Food Security & Climate Change in the UAE

Bill Dougherty
Regional Climate Change Symposium

March 15, 2017

Climate Change Research Group

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مبادرة أبوظبي العالمية للبيانات البيئية
Abu Dhabi Global Environmental Data Initiative

هيئة البيئة - أبوظبي
Environment Agency - ABU DHABI

OUTLINE

- **Background**
- **Approach**
- **Conclusions**
- **Recommendations**

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BACKGROUND

RESEARCH TEAM

- Bill Dougherty. Climate Change Research Group, Principal Investigator
- Patrick Keys. Keys Consulting, Inc; research assistance

- Ian Tellam. Director, Adaptify, research assistance

- Siwa Msangi. Senior Research Fellow, IFPRI's Environment and Production Technology Division, strategic advice

- Clemens Breisinger, Director, IFPRI's Development Strategy and Governance Division, strategic advice

- Holger Hoff. Scientist at Potsdam Institute for Climate Impact Research and Stockholm Environment Institute, strategic advice.

- Eckart Woertz. Senior Research Fellow, Barcelona Centre for International Affairs, strategic advice

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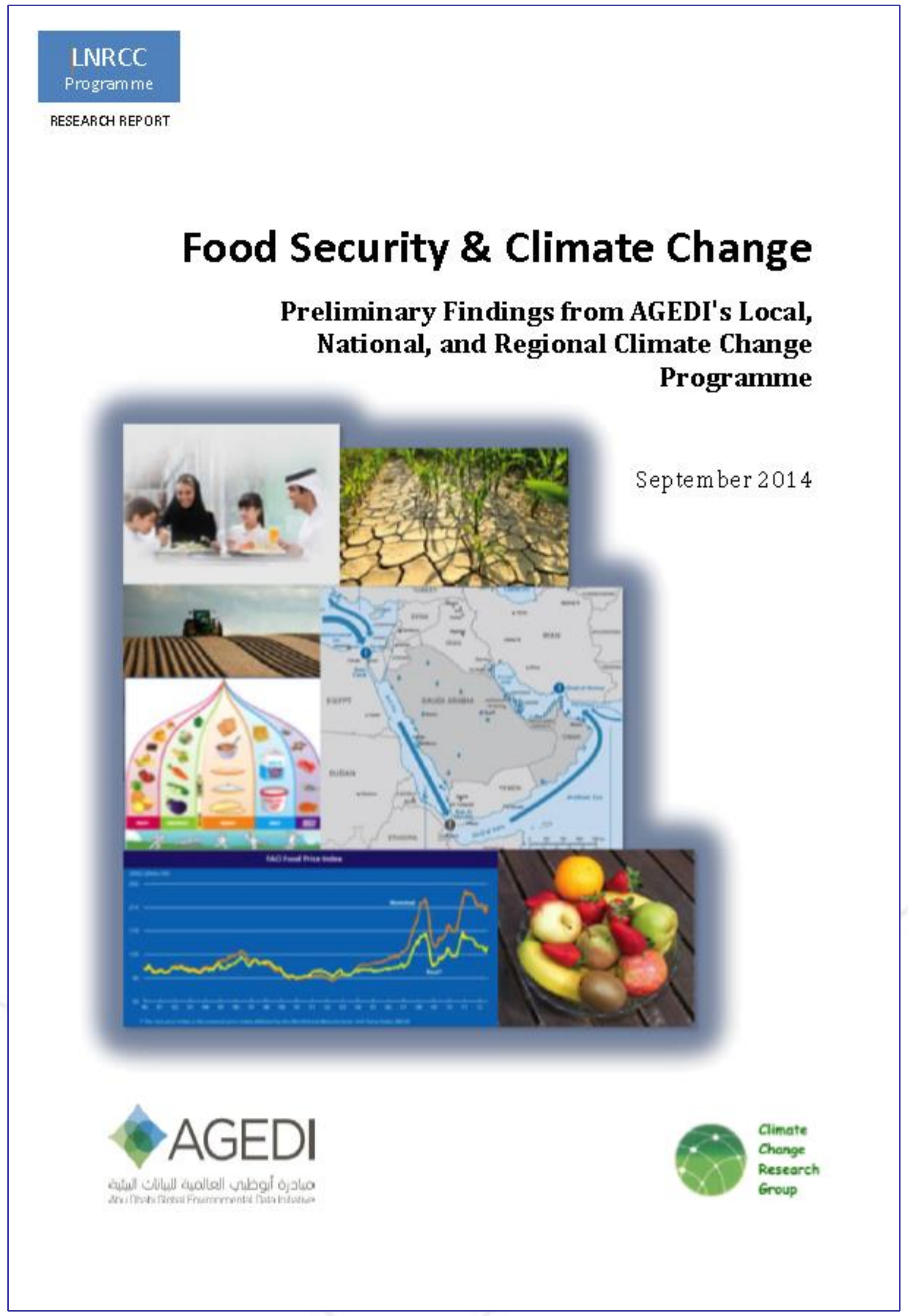
REPORTS

Preliminary Findings


LNRCC Programme

RESEARCH REPORT

Food Security & Climate Change

Preliminary Findings from AGEDI's Local, National, and Regional Climate Change Programme

September 2014

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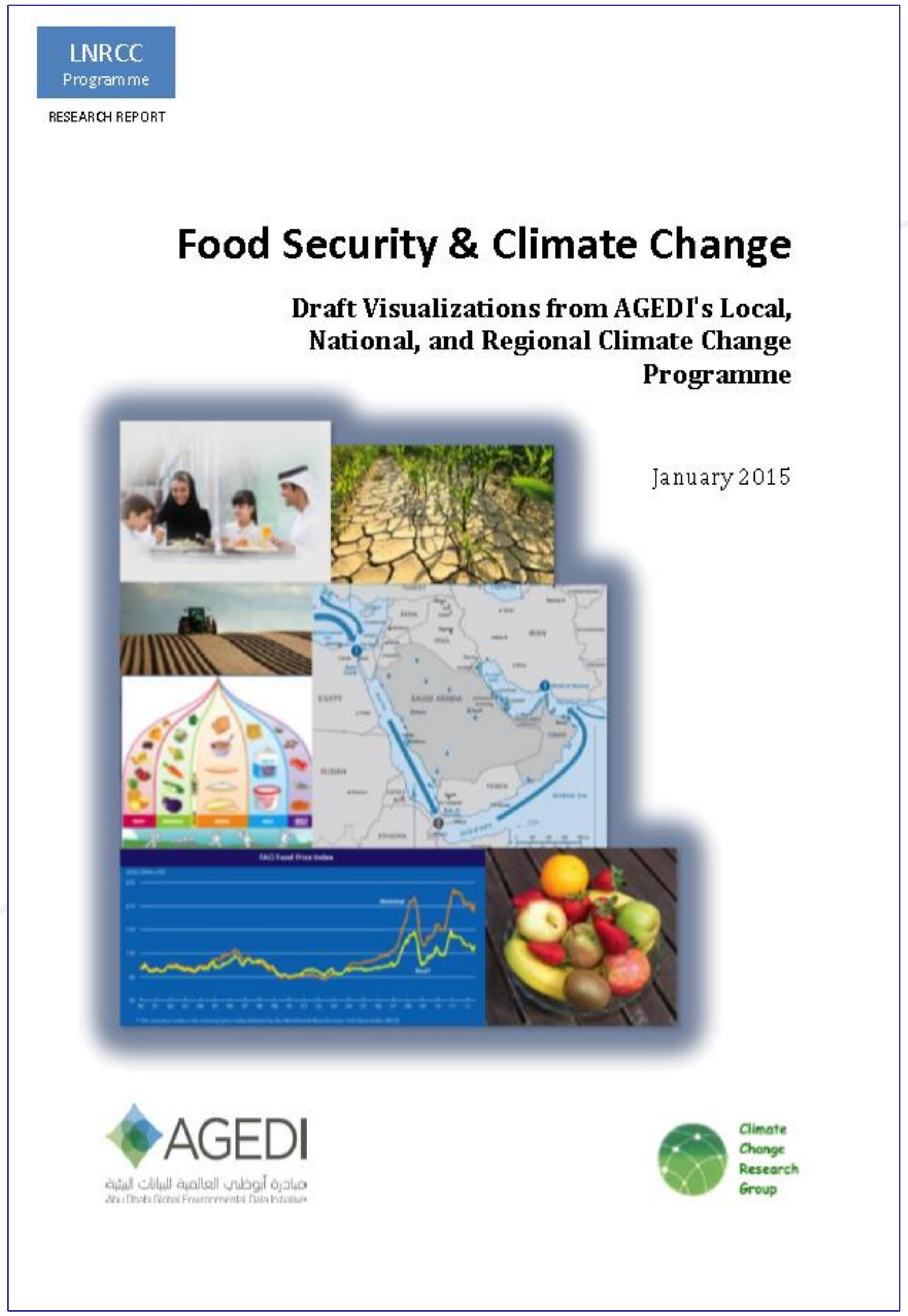
Visualizations report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RESEARCH REPORT

Food Security & Climate Change

Draft Visualizations from AGEDI's Local, National, and Regional Climate Change Programme

January 2015

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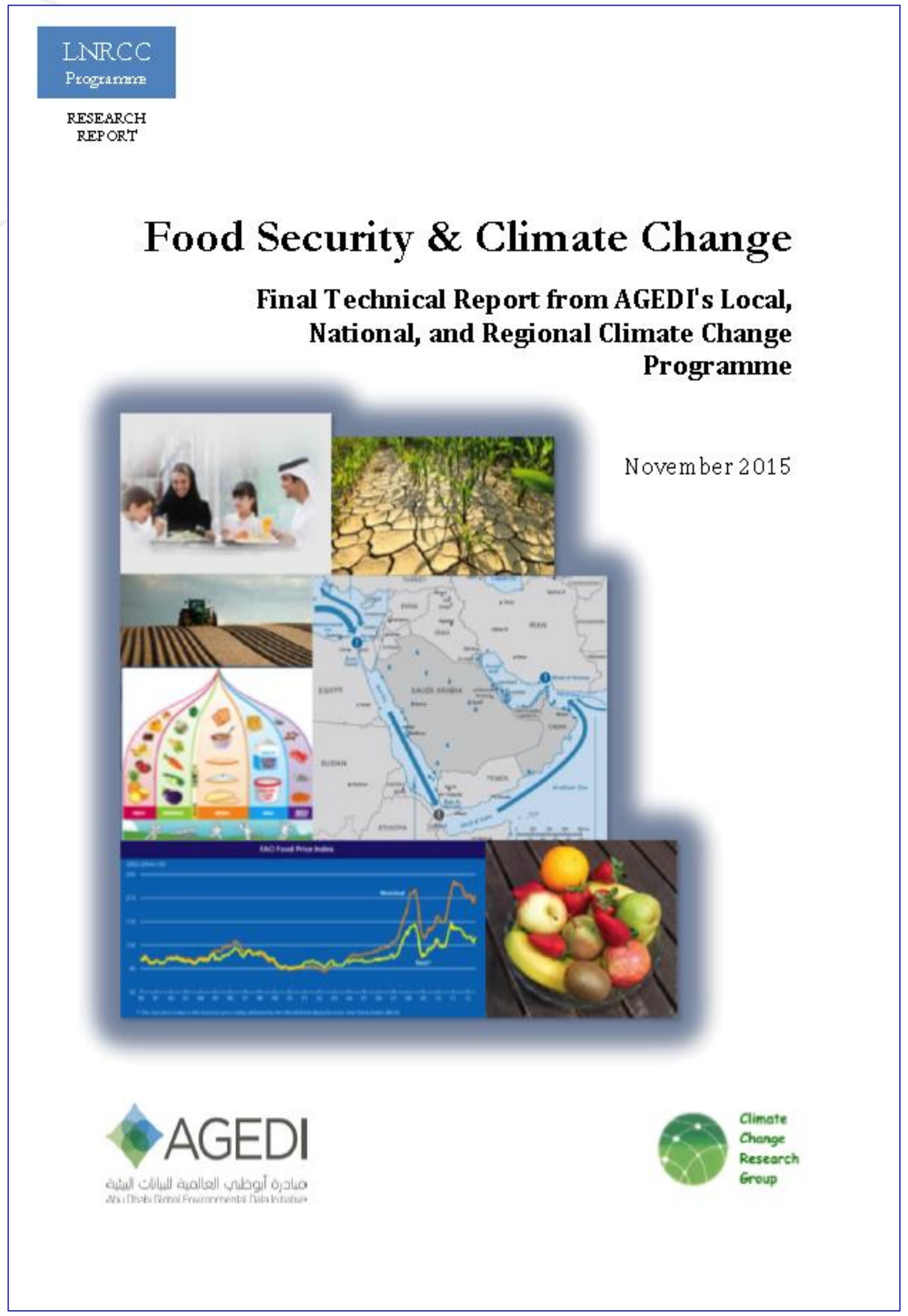
Technical report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RESEARCH REPORT

Food Security & Climate Change

Final Technical Report from AGEDI's Local, National, and Regional Climate Change Programme

November 2015

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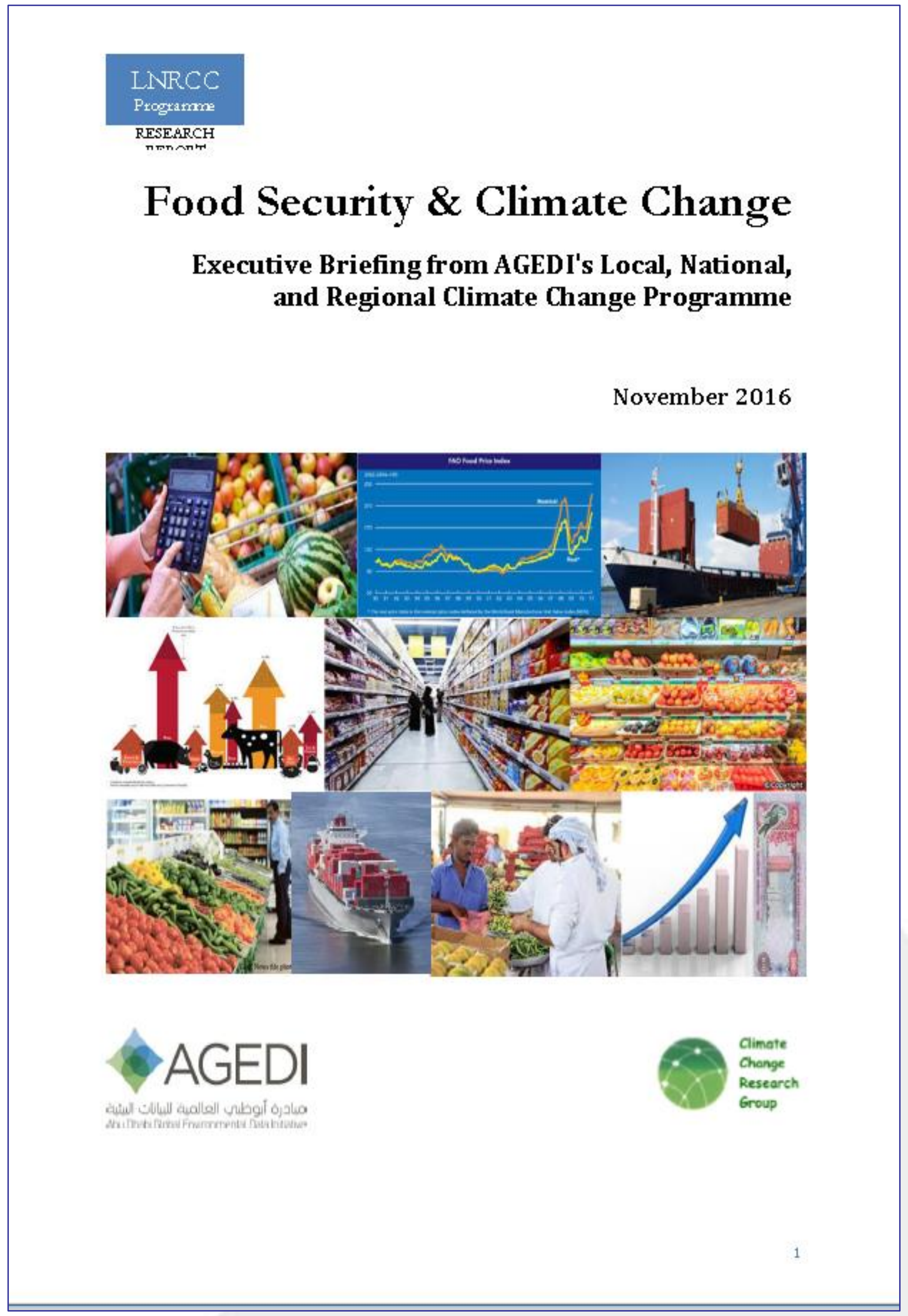
Executive briefing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RESEARCH REPORT

Food Security & Climate Change

Executive Briefing from AGEDI's Local, National, and Regional Climate Change Programme

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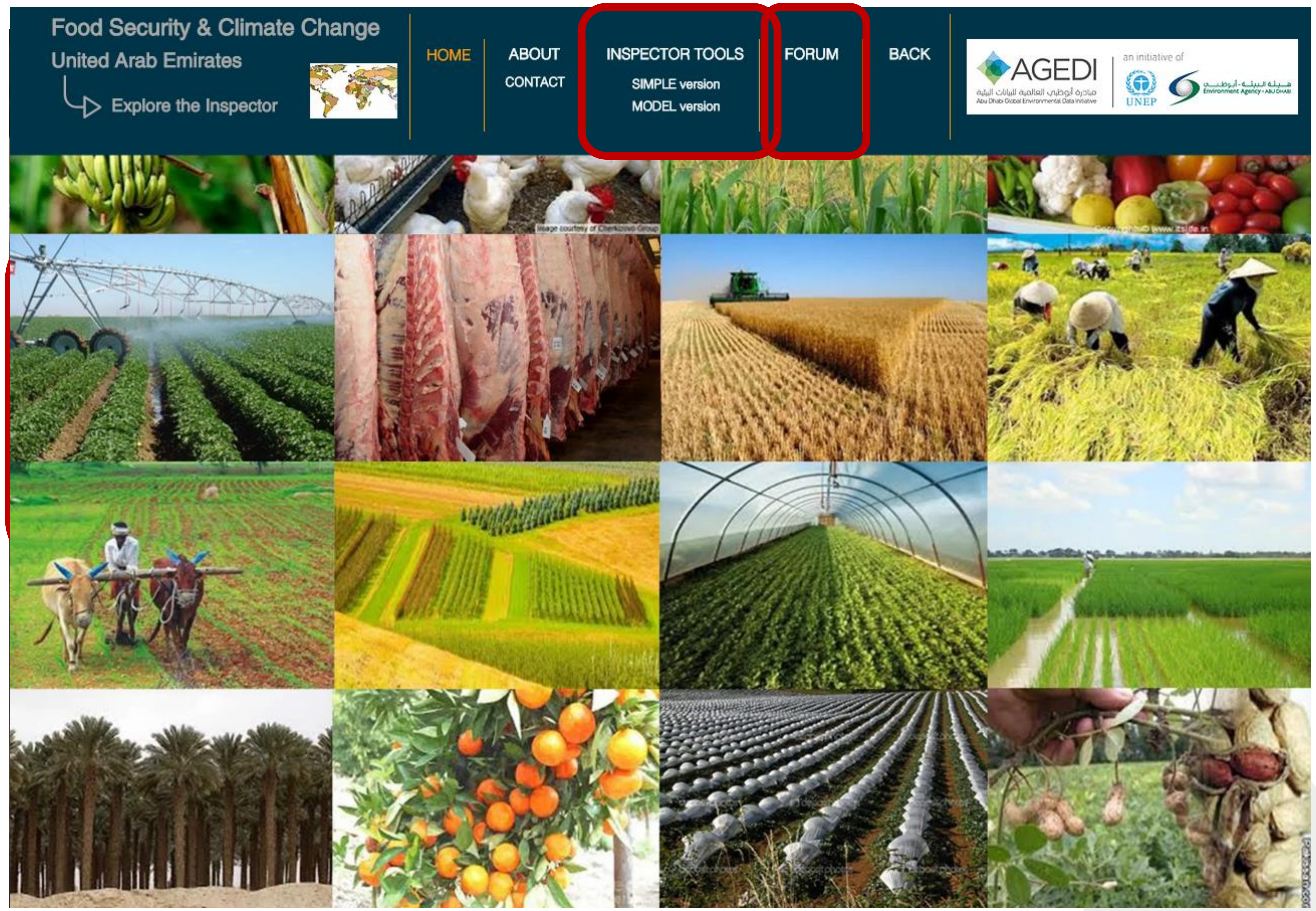
FOOD SECURITY & CLIMATE CHANGE INSPECTOR

- One of 12 Inspectors
- Background; links to online resources
- Explore the Inspector
  - Inspector tools
  - Discussion forum



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APPROACH

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CONTEXT / MOTIVATION

- **IMPORT-DEPENDANT:** As a country country that is heavily dependent on food imports, UAE could be vulnerable to food trade/price shocks under climate change
- **CLIMATE CHANGE:** Lower agricultural yields in key countries from which UAE imports food, currently & projected
- **FOOD PRICES:** Combination of declining agricultural productivity in food-exporting countries, tightening world food markets, and price speculation pressures could lead to export constraints and recurring food price spikes

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MOTIVATING QUESTIONS

- What are the key current patterns of UAE's food supply and demand that affect food security risks?
- How could the impacts of climate change on food exporting countries impact the long-term food security of the UAE?
- How could the impacts of climate change on food prices impact household food expenditure shares in the UAE?

RESEARCH FOCUS

- Is the UAE vulnerable to future constraints in food trade under climate change?
- Are households in the UAE vulnerable to food price increases under climate change?

MACRO INDEX (national)

Scale: 1 to 10 (1 indicates low food insecurity; 10 indicates high food insecurity)

Index types: Import vulnerability by food item
Import vulnerability by export country

MICRO INDEX (household)

Scale: 1 to 5 (1 indicates low food insecurity; 5 indicates high food insecurity)

Index type: Household food budget vulnerability by scenario and decile

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ANALYTICAL APPROACH

- **FOOD SUPPLY PATTERNS:** Analyze baseline patterns in food production, food imports, and stock supplies/contingencies

- **CLIMATE CHANGE IMPACTS:** Analyze future impacts of climate change on countries from which UAE relies on food imports (MACRO analysis)

- **VULNERABLE GROUPS:** Analyze the impact on communities/groups within the UAE that may be particularly vulnerable to future food price shocks (MICRO analysis)

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BASELINE PATTERNS

- PERIOD: From 2000 to the present
- DATA sources: FAOSTAT and NSB
- PARAMETERS:
  - Food trade
  - Food balance
  - Food producer prices
  - Consumption
- REPORTING
  - Inspector tool to produce standardized reports and data summaries

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MACRO - FUTURE IMPACTS TO FOOD IMPORTS

- PERIOD: From 2010 to 2050
- DATA: GHG emission scenarios from IPCC 4rth Assessment Report
- PARAMETERS:
  - Agricultural yields (by country, by major river basin)
  - Food production levels
  - Food producer prices
  - Food demand
- MODELING
  - IFPRI's International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) model

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MICRO - FUTURE IMPACTS TO UAE HOUSEHOLDS

- PERIOD: From 2010 to 2050
- DATA: 2007 and 2011 UAE household income surveys from NSB; other publicly accessible options unavailable
- PARAMETERS:
  - Extent/nature of vulnerable populations
  - Calorific content of typical diets
  - Level of household food expenditures
- OUTPUTS
  - Data wizard tool under development to explore costs and benefits of potential policy scenarios

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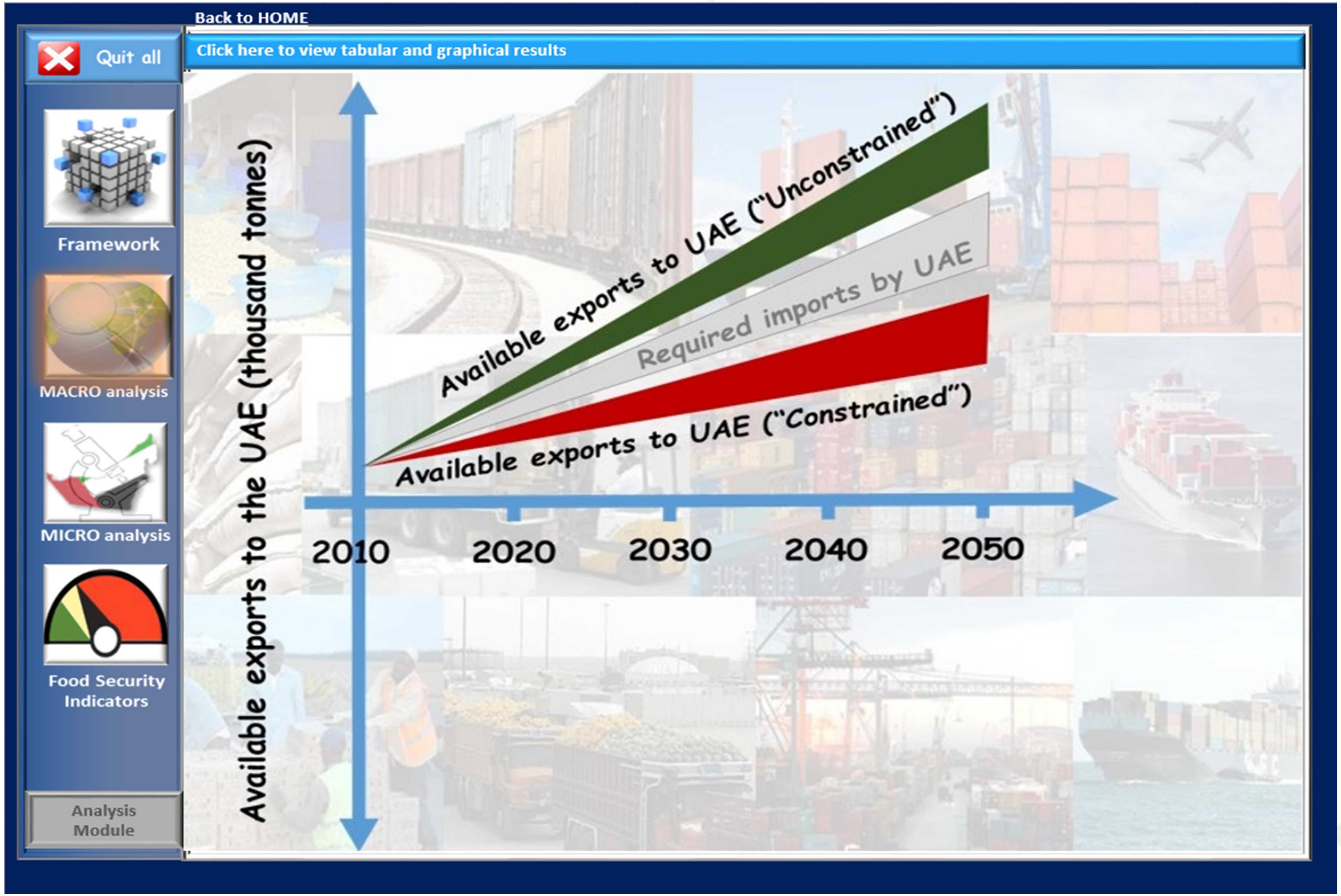
MODELING FRAMEWORKS - MACRO



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MODELING FRAMEWORKS - MICRO

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Framework

MACRO analysis

MICRO analysis

Food Security Indicators

Analysis Module

UAE household expenditure shares, 2014

Breakdown in UAE household expenditure shares in 2014 (%)

Decile	Food expenditures	Other non-discretionary expenditures	Discretionary expenditures	Total	Food expenses as share of total expenses: Food secure (spends less than)	Food expenses as share of total expenses: Food Insecure (spends more than)
1	40%	30%	30%	100%	17%	40%
2	36%	31%	33%	100%	17%	40%
3	33%	33%	35%	100%	17%	40%
4	29%	34%	38%	100%	17%	40%
5	25%	35%	40%	100%	17%	40%
6	23%	34%	43%	100%	17%	40%
7	21%	33%	46%	100%	17%	40%
8	19%	33%	48%	100%	17%	40%
9	17%	32%	51%	100%	17%	40%
10	15%	31%	54%	100%	17%	40%

CONCLUSIONS

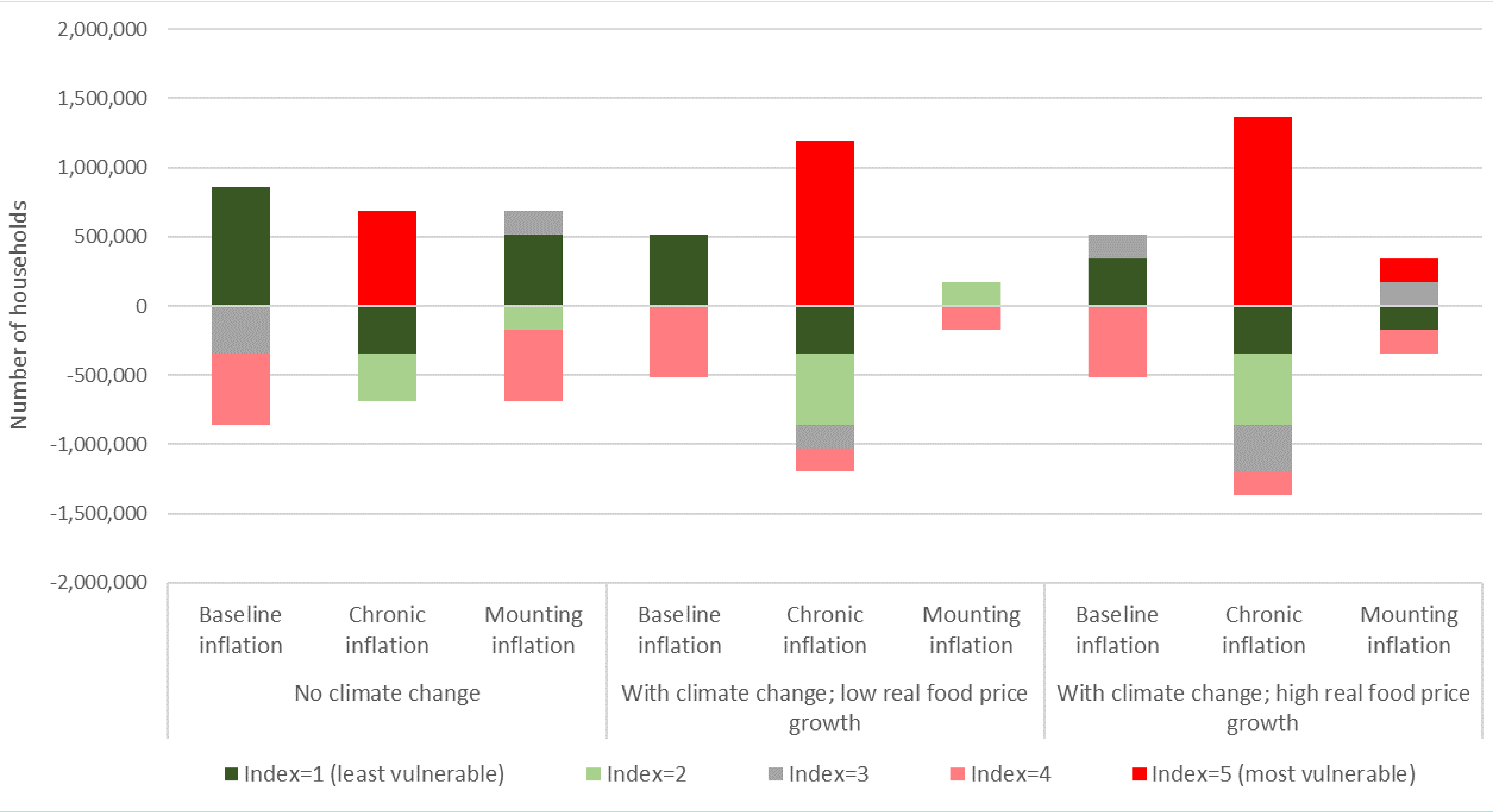
SUMMARY OF MACRO ANALYSIS RESULTS:

food import deficit under climate change

MODELED FOOD #	FAO Food item	Food import deficit by 2050 (thousand tonnes)	Status
1	Bovine Meat	0	UNCONSTRAINED
2	Cassava and products	25	CONSTRAINED
3	Pulses, and products	3	PARTIALLY CONSTRAINED
4	Eggs	2	PARTIALLY CONSTRAINED
5	Groundnuts (Shelled Eq)	31	CONSTRAINED
6	Mutton & Goat Meat	0	UNCONSTRAINED
7	Maize and products	0	UNCONSTRAINED
8	Milk - Excluding Butter	22	PARTIALLY CONSTRAINED
9	Millet and products	15	CONSTRAINED
10	Barley and products	152	CONSTRAINED
11	Oil - Palm and Palm kernel	18	PARTIALLY CONSTRAINED
12	Pigmeat	6	CONSTRAINED
13	Potatoes and products	56	PARTIALLY CONSTRAINED
14	Poultry Meat	89	PARTIALLY CONSTRAINED
15	Rice (Milled Equivalent)	1,343	CONSTRAINED
16	Rape and Mustard Oil	2	CONSTRAINED
17	Rape and Mustardseed	224	CONSTRAINED
18	Soyabean Oil	68	CONSTRAINED
19	Sunflowerseed Oil	43	CONSTRAINED
20	Sunflower seed	38	CONSTRAINED
21	Soybeans	150	CONSTRAINED
22	Fruit - Subtropical	442	CONSTRAINED
23	Sugar (raw)	1	PARTIALLY CONSTRAINED
24	Sugar (Refined)	303	CONSTRAINED
25	Sweet potatoes	1	CONSTRAINED
26	Fruit - Temperate	409	CONSTRAINED
27	Oil - Other	50	CONSTRAINED
28	Vegetables - All	386	CONSTRAINED
29	Wheat and products	1,295	CONSTRAINED

SUMMARY OF MICRO ANALYSIS RESULTS:

Change in Number of vulnerable households



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RECOMMENDATIONS

NEXT STEPS

- Assess and address any procurement barriers to food Imports
- Exploit any regional economies of scale for food imports
- Develop an early warning system to monitor international food trade developments
- Complement physical food stockpiling with virtual stockpiling strategies
- Invest in agricultural research and development in traditional priority trading partners
- Reassess agricultural land acquisition strategies

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