Strengthening Food Systems in the Organization of Eastern Caribbean States (OECS) to Achieve Food and Nutrition Security¹

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2 SUMMARY

Achievement of food and nutrition security (FNS) has long been a major goal of policy makers, researchers, and citizens of the OECS and other countries within the Caribbean Community (CARICOM). This region of the world is heavily dependent on food imports and tourism, prone to natural disasters, and highly vulnerable to global and environmental shocks. Major shifts in dietary patterns, characterized by rising consumption of imported ultra-processed food and drinks, combined with very low intake of vegetables and fruits, have led to an epidemic of adult and childhood obesity, and non-communicable diseases (NCDs); the probability of dying prematurely from NCDs in the OECS and CARICOM is among the highest in the Americas.

Declining public investments in agricultural infrastructure and human resources, combined with limitations in institutional and knowledge support for farmers, have contributed to gaps in trust among these key stakeholders, stifling technology adoption and innovation. Opportunities exist for greater contributions of fisheries to food and nutrition security through improved governance and knowledge management. Based on case studies of environmentally sustainable agricultural interventions in St Kitts and
Nevis and in St Vincent and the Grenadines, opportunities exist to expand climate-smart agriculture and community-based food production and strengthen nutrition-sensitive value chains to improve diet diversity and population health. Schools, policy coordination and cross-sectoral collaboration are identified as important leverage points to bring about food system changes to improve healthy eating and achieve OECS food and nutrition security, especially for children.

3 INTRODUCTION

For decades, food and nutrition security (FNS) has been a major concern of policy makers, researchers, citizens, and Civil Society Organizations (CSOs) within the Caribbean Community (CARICOM). This region of the world comprises mainly Small Island Developing States (SIDS) that are highly reliant on food imports and tourism and are vulnerable to global shocks. In a recent publication, Thompson (2019) aptly described the situation regarding agriculture, food security and “food sovereignty” as follows:

“The independent Anglo-Caribbean has, since the time of colonial conquest, been entrenched in inequitable relations of food production, distribution and consumption. Its contemporary food system is characterized by low levels of domestic production, increasing dependency on imports, nutritionally poor diets, non-communicable diseases, and vulnerability to fluctuations in international markets, climate change and natural disasters, which pose a number of challenges to policymakers”.

The climate crisis and the COVID-19 pandemic have heightened concerns about FNS in CARICOM countries, and “calls for action” to address FNS have been amplified.

Within the Eastern Caribbean, several SIDS established, in 1981, the Organization of Eastern Caribbean States (OECS) with the goal of cooperating with each other and promoting unity and solidarity among the Members. The OECS countries have limited institutional and human capacity and calls for action to address FNS would require a holistic understanding of the factors underlying FNS in this Caribbean subregion.
3.1 Objectives and scope of this paper

This background research paper seeks to contribute the OECS/ECCU Virtual 5th Growth and Resilience Dialogue by:

a) Undertaking a situation analysis of food and nutrition security within the OECS;

b) Assessing case studies and interventions aimed at improving FNS within the OECS; and

c) Providing a basis for discussions and actions towards sustainable achievement of FNS within the OECS.

The scope of the paper is restricted to English-speaking members of the OECS, and except for Montserrat, to those OECS Member States served by the Caribbean Agricultural and Development Institute (CARDI). Therefore, only six (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, and St. Vincent and the Grenadines) of the 11 OECS countries are covered in this paper. These six countries are independent nations, full members of the OECS, and share a common currency (the Eastern Caribbean dollar, XCD); these common characteristics would facilitate any broad collective action that may arise from an assessment of FNS within the OECS.

4 PART 1 – FOOD AND NUTRITION SECURITY IN OECS

4.1 Food and Nutrition Security (FNS): Concept and Indicators

4.1.1 What is Food and Nutrition Security?

The World Food Summit 1996 states that “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 Policy Brief 2016). Food security comprises four pillars- availability, accessibility, utilization, and stability, and the concept emphasizes multi-sectoral and multidimensional policy and community planning. Availability represents food production and imports; accessibility is best understood as access to markets and reflect food price, affordability and purchasing power; utilization of food refers to the adequacy of a diet through clean water, sanitation and health care to provide a state of nutritional
well-being; *stability* refers to access to adequate food at all times, and can refer to both the availability and access dimensions of food security (FAO, 2016).

Over the years, concepts surrounding food security have evolved to encompass the interrelationship between food, nutrition, and health (Pangaribowo et al. 2013). Hence, the concept, “food and nutrition security” has been adopted by the United Nations (UN) and other international agencies (Pangaribowo et al. 2013) and has gained widespread acceptance in tackling all forms of malnutrition.

### 4.1.2 How is Food and Nutrition Security Measured?

Global indicators of FNS have been compiled and reviewed (Pangaribowo et al. 2013) and are summarized in Table 1 below:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Food Security Index</td>
<td>Measure of the risks of food insecurity based on food availability, affordability, quality, and safety</td>
</tr>
<tr>
<td>Poverty and Hunger Index</td>
<td>A multidimensional indicator linked to the UN Millennium Development Goals (MDGs), but whose reliability and utility seems to be in doubt;</td>
</tr>
<tr>
<td>Anthropometric indicators</td>
<td>Stunting (low height-for-age) and wasting (low weight-for height), as indicators of nutritional status at the individual level, especially for children under five years old;</td>
</tr>
<tr>
<td>Diet Diversity Score (DDS)</td>
<td>Represents the number of different foods or food groups consumed over a given reference period.</td>
</tr>
</tbody>
</table>

*Table 1 – Description of Food and Nutrition Security Indicators*

Apparent advantages of DDS as an indicator of FNS include: 1) DDS scores correlate with measures of food consumption and are a good measure of household food access and caloric availability; 2) a varied diet is a worthy outcome in itself; 3) more diet variety is associated with a number of improved health outcomes, particularly in birthweight, child anthropometric status, reduced risk of mortality from cardiovascular disease and hypertension; 4) DDS scores can be collected through household surveys.
and can be used to examine food and nutrition security at individual and intrahousehold levels; 5) field experience indicates that it is quite feasible to collect dietary diversity data as part of household surveys (Pangaribowo et al. 2013).

Research conducted with adolescents in Sweden (Moraeus et al. 2020) showed that high diet diversity scores were associated with higher intake of vegetables, fish and several nutrients, and lower intake of sugar-sweetened beverages and red meat. Research in Sri Lanka revealed that DSS is a useful proxy indicator of nutrient adequacy of rural elderly people (Rathnayake et al. 2012). Improvements in diet diversity have also been shown to be related to better diet quality and lower prevalence of overweight and obesity (Moraeus et al. 2020). Diet diversity is a useful indicator of FNS among populations but except for one pilot study (Haynes et al. 2020), research and data regarding DDS for the Caribbean populations are lacking.

4.2 Food and Nutrition Security within the OECS

There is consensus among researchers, health practitioners and policy makers that the problem of food and nutrition insecurity in the Caribbean has more to do with obesity (adult, adolescent and childhood) than undernutrition, though evidence of a “double burden” of undernutrition co-existing with overweight in early childhood does exist (Gaskin et al. 2014). Childhood obesity in OECS is of particular concern because obese children are at higher risk of becoming obese adults, and heavier children are at elevated risk of continued rapid increase in their weight status (Mumena et al. 2018). According to Sobers and Samuels (2019), childhood obesity in the Caribbean has increased fourfold over the last four decades, from less than 2.5 per cent in 1980 to over 10 per cent in 2015. Rambaran et al. (2020) recently complied data for 6 to 12-year-old children in 10 Caribbean countries (Table 2) showing prevalence of childhood obesity as high as 17 per cent in St. Vincent and the Grenadines, and cumulative overweight and obesity as high as 60 per cent in Dominica.
Table 2 – Heat indicators in six OECS Countries

<table>
<thead>
<tr>
<th>Data Year</th>
<th>Probability of dying between 30-70 years due to NCDs (per cent)1</th>
<th>Adult Obesity (per cent)1</th>
<th>Childhood Obesity (6 -12 yr old) per cent</th>
<th>Children (6 -12 y old) over weight &amp; under weight2</th>
<th>Government spending on health (per cent of GDP)3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>81.8</td>
<td>22.6</td>
<td>18.9</td>
<td>16.2</td>
<td>53.8</td>
</tr>
<tr>
<td>Dominica</td>
<td>n/a</td>
<td>n/a</td>
<td>27.9</td>
<td>15.6</td>
<td>60.1</td>
</tr>
<tr>
<td>Grenada</td>
<td>81.3</td>
<td>21.4</td>
<td>21.3</td>
<td>15.0</td>
<td>43.0</td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td>n/a</td>
<td>n/a</td>
<td>22.9</td>
<td>15.5</td>
<td>55.0</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>82.0</td>
<td>18.8</td>
<td>19.7</td>
<td>14.3</td>
<td>45.3</td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>81.0</td>
<td>23.2</td>
<td>23.7</td>
<td>16.7</td>
<td>50.7</td>
</tr>
</tbody>
</table>

**Reference Countries**

| | | | | | |
| Barbados | 82.8 | 16.2 | 23.1 | | |
| Canada | 88.3 | 9.8 | 29.4 | | |
| USA | 88.3 | 14.6 | 36.2 | | |

-6-
(PAHO/WHO) NCDs in the Region of the Americas - Facts and Figures
Kirin Rambaran et al. (2020)

Source: Eastern Caribbean Central Bank; data used to calculate spending were budgeted amounts for the sector.
Consumption of fruits and vegetables has served as a proxy for diet quality, and the US Centers for Disease Control and Prevention (CDC, 2011) regards inadequate intake of fruits and vegetables as increasing the risk of chronic diseases. The World Health Organization (WHO) recommends a daily intake of 400g /day (5 servings per day) as a population-wide goal for the prevention of NCDs. According to Samuels and Unwin (2016), more than 85 per cent of adults in CARICOM Member States do not meet recommended levels of fruit and vegetable intake. Based on FAO food balance sheets and a statistical study of countries in Latin America and the Caribbean, Asfaw (2008) concluded that income, urbanization, price, and poverty were important factors affecting long-term availability of fruits and vegetables for human consumption.

Using FAO food balance sheets, Fitzroy Henry (unpublished; pers. comm.) of the University of Technology in Jamaica complied data on availability of fruits and vegetables for human consumption in St. Kitts and Nevis and St. Vincent and the Grenadines from the 1960’s to 2013 (Figures 1, 2, 3 and 4). Results for St Kitts and Nevis showed that availability of vegetables, and to a less extent fruits, was consistently and substantially below recommended population goal (RPG), and availability was largely the result of imports. In St Vincent and the Grenadines, fruit availability exceeded RPG from 2008 to 2013; however, availability of vegetables, due to both imports and local production, was also substantially below RPGs.
Figure 1 – Availability of Fruits for human consumption in St. Kitts and Nevis (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)

Figure 2 - Availability of vegetables for human consumption in St. Kitts and Nevis (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)

Figure 3 - Availability of Fruits for human consumption in St. Vincent and the Grenadines (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)
Figure 4 - Availability of vegetables for human consumption in St. Vincent and the Grenadines (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)
In contrast to the situation with fruits and vegetables, in both St Kitts and Nevis and St Vincent and the Grenadines the availability of sugar and sweeteners, known risk factors for obesity, far exceeded RPGs (Figures 5 and 6).

**Figure 5 - Availability of Sugar & Sweeteners for human consumption in St. Kitts and Nevis (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)**

**Figure 6 - Availability of sugar & sweeteners for human consumption in St. Vincent and the Grenadines (1960-2013) Source: F. Henry (Unpublished; pers. Comm.)**
4.3 Food Imports and Food Availability in the OECS

Availability of food for human consumption, one of the key pillars of FNS, is principally a function of domestic production and imports; weak and globally non-competitive agri-food systems in the Caribbean have, over decades, shifted the availability balance towards food imports. According to a UN World Food Programme (WFP) Report (https://www.wfp.org/publications/caribbean-covid-19-food-security-livelihoods-impact-survey-round-1), over 80 per cent of food in the Caribbean is imported and in 2020 the food import bill for the region was estimated at US$ 5 billion. The US accounts for almost 50 per cent of the food imports to the region and in 2020 only two CARICOM countries (Trinidad and Tobago and Guyana) featured among the top 10 sources of food imported into the CARICOM countries; together these countries accounted for only 7 per cent of CARICOM food imports.

The OECS countries are especially dependent on food imports, and this reflects weaknesses in their agriculture and fisheries sectors. Data on food dependency ratio (total food imports / total consumption) reveal that in 2015, the population in St. Kitts and Nevis imported 95 per cent of the food it consumed; Dominica was the least reliant on food imports (Table 3).
Table 3 – Performance indicators for OECS Agriculture and Fisheries sectors.

<table>
<thead>
<tr>
<th>Data year</th>
<th>per cent of cultivated land irrigated (per cent)¹</th>
<th>Average annual precipitation (mm/yr)¹</th>
<th>Agriculture Value added (per cent of GDP)¹</th>
<th>Fisheries sector contribution to GDP (per cent)²</th>
<th>per cent of labour force employed in fisheries²</th>
<th>Total fish available for local consumption (kg/capita)²</th>
<th>Food Dependency Ratio³</th>
<th>Government spending on agriculture (per cent of GDP)⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>7.7</td>
<td>1,030</td>
<td>1.79</td>
<td>0.95</td>
<td>6.3</td>
<td>38</td>
<td>0.92</td>
<td>0.54</td>
</tr>
<tr>
<td>Dominica</td>
<td>0.0</td>
<td>2,083</td>
<td>13.45</td>
<td>0.40</td>
<td>4.1</td>
<td>16</td>
<td>0.55</td>
<td>2.36</td>
</tr>
<tr>
<td>Grenada</td>
<td>5.2</td>
<td>2,350</td>
<td>5.37</td>
<td>1.16</td>
<td>4.6</td>
<td>23</td>
<td>0.81</td>
<td>1.01</td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td>0.6</td>
<td>1,427</td>
<td>1.11</td>
<td>0.51</td>
<td>5.2</td>
<td>24</td>
<td>0.95</td>
<td>0.46</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>0.1</td>
<td>2,301</td>
<td>1.49</td>
<td>0.55</td>
<td>3.4</td>
<td>20</td>
<td>0.83</td>
<td>0.89</td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>0.0</td>
<td>1,583</td>
<td>6.93</td>
<td>0.60</td>
<td>2.9</td>
<td>9</td>
<td>0.68</td>
<td>1.06</td>
</tr>
</tbody>
</table>

¹Source: FAO-Aquastat - 2017
²Caribbean Regional Fisheries Mechanism (CRFM) Statistics and Information Report-2018
³Source: Deep Ford (2015)
⁴Eastern Caribbean Central Bank
The vulnerability of the OECS and other CARICOM countries to global shocks, and the impact of the COVID-19 pandemic have revitalized the commitment of CARICOM Heads of Government to strengthening domestic food production. In announcing a “25 in 5” Plan, CARICOM leaders have identified a target to reduce the region’s annual food import bill by 25 per cent in 2025.

4.4 Other Factors Impacting FNS in the OECS

4.4.1 COVID-19 pandemic

The COVID-19 pandemic has also had an impact on food and nutrition security in the OECS. The WFP Caribbean COVID-19 Food Security & Livelihood Impact Survey (https://www.wfp.org/publications/caribbean-covid-19-food-security-livelihoods-impact-survey-round-1.) revealed that, throughout the Caribbean, a majority (57 per cent female, 60 per cent male) of respondents maintained normal eating patterns during the COVID-19 pandemic. However, 20 per cent of respondents ate less preferred foods, and 17 per cent skipped meals or ate less than usual. Food security data were not available at the level of individual member states of OECS, but 78 per cent of respondents in Grenada and St Kitts and Nevis, and 81 per cent in Dominica and Saint Lucia reported disruptions to livelihoods due to the pandemic. As more is learned from research related to COVID-19 disruptions, OECS member states may be better positioned to adopt strategies and actions to strengthen domestic food systems to offset global shocks and ensure FNS for their populations (Gordon and Unwin, 2020).

4.4.2 Public awareness

Public awareness of the importance of healthy eating must be aligned with institutional efforts to improve food and nutrition security. As part of a Canadian government (IDRC) funded project (FaN Project: https://onecaribbeanhealth.org/ ) dealing with food and nutrition security in CARICOM, The UWI Health Economics Unit (HEU) recently conducted surveys of eating habits among populations in St Kitts and Nevis and St Vincent and the Grenadines. Preliminary results revealed that in both countries, more than half of the respondents believed that they generally consumed healthy foods and drinks. When results were disaggregated by gender, 63 per cent of females and 53 per cent of males in St Kitts and Nevis perceived their eating habits to be “healthy”. 
However, anthropometric measures (body mass index) show that in both St Vincent and the Grenadines and St Kitts and Nevis, obesity prevalence is greater in females than in males (PAHO 2019). These findings reveal the complexity of the relationships among human beliefs, behaviour, and health outcomes. In addressing FNS, there is a need for enhanced nutrition education and public awareness of the link between food, nutrition and health; more research and better understanding of human psychology and social and cultural norms in the sub-region is also needed.

4.5 Food and Health Security in the Context of Globalization

4.5.1 The food-health connection

Obesity is a major risk factor for NCDs which account for over 80 per cent of all deaths in OECS and other CARICOM countries (Table 1) and represent the greatest ongoing health threat to the region’s populations. The probability of dying from NCDs within the OECS is twice that in Canada (Table 1) and is among the highest in the Americas (PAHO 2019). Obesity is a risk factor for mortality from COVID-19 (Dietz and Santos-Burgoa, 2020) and this increases the urgency of dealing with obesity as a major public health problem for OECS countries. However, in dealing with obesity and NCDs as food-related health threats, the OECS confronts two major international challenges: a) the forces of globalization accelerated during the 1980’s and 1990’s; b) the power and impact of food marketing and advertising by multinational food companies.

4.5.2 Globalization of supply chains

Liberalization of global trade and markets combined with advances in digital and manufacturing technologies, and efficiencies in containerized freight transport (Kendall 2008) have resulted in major changes in global food supply. Given the limited competitiveness of the Caribbean agri-food sector and the growth in tourism, the Caribbean has become a ready market for global food companies. A report by Gonzalez et. al. (2015) notes that, of the total amount of food products imported into the OECS countries in 2013, roughly 60 - 70 per cent is absorbed by the retail sector and the remainder is channeled to the hotel, restaurants, and institutions. Modern grocery retailers (large and small supermarkets, discount, and convenience stores) account for about a quarter of all grocery retail establishments; traditional grocery retailers
(independent small grocers) account for approximately 75 per cent of the grocery retailers. Wholesalers and distributors in the Caribbean tend to focus on importation of non-perishable food items (dry goods) with little emphasis on fresh produce (Gonzalez et. al 2015). For example, in 2014 fresh vegetables accounted for only 2.6 per cent of the total exports to the OECS; snack foods accounted for 8 per cent (Gonzalez et. al 2015).

Based on studies in Latin America, Reardon et. al (2004) concluded that within the last 5 to 10 years, there has been rapid transformation of the food retail sector in developing regions of the world, accompanied by further consolidation and multi-nationalization of the supermarket sector. Globalization, growth of supermarkets (Reardon et. al 2004) and concentration of international supply chains have had enormous influence on the food items available to consumers in the Caribbean.

4.5.3 Global food marketing, advertising, and sales

Research reviewed by Hawkes (2009) reveals that sales promotion can influence consumption patterns by influencing the purchasing choices of consumers and encouraging them to eat more. Another scientific review by Sonntag et al (2015) reveals that the global food industry contributes to obesogenic environments through television and internet marketing, and through promotions and influences on the physical environment in the home, school, and food retail spaces. The report also found that healthy foods are generally not highly advertised and promoted by food companies. A scientific review by Hastings et al. (2006) showed that children in both the developed and developing world have extensive recall of food advertising and that food promotion influences children’s food preferences, consumption and other diet-related behaviours and outcomes.

A PAHO report (PAHO 2019) distinguishes among unprocessed or minimally processed foods, processed foods, and ultra-processed foods. Unprocessed foods would be edible parts of plants or of animals. Minimally processed foods would be unprocessed foods altered only by removal of inedible or unwanted parts and/or by processes (including drying, roasting refrigeration, freezing, vacuum packaging) used to extend the life of the unprocessed food or facilitate food preparation. Processed foods generally have two or
three added food ingredients, including sugar, oil and salt, and the processing purpose is to increase durability of unprocessed or minimally processed foods.

Ultra-processed food and drink products (UPFDs) are classified as industrial formulations with typically five or more ingredients including that include salt, sugar oils, fats, ultra-processed food ingredients and additives; the purpose of UPFDs is to imitate sensory qualities of unprocessed or minimally processed foods or disguise undesirable qualities of the product. Such products, which include carbonated drinks, snacks, candies, cookies, breakfast cereals and “energy bars” are attractively packaged, “ready-to-eat”, and are aggressively marketed to children and adolescents by transnational corporations. These products are energy-dense and of poor dietary quality. Based on an extensive analysis of food trends in Latin America, the PAHO report (PAHO 2019) concluded that between 2009 and 2014, per capita sales of ultra-processed foods that region of the world grew by 8.3 per cent; the sales of ultra-processed foods increased at the expense of non-ultra-processed foods, and confirmed a trend observed in Canada and Brazil where UPFD products were found to replace fresh or minimally processed foods and freshly made meals.

![Figure 7](image1.png)  
*Figure 7 – Change in total global volume sales of ultra-processed food products (UPF) over the period 2002-2016; Vandevijvere et. al (2019).*

![Figure 8](image2.png)  
*Figure 8 – Change in total global volume sales of ultra-processed drink products (UPD) over the period 2002-2016; Vandevijvere et. al (2019).*
Vandevijvere et al (2019) evaluated the global trends in sales of ultra-processed food and drink (UPFD) in 80 countries and matched the sales volume of UPFD to mean adult body mass index (BMI). The study found that between 2002 and 2016, sales of ultra-processed food products (UPF) decreased in North America and Australasia; however, sales of UPF increased in other parts of the world, including Latin America and the Caribbean (Figure 7). Sales of ultra-processed drinks (UPD) decreased in North America, Australasia and Western Europe but increased in other world regions, with the largest increase occurring in Latin America and the Caribbean (Figure 8). A key finding from the study was that increases in UPFD sales volume (sales/capita) were positively associated with population-level BMI trajectories.

Data on the sales and marketing of ultra-processed foods in the Caribbean countries are scarce but the region is known to be among the highest consumers of sugar-sweetened beverages in the world (Haynes et al. 2020). The Caribbean operates in an open global market and is fully exposed to the global forces of marketing and sales of UPFDs. Therefore, efforts to reduce obesity and improve the health of Caribbean populations must be driven by a combination of consumer awareness, strengthening of domestic production of nutritious foods and public policy that mitigates against marketing of UPFDs, especially to children.

4.6 Social and Economic Implications of Food and Nutrition Insecurity

At its extreme, food and nutrition insecurity leads to hunger. At the 1974 World Food Conference, the UN adopted the Universal Declaration on the Eradication of Hunger which proclaimed that “Every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties.” The UN SDGs 2, 8 and 13 deal, respectively, with achieving food and nutrition security, sustainable economic growth, and climate action, rendering it almost impossible to separate these three aspirations for development. Investment in food and nutrition security is an investment in human capital; lack of such investment leads to malnutrition, whether undernutrition or obesity, and represents a cost to society.
Citing studies by the World Bank, Bokeloh et al. (2009) reported that investments in nutrition programmes are efficient in that cost-benefit analyses show that for every 1$ US invested in nutrition programme, there is a gain of 0.9 to 84 US$ through increased remuneration and decreased incapacity to work. The gain is achieved through the impact on adult labor force participation and productivity, on improved health and school performance and ultimately on economic growth investments in nutrition. Theodore et al. (2016) assessed the economic cost of NCDs in the Caribbean to be 1.4 to 8 per cent of the region’s GDP, and reported that among persons 40 years and older in 10 Caribbean countries, including Antigua and Barbuda, St Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, and Dominica, there were 21,206 potential years of life lost due to diabetes in 2003, with foregone future earnings of US$145 million. Improving diet quality and health outcomes for OECS populations would not only improve quality of life but could led to reduced government health expenditure which, except for Dominica, increased by 6.5 per cent to 14 per cent between 2016 and 2019 (Table 1).

5 PART 2 – BUILDING SUSTAINABLE FOOD SYSTEMS for FNS

5.1 Vulnerabilities of OECS Agriculture and Fisheries Sectors to Climate Impacts.

Food production affects the environment and the environment affects food production. Environmentally sustainable food systems are, therefore, central to sustainable food and nutrition security. Culminating with the “Paris Agreement” in 2015, countries around the world pledged to limit greenhouse gas (GHG) emissions, and prevent the global average temperature from rising 2°C above preindustrial levels and pursue efforts to keep it below 1.5°C. The EAT Lancet Commission (Willet et al. 2019) reports that food production is responsible for up to 30 per cent of GHG emissions and 70 per cent of fresh water use, and notes that “a revolutionary change in food systems to support human health and environmental sustainability is essential to the Paris Agreement”.

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Rhiney (2015) reviewed the scientific literature on climate change and its impact on the Caribbean and assessed the region’s social and economic vulnerabilities to climate change. The author points out that, in addition to geography and small size, the debilitating legacies of the Caribbean’s colonial past contributes to the region’s vulnerability to global economic and environmental change. The review by Rhiney (2015) revealed that if GHG emissions in the Caribbean remain unchecked, the cost of inaction to the region as a result of increased hurricane damages, loss of tourism revenue and infrastructure damages could total approximately US$22 billion annually by 2050 and US$46 billion by 2100; these costs were reported to represent, in 2008, an estimated to 10 per cent and 22 per cent of GDP, respectively.

The scientific evidence reviewed also revealed the following: 1) since the 1950’s there has been an increase in the number of very hot days and very hot nights throughout the region; 2) the Caribbean Sea has warmed by approximately 1.5°C over the last century; 3) sea surface levels have risen since 1950; 4) moderate decline in precipitation across the northern Caribbean basin; 5) greater variability in seasonal and inter-annual rainfall; 6) increasingly more and prolonged dry spells, especially during the summer; 7) marked increase in hurricane and tropical storm activities since the mid-1990s; 8) climate model projections of a 1–5 °C increase in annual mean temperature for the region by the 2080s when compared to 1960-1990 baseline.

Data for the OECS complied by the Caribbean Disaster Emergency Management Agency (CDEMA) covering the period 1980 to 2004, show that five extreme weather events in Dominica, Grenada, St Kitts and Nevis, and Saint Lucia resulted in damage to the agricultural sector that amounted to over $US157 million. The cost of hurricane damage to crops in Grenada was about $ 36 million; in Saint Lucia two hurricane events (Allen and Debbie) caused flooding, wind and soil erosion damage to crops plus damage to the housing and agricultural sector that amounted to over US$75 million. In 1995, St Kitts and Nevis experienced a hurricane that cost the agriculture sector US$35 million due to wind damage to crops, soil erosion and impact on sugar cane and loss of infrastructure. In addition to hurricanes and floods, climate impacts include droughts and water scarcity which affect crop yield.
and render crop production highly seasonal, thereby creating uncertainties in supply chains and incomes for farmers. Lenderking et al. (2020) concluded that climate change will have a significant effect on agriculture and fisheries in the Caribbean, mainly through changing patterns of weather, air and sea surface temperatures, and water availability. The authors also reported that warming ocean temperatures will likely threaten reef species of fish; but some species (e.g. dolphin fish and skipjack tuna in Dominica) are likely to be able to adapt to climate change, and therefore fisheries could become key sources of food security in the aftermath of hurricanes leading to intense damage and losses in the agriculture sector.

5.2 Domestic Food Production: Constraints and Opportunities

Agricultural production in the OECS countries has been on the decline for decades. Data from FAO reveals that between 2002 and 2017, the proportion of the total land area under cultivation in Grenada, St Kitts and Nevis and Saint Lucia decreased by 42 per cent, 28 per cent and 16 per cent, respectively. Constraints to domestic food production in the Caribbean have been well documented and in 2007, with the development of the “Jagdeo Initiative” (CARICOM Secretariat, 2007) by Guyana’s former President Jagdeo, the CARICOM Heads of Government committed to strengthen regional agricultural production. The “Jagdeo Initiative” identified the need to address several issues that include: a) market development and strengthening of value chains; b) protecting the natural environments; c) capacity and partnership building; d) policy and institutional realignment. The 2012-2022 Revised OECS Regional Plan for Agriculture (OECS-RPA) is essentially in harmony with the Jagdeo Initiative and identifies similar constraints on OECS agricultural sector.

Lowitt et al. (2015) reported on extensive surveys conducted with farmer households in Saint Lucia and St Kitts and Nevis, and concluded that smallholder farmers perceived a systemic lack of access to finance, markets, and knowledge networks as key factors limiting agricultural innovation potential in the region. Compounding these challenges, lack of trust in institutions was reported among actors across the agricultural system,
hindering the potential for collective action (Lowitt et al. 2015). In a follow up study of two farming communities in Saint Lucia, peer-to-peer learning was reported as being the primary source of new agricultural knowledge for farmers, with government extension officers playing a secondary role in knowledge transfer (Saint Ville et al. 2016). These findings indicate that improvements in institutional support and trust building would be required in efforts to strengthen the agricultural sector in OECS.

Limitations in government spending in agriculture represent additional constraints on sector growth and sustainability. In all six OECS countries, government spending on the agricultural sector in 2016 ranged from 0.5 per cent to about 2 per cent of GDP (Table 3). More importantly, between 2016 and 2019, except for Antigua and Barbuda, the countries reduced or barely maintained their investments in agriculture. Investments in human resources and agricultural infrastructure have been strained. For example, in its 2016-2017 Annual Report, the Saint Lucia Department of Agriculture states the following constraint within its Extension Service—“Weak extension and advisory services limit the ability to reach small-holder farmers with agricultural innovations and market opportunities”. In Antigua and Barbuda, St Kitts and Nevis and St Vincent and the Grenadines where rates of precipitation are low, government spending on agriculture is low (Table 3). The construction of a rainwater catchment facility in St Kitts in 2009 is a notable investment to mitigate against seasonality and scarcity of water resources.

5.2.1 Contribution of the fisheries sector to FNS in OECS

Fish and other seafood contribute to overall food availability in OECS and to employment, income and livelihoods of many citizens living in coastal areas (Table 3). Data from FAO show that in 2018, Grenada was the largest producer of fish and exported 26 per cent of its production. Antigua and Barbuda was the second largest producer of fish but exported less than 3 per cent of production and had the highest level of fish available for consumption (104 g/day) in 2018. The contribution of fisheries to the GDP of the OECS countries (Table 3) is much lower than that of the agriculture (crop) sector. Employment in the fisheries sector was highest for Antigua and Barbuda.
and St. Kitts and Nevis but the contribution of the fisheries sector to GDP was highest in Grenada.

The fisheries sectors within the OECS face similar and additional constraints to expansion and sustainability as those discussed for the agricultural sector. Based on case studies that included Grenada, the Grenadines islands, Saint Lucia and St Kitts and Nevis, McConney et al. (2020) concluded that depletion of fisheries resources, coastal habitat degradation, pollution, climate change are among the threats to the fisheries sectors in the region. They emphasized the need for enhanced fisheries governance with the need to build food security and resilience into governance mechanisms.

Karr et al. (2017) have argued that most small-scale fisheries in developing areas appear to not be achieving either fisheries or conservation goals, with respect to creating healthier oceans that support more fish, feed more people, and improve livelihoods. Based on their case studies, which included Belize, Cuba, the Philippines and Mexico these researchers concluded that performance of fisheries sectors can be improved by considering, among others, the following lessons: 1) participatory processes empower fishers, increase compliance, and support integration of local and scientific knowledge; (2) partnership across sectors improves communication and community buy-in.

The fisheries sector in the OECS has the potential to make a greater contribution to food and nutrition security in the OECS; however, this would require a national and subregional environment that emphasizes stakeholder engagement, sustainable fish production and institutional support for fishers. Fish is an important part of a diverse and healthy diet and The EAT- Lancet Commission (Willet et al. 2019) recommends a daily intake of fish and shellfish of 28 g/day (range 0-100g), three times that for red meats. Table 3 shows that among the OECS member states Antigua and Barbuda has the highest level of fish available for consumption. Given the desirability of fish as a component of a healthy diet, there is much room for expansion of the fisheries sector as a contributor to FNS in the OECS countries.
5.2.2 Removal of food production constraints: Illustrative example in St. Kitts and Nevis:

An agricultural project intervention (case study 2 below) in St Kitts and Nevis provides an example of the impact of attempts at removing some of the constraints on domestic food production through investments in training, agricultural infrastructure, and research and development in OECS. In 2013-2014, as part of a regional FNS project, local farmers were recruited for an on-farm participatory research trial. The goal of the project was to increase children’s consumption of locally grown vegetables and fruits for school meals, while understanding and addressing some of the constraints on local agricultural production. Farmers were trained in adoption of environmentally sustainable technologies and subsidized by the project for additional equipment, fertilizer and other input costs associated with their participation in the project. Results of the on-farm participatory research with both vegetable and fruit crops (including tomato, pumpkin, string beans, and watermelon) showed that adoption of drip irrigation and mulching technologies boosted overall crop productivity and increased water use efficiency by up to 20 per cent. Improvements also occurred in crop diversity (Lowitt et al. 2018).
Figure 9 – Causal map showing Farm to Fork theory of change linking agricultural and nutrition interventions (red arrows) to anticipated outcomes (blue arrows).

Project results also revealed that post-harvest crop losses (which exceeded 30 per cent) could be reduced with the use of simple techniques to protect produce from direct sunlight (Cortbaoui and Ngadi 2016). The project outcomes highlight the capability of local farmers to increase production when provided with market opportunities, technical training and institutional support.

5.2.3 Developing resilient and nutrition-sensitive value chains

5.2.3.1 Integrating Climate-Smart Agriculture into OECS strategies for FNS

Arising from the global awareness of climate change and the need for climate-resilient food systems, concepts and practices such as “climate-smart” agriculture (CSA) and “regenerative agriculture” are being widely promoted. At their core, these concepts describe farming practices that, among other benefits, reverse soil degradation and restore soil health, improve water use efficiency, enhance biodiversity and contribute to diet diversity. The CGIAR (Consultative Group on International Agricultural Research) describes CSA as “agriculture and food systems that sustainably increase food production, improve resilience (or adaptive capacity) of farming systems, and mitigate climate change when possible” (Rosenstock et al. 2016). According to Rosenstock (et al. 2016) a ‘Global Alliance for Climate-Smart Agriculture’ (GACSA) was launched at the United Nations Secretary Generals’ Climate Summit in September 2014 with the goal of helping 500 million smallholder farmers practice CSA.

Building resilient value chains within OECS countries begins with climate-resilient food production systems and climate-smart agriculture that could form the basis of “best practices”, which would include:

i. Soil health:
   a. prevention and control of soil erosion and loss of organic matter
   b. Cover cropping and intercropping to prevent soil erosion.
c. Composting for crop fertilization and soil organic matter restoration

ii. Drip irrigation, rainwater harvesting, mulching for water conservation

iii. Avoiding or limiting use of pesticides

iv. Reducing soil and water contamination

v. “Protected agriculture”- year-round vegetable production

vi. Pasture, drought-tolerant forage management (small ruminants)

Rosenstock (et al. 2016) emphasized that CSA is not a new set of practices to be promoted to farmers, but rather an integrated approach to the implementation of agricultural development policies and programmes that strives to improve food security, livelihoods, and resilience under the realities of climate change.

At the regional level, The Caribbean Community Climate Change Centre (CCCCC) provides support and outreach to OECS and other CARICOM countries in addressing impacts of climate variability on all aspects of development. In Dominica, for example, the CCCCC supported The Milton Pilot Irrigation project which was designed to ensure availability of irrigation water on farmlands compromised by extended drought periods and encourage farmers within the Milton area in adaptation measures to climate change. Through its climate change research subprogram, CARDI generates knowledge on climate-resilient agriculture aimed at supporting farmers in adopting environmentally sustainable practices. CARDI’s technology research, drip irrigation and water harvesting, mulching, drought-tolerant varieties of food crops and forages, protected agriculture and intercropping represent examples of how OECS farmers benefit from the region’s research infrastructure to integrate CSA into their production practices. For example, CARDI’s participatory research project in St. Kitts and Nevis using shipping containers (“container farming”) for vegetable crop production aims to provide defense against hurricanes and droughts and improve year-round crop production. This form of protected agriculture represents an innovative approach to CSA but project results and analyses would be required to determine the extent of farmer uptake of such technology.
5.2.3.2 Case Studies of Nutrition sensitive value chains - Assessment

Nutrition sensitive value chains (NSVCs) represent a careful design of interventions through a range of actors along an identified value chain to ensure nutritious products reach consumers (Allen and de Brauw, 2019). Models for developing NSVCs are generally rooted in initiatives and advocacy for community-supported agriculture that emphasize support for local farmers and local economies (“going local”), locally-sourced fresh and nutritious produce, exemplified by access to farmers’ markets, and contribution to sustainable food systems through shorter value chains that reduce environmental footprints (Brown and Miller, 2008).

5.2.3.2.1 Case Study 1: The Brazil school Nutrition Program (PNAE)

Community-supported food systems have tended to revolve around local communities and schools, and Brazil has been a pioneer in developing NSVCs through its national student nutrition program-Programa Nacional de Alimentação Escolar (PNAE) initiated in the 1950’s. In 2009, Brazil passed legislation requiring that at least 30 per cent of food purchased for the program must be supplied by small family farmers. It has been reported that in 2012, PNAE was funneling about US$500,000 into local farmers supplying fresh fruits, vegetables, milk and other products to schools (Source: Colleen Kimmett 11 May 2016 | TheTyee.ca). An NSVC model that links procurement of fresh, nutritious produce from local small-holder farmers to school feeding programmes (SFPs) could improve health outcomes of children, as well as income and livelihoods of local farmers.

5.2.3.2.2 Case Study 2: Farm-to- Fork NSVC Intervention in St. Kitts and Nevis

Combining climate-smart agriculture with NSVCs oriented, initially, towards schools and public institutions represents a viable approach to transforming OECS food systems to support human and environmental health. Publicly funded school feeding programmes (SFPs) exist in most OECS countries and these programmes serve as important national structures to ensure food and nutrition security for children.

The school feeding programme in St Kitts is a universal programme, fully funded by the government and administered under the Ministry of Education. The programme serves a
free lunch meal every day accessible to each of approximately 4,000 school children, irrespective of household economic status, in the 17 public primary schools in the country. A single central facility (the School Meals Centre) is responsible for the preparation and delivery of lunch meals to the children at their respective schools.

Between 2012 and 2014, and for the first time in CARICOM, a multidisciplinary, multi-sectoral research project was undertaken in St Kitts as a collaboration between McGill University and The University of The West Indies, in partnership with the local government and regional institutions. The project was funded by Canada’s International Development Research Centre (IDRC) with the goal of developing a “farm to fork” NSVC.

As indicated previously, the key objectives were to:

a) improve children’s consumption of locally grown vegetables and fruits;
b) create market opportunities for local small farmers; and
c) strengthen the capacity of farmers to adopt sustainable production practices that could enhance year-round availability and diversity of produce for school feeding.

A total of 188 children from seven schools participated in the study which involved 86 children from three “control” schools and 102 from four schools with the “test menus” professionally designed to enhance daily portions of fruits and vegetables and improve the overall nutritional quality of the meal. Sixteen (16) farmers from twelve (12) farms participated in the project, details of which have been published by Lowitt et al. (2018).

Through interviews and focus groups, data were also collected to better understand and assess barriers to farmer innovation and adaptive capacity, social capital, and supporting conditions for value chain development. The “theory of change” driving the project is shown in Figure 9 above. The following are the main findings and outcomes from the project:

- Drip irrigation technology with mulching increased crop productivity and diversity on local farms (Figure 10); 12,746 kg of new produce were supplied to the SFP
- Structure coordination of produce procurement from local farmers would enhance the supply of locally farmed produce for SFPs, with important implications for food imports
- Compared to control, children offered meals from the test menu significantly increased consumption of vegetables and micronutrients (Table 4)
- Social science research identified trust in institutions and knowledge sharing as being foundational to collective action and “communities of practice” (Lowitt et al. 2015).

![Figure 10](image)

**Figure 10 - Yields (kg/ha) for selected crops used in a Farm to Fork project in St. Kitts (2013-2014)**

<table>
<thead>
<tr>
<th>Nutrient/Food group</th>
<th>Children who consumed the school lunch (n=121)</th>
<th>Menu change (n=71)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control (n=50)</td>
<td></td>
</tr>
<tr>
<td>Energy, kilocalories</td>
<td>603±375</td>
<td>529±225</td>
</tr>
<tr>
<td>Percent energy as protein, per cent</td>
<td>13.8±4.74</td>
<td>19.3±10.4**</td>
</tr>
<tr>
<td>Percent energy as fat, per cent</td>
<td>18.3±11.1</td>
<td>21.9±9.41*</td>
</tr>
<tr>
<td>Percent energy as carbohydrate, per cent</td>
<td>66.8±13.5</td>
<td>58.3±15.4**</td>
</tr>
<tr>
<td>Fiber, g</td>
<td>3.21±3.40</td>
<td>3.07±2.56</td>
</tr>
<tr>
<td>Calcium, mg</td>
<td>141±106</td>
<td>131±88.4</td>
</tr>
<tr>
<td>Iron, mg</td>
<td>2.72±2.39</td>
<td>2.59±1.36</td>
</tr>
<tr>
<td>Nutrient/Food group</td>
<td>Children who consumed the school lunch (n=121)</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Control (n=50)</td>
<td>Menu change (n=71)</td>
</tr>
<tr>
<td>Potassium, mg</td>
<td>403±330</td>
<td>481±310*</td>
</tr>
<tr>
<td>Vitamin A, RAE</td>
<td>126±300</td>
<td>215±242**</td>
</tr>
<tr>
<td>Vitamin C, mg</td>
<td>66.6±54.2</td>
<td>86.1±75.5</td>
</tr>
<tr>
<td>Fruits, portions</td>
<td>0.17±0.54</td>
<td>0.20±0.65</td>
</tr>
<tr>
<td>Vegetables, portions</td>
<td>0.11±0.27</td>
<td>0.24±0.32**</td>
</tr>
<tr>
<td>Staple vegetables¹, portions</td>
<td>0.06±0.35</td>
<td>0.07±0.21</td>
</tr>
</tbody>
</table>

Mean±SD. * p<0.05 ** p<0.01.

Source: Lowitt et. al. (2018)

Table 4 – Nutrient intake and food group portions at lunch for control and menu change groups of 6-12 year old children in St. Kitts-Nevis at endpoint.

The F2F school feeding intervention in St Kitts was able to demonstrate a “proof of concept” for building NSVCs but subsequent evaluation of the intervention showed little evidence of institutional or community uptake of results or outcomes. In some SFPs in the OECS, over 70 per cent of the food items are imported and thus, farm-to-school value chains that emphasize procurement of locally produced nutritious food items could not only improve nutrition outcomes of children but reduce food imports.

5.2.3.2.3 Case Study 3: Stakeholder Group Model Building (GMB) Workshop for Healthy Eating

There is evidence that cross-sector collaboration is needed to address root causes of persistent public health challenges (Calancie et a. 2021), and that systems thinking and approaches that engage stakeholders across multiple settings can provide catalysts for community-wide action (Amed et. al 2016). This last case study builds the previous one, and arose from the IDRC funded FaN project, previously noted (FaN Project: https://onecaribbeanhealth.org/).

In 2018, stakeholders from across the food system in St Vincent and the Grenadines, St Kitts and Nevis, and Jamaica engaged with researchers in two group model building workshops led by experts in systems modeling and public health and nutrition. The
goals of both workshops were to map the complex system driving unhealthy eating in all three countries and evaluate the previous farm-to-fork school feeding intervention experience in St. Kitts. This type of stakeholder engagement for group model building was a novel intervention in the Caribbean. Details of the process and outcomes of the workshop have been published by Guariguata et al. (2020). The following are among key findings and outcomes from the GMB workshop:

- Stakeholders identified the key drivers of unhealthy eating and arrived at consensus about areas of intervention and leverage points to reduce unhealthy eating among Caribbean populations.
  - Knowledge, skills training, research, and communication were at the top of the list of intervention areas and leverage points to reduce unhealthy eating.
  - School settings and policy coordination were high on the list of intervention areas and leverage points identified by stakeholders for improvements in healthy eating.

It is significant that knowledge, skills training, and communication were at the top of the priority list of intervention areas because it suggests that public education and awareness of the link between health, nutrition, food and agriculture could ultimately influence dietary patterns in the Caribbean. It is also significant that stakeholder consensus arose from the workshop. This implies that nutrition and health initiatives undertaken at national levels could be scaled at sub-regional or regional levels in the Caribbean.

5.2.3.3 Sustainable Community-based initiatives for diet diversity and food and nutrition security

Achieving sustainable food and nutrition security through community-based initiatives, especially with schools and young people, are at the center of global food system change. For example, Rojas et al. (2011) describe the Think&EatGreen@School (TEGS) project (https://thinkeatgreen.ca/) initiated in 2010 in Vancouver, Canada, where local schools,
students, and researchers from the University of British Columbia (UBC), and community-based researchers and organizations work collaboratively to bring about changes towards food system sustainability, food security, and food sovereignty.

Ideas have been posited about food sovereignty in the Caribbean to address the global forces underlying food imports and food dependency that characterize region’s food system (Thompson, 2019). Advocates of food sovereignty argue that this represents the “right” of local small-holder farmers and populations to define their own food and agriculture, rather than having the food supply subject to global market forces (Thompson, 2019; Beckford and Bailey, 2009). The concept implies that, though community-based food production, home gardens and small holder farming, people will have agency over their food supply.

There is very little scientific evidence from the Caribbean of community-based food production initiatives, but a pilot study was recently undertaken in St. Vincent and the Grenadines to understand how local communities source their food, and to build a regional evidence base to inform policy and consumer dietary practices (Haynes et. al. 2020). The study involved 147 individuals from 86 households who were surveyed to assess the roles of purchasing, own production (including home gardens), and borrow/exchange/barter (BEB) in food acquisition; the roles of super markets, small shops and food service business in purchasing habits were also investigated. An important and novel finding emerging from this research was that diet diversity was positively and significantly associated with BEB and negatively associated with small shops.

Another initiative in St Vincent and the Grenadines, The “Pass-IT-ON” Sustainable Home Garden Project (https://richmondvale.org/en/what-we-do/sustainable-home-gardens), led by Richmond Vale Academy, provides a good model of an approach to achieving food, water and nutrition security with a strong focus on environmental sustainability. The “Pass-IT-ON” project emphasizes permaculture and the use of community and home gardens as a foundation for climate-smart production and selling of nutritious foods to local communities. Reducing reliance on food imports and
stimulating sustainable and diverse food production in support of human health and development of the local economy are at the core of the project’s mission. Based on personal conversations with researchers involved in the project, the initiative shows immense promise as a model for sustainably achieving food and nutrition security in OECS countries. Through a regional and international collaboration among researchers at the University of the West Indies, Cambridge University and the University of Exeter, scientific research is currently underway to formally evaluate the nutritional, health and economic impacts of the “PASS-IT-ON” model in communities in St. Vincent and the Grenadines.

5.2.3.4 New Approaches for Sustainable Achievement of Food and Nutrition Security in OECS

To achieve food and nutrition security and sustainable economic growth in the OECS the following approaches could be considered:

- Address the issue of public awareness of obesity and diet related NCDs in the Caribbean. Recent surveys (FaN project; unpublished) in St. Vincent and the Grenadines and St Kitts and Nevis suggest a gap between consumer understanding of healthy eating and the rising prevalence of obesity and NCDs. Though the prevalence of obesity is escalating in both countries, more than half of the populations in each country believe that they “eat healthy”.
- Price affordability, aggressive industry marketing and ease of availability of processed and unhealthy foods are key drivers of unhealthy eating among consumers. Therefore, national and regional civil society advocacy, as exemplified by HCC, for nutrition-sensitive food policy is paramount.
- Schools are important settings for socialization and the shaping of children’s food habits (Rojas et al. 2011); therefore, schools should be key entry points and “seeding grounds” for food system changes towards food and nutrition security and environmental sustainability. Combining school gardens with local farms practicing climate smart agriculture to supply school feeding programmes with
fresh nutritious produce could lead to sustainable nutrition-sensitive value chains that could spread throughout national and subregional communities

- Strengthening institutional and financial support for community-based food production practices and farmers practicing climate-smart food production could enhance participation in efforts to sustainably achieve food and nutrition security

- Fish is a highly recommended food item in a diverse and healthy diet but the potential for fish and other sea food to contribute to OECS food and nutrition security and economies is underestimated.

- Institutional strengthening of farmer and fisher-folk organization and social capital would contribute towards achievement of food and nutrition security

- Strong emphasis should be placed on investments in research, innovation, and knowledge translation as a basis for collective and community action

### 5.3 Capacity building food and nutrition security in OECS

This final section of the paper deals with human capacity building in the OECS countries as an integral part of efforts to achieve food and nutrition security. Capacity building has been described as “developing and strengthening knowledge, skills, processes, and resources so that institutions and communities can adapt and thrive in a fast-changing world”. Building human capacity should be the central pillar of efforts to address food and nutrition security for sustainable development in OECS; without investments in people, nations cannot thrive, and development falters.

In 2011, Hospedales et al. (2011) published a report on the evaluation of the implementation and impact the CARICOM Heads of Government Port-of-Spain (POS) Declaration- a 15-point mandate and 27 specific commitments to address NCDs in the Caribbean. The following quotations is an excerpt from the report: .... “progress has been moderate partly due to lack of resources and inadequate mechanism for establishing milestones for all of government actions”. The authors go on to report that CARICOM member states with small population size (100, 000 and less) were unable to comply with more than 30 per cent of the performance indicators of the POS Declaration; this contrasted with a compliance rate of 62 per cent for member states
with large populations (excluding Haiti). Low compliance rate, especially in small member states, was associated with limited capacity.

The quotation from Hospedales et al. (2011) underlines the capacity gap confronting the OECS member states, whose financial and human resources have been even more strained by the COVID-19 pandemic.

5.3.1 Gender equity

One of the most profound ways of increasing capacity in the Caribbean is achieving gender equity. Women in the Caribbean are under-represented in the food production sector, and have limited access to land and finance for business development. A 2018 report by the International Labour Organization (ILO, 2018) on gender equity in the Caribbean and based on five countries (Antigua and Barbuda, Dominica, Guyana, Jamaica, and Saint Lucia), emphasized that girls and women generally outperform boys and men in education, yet this superior performance is generally not reflected in the world of work, where the level of overall labour force participation rate and seniority is low.

The author of this paper would direct readers to the ILO report which provides comprehensive treatment of gender equity in the Caribbean. However, legislating and implementing policies and practices that lead to gender equality in the workplace and throughout society, and providing leadership opportunities for women would markedly contribute to narrowing the capacity gap in OECS and other Caribbean countries.

5.3.2 Knowledge generation, sharing and network building

Since 2000, the year of the establishment of the UN Millennium Development Goals (superseded by the 2015 UN SGDs), there have been major initiatives in the Caribbean to generate new knowledge around food and nutrition security. Most of these initiatives have been led by CARDI and the University of the West Indies (Mona, St. Augustine, and Cave Hill campuses) in partnership with regional and international institutions. The following represent examples of significant initiatives aimed at generating research
knowledge and innovations to advance food, nutrition, and health security among the OECS and other CARICOM countries:

- **Annual Reports: Caribbean Agricultural Research and Development Centre (CARDI)**
- **Accelerating Action on NCDs- Evaluation of the 2007 CARICOM Heads of Government Port of Spain NCD Summit Declaration- 2016-UWI-Mona, St. Augustine, Cave Hill; CARPHA; PAHO/WHO; CARICOM; HCC; University of Toronto; Canada’s International Research and Development Centre (IDRC)**
- **Improving the Nutrition and Health of CARICOM Population- 2011-2014. – UWI-St. Augustine; McGill University; University of Guyana; CARDI; Governments of Guyana, Trinidad and Tobago, St. Kitts and Nevis, St. Lucia.; CARPHA; Ross University School of Veterinary Medicine; Group for the Analysis of Development (GRADE)-Peru; Canada’s IDRC**
- **Improving Household Nutrition Security and Public Health in the CARICOM-Food and Nutrition (FaN)Project. 2018-2022. UWI- UWI-Mona, St. Augustine, Cave hill.; University of Technology, Jamaica; University of Cambridge; McGill University; IICA; FAO; PAHO; Healthy Caribbean Coalition (HCC); CARPHA; Caribbean Examination Council (CXC); CARICOM; Canada’s IDRC.**

All the above initiatives involve extensive collaboration and network building of local, regional, and international researchers and professionals from academic institutions in Canada, UK, Peru, and major international organizations and government agencies such as IDRC, FAO, and IICA. The extensive knowledge base and findings from the above research initiatives have been, and continue to be disseminated, electronically and in print, in academic journals, policy briefs, newspaper, radio and other public media, newsletters and bulletins. For example, The PAHO journal dedicated an entire special issue to the dissemination of the results of the POSDEVAL NCD Summit Declaration.

Observations from OECS and CARICOM stakeholder workshops of limitations in knowledge suggest, therefore, the need for enhanced efforts around knowledge sharing and creation of an FNS “knowledge hubs” for ease of public access to information,
knowledge and innovations. Peer-to-peer learning is a significant channel for knowledge transfer within OECS; this avenue for knowledge sharing needs to be explored and amplified.

There is also great potential to tap into the Caribbean professional diaspora, especially in the US, Canada, and UK, to strengthen OECS human capacity. In their evaluation of the role of international migration of talent and diaspora networks, Kuznetsov and Sabel (2006) noted that international mobility of talent (brain drain) is central for learning and development but that diaspora networks can serve as “bridges” by providing expertise, sources of investments and access to markets. These are opportunities open to OECS countries.

5.3.3 Collaboration and stakeholder engagement

Calancie et. al., 2021 characterize cross-sector collaborations as “groups whose members represent different sectors in a community who contribute their unique perspectives, resources, capabilities and social capital towards a shared vision that could not be achieved by organizations acting within a single sector”. Health, education, justice agencies and States within the US are actively promoting cross-sector collaboration to solve complex societal problems (Calancie et. al., 2021;) and there is an ever-expanding field of scientific research on “systems collaboration and systems thinking (Cilenti et al. 2019; Berta et. al. 2015). Cross-sector collaboration is seen as mechanism to engage community members and influence change (Calancie et. al., 2021)

Within the Caribbean there is limited scientific evidence of the impact of cross-sector collaboration and stakeholder engagement on policy action or community practice regarding food and nutrition security. However, issues of food and nutrition security cut across several sectors of government and academic disciplines including, finance, agriculture, health, education and social and services; therefore, it is reasonable to expect that in addressing food and nutrition insecurity, a collaborative approach that seeks diverse perspectives, expertise and resources from stakeholders would minimize “blind spots” associated with single-sector and homogeneous experiences.
The experience and outcomes of the Stakeholder Group Model Building Workshop discussed previously may be instructive. The stakeholders were from different countries, had diverse perspectives and expertise but shared a common vision of food system improvement in the Caribbean. It is unknowable what would have resulted without such collaboration but the success of the exercise in collectively defining viable approaches to improving healthy eating (Guariguata, 2020) provides some evidence of the value of collaboration and stakeholder engagement in the Caribbean.

Along similar lines, Lowitt et. al (2015) concluded that a “community of practice”\(^1\) approach would facilitate the development of social capital to overcome constraints to agricultural development in St Kitts and Nevis; this is a key pillar underlying collaboration. Lowitt et al. (2015) suggest that agricultural value chains are made up of various communities of practice such as farmers, processors, and consumers. Value chain initiatives bring actors together in new organizational arrangements, and these could be strengthened by recognizing the existing ways that individuals in these communities are already learning and interacting together. These communities might then be leveraged to scale up trust and collaboration across entire value chains (Figure 11).

\(^1\) Communities of practice are “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” (Wenger, 2006).
The following conclusions derive from the assessment of the state of food and nutrition security in the OECS, and some of the vulnerabilities, challenges and opportunities confronting the food and health systems in six of OECS countries covered in this paper:

1. Food and nutrition insecurity in OECS continues to be largely an issue of excess intake of calories and low intake of vegetables and fruits leading to obesity and NCDs being the principal FNS challenge confronting OECS member states
2. Diet diversity score is a useful indicator of food and nutrition security but there is a scarcity of scientific research dealing with diet diversity in OECS and other CARICOM countries
3. Food imports, especially of ultra-processed foods, create health vulnerabilities for the OECS populations, and efforts to minimize domestic constraints (lack of access to finance, markets and knowledge networks) on small-holder production
and innovation to enhance availability of fresh and nutritious produce should be pursued

4. Improvements in governance and institutional support could enhance the contribution of the fisheries sector to diet diversity, food and nutrition security and GDP growth within the OECS

5. Climate change is an existential threat to food and nutrition security in OECS, and initiatives to expand climate-smart agriculture, support community-based food production, and develop nutrition-sensitive value chains would build resilience within local food systems and mitigate against environmental and global shocks to OECS countries

6. School settings, policy coordination and cross-sectoral collaboration represent significant leverage points to improve healthy eating and increase food and nutrition security in OECS

7. Mechanisms to enhance knowledge sharing and skills training in food systems and health should be strengthened; creation of “knowledge hubs” in food, nutrition and health systems would facilitate knowledge sharing and public awareness of threats to human and environmental health

8. Social capital embedded within communities and stakeholders should be optimized


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