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FOODSECURE

FOR POLICIES THAT MATTER

Region report for: Latin America and Caribbean



Countries included in this report:

Anguilla
Antigua and Barbuda
Argentina
Aruba
Bahamas
Barbados
Belize
Bermuda
Bolivia
Bouvet Island
Brazil
British Virgin Islands
Cayman Islands
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Republic
Ecuador
El Salvador
Falkland Islands (Malvinas)
French Guiana
Grenada
Guadeloupe
Guatemala
Guyana
Haiti
Honduras
Jamaica
Martinique
Montserrat
Nicaragua
Panama
Paraguay
Peru
Puerto Rico
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and Grenadines
South Georgia and the South Sandwich Islands
Suriname

Trinidad and Tobago

Turks and Caicos Islands

Uruguay

Venezuela (Bolivarian Republic of)

Virgin Islands US



FOODSECURE
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Country report for: Anguilla

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Anguilla

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility		
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Anguilla

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Anguilla

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

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Research and development

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Country report for: Antigua and Barbuda

Introduction

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Table: food security indicators for Antigua and Barbuda

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	15.76	3
	Irrigation gap	36.92	4
	Arable land per capita	0.05	1
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	2
	Social protection		
	GDP per capita	18530.3	4

The scores in the table above result in the following problems for Antigua and Barbuda

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Antigua and Barbuda

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
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Health and Nutrition

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1862	42.4	51.2
1974	1605	40.6	48.1
1979	1520	41	49.3
1984	1960	58.3	75.7
1989	2174	68.9	87.7
1994	1927	60.2	62
1999	1901	59	65.3
2004	1896	57.2	68.1
2009	2075	68.9	70.9

Research and development

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Country report for: Argentina

Introduction

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is low
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Argentina

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	8.9	2
	Irrigation gap	20.21	4
	Arable land per capita	0.84	5
Efficiency	Cereals yield	0.1	5
FNS Risk	Stunting	8.2	1
	Underweight	2.3	1
	Wasting	1.2	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	10059.4	4

The scores in the table above result in the following problems for Argentina

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Argentina

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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Health and Nutrition

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	3033	89.3	101.1
1974	2907	81.5	88.4
1979	2903	85.9	95.5
1984	2749	79	87.1
1989	2649	75	85.4
1994	2821	78.9	95.5
1999	2899	82	96.5
2004	2810	75.6	85.8
2009	2606	72.2	88.8

Research and development

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The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Aruba

Introduction

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Table: food security indicators for Aruba

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0	1
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Aruba

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

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Research and development

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Country report for: Bahamas

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The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Bahamas

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.16	2
	Irrigation gap	7.42	3
	Arable land per capita	0.02	1
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0	1
	Social protection		
	GDP per capita	29595.7	5

The scores in the table above result in the following problems for Bahamas

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Bahamas

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2399	64.2	73.1
1974	2213	58.5	72.9
1979	2115	54.7	63.9
1984	2444	65.8	77.7
1989	2558	68.4	82.1
1994	2232	66.1	67.3
1999	2443	72.2	79.4
2004	2503	71.2	83.5
2009	2443	73.5	84.2

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

Country report for: Barbados

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

More information about the FOODSECURE project is available at <http://www.foodsecure.eu/>

Typology

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The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Barbados

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	10.09	2
	Irrigation gap	2.65	2
	Arable land per capita	0.05	1
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	2
	Social protection		
	GDP per capita	23013.2	4

The scores in the table above result in the following problems for Barbados

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Barbados

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2424	60	63.4
1974	2536	60.3	76.7
1979	2673	69.5	79.2
1984	2664	76.3	79.4
1989	2826	81	92.5
1994	2692	70.4	90.7
1999	2718	73.7	86.7
2004	2494	68.6	73.2
2009	2716	74.2	84.7

Research and development

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Country report for: Belize

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Belize

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.4	3
	Irrigation gap	18.44	4
	Arable land per capita	0.26	4
Efficiency	Cereals yield	0.03	3
FNS Risk	Stunting	20.75	3
	Underweight	5.55	2
	Wasting	2.6	2
	Volatility		
	Social protection		
	GDP per capita	6553.52	3

The scores in the table above result in the following problems for Belize

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Belize

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2026	43.9	51.7
1974	2061	44.6	52.2
1979	2239	49.3	62.3
1984	2178	48.9	60.2
1989	2203	48.9	51.5
1994	2273	50.4	57.3
1999	2323	55.1	51.6
2004	2480	63.4	52.7
2009	2480	57.7	55.8

Research and development

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Country report for: Bermuda

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

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Table: food security indicators for Bermuda

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0	1
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Bermuda

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Bermuda

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2497	72.4	105
1974	2508	73.9	104.7
1979	2564	77.8	110.6
1984	2751	86.7	108.8
1989	2623	81.5	106.3
1994	2484	76.1	86.1
1999	2422	68.9	90.8
2004	2263	60.1	95.6
2009	2480	70.2	109

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

Country report for: Bolivia

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very low
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is medium
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is low
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Bolivia

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	17.69	4
	Irrigation gap	22.97	4
	Arable land per capita	0.37	5
Efficiency	Cereals yield	0.04	4
FNS Risk	Stunting	29.85	4
	Underweight	5.2	2
	Wasting	1.55	1
	Volatility	0.01	3
	Social protection	3.6	5
	GDP per capita	3876.85	2

The scores in the table above result in the following problems for Bolivia

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Bolivia

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1848	42.9	38
1974	1984	47.4	42.1
1979	2062	48.1	42.2
1984	1943	48	35.4
1989	1953	47.6	35.5
1994	1900	45.8	36.2
1999	1971	49.1	37.8
2004	1957	49.1	38.1
2009	2052	53.2	41.9

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- Annual growth in total factor productivity (difference between rate of change in output and rate of change in input) in the period 2000-2009 has been low
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium
- The educational level is high
- There is a high economic incentive regime
- The level of information and communication technology (ICT) is high

Country report for: Bouvet Island

Introduction

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- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
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Typology

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The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

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Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

Country report for: Brazil

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is medium
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Brazil

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.19	2
	Irrigation gap	15.01	4
	Arable land per capita	0.36	5
Efficiency	Cereals yield	0.06	4
FNS Risk	Stunting	7.1	1
	Underweight	2.95	1
	Wasting	1.6	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	8827.65	3

The scores in the table above result in the following problems for Brazil

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Brazil

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is low
- The mean quintile of transmission elasticity quintiles over commodities is 3.33

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2308	53.5	38.7
1974	2345	51.4	47.6
1979	2564	54.6	57.2
1984	2435	53	54.2
1989	2561	55	68.7
1994	2621	60.6	68.9
1999	2640	65.8	84.1
2004	2857	70	92.7
2009	2904	72.8	96.2

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- Annual growth in total factor productivity (difference between rate of change in output and rate of change in input) in the period 2000-2009 has been high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high
- The educational level is high
- There is a low economic incentive regime
- The level of information and communication technology (ICT) is high
- Spending on research and development (R&D) is high

Country report for: British Virgin Islands

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Table: food security indicators for British Virgin Islands

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	2
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for British Virgin Islands

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for British Virgin Islands

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Research and development

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Country report for: Cayman Islands

Introduction

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Table: food security indicators for Cayman Islands

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility		
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Cayman Islands

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Cayman Islands

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
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- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

Country report for: Chile

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is low
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Chile

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	4.92	1
	Irrigation gap	0.76	1
	Arable land per capita	0.09	2
Efficiency	Cereals yield	0.1	5
FNS Risk	Stunting	2.36	1
	Underweight	0.61	1
	Wasting	0.44	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	13110.8	4

The scores in the table above result in the following problems for Chile

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Chile

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2482	57.8	51.3
1974	2545	63.3	46.9
1979	2491	59.2	50
1984	2416	58.1	47.9
1989	2299	56.3	48.7
1994	2526	65.2	64.9
1999	2578	63.4	69.1
2004	2706	73.5	74.6
2009	2737	77.5	71.7

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Colombia

Introduction

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- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is medium
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Colombia

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.1	2
	Irrigation gap	2.22	2
	Arable land per capita	0.05	1
Efficiency	Cereals yield	0.06	4
FNS Risk	Stunting	15.67	2
	Underweight	4.47	2
	Wasting	1.17	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	7665.77	3

The scores in the table above result in the following problems for Colombia

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Colombia

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 2

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1755	35.4	31.8
1974	1984	36.5	36.2
1979	2127	40.6	40.3
1984	2174	41.5	44.3
1989	2206	42.4	48.2
1994	2317	46.2	54.2
1999	2392	47.4	57.2
2004	2418	47.2	57.1
2009	2442	50.5	59

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Costa Rica

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Costa Rica

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.29	2
	Irrigation gap	1.98	2
	Arable land per capita	0.05	1
Efficiency	Cereals yield	0.02	2
FNS Risk	Stunting	5.6	1
	Underweight	1.1	1
	Wasting	1	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	9472.9	3

The scores in the table above result in the following problems for Costa Rica

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Costa Rica

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

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National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is low
- The mean quintile of transmission elasticity quintiles over commodities is 3

Health and Nutrition

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2011	39.5	40.5
1974	2158	39	43
1979	2214	43.9	47.6
1984	2331	47.5	46.8
1989	2478	51.6	52.8
1994	2492	50.9	58.8
1999	2547	52.2	58
2004	2471	51.5	65.3
2009	2542	54.1	72

Research and development

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The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Cuba

Introduction

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Cuba

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	13.99	3
	Irrigation gap	4.15	3
	Arable land per capita	0.32	4
Efficiency	Cereals yield	0.02	3
FNS Risk	Stunting	7	1
	Underweight	3.4	2
	Wasting	2.4	1
	Volatility	0.02	4
	Social protection GDP per capita		

The scores in the table above result in the following problems for Cuba

- Volatility without malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Cuba

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2233	48.1	57.1
1974	2583	53.3	61.7
1979	2463	48.7	62.7
1984	2861	56.3	71.7
1989	2748	55.9	71.9
1994	2218	43	47.8
1999	2762	57.9	39.6
2004	3219	66.9	51.8
2009	3084	74.6	57.2

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Dominica

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Dominica

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	17.14	4
	Irrigation gap		
Efficiency	Arable land per capita	0.07	2
	Cereals yield	0.01	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	1
	Social protection	3.5	3
	GDP per capita	9264.26	3

The scores in the table above result in the following problems for Dominica

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Dominica

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1856	41.8	39.9
1974	1816	40.6	42.7
1979	1898	45.3	47.3
1984	2217	49.3	56.9
1989	2699	59.8	71.5
1994	2608	65	66.6
1999	2589	66.2	62.7
2004	2760	72.9	68.2
2009	2782	72	65.7

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Dominican Republic

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Dominican Republic

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.8	3
	Irrigation gap	2.84	2
	Arable land per capita	0.09	2
Efficiency	Cereals yield	0.02	3
FNS Risk	Stunting	10.07	1
	Underweight	3.92	2
	Wasting	1.98	1
	Volatility	0.01	3
	Social protection		
	GDP per capita	7000.46	3

The scores in the table above result in the following problems for Dominican Republic

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Dominican Republic

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 1.67

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1839	34.3	40.7
1974	1981	36.4	41.8
1979	2021	38.3	46.9
1984	2147	40.1	46.3
1989	2164	42.3	56.7
1994	2140	40.4	63.7
1999	2158	40.3	70.7
2004	2201	42.1	74.1
2009	2330	49	69.1

Research and development

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The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Ecuador

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very low
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is medium
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Ecuador

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	18.35	4
	Irrigation gap	1.43	1
	Arable land per capita	0.09	2
Efficiency	Cereals yield	0.04	4
FNS Risk	Stunting	29	3
	Underweight	6.2	2
	Wasting	2.3	1
	Volatility	0.01	3
	Social protection		
	GDP per capita	7205.38	3

The scores in the table above result in the following problems for Ecuador

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Ecuador

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Land availability

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Prices & productivity

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The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1863	38.4	39.7
1974	1851	35.8	41.7
1979	1931	35.3	46.6
1984	1926	35.2	56.6
1989	2236	37.7	73.1
1994	2084	40.8	58.7
1999	2108	43.1	68.1
2004	2019	41.7	73.2
2009	2065	45.4	77.4

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

Country report for: El Salvador

Introduction

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is medium
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is medium
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for El Salvador

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	9.39	2
	Irrigation gap	14.89	4
	Arable land per capita	0.11	2
Efficiency	Cereals yield	0.04	4
FNS Risk	Stunting	22.6	3
	Underweight	6.35	2
	Wasting	1.45	1
	Volatility	0.01	3
	Social protection		
	GDP per capita	5725.42	3

The scores in the table above result in the following problems for El Salvador

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for El Salvador

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 1

Health and Nutrition

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1640	37.4	30.7
1974	1787	39.9	34.6
1979	2064	44.6	39
1984	2145	46.1	42.6
1989	2135	46.5	42.6
1994	2234	49.7	42.5
1999	2244	48.6	45.5
2004	2363	57.2	45.6
2009	2325	56.9	45

Research and development

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The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Falkland Islands (Malvinas)

Introduction

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Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Falkland Islands (Malvinas)

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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Research and development

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Country report for: French Guiana

Introduction

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Typology

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Table: food security indicators for French Guiana

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	2
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for French Guiana

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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Research and development

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Country report for: Grenada

Introduction

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Typology

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Table: food security indicators for Grenada

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	24.08	5
	Irrigation gap	2.9	2
	Arable land per capita	0.02	1
Efficiency	Cereals yield	0	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0	1
	Social protection	3.5	3
	GDP per capita	9214.94	3

The scores in the table above result in the following problems for Grenada

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Grenada

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2003	48	51.2
1974	1882	46.4	57.4
1979	2060	51.6	59.7
1984	1889	44.7	58.9
1989	2157	50.5	69
1994	2203	52.6	72.2
1999	1989	46.2	67.3
2004	2013	55.8	68.4
2009	2189	61.6	79.3

Research and development

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Country report for: Guadeloupe

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Typology

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The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Guadeloupe

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	3
	Social protection GDP per capita		

The scores in the table above result in the following problems for Guadeloupe

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

Country report for: Guatemala

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very low
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is medium
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Guatemala

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	15.23	3
	Irrigation gap	5.37	3
	Arable land per capita	0.12	2
Efficiency	Cereals yield	0.04	4
FNS Risk	Stunting	50.77	5
	Underweight	16.77	4
	Wasting	2.2	1
	Volatility	0.01	2
	Social protection		
	GDP per capita	4183.78	2

The scores in the table above result in the following problems for Guatemala

- Chronic malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Guatemala

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 2

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1899	47.3	29.7
1974	1926	46.9	31.1
1979	2017	47.3	35.1
1984	1898	44.9	29.5
1989	2113	50.3	36.4
1994	2162	53.4	34.1
1999	1978	49.1	38.1
2004	2015	50.4	45.3
2009	2088	51.9	49.8

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- Annual growth in total factor productivity (difference between rate of change in output and rate of change in input) in the period 2000-2009 has been high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium
- The educational level is high
- There is a low economic incentive regime
- The level of information and communication technology (ICT) is high

Country report for: Guyana

Introduction

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Typology

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- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Guyana

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.62	3
	Irrigation gap	2.88	2
	Arable land per capita	0.57	5
Efficiency	Cereals yield	0.02	2
FNS Risk	Stunting	17.17	2
	Underweight	11.27	3
	Wasting	8.57	4
	Volatility	0.02	4
	Social protection	3	2
	GDP per capita	2556.26	2

The scores in the table above result in the following problems for Guyana

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Guyana

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

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Prices & productivity

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Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2090	48.9	38.9
1974	2254	50.1	40.8
1979	2245	51.1	42.7
1984	2407	50	34.7
1989	2342	52.4	25.4
1994	2426	63.8	43.2
1999	2548	68.1	50
2004	2523	64.1	47
2009	2528	62	44.1

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Haiti

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

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- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very low
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very low
- The obesity index (based on the prevalence of obesity among adult women) is low
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very low
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is low

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Haiti

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	25.37	5
	Irrigation gap	9.87	3
	Arable land per capita	0.1	2
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting	26.63	3
	Underweight	14.73	4
	Wasting	7	4
	Volatility	0.01	3
	Social protection	2.38	1
	GDP per capita	1064.67	1

The scores in the table above result in the following problems for Haiti

- Acute malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Haiti

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

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National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is medium
- The mean quintile of transmission elasticity quintiles over commodities is 4.67

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1843	41.4	25
1974	1885	42.2	25.3
1979	1919	43.8	30.7
1984	1836	43.5	33.9
1989	1643	40.5	24.9
1994	1650	39.1	27.4
1999	1877	40.2	39.8
2004	1799	38.1	36.1
2009	1927	41.8	39

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- Annual growth in total factor productivity (difference between rate of change in output and rate of change in input) in the period 2000-2009 has been low
- The educational level is high
- There is a high economic incentive regime
- The level of information and communication technology (ICT) is high

Country report for: Honduras

Introduction

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- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is medium
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is medium
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is medium
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is low

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Honduras

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	17.02	4
	Irrigation gap	12.37	3
	Arable land per capita	0.15	3
Efficiency	Cereals yield	0.03	3
FNS Risk	Stunting	32.2	4
	Underweight	10.55	3
	Wasting	1.3	1
	Volatility	0.01	2
	Social protection	3.38	3
	GDP per capita	3308.17	2

The scores in the table above result in the following problems for Honduras

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Honduras

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is low
- The mean quintile of transmission elasticity quintiles over commodities is 3.67

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1971	44.1	33
1974	1890	40.9	35.5
1979	1920	41.1	31.9
1984	1982	41.4	39.9
1989	2159	44.7	51.7
1994	2194	46.9	49
1999	2242	47.4	56.4
2004	2352	52.3	57.5
2009	2495	53.5	62

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is low

Country report for: Jamaica

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is medium
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Jamaica

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	19.86	4
	Irrigation gap	5.15	3
	Arable land per capita	0.05	1
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting	5.44	1
	Underweight	3.04	1
	Wasting	2.99	2
	Volatility	0.01	2
	Social protection		
	GDP per capita	7082.61	3

The scores in the table above result in the following problems for Jamaica

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Jamaica

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2214	51.4	53.8
1974	2449	56.3	54.5
1979	2453	54.1	59.8
1984	2476	56.3	61
1989	2462	54.2	58.7
1994	2516	57.4	58.1
1999	2534	61	68.5
2004	2572	62.8	75.4
2009	2607	64.9	75.2

Research and development

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The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Martinique

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Table: food security indicators for Martinique

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.01	2
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Martinique

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

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Land availability

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Health and Nutrition

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Research and development

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Country report for: Montserrat

Introduction

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The status of different policy instruments related to food security for Montserrat

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Research and development

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Country report for: Nicaragua

Introduction

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is very low
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is medium
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is medium
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is low
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is medium
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is low

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Nicaragua

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	13.35	3
	Irrigation gap	31.99	4
	Arable land per capita	0.36	5
Efficiency	Cereals yield	0.03	3
FNS Risk	Stunting	22.33	3
	Underweight	5.93	2
	Wasting	1.37	1
	Volatility	0.01	3
	Social protection	3.5	3
	GDP per capita	3106.77	2

The scores in the table above result in the following problems for Nicaragua

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Nicaragua

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 1

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1883	49	26.8
1974	1809	43.2	29.9
1979	1774	40.9	29.2
1984	2016	45.6	31
1989	1980	41.5	34.8
1994	1826	36.5	42.2
1999	1931	43.7	35.2
2004	2216	49.7	42.8
2009	2352	57	49.7

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is low

Country report for: Panama

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Panama

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	14.99	3
	Irrigation gap	12.65	3
	Arable land per capita	0.16	3
Efficiency	Cereals yield	0.03	3
FNS Risk	Stunting	20.65	3
	Underweight	4.5	2
	Wasting	1.2	1
	Volatility	0	1
	Social protection		
	GDP per capita	10034.8	4

The scores in the table above result in the following problems for Panama

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Panama

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

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National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is very low
- The mean quintile of transmission elasticity quintiles over commodities is 1

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2204	48.9	43.2
1974	2235	49.2	47.4
1979	1962	44.4	49
1984	2199	48.4	60.4
1989	2054	47.3	50.3
1994	2208	50.7	53.7
1999	2065	48.6	65.1
2004	2124	52.3	51.2
2009	2364	59.8	59.4

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Paraguay

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is medium
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is medium
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is medium
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is medium
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Paraguay

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.15	2
	Irrigation gap	52.23	5
	Arable land per capita	0.59	5
Efficiency	Cereals yield	0.05	4
FNS Risk	Stunting	17.5	2
	Underweight	3.4	2
	Wasting	1.1	1
	Volatility	0.02	5
	Social protection GDP per capita	4796.42	3

The scores in the table above result in the following problems for Paraguay

- Volatility without malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Paraguay

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2312	59.5	52
1974	2363	60.2	51.2
1979	2393	63.5	59.4
1984	2364	61.8	60.9
1989	2410	60.1	59.7
1994	2367	63.5	70.4
1999	2418	63.5	78.1
2004	2478	58.9	81.7
2009	2307	50.6	76.2

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is medium

Country report for: Peru

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

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Typology

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- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is medium
- The obesity index (based on the prevalence of obesity among adult women) is medium
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is medium
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Peru

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	12.7	3
	Irrigation gap	3.05	2
	Arable land per capita	0.13	3
Efficiency	Cereals yield	0.06	4
FNS Risk	Stunting	25.12	3
	Underweight	4.47	2
	Wasting	0.75	1
	Volatility	0.01	1
	Social protection		
	GDP per capita	7042.64	3

The scores in the table above result in the following problems for Peru

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Peru

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

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Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is very low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is very low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is low
- The mean quintile of transmission elasticity quintiles over commodities is 2.67

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2201	49.7	31.1
1974	2020	46.4	28.2
1979	1955	44.6	28.2
1984	1895	42.9	39.4
1989	2085	47.2	36.1
1994	2100	52.3	39.8
1999	2169	52.9	37
2004	2199	55.2	33.8
2009	2432	62	35.8

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

Country report for: Puerto Rico

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
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Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Puerto Rico

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	14.98	3
	Irrigation gap	2.85	2
	Arable land per capita		
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.02	4
	Social protection GDP per capita		

The scores in the table above result in the following problems for Puerto Rico

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Puerto Rico

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

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Country report for: Saint Kitts and Nevis

Introduction

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very low
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high

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Table: food security indicators for Saint Kitts and Nevis

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap	157.25	5
	Arable land per capita	0.11	2
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility		
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Saint Kitts and Nevis

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Saint Kitts and Nevis

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
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Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

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Health and Nutrition

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1832	35.3	53.7
1974	2115	46	62.2
1979	2090	53.3	64.8
1984	2200	56.7	70.5
1989	2372	58.9	81.3
1994	2075	51.6	67
1999	2101	58	64.1
2004	2146	69.9	73.3
2009	2231	61.4	71.6

Research and development

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Country report for: Saint Lucia

Introduction

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Typology

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is low
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Saint Lucia

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap	0.83	1
	Arable land per capita	0.01	1
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility	0.02	4
	Social protection	3.5	3
	GDP per capita	9073.38	3

The scores in the table above result in the following problems for Saint Lucia

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Land availability

This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	1735	38.4	46.6
1974	1814	40	49.9
1979	2093	50.5	52.5
1984	2202	54	61.4
1989	2247	62.9	48.5
1994	2481	72.4	64.3
1999	2447	72.2	68
2004	2390	75.1	69.3
2009	2481	75.7	65.3

Research and development

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Country report for: Saint Vincent and Grenadines

Introduction

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Table: food security indicators for Saint Vincent and Grenadines

Dimension	Indicator	Value	Score
Potential	Cereals yield gap		
	Irrigation gap		
	Arable land per capita		
Efficiency	Cereals yield	0	1
FNS Risk	Stunting		
	Underweight		
	Wasting		
	Volatility		
	Social protection		
	GDP per capita		

The scores in the table above result in the following problems for Saint Vincent and Grenadines

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Saint Vincent and Grenadines

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2091	38.7	53.8
1974	2048	42.7	53.1
1979	2271	47.8	54.6
1984	2314	50.2	55.1
1989	2173	49.2	57.2
1994	2202	53.7	52.2
1999	2392	60.2	61.3
2004	2582	69.3	69.5
2009	2678	73.1	73.7

Research and development

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Country report for: South Georgia and the South Sandwich Islands

Introduction

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Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

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The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

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Country report for: Suriname

Introduction

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The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is medium
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is medium
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is very high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Suriname

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	13.03	3
	Irrigation gap	0.96	1
	Arable land per capita	0.11	2
Efficiency	Cereals yield	0.02	3
FNS Risk	Stunting	11.33	2
	Underweight	8.23	3
	Wasting	5.63	3
	Volatility	0.03	5
	Social protection		
	GDP per capita	6273.04	3

The scores in the table above result in the following problems for Suriname

- Volatility without malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Suriname

- The country is not strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2161	52.6	40.1
1974	2102	46.8	41.8
1979	2168	48.9	45.5
1984	2507	55.1	45.1
1989	2269	51.2	37
1994	2299	48.1	38.2
1999	2327	47.4	57.4
2004	2324	46.7	60
2009	2463	50.3	63.4

Research and development

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Country report for: Trinidad and Tobago

Introduction

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Table: food security indicators for Trinidad and Tobago

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	16.04	4
	Irrigation gap	4.31	3
	Arable land per capita	0.02	1
Efficiency	Cereals yield	0.01	2
FNS Risk	Stunting	5.3	1
	Underweight	4.4	2
	Wasting	5.2	3
	Volatility	0.02	4
	Social protection		
	GDP per capita	20334.2	4

The scores in the table above result in the following problems for Trinidad and Tobago

- Volatility without malnutrition

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Trinidad and Tobago

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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2257	49.5	46.8
1974	2473	53	57
1979	2617	59.3	57.8
1984	2675	60.2	72.2
1989	2516	53.2	64
1994	2355	45.8	65.1
1999	2425	48.7	63.2
2004	2427	52.5	64.7
2009	2535	55.5	66.4

Research and development

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Country report for: Turks and Caicos Islands

Introduction

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The status of different policy instruments related to food security for Turks and Caicos Islands

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Country report for: Uruguay

Introduction

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- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished, % of women suffering from anemia and under-five mortality rates) is very high
- The obesity index (based on the prevalence of obesity among adult women) is high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is very high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is very high
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

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Table: food security indicators for Uruguay

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	8.79	2
	Irrigation gap	6.94	3
	Arable land per capita	0.44	5
Efficiency	Cereals yield	0.08	5
FNS Risk	Stunting	13.18	2
	Underweight	4.94	2
	Wasting	2.4	1
	Volatility	0.01	3
	Social protection		
	GDP per capita	10585.1	4

The scores in the table above result in the following problems for Uruguay

- None of the categorized FNS profiles

Markets & trade

The various policy responses to the food crisis in 2007/2008 and 2011 are thoroughly discussed in the price volatility literature (Kalkuhl et al. 2015). In the following, the existence of different policy measures/instruments in the country are provided. These instruments are: import and export regulation, price stabilization through public storage, and last risk management and fortification of market institutions. General production oriented policies are not considered since they aim at increasing production in the long-run rather than impacting on volatility in the short and medium-run.

The status of different policy instruments related to food security for Uruguay

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
- There is no public storage in the country (FAPDA 2014)
- The country has not changed its import tariff in the period 2007-2012 (based on the World Bank Food Policy Monitor 2014)
- Export restrictions have not been applied in the period 2007-2012 (World Bank Food Policy Monitor 2014)

Agricultural and food imports play a particular key role in terms of food security in low income countries. Indeed, dependency on imports for food may raise a problem for food security in particular in the case of sudden price increase which put up national food bill. The national state of food availability combining food imports and domestic food production thus constitutes some crucial information. The Bonilla Index, which is the ratio of national food import expenditure to the total value of exports, is a useful indicator of national access to the world food supply. This is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. The Bonilla Index in the period 1995-2010 for country name ranged between BI_{min} (BN) and BI_{max} (BO), with an average of BI_{ave} (BP). In 2008, the height of the food crisis, the BI was BI_{2008} (BQ). More information can be found in FOODSECURE Working Paper 18.

The Bonilla Index is influenced by the Nominal rate of assistance for importable food products (NRA_m). If NRA_m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price rise for imported food, with a negative (resp. positive) effect on national food security. In country name, the NRA_m ranged between NRA_{min} and NRA_{max} (mean: NRA_{mean}), and was NRA₂₀₀₈ in 2008.

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This assessment focused on the issue of remaining agricultural land per region (FOODSECURE Technical Paper 7 by Mandrik, Doelman and Stehfest, 2015). Firstly, the total available and biophysically suitable land was assessed by excluding areas with certain biophysical restrictions. Secondly, institutional parameters of land suitability to exclude protected areas and - in some regions - also intact forests, were applied. Thirdly, a suitability index was used to define the potentially available land that is also suitable for conversion to agricultural production from a socio-economic perspective. Finally, the current agricultural land was subtracted from the total available and suitable land to derive the remaining (potentially available/suitable) land per region. Information on the quality and suitability of the available land is also provided, based on classes of crop productivity. The distribution of global grasslands in both intensive and extensive agricultural systems, and the effects of this distribution on potentially available land per region is also analysed.

Prices & productivity

The FoodSecure project has looked at price-related food insecurity by looking at the commodity prices. This provides an alternative to looking at the national food price indices which might not be representative for poor consumers. A typology has been created which includes: (1) general price instability; (2) seasonal price instability; and (3) price uncertainty. This typology provides an indication of the potential of policy instruments to reduce price volatility. FOODSECURE Technical paper no. 5 by Korner and Kalkuhl (2015) provides more information about the data and methodology which are used to derive these results and can be found [here](#).

The typology with respect to price related food insecurity is based on three indicators. First, national food price volatility measured as the extent of commodity price fluctuations in domestic food markets. Second, price transmission from international into domestic food markets which captures the risk of importing volatility from international food prices. Third, trade status defining whether a country is importer, exporter, or trade-switcher. This relates to a country's vulnerability to international price surges.

National food price volatility

- The general food price volatility in the country is low
- The irregular volatility (price uncertainty) in the country is very low
- The seasonal range (percentage deviation between highest and lowest price of the seasonality obtained from decomposition analysis) is low

Price transmission

- The maximum transmission elasticity (over all commodity prices) is medium
- The mean quintile of transmission elasticity quintiles over commodities is 4.67

Health and Nutrition

The definition of food security takes into account both the individual and the global level of food security and recognizes the importance of the nutritional value of the diet. It confirms that food security is a multidimensional issue that goes beyond the simple availability of food and requires access to sufficient, safe and nutritious food. The accepted definition is: '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 1998). The health and nutrition aspect includes indicators such as daily calorie intake (with a separation for consumption of fats and proteins – figures below).

Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2607	70.5	93.1
1974	2597	69.2	92.7
1979	2530	64.7	85
1984	2368	60.6	75.3
1989	2198	58.5	74.5
1994	2428	67.1	83.5
1999	2476	69.3	79.7
2004	2481	58.2	62.6
2009	2595	61.5	64.3

Research and development

Innovations play a key role in enhancing human welfare, reducing poverty, and promoting economic growth in developing countries. In the agricultural sector, innovation leads to improved engineering and communication, which supports food production, develops biotechnology, and sets new platforms and institutional arrangements for farmers.

The innovation profile for country name is based on this/these factor(s):

- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is very high

Country report for: Venezuela (Bolivarian Republic of)

Introduction

The FOODSECURE project aims to design effective and sustainable strategies for assessing and addressing the short- and long-term challenges of food and nutrition security (FNS). The project will provide a variety of analytical tools to experiment, analyse, and coordinate policies to address tight and volatile food markets. More specifically, FOODSECURE aims to:

- Better understand the causes of hunger and malnutrition and the determinants of global food and nutrition security.
- To improve the ability of decision makers to foresee and respond to future food and nutrition security crises.
- Provide guidance to stakeholders on technological and institutional change and policy strategies to improve global FNS.

More information about the FOODSECURE project is available at <http://www.foodsecure.eu/>

Typology

A categorization of countries based on their characteristics can help policy makers in developing the right strategy, as it facilitates the interpretation and drawing of suitable conclusions from case studies and successful policies in other countries. In this FOODSECURE project, the typology will help calibrating models and interpreting results at national levels, as well as guide the selection of case studies by project partners.

The typology is developed based on the countries' food or nutrition security profiles, as well as on their agricultural, economic, (agricultural) innovation systems, social and political profiles:

- The food security index (based on average daily calorie intake, share of animal proteins, and calorie deficit) is high
- The nutrition security index (based on % undernourished , % of women suffering from anemia and under-five mortality rates) is high
- The obesity index (based on the prevalence of obesity among adult women) is very high
- The economic performance (based on per capita GDB, the GINI coefficient, and the women's economic opportunity index) is very high
- Agricultural performance (based on per capita food production, value added per agricultural worker, and import share of agricultural products) is high
- The agricultural potential (based on precipitation, growing season, soil fertility and water availability) is high
- The health infrastructure (based on % with access to (1) improved water sources and (2) proper sanitation)) is very high
- The political index (based on level of democratization, efficiency/quality of the government and political stability) is low
- The innovation index (based on an index for education, economic incentive regime, information infrastructure and the innovation system) is high

The food security profiles can help in highlighting countries with unstable market conditions, high seasonality or acute and chronic malnutrition. Three key dimensions are identified to construct typology indicators. These include countries' potential to expand production, efficiency of grain production and food and nutrition security (FNS) risk. The data is based on monthly and annual observations from the period 2000 – 2012. More information about this data can be found in FOODSECURE Technical Paper 4 (Mujahid and Kalkuhl, 2014).

Table: food security indicators for Venezuela (Bolivarian Republic of)

Dimension	Indicator	Value	Score
Potential	Cereals yield gap	11.64	3
	Irrigation gap	3.05	2
	Arable land per capita	0.1	2
Efficiency	Cereals yield	0.04	4
FNS Risk	Stunting	16.31	2
	Underweight	3.9	2
	Wasting	4.67	3
	Volatility	0.02	4
	Social protection		
	GDP per capita	10264	4

The scores in the table above result in the following problems for Venezuela (Bolivarian Republic of)

- Volatility without malnutrition

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The status of different policy instruments related to food security for Venezuela (Bolivarian Republic of)

- The country is strengthening its risk management and institutions (based on FAPDA 2014)
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Year	Daily calorie intake	Daily protein intake	Daily fat intake
1969	2167	46.9	44.9
1974	2109	45.5	45.2
1979	2421	50.8	62.2
1984	2517	54.7	70.9
1989	2122	45.3	57.1
1994	2249	53.2	55.5
1999	2224	55.7	58.4
2004	2412	58.9	69.6
2009	2769	69.7	82.7

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Country report for: Virgin Islands US

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