Honduras: The Green Heart of Central America

Sunset landscapes in the small village of coffee growers in the highlands of Honduras. Santa Barbara National Park © Shutterstock

Honduras

[1] Carolina Alduvín Sainz
[2] Napoleón Molina
[3] Dinie Espinal
[4] Carlos Almendares

Food insecurity in Honduras affects 72% of the population, mainly in rural areas, because of its extreme poverty conditions, coupled with the degradation of natural resources, climate change, low productivity levels, low education levels, the use of obsolete, inefficient technology, economic constraints on obtaining access to food and uncoordinated state policies

Summary

Food insecurity affects 72% of Honduras's population, mainly in rural areas, since over half the population lives in extreme poverty. This situation is linked to the degradation of natural resources, climate change, low productivity levels, low educational attainment, the use of obsolete and inefficient technology, economic constraints on access to food and uncoordinated state policies.

There is a vicious circle among agriculture, degraded natural resources and poverty. Extreme poverty and lack of education have led peasants to clear forests to provide farmland which, however, has a forest vocation. This puts pressure on the land, degrades soils and destroys wildlife habitats, reduces forest cover, increases the risk of landslides and floods and exacerbates vulnