Improving Food and Nutrition Security in the Caribbean: Linkages among Agricultural, Health and Social Science

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McGill Institute for Global Food Security
Institut pour la sécurité alimentaire mondiale de McGill

McGill

UWI

Canadian International Development Agency | Agence canadienne de développement international

IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international

Outline

1. Project Background – Rationale for Project
2. The “Farm-to-Fork" CIFSRF CARICOM Project
3. Research Interventions & Activities
4. Results and Outcomes
5. Conclusions

Project Background

Project Background

CARICOM- Economic Union of 15 Caribbean Countries

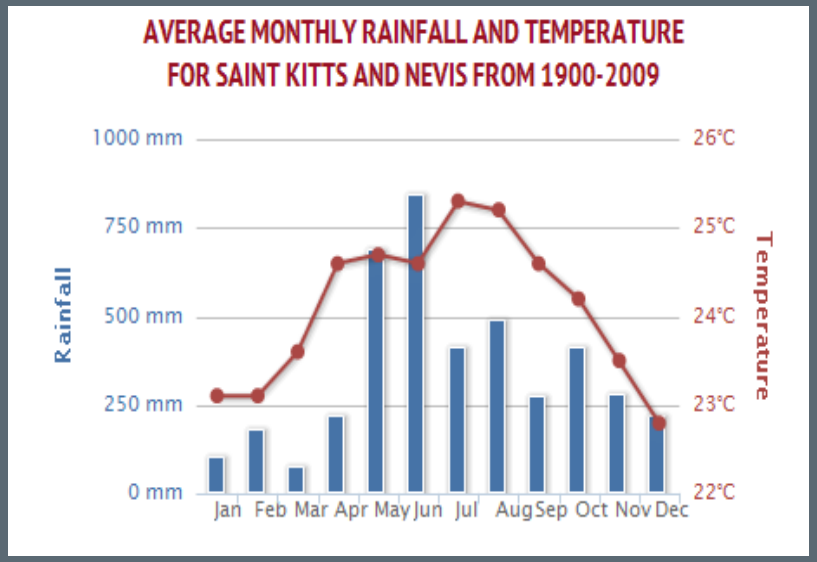
CARICOM: ~7 million people in 15 small countries

Threats to CARICOM Food Security

- Water Scarcity- droughts / floods (seasonality in rainfall: dry – wet season)
- Natural Disasters (hurricane damage to crops and infrastructure)
- Decline in agricultural productivity and global competitiveness
- Limitations in research and data-generating capacity for decision-making
- Constraints to Institutional support for Small Holder Farmers

Project Background

Average monthly rainfall - St. Kitts and Lucia



Project Background

CARICOM: Hurricane Vulnerabilities

Project Background

Decline of the Sugar and Banana Industries in CARICOM Countries

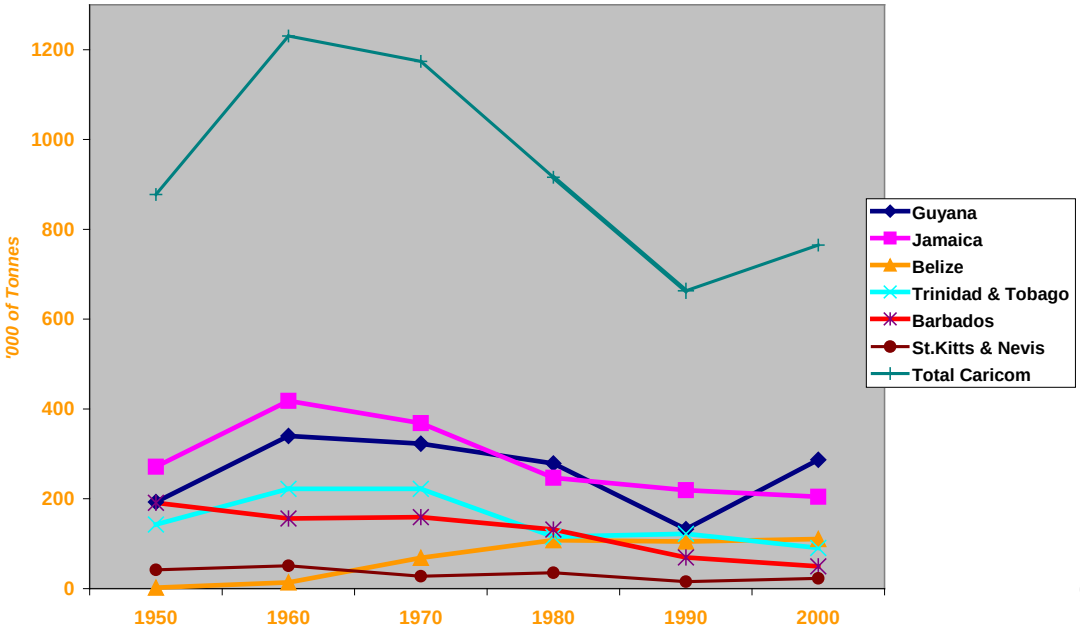
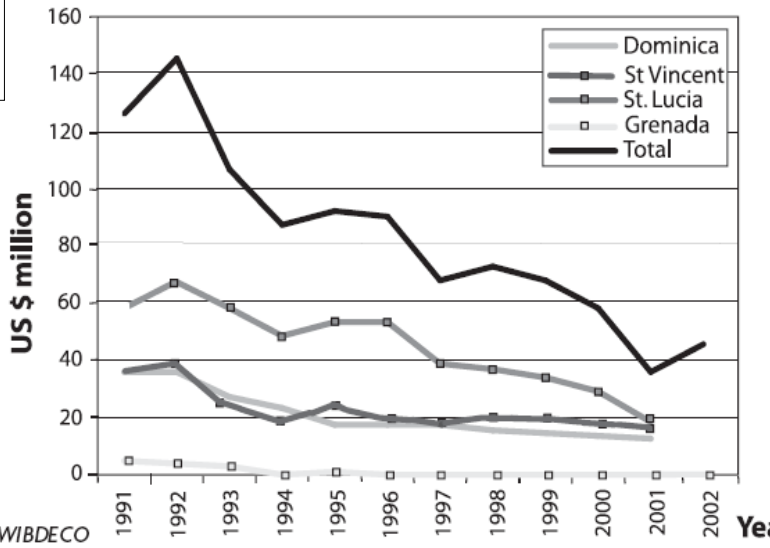


Figure 5. Export values for bananas fob, 1991-2002, $US million

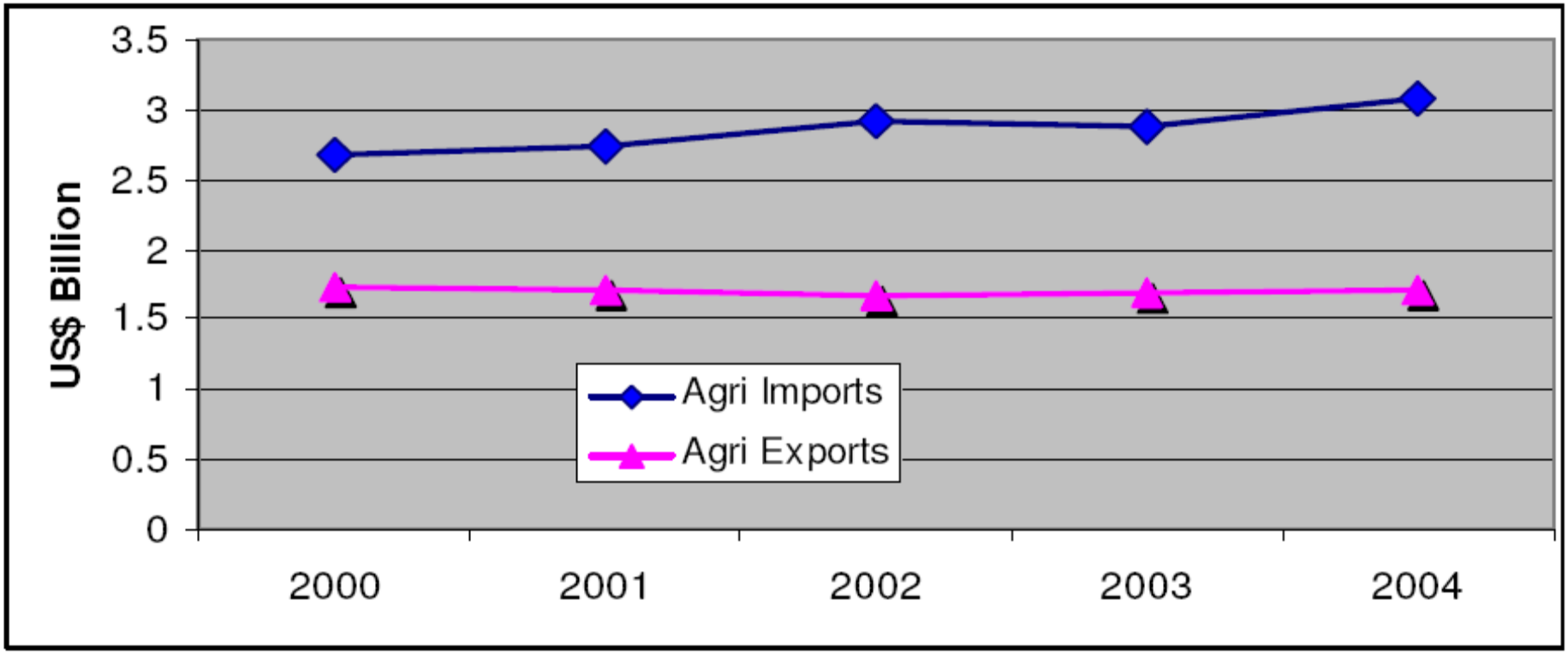


Source : WIBDECO

Project Background

Caribbean Food Trade Balance

Figure II.1: CARIFORUM Food Trade Balance, 2000-2004.



Source: FAOSTAT. www.fao.org. July, 2007.

Project Background

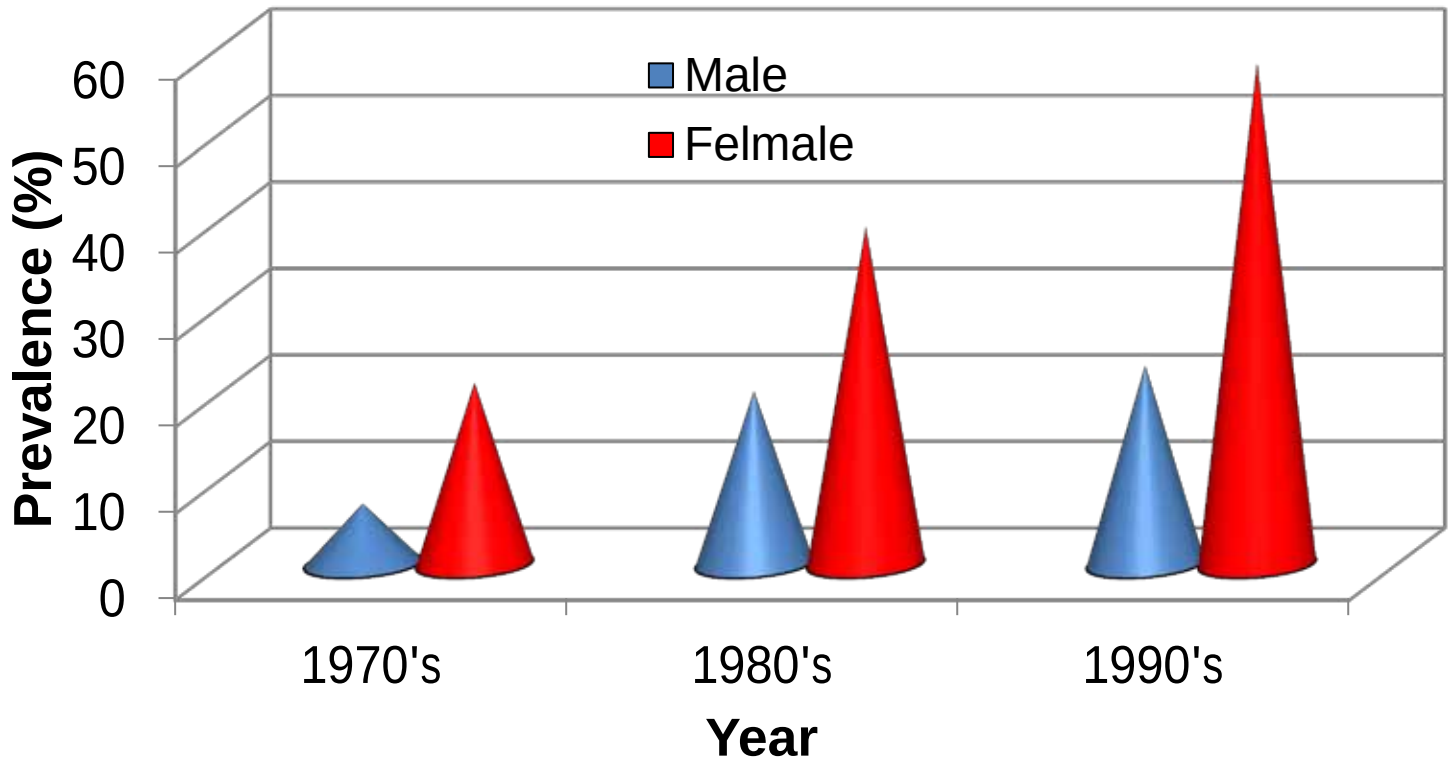
Food Availability in the Caribbean

Food Availability	Availability[1] (Calories/caput/day)		RPG[2]	2000-02 Surplus (+) or Deficit (-) relative to RPG (%)
	1991-03	2000-02		
Total Food Calories	2,933	3,071	2,250	36(+)
Carbohydrates	1,766	1,825	1,238	47(+)
Protein	313	336	225	49(+)
Fats/Oils	746	802	450	78(+)
Fruits/Vegetables	215	238	337	29(-)
Sweeteners	393	424	180	136(+)
Staples[3]	967	974	1012	4(-)

