process by which you and the school plan, deliver and receive payment?

7. What crops do you supply? Probe: What is the cost per pound/per head of production for that crop? What does the school pay for that crop? What do other people pay for that crop?

***Future Interests:* This section seeks to ask questions about how satisfied you are with the SFP arrangements and how it can be improved**

8. How would you assess the interaction between you and the SFP? Probe: Have you ever seen the foods you supplied made into school meals? Any there changes you would like to see in the SFP?

9. What would you like to see done? Probe: Why are these changes needed? How would you like that to happen?

10. What can farmers do to better organize food production for the SFP? Probe: What is the responsibility of farmers to improve the SFP?

***Organizing Farmers to Work as a Structured Whole*: This section we are asking questions about how farmers are organized formally and informally.**

<u>Formal Organizing</u>

11. Is there an organization or institution that you think is responsible for getting farmers to better organize to produce food to the SFP? Probe: Are they doing it? If not, why? If they are, please provide details on what they are doing?
12. Is there a policy that guides them on what they should be doing?

13. When do the farmers and [organizers] meet? Probe: Where do farmers meet? How often? What discussions take place at those meetings?

14. Why are you organizing with farmers to produce more food to the SFP? Probe: Betterment of the community? Policy?

15. How are the organizers organizing with you? Probe:

    a. Crop Production
    b. Farm size
    c. Location
    d. School
    e. Finances

This section asks questions about how the current organizing is working and any recommendations for changes that are needed in farmer organizing to improve the supply of fresh foods to SFPs.

16. How would you describe the results of the current organizing? Is it working well? Probe: What makes you think that?

17. Is everyone that should be involved, working together? Probe: Who is working? Who is missing?
18. Why are they involved? Probe: What is the evidence of this?

19. Any changes needed?

20. Why is it working? Probe: Is it not working because of who's involved (or not)? Resources? Time?

21. Why isn't it working? Probe: Is it related to who's involved (or not)? Resources? Time?

This section will ask questions about any organizing that is happening informally with friends, family or neighbors.

22. Are you working together with anyone to improve your supply, delivery or finding out new things in farming (what are their names also give their nicknames if known)?

a. Family
b. Friends
c. Neighbors
d. Other

23. When do you meet?

24. Where do you meet?

25. Why did you come together? Probe: What was the reason? (Cost-effectiveness, improved efficiency, support needed, schools initiated)

26. Is the current arrangement working? Probe: Any changes you think is necessary?

***Outcome: How Historical Organizing Affected the Past*: In this section questions will be asked about experiences you have had related to organizing and lessons learned.**

<u>In the Past</u>

27. Broadly, were there any work that has happened in the past around organizing farmers?

28. What was being organized?

29. Were you involved? Probe: How were you involved?

30. What happened? Probe: What worked? What didn't work? Why did this happen? (people involved (or not), resources, project-focus) Who was involved? Probe: Who supported the organizing of farmers? Probe: a. How was is supported? Were there any incentives? Any changes you think is necessary?