Source: FAO-CARICOM Food Security Project Report 2007

Project Background

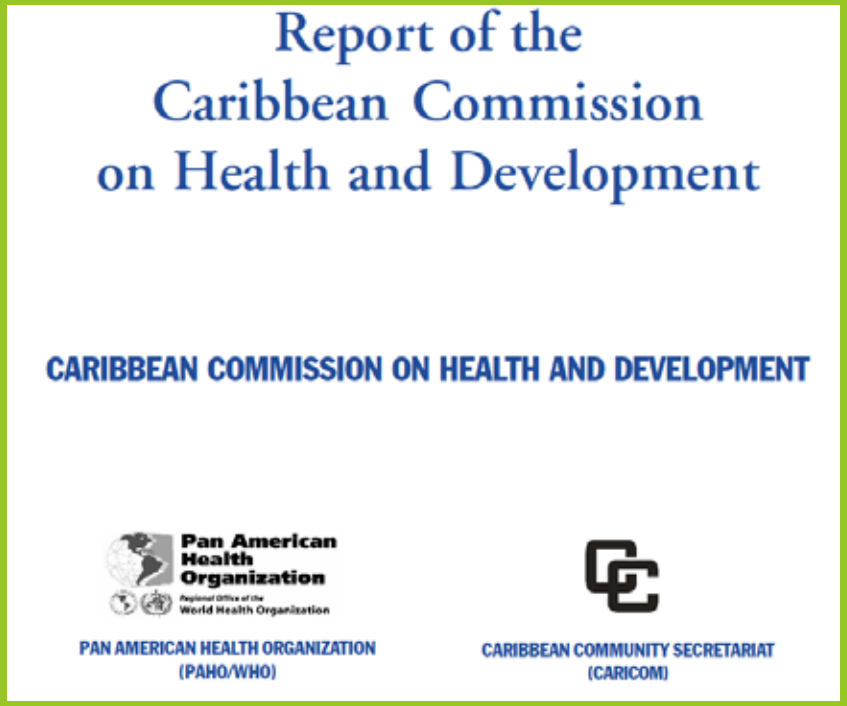
Obesity Trends in CARICOM



Source: CFNI

Project Background: Project Motivation

2 Key CARICOM Reports on Agriculture and Health



Project Background: Project Motivation

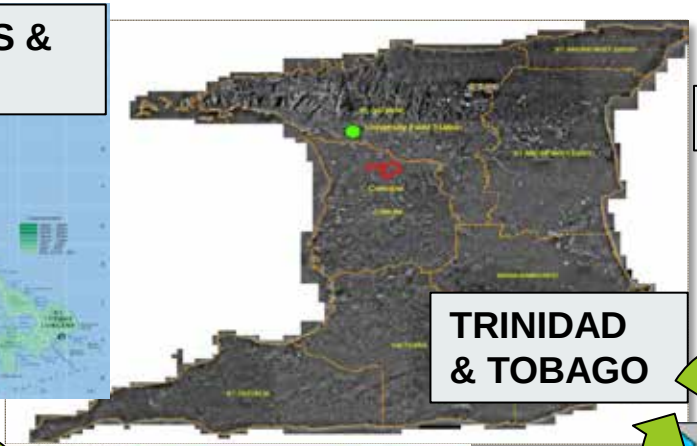
CARICOM Project Challenge: Linking Agriculture and Health

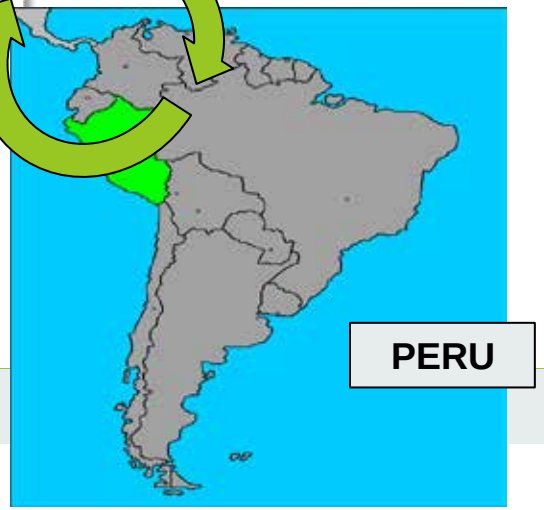
- **Obesity/Overweight:** major public health problems linked to CNCD's
- Estimated cost of obesity and its co-morbidities: **US$ 1 billion per year**
- Shifts in consumer food choices towards energy-dense foods
- Need for agricultural diversification away from monoculture (sugar, bananas, rice) to accommodate need for **increased production and consumption of vegetables, fruits and other nutritious foods**

CIFSRF CARICOM Project

CIFSRF CARICOM PROJECT

Hemispheric and sub-regional Collaboration





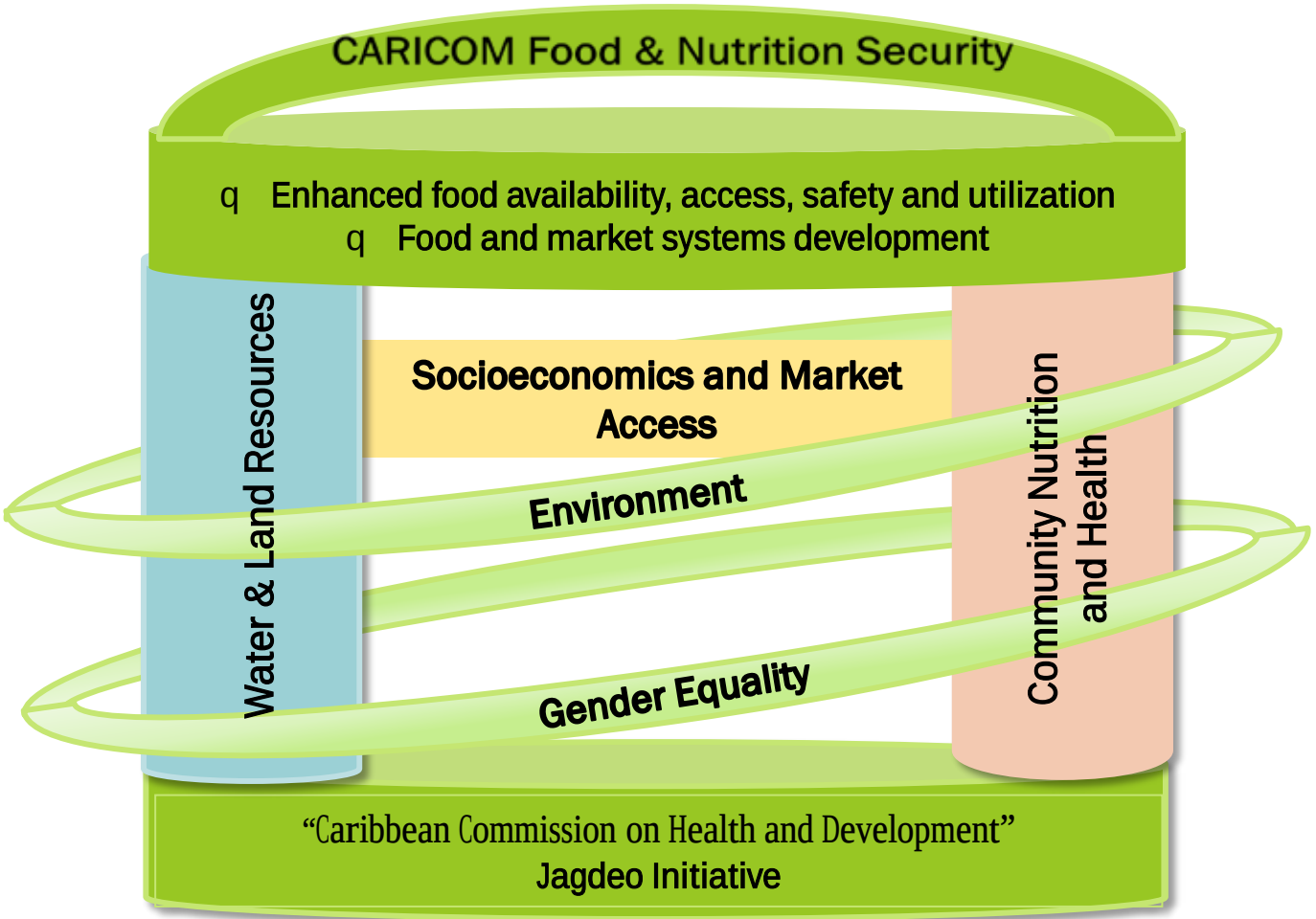
CIFSRF CARICOM PROJECT

Project Goals

- Improve nutrition and health outcomes of children and women (vulnerable segments of the populations), through increased availability and access to foods that would decrease caloric intake and increase micronutrient intake;
- Develop food production systems based on agricultural diversification, conservation of water, and efficient use of land;
- Adopt and adapt international standards of food safety and quality for a healthy, market-oriented food supply chain;
- Through South-South collaboration, understand the constraints to, and increase the rate of technology adoption by small farmers;
- Enhance CARICOM's human resource capacity to solve problems of food and nutrition security.

CIFSRF CARICOM PROJECT

Project Integration and Design



CIFSRF CARICOM PROJECT

Farm-To-Fork Approach

Research Interventions & Activities

Research Interventions & Activities

Country	Baseline Surveys		Drip Irrigation	Protected Agriculture	Post Harvest Quality	Forage-based Small Ruminant Production	School Lunch Menu Change
	PHS	CHS					
Guyana	X		X		X		
St. Lucia	X		X	X			
St. Kitts & Nevis	X	X	X	X	X	X	X
Trinidad &Tobago	X	X		X	X		X

Research Intervention & Activities

Purpose of Baseline Surveys

Country	Baseline Surveys	
	PHS	CHS
Guyana	X	
St. Lucia	X	
St. Kitts & Nevis	X	X
Trinidad &Tobago	X	X

- Provide baseline information
- Identify sources of market failures
- Measure gender-based decision making within households
- Evaluate food consumption patterns of households, and nutrition and health status of 5-9 yr old school children

Research Intervention & Activities

PHS Study Design and Description

Country	Baseline Surveys		
	PHS	Sample Size	RR
Guyana	X	304	58%
St. Lucia	X	118	63%
St. Kitts & Nevis	X	91	66%
Trinidad &Tobago	X	93	78%

- Lists of farmers provided by local partners
- Comparison of “intervention communities” with control
- 90 minute, modular questionnaire

Research Intervention & Activities

CHS Study Design and Description: St. Kitts-Nevis

Country	Baseline Surveys	
		CHS
Guyana		
St. Lucia		
St. Kitts & Nevis		X
Trinidad &Tobago		X

- 7 primary schools in government sponsored lunch program: 4 with menu change ; 3 control
- Sample Size: 189 caregivers; 188 children (5-9 yr.)
- RR: 92%
- Data Collection
  - Children's anthropometrics: height and weight
  - Children's blood pressure, finger-prick blood sample (Hb assay)
  - Caregivers completed a 60 minute questionnaire
  - Caregivers' anthropometrics

Research Intervention & Activities

Country	Drip Irrigation
Guyana	X
St. Lucia	X
St. Kitts & Nevis	X
Trinidad &Tobago	

Drip irrigation lines fed by canals in Guyana

Water catchment dam and drip irrigation lines with mulch in St. Kitts

Research Intervention & Activities

Country	Protected Agriculture
Guyana	
St. Lucia	X
St. Kitts & Nevis	X
Trinidad &Tobago	X

Research Intervention & Activities

Country	Post Harvest Quality
Guyana	X
St. Lucia	
St. Kitts & Nevis	X
Trinidad &Tobago	X

Research Intervention & Activities

Country	Forage-based Small Ruminant Production
Guyana	
St. Lucia	
St. Kitts & Nevis	X
Trinidad &Tobago	

Research Intervention & Activities

Country	School Lunch Menu Change
Guyana	
St. Lucia	
St. Kitts & Nevis	X
Trinidad &Tobago	X

Results and Outcomes

Results and Outcomes

1. Training and Capacity Building
2. Baseline Surveys: Farm-to-Fork Model, St. Kitts-Nevis
3. Research Interventions

Results and Outcomes

1. Training and Capacity Building
2. Baseline Surveys: Farm-to-Fork Model, St. Kitts-Nevis
3. Research Interventions

Training and Capacity Building

Installation of Agro-met station in St. Kitts

Soil Sampling in St. Lucia

Field personnel training in Guyana

Survey Training of field personnel in Trinidad

Training and Capacity Building

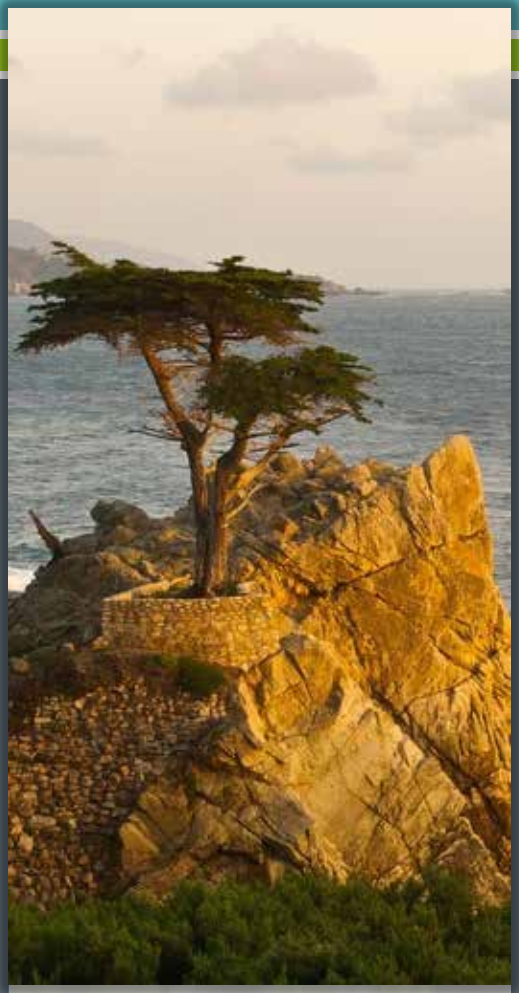
Total Personnel Trained (to Dec. 2012)

Country	Female	Male
Overall	61	124
Guyana	16	41
Trinidad	16	4
St. Lucia	13	24
St. Kitts	16	55

Results and Outcomes

1. Training and Capacity Building
2. Baseline Surveys: Farm-to-Fork Model, St. Kitts-Nevis
3. Research Interventions

Baseline Surveys: Farm-To-Fork Model



St. Kitts-Nevis

Baseline Surveys: Farm-To-Fork Model

Profile of Consumers: Families with Children

Preliminary Findings from CHS, St. Kitts-Nevis

Baseline Surveys: Farm-To-Fork Model

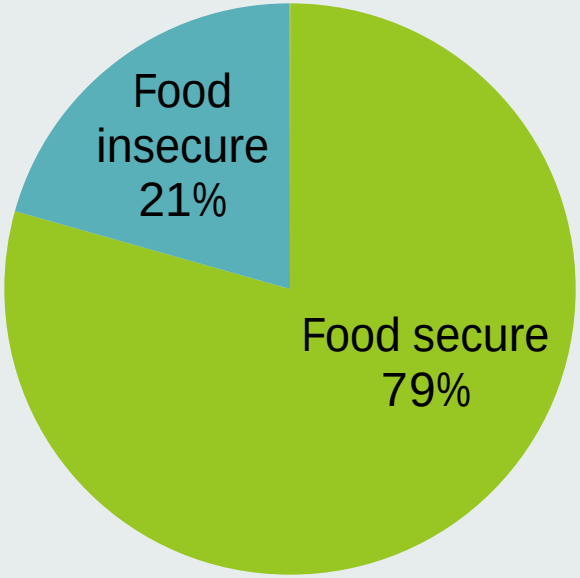
§Families with Children in St. Kitts: Caregiver's Characteristics

Caregiver's Characteristics	
Age (mean)	35 yrs.
Female	90%
High School	84%
Health Status (Good to Excellent)	93%

Household Characteristics	
Single-Headed Female	44%
Owns Mobile Phone	97%
Internet Use	50%
Owns Dwelling/Land	77%

Baseline Surveys: Farm-To-Fork Model

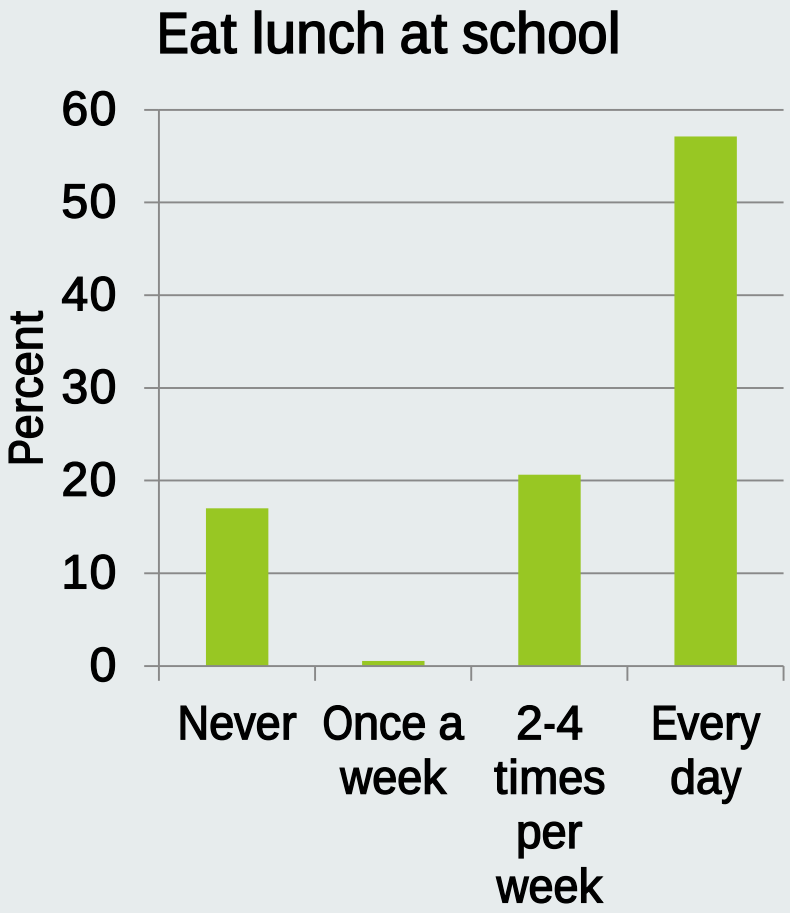
§Household Food Security

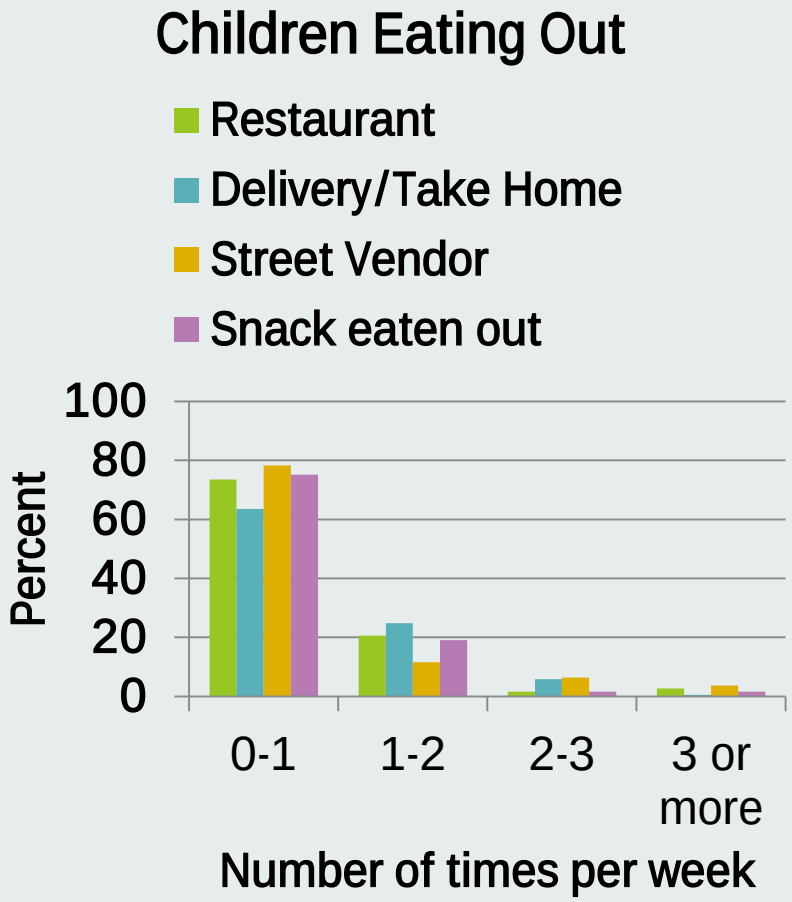


N=186

Baseline Surveys: Farm-To-Fork Model

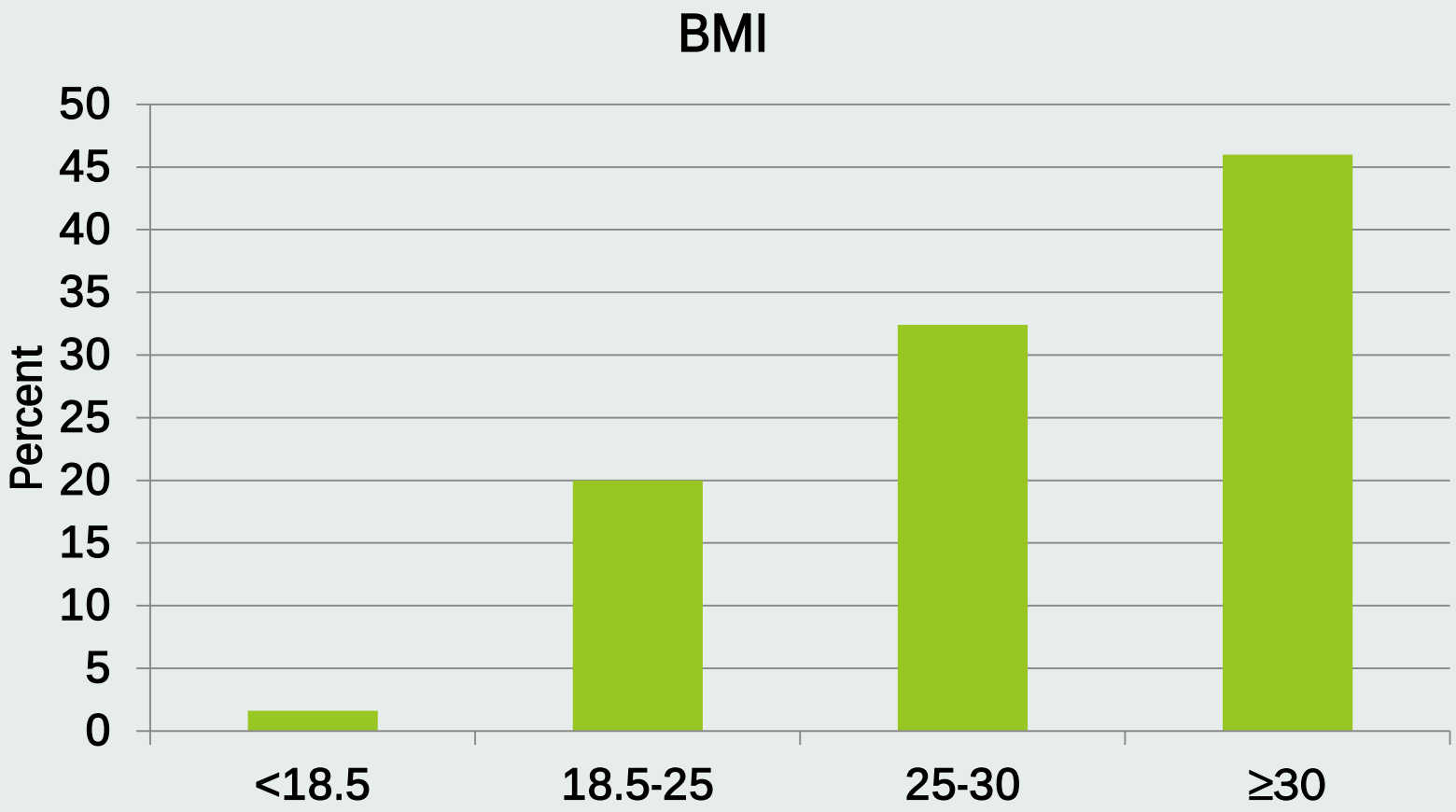
§Lifestyle Behavior of Children





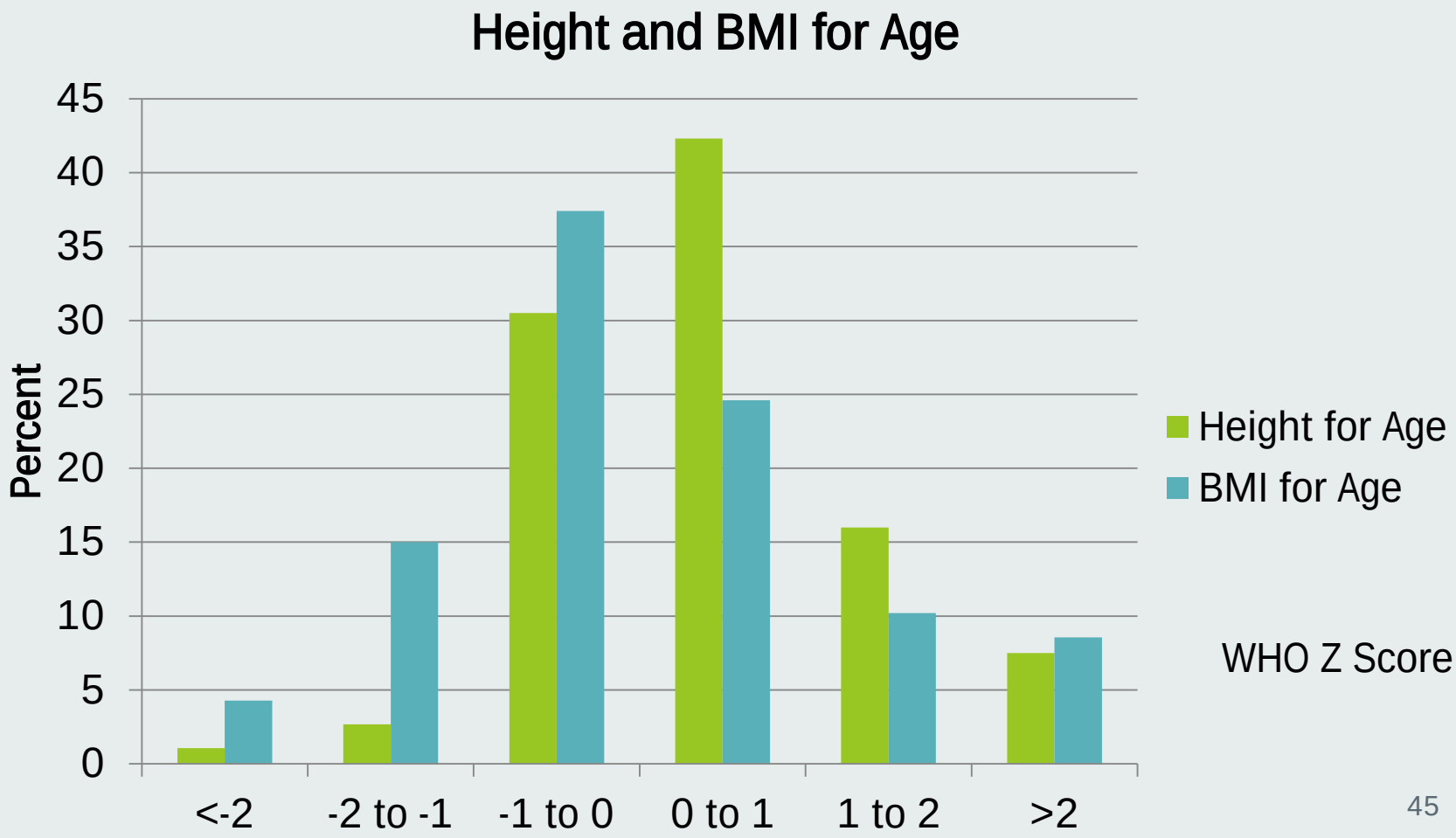
Baseline Surveys: Farm-To-Fork Model

§Health and Nutrition Status of Caregivers



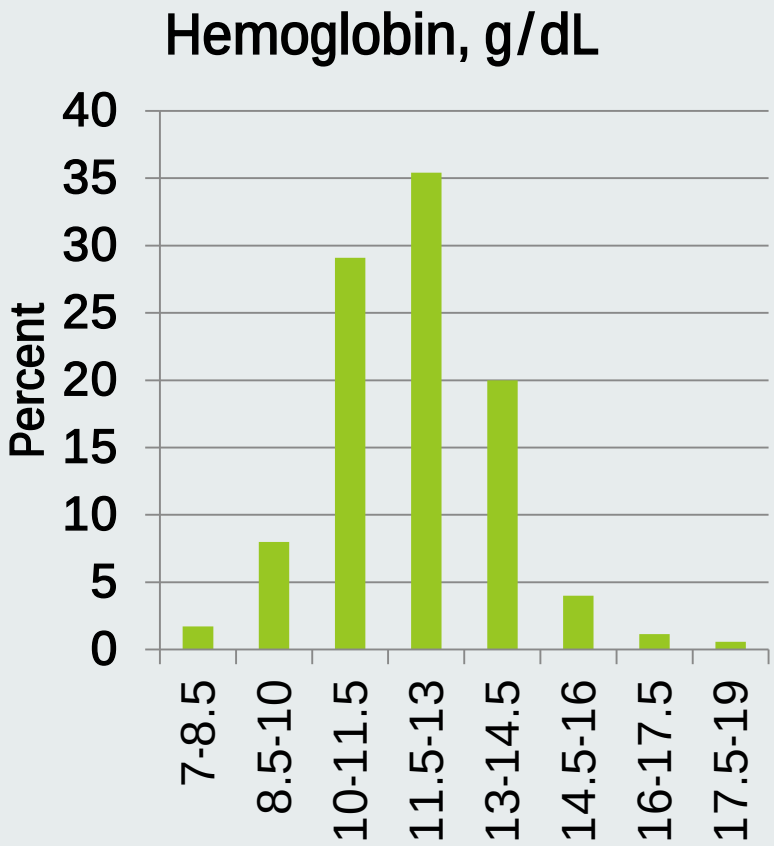
Baseline Surveys: Farm-To-Fork Model

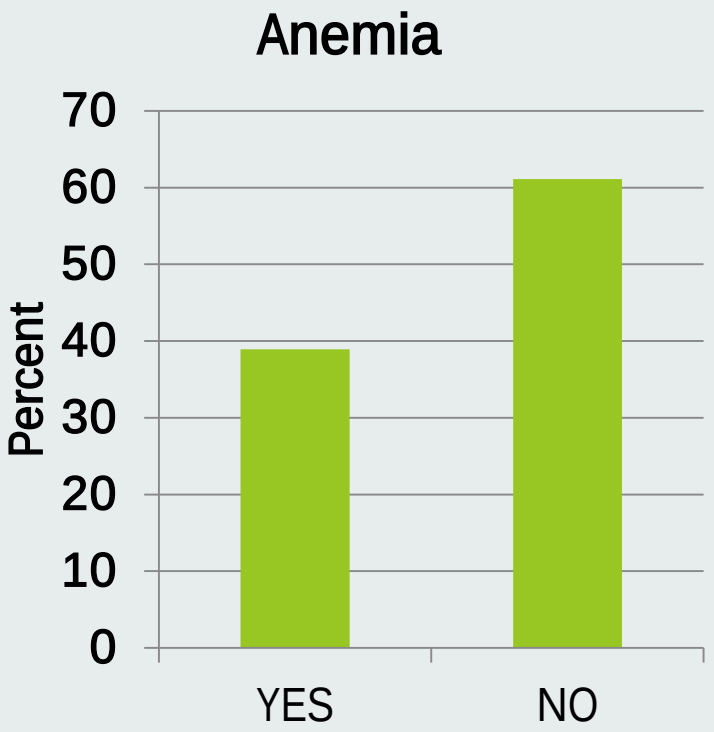
§Health and Nutrition Status of Children



Baseline Surveys: Farm-To-Fork Model

§Health and Nutrition Status of Children





Baseline Surveys: Farm-To-Fork Model

Dietary Intake of Children

Macro-Nutrient Intake	Mean ± SD	Acceptable Macronutrient Distribution Range
Energy (*kilocalories*)	1,888 ± 726	-
Percent energy from fat	26.1 ± 9.07	25-35
Percent energy from carbohydrate	61.6 ± 11.3	45-65
Percent energy from protein	13.6 ± 4.84	10-30
N=188		

Baseline Surveys: Farm-To-Fork Model

Dietary Intake of Children

Micro-Nutrient	Mean ± SD	Estimated Average Requirement
Fiber (g)	14.2 ± 8.77	25*
Calcium (mg)	647 ± 370	800
Iron (mg)	16.3 ± 12.0	4.1
Zinc (mg)	7.98 ± 4.27	4.0
Vitamin D (mcg)	9.02 ± 8.23	10
Vitamin C (mg)	190 ± 269	22
N=188		

* Fiber does not have an estimated average requirement, this is an adequate intake

Summary of CHS Findings

- Children are growing well in height but 20% are overweight.
- Dietary habits are being explored in terms of foods, fruits and vegetables, added sugars, and sources of calcium
- Anemia is of concern and the underlying reasons need to be understood
- Food Insecurity is high in St Kitts and Nevis

Baseline Surveys: Farm-To-Fork Model

Profile of Producers

Preliminary Findings from PHS, St. Kitts-Nevis

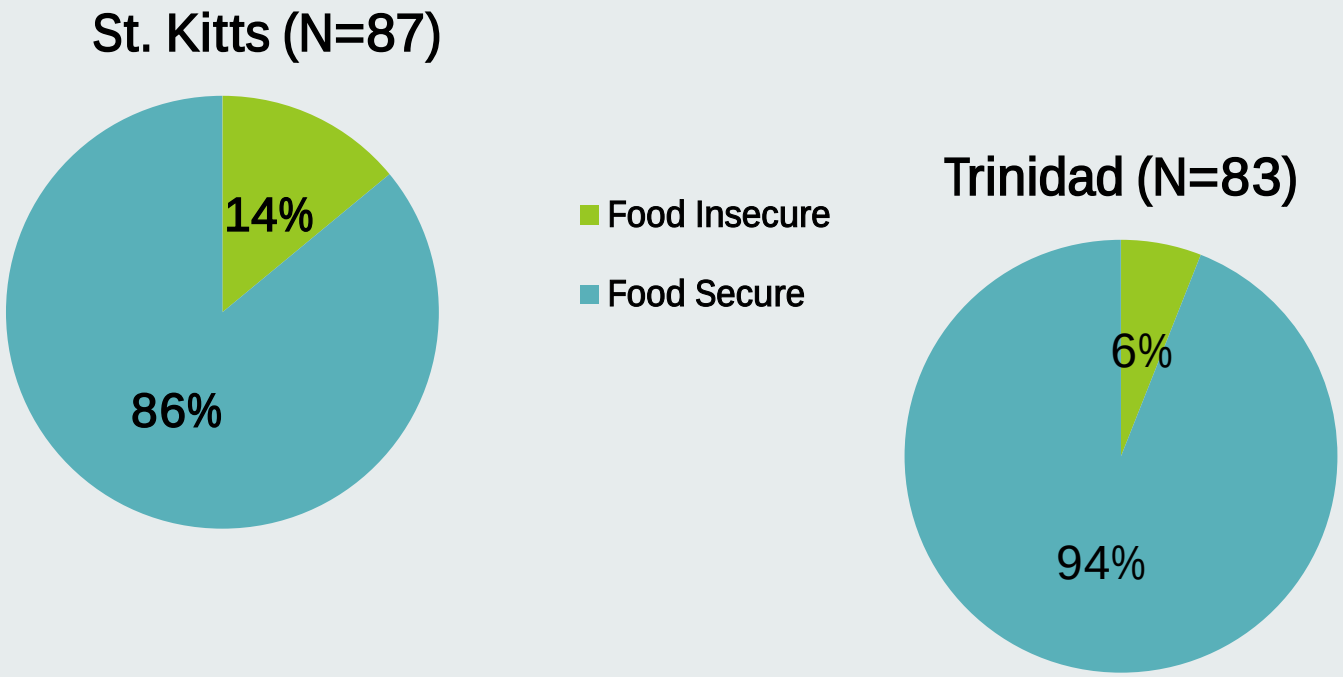
Baseline Surveys: Farm-To-Fork Model

§Farmers' Profile in St. Kitts

Respondent's Characteristics	
Age	50 yr
Female	20%
High School	67%
Health Status (Good to Excellent)	96%
Household Characteristics	
Single-Headed Female	14%
Owns Mobile Phone	98%
Internet Use	57%
Owns Dwelling Land	74%

Baseline Surveys: Farm-To-Fork Model

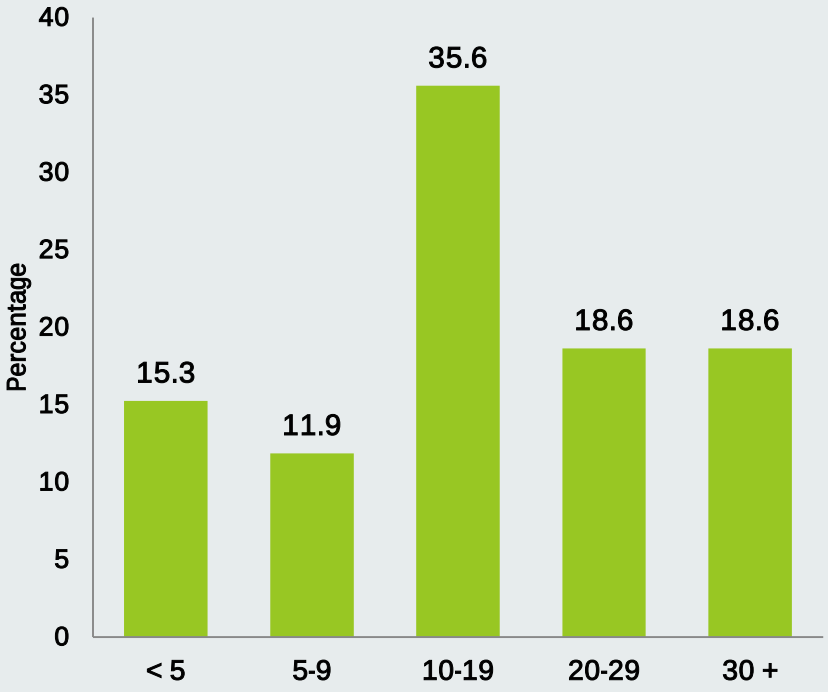
Household Food Security among farmers in St. Kitts compared to Trinidad



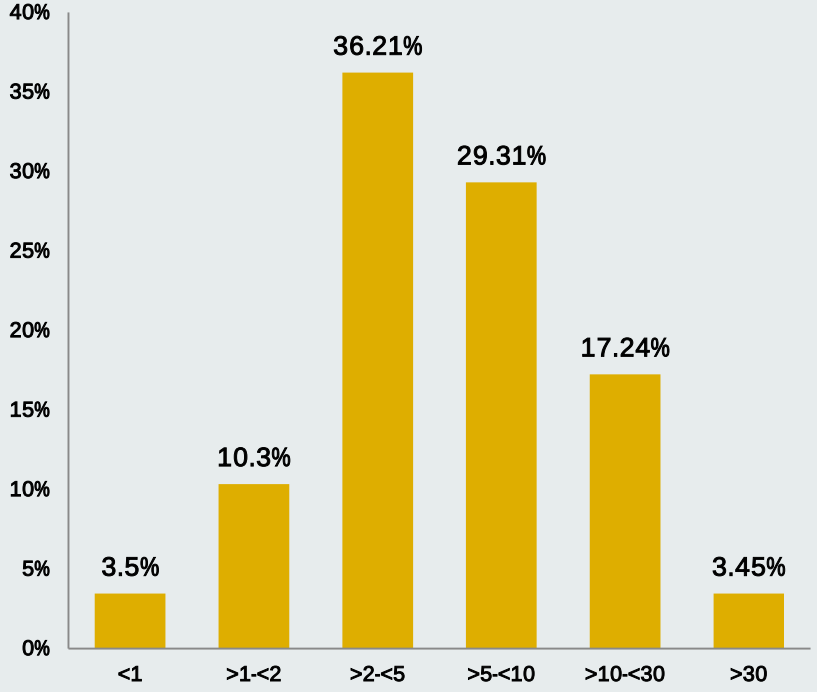
Baseline Surveys: Farm-To-Fork Model

Farming Practices

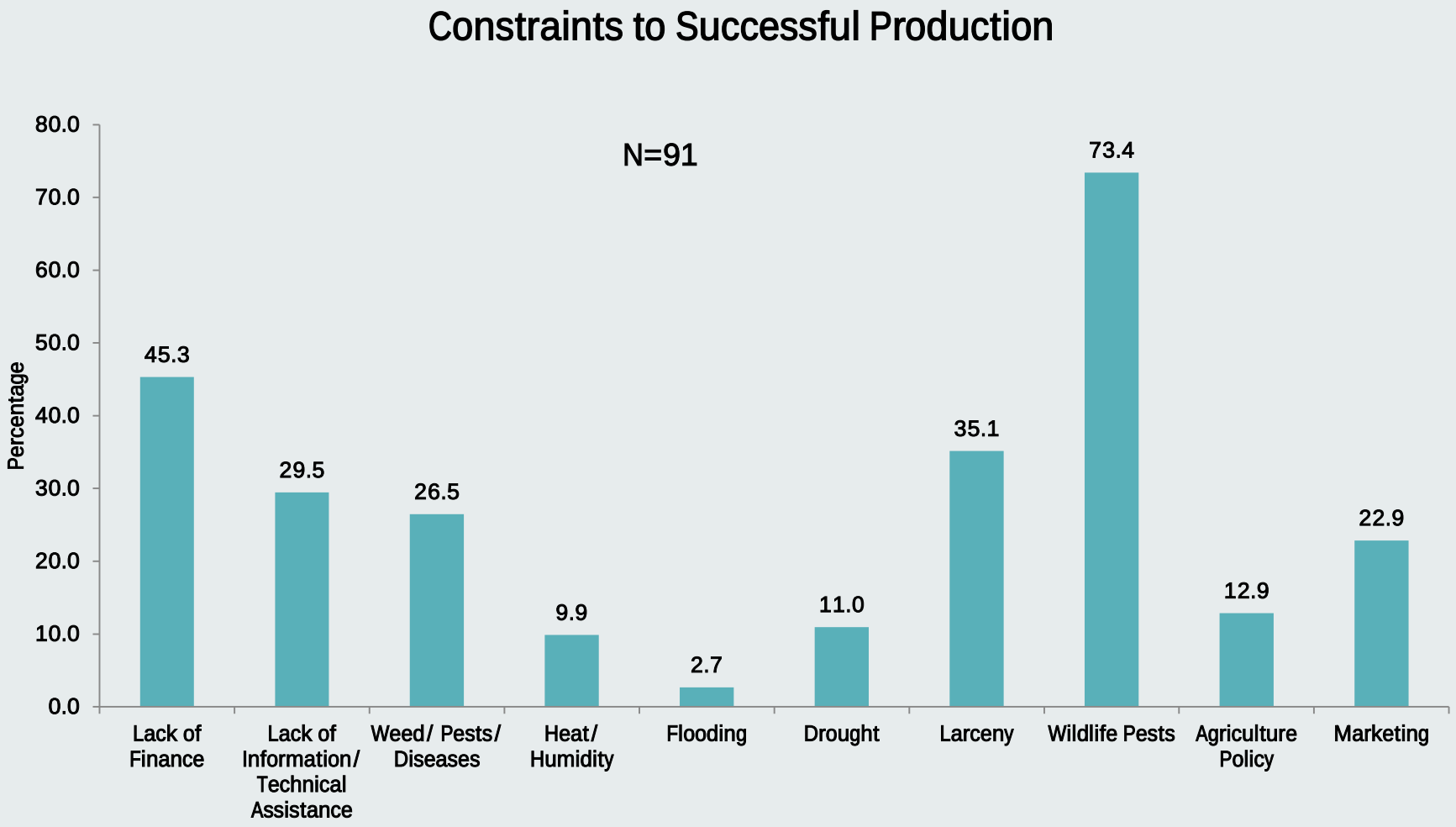
Number of Years Farming



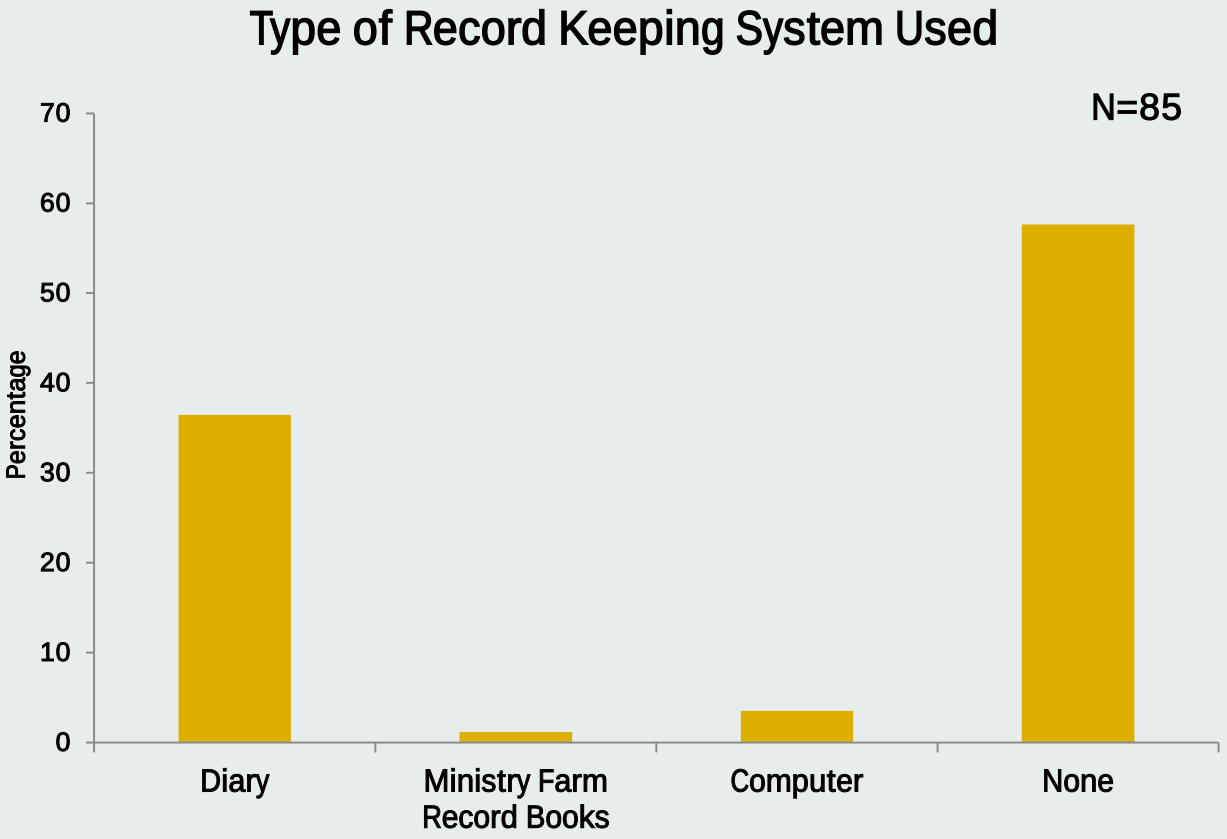
Farm Size (Acres)



Baseline Surveys: Farm-To-Fork Model

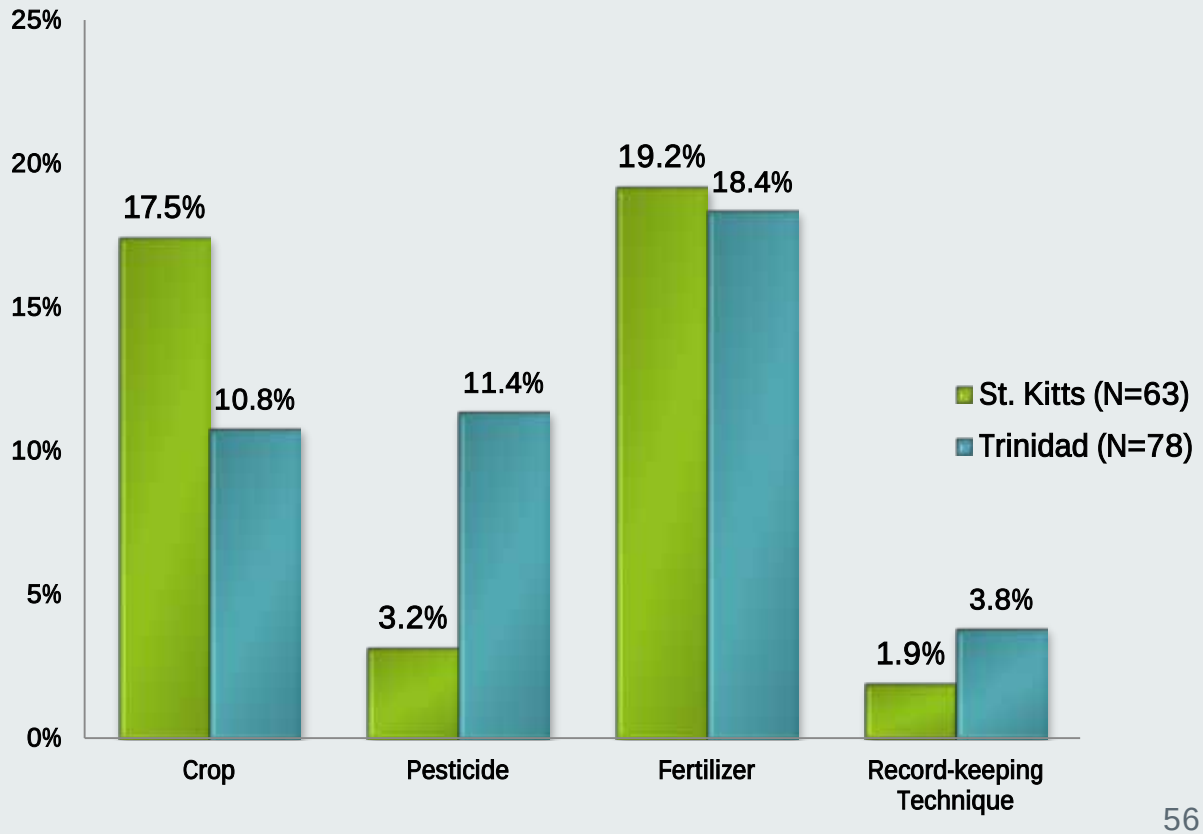


Baseline Surveys: Farm-To-Fork Model

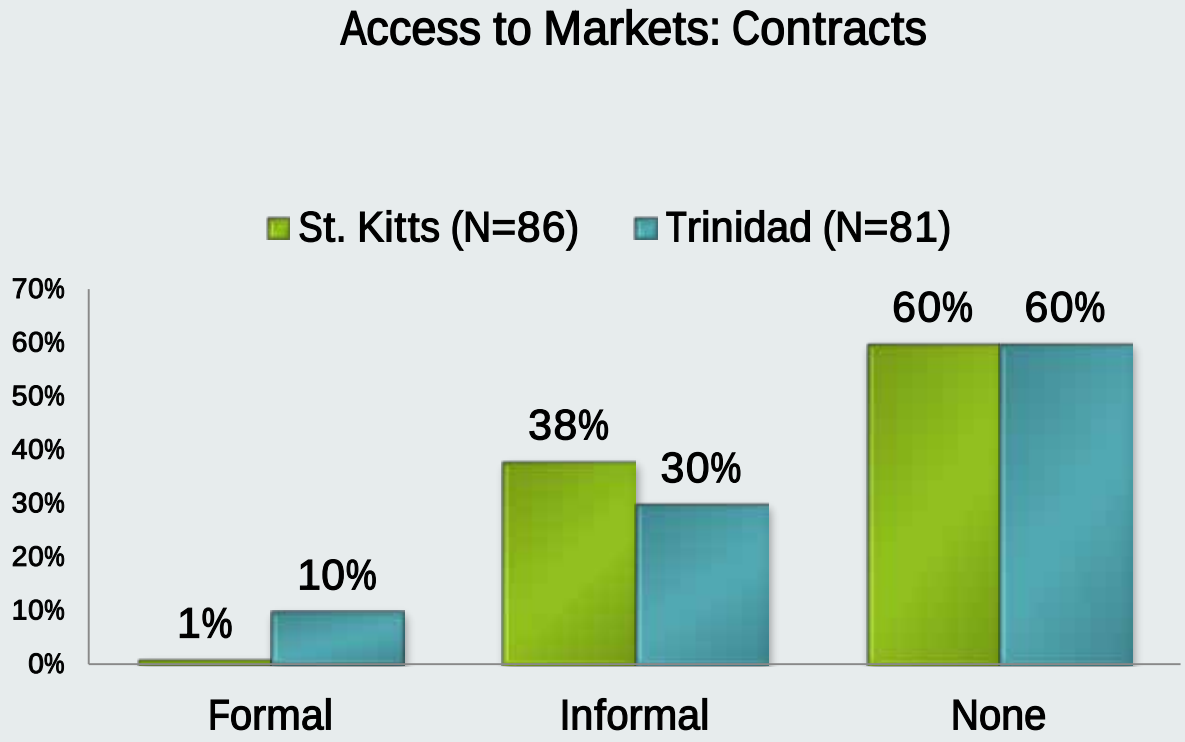


Baseline Surveys: Farm-To-Fork Model

In the last 12 months, have you used or tried out a new...



Baseline Surveys: Farm-To-Fork Model



Summary of PHS Findings

- **Health and Food Security:**
  - Based on self reporting, respondents generally healthy
  - Compared to Trinidad, relatively high level of food insecurity among farmer households in St. Kitts
- **Technology Adoption:**
  - Willingness among farmers in St. Kitts to adopt new technology for "production inputs" but low propensity for **record keeping**
- **Market Access:**
  - A most striking result is the lack of **"marketing of contracts "**with retailers, limiting market opportunities for producers

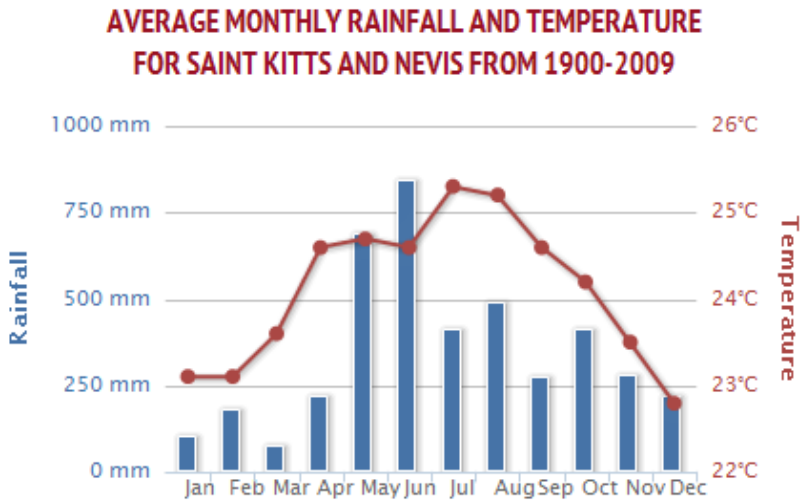
Results and Outcomes

1. Training and Capacity Building
2. Baseline Surveys: Farm-to-Fork Model, St. Kitts-Nevis
3. Research Interventions

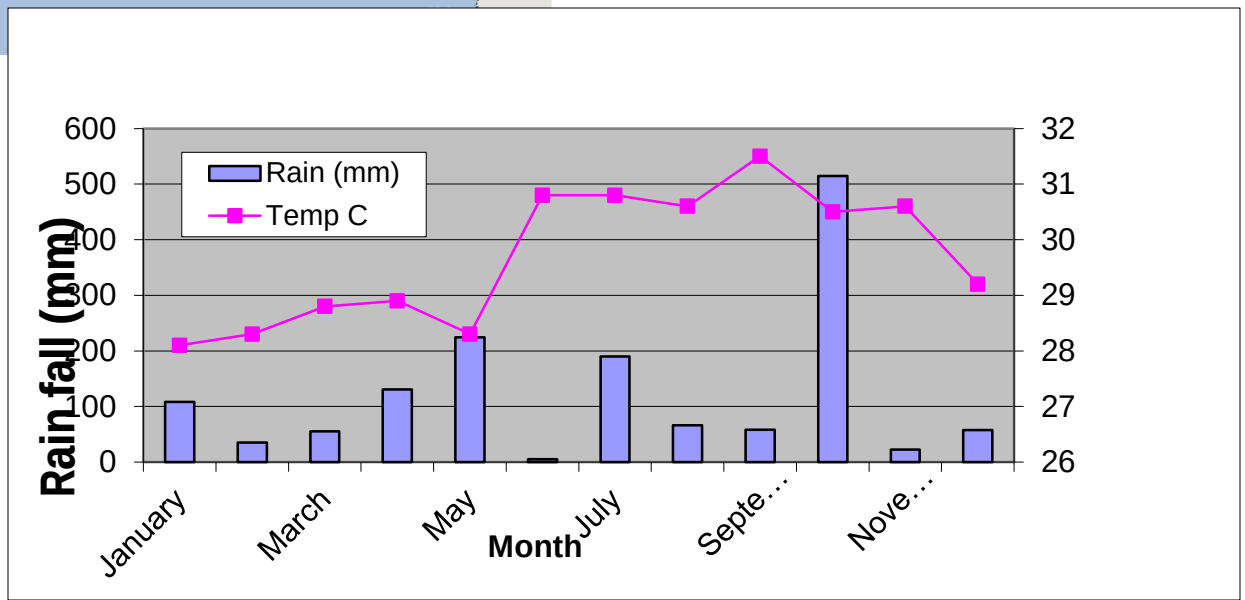
Research Intervention: Drip Irrigation

Preliminary Findings from St. Kitts-Nevis and Guyana

Intervention: Irrigation



Source: The World Bank



Intervention: Irrigation

Drip Irrigation and Crop Production in St. Kitts

Cultivation of tomato and pumpkin under drip irrigation and mulch in St. Kitts

Intervention: Irrigation

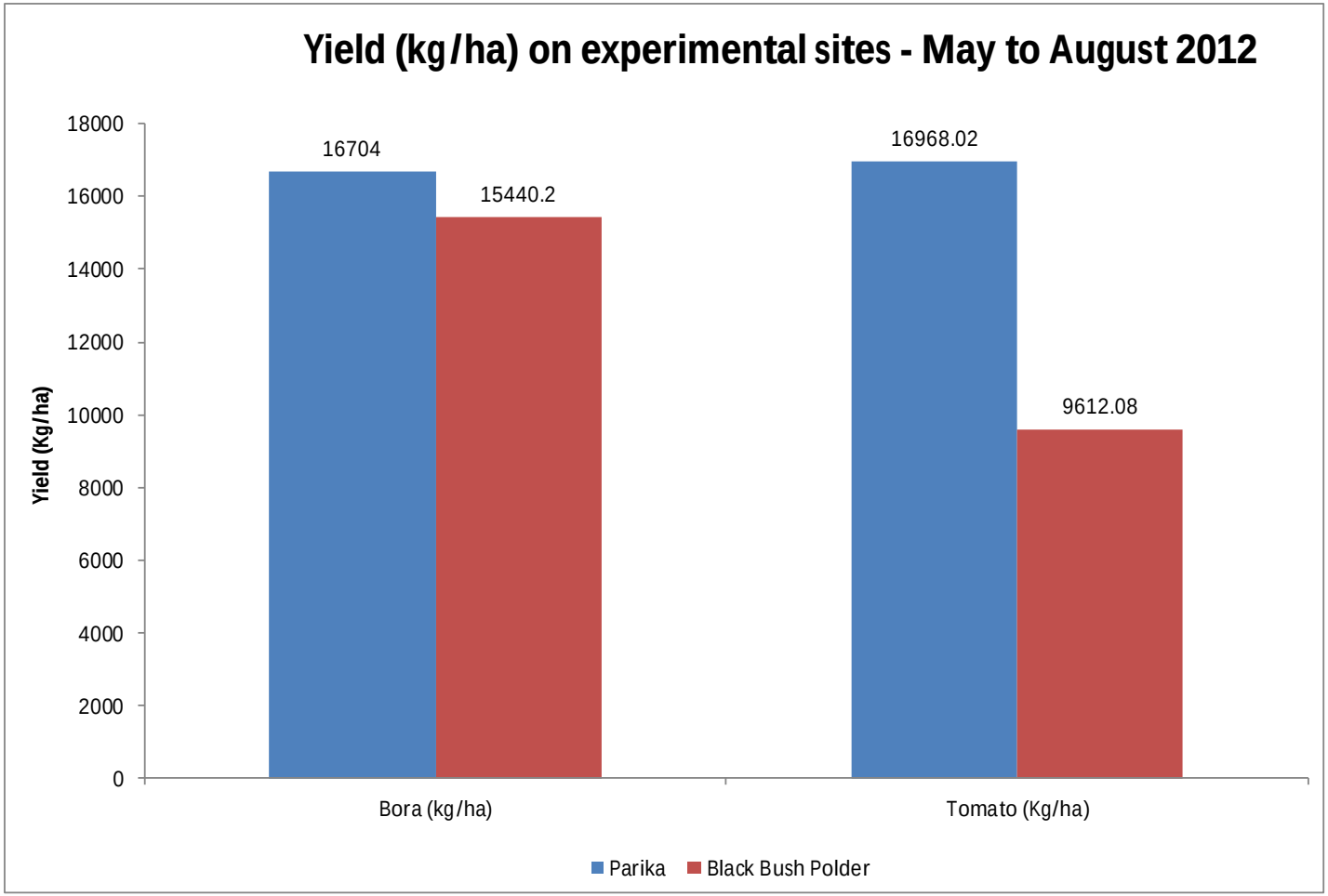
- St Kitts – 18 farmers on 2 different sites

Harvesting of string beans from drip irrigated plots in St. Kitts

Tomato harvesting from drip irrigated plots in St. Kitts

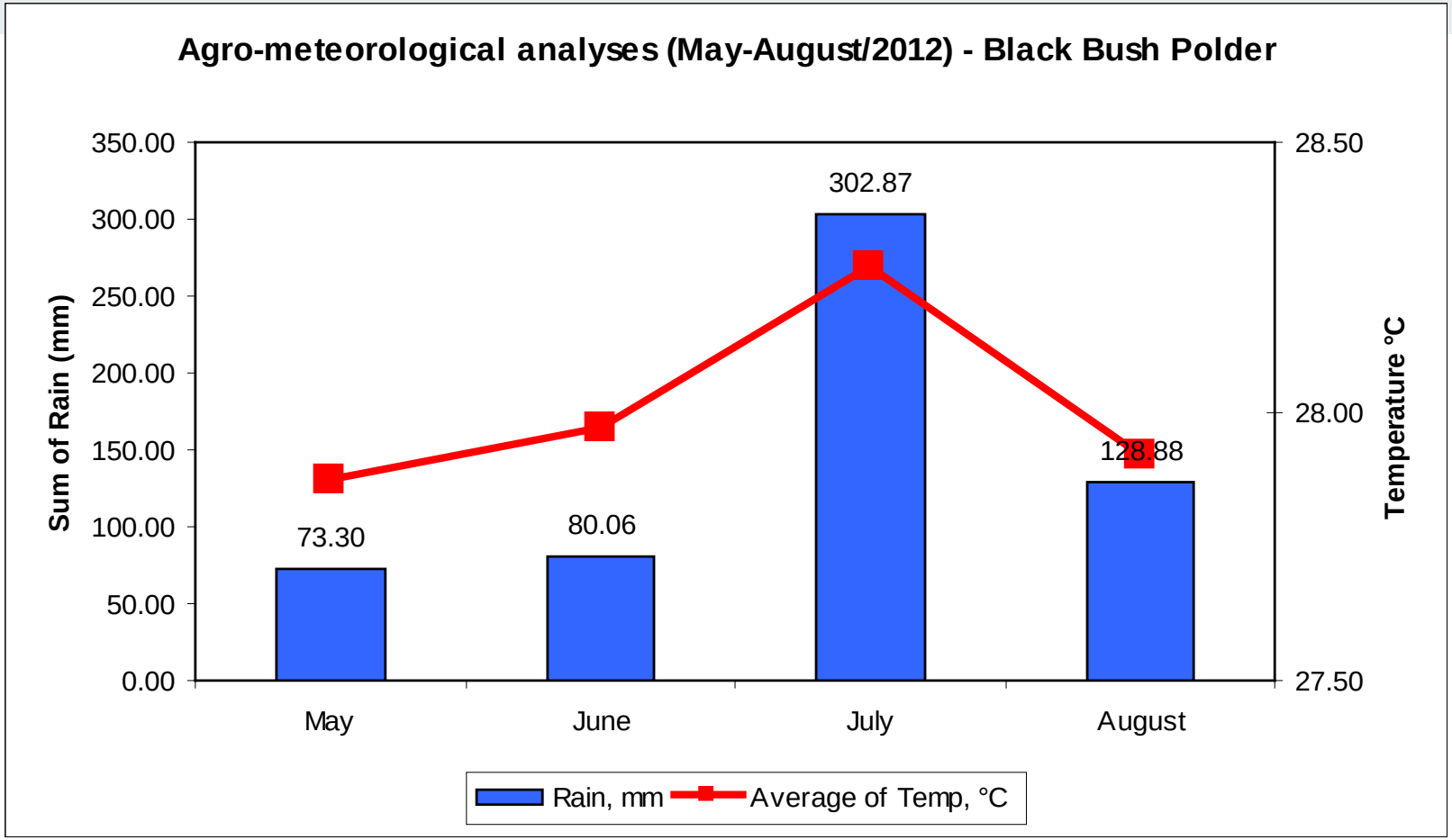
Intervention: Irrigation

Preliminary Results of Crop Yields from Drip Irrigation Studies in Guyana



Intervention: Irrigation

Agro-Meteorology Inputs to Water Use Efficiency Models



Emerging Findings in St. Kitts

- Water harvesting and drip irrigation technology mean that farmers are no longer dependent just on rainfall for **year round food crop production**
- Small farmers have progressed from being “subsistence holders "to being **more entrepreneurial**;
- Integrating **produce from project farmers into the school lunch feeding** provides farmers with an additional market outlet for their produce
- Farmers have intensified their food crop production practices, growing a **broader range (diversifying)** of food crops on **limited land**, increasing crop yields, with potential for increased incomes from irrigated agriculture;

Research Intervention: Protected Agriculture

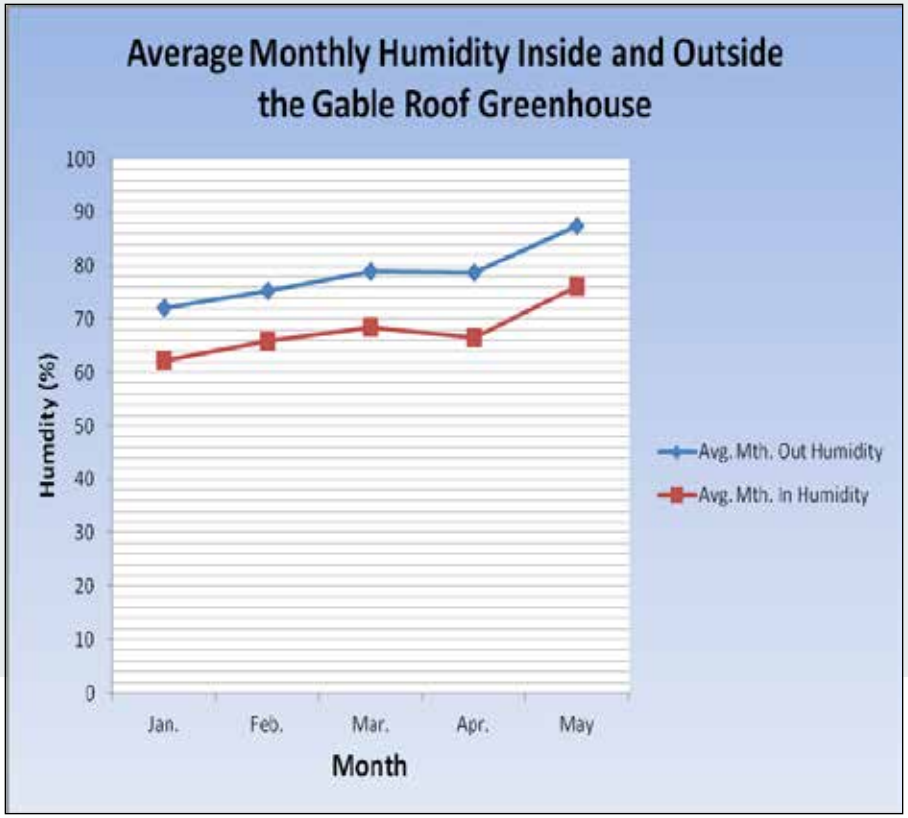
Preliminary Findings from Trinidad-Tobago

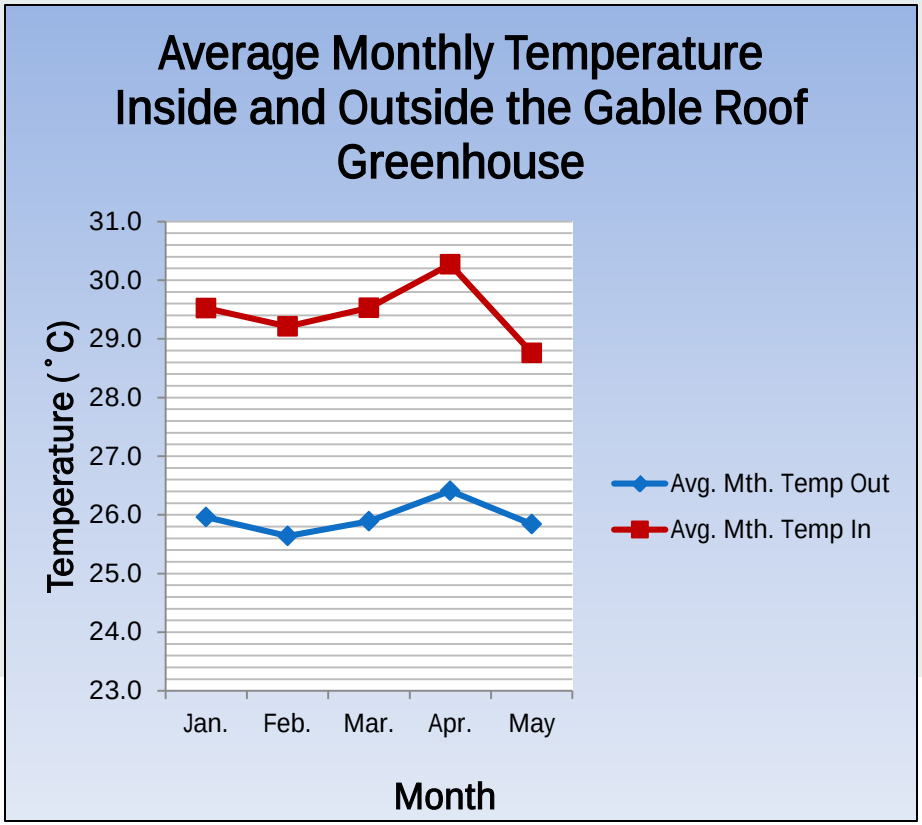
Intervention: Protected Agriculture

Crop studies under protected agriculture in Trinidad

Intervention: Protected Agriculture

Environmental Conditions in an enclosed Gable Roof Greenhouse





Intervention: Protected Agriculture

Optimizing greenhouse design for local conditions

Gable Roof (conventional)

Natural ventilation augment cooling (NVAC)

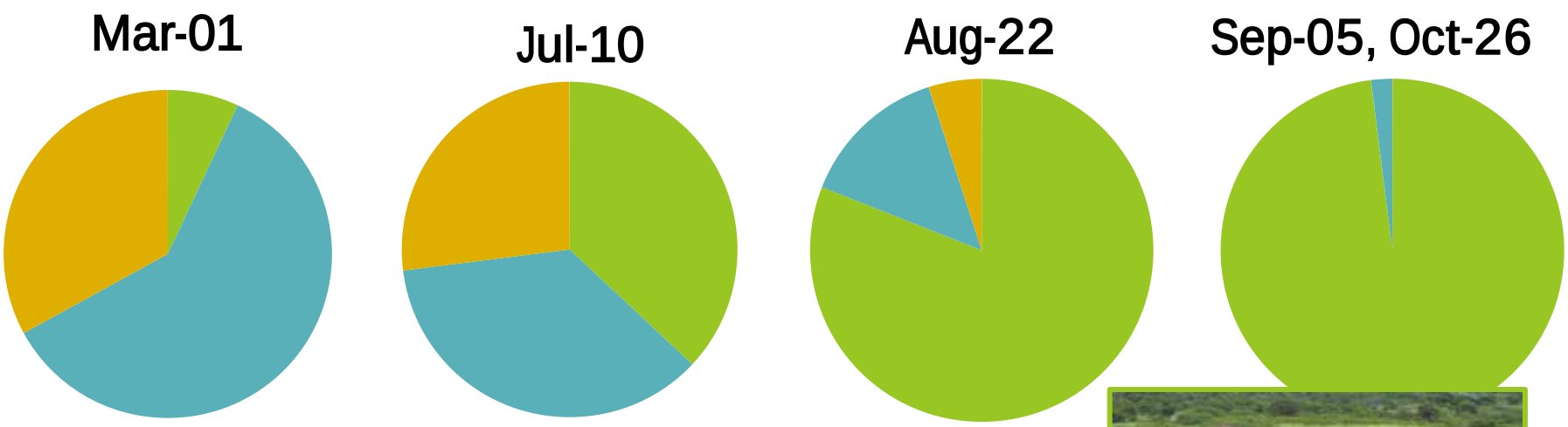
Research Intervention: Small Ruminant Production

Preliminary Findings from St. Kitts-Nevis

Intervention: Small Ruminant Production

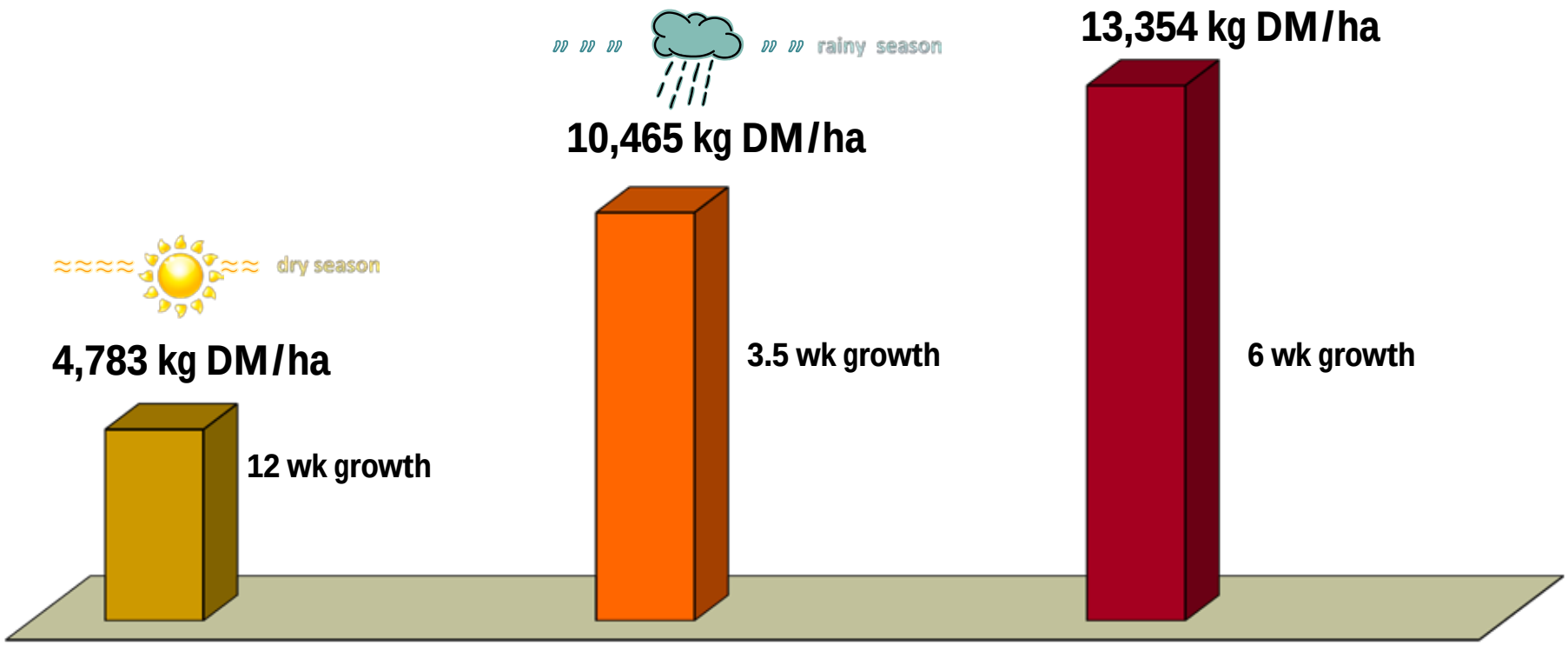
Establishment of Mulato grass

Dry Season (2012) establishment (% cover) of mulato grass



Intervention: Small Ruminant Production

Mulato Grass- Biomass production



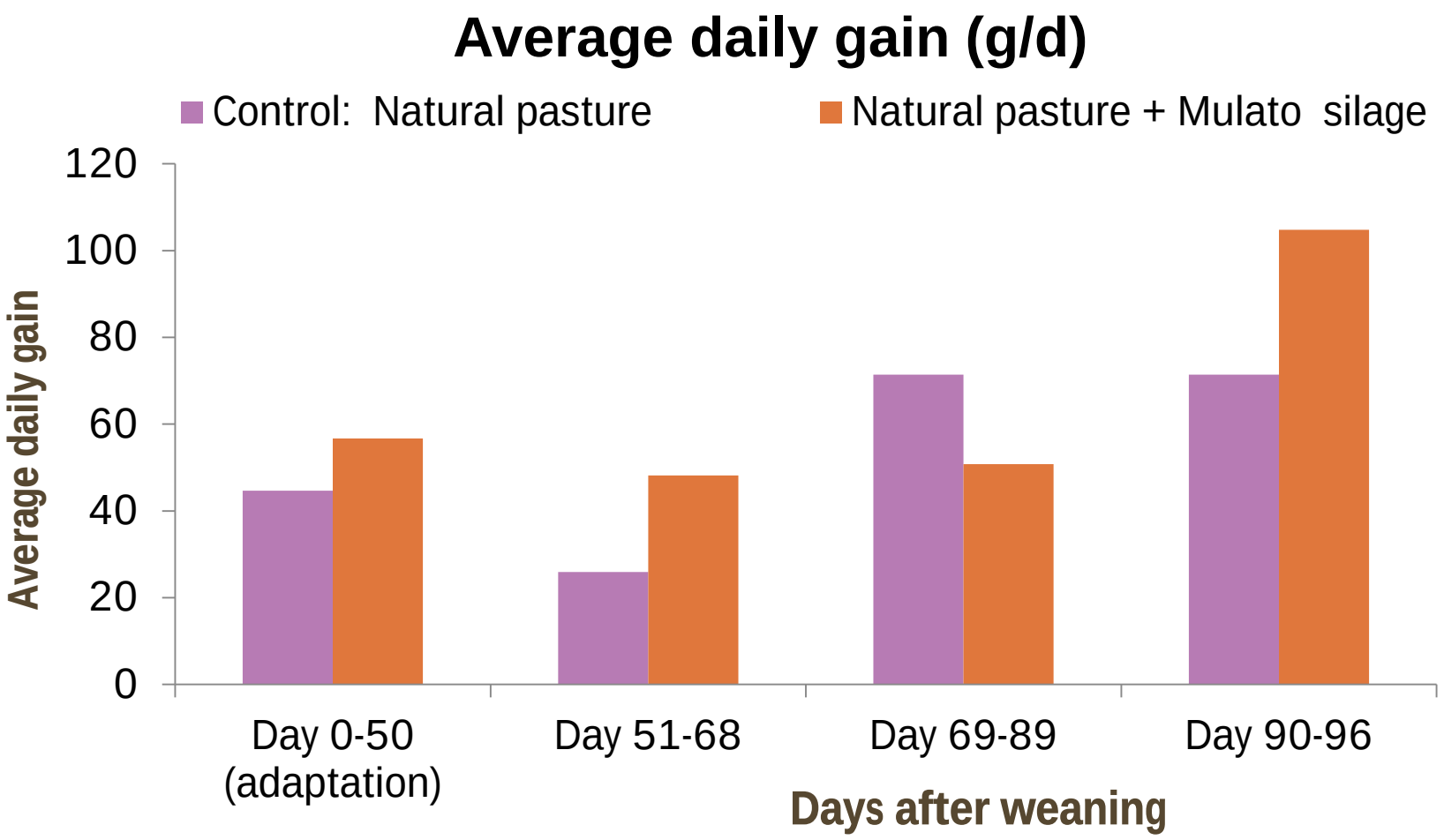
July 10, 2012
CARICOM project
St. Kitts

August 22, 2012
CARICOM project
St. Kitts

CARDI Research Station; SFC
Trinidad (2007-2008)

Intervention: Small Ruminant Production

On Farm Sheep Performance



Research Intervention: School Lunch Menu Change

Preliminary Findings from St. Kitts-Nevis

Intervention: School Lunch Menu Change

Menu	Day 1	Day 2	Day 3	Day 4	Day 5
Control	• "Cook-up" (Rice, Chicken, Carrots, Onions)	• Spaghetti and Turkey	• "Cook-up"	• Chicken Soup	• Bread & Cheese
Test Menu	• Curried Mutton • Steamed White Rice • Steamed Carrots & String Beans • Fresh fruit salad	• Oven Fried Chicken • Seasoned Sweet Potatoes • Tossed Salad (Lettuce, tomatoes, cucumber) • Papaya Slices/Ripe Banana	• Stewed Turkey Wings • Rice and Pink Beans • Carrot & Raisin Salad • Watermelon Slices	• Minced Meat in Tomato Sauce • Spaghetti w Mixed Vegetables • Lemonade/ Tamarind Drink	• Vegetable Pizza • (sweet pepper, tomato, carrots, corn, onions) • Carrot Milk Drink

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Intervention: School Lunch Menu Change

Menu Modification

Conclusions

- Market opportunities for farmers in St. Kitts and Trinidad are constrained by low prevalence of “contracts’ with retailers;
- Integrating produce from “project farmers” into the school lunch feeding in the “farm to fork model” provides farmers with an additional market outlet for produce;
- Adoption of water harvesting and drip irrigation technologies is proving to be a means of enhancing year round production of vegetables and fruits, which is partially constrained by seasonality in rainfall in CARICOM countries;
- Baseline data in St. Kitts reveal a high prevalence of anaemia and overweight among school children; the impact of dietary and other project interventions on child health await project outcomes;
- Baseline data collection reveal a relatively high prevalence of food insecurity among consumer and farmer households in St. Kitts; however, the prevalence of food security among farmer households in St. Kitts was lower than that in Trinidad;
- Integration of social science research with agricultural and health interventions is a useful model to address food and nutrition insecurity in the Caribbean.

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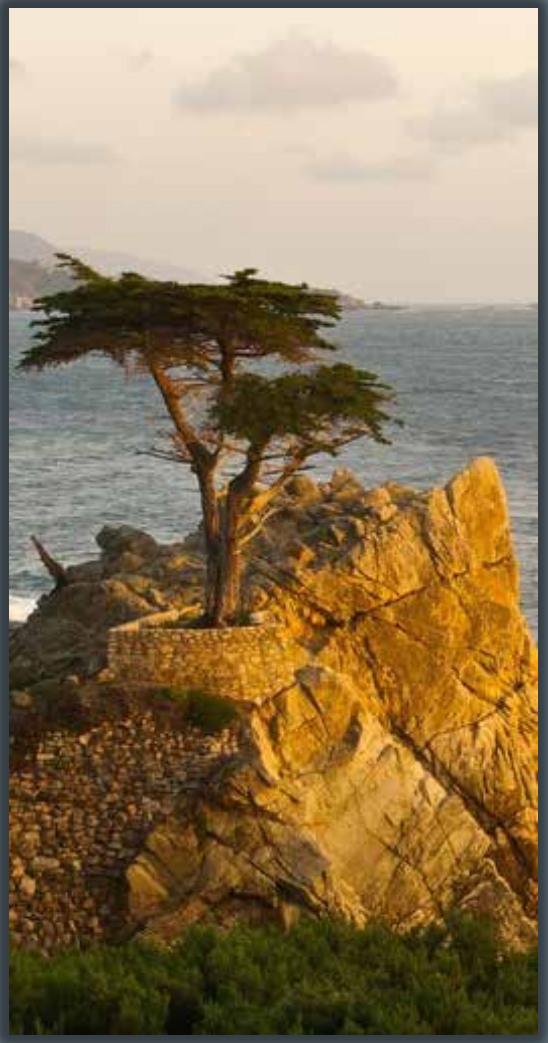

Thank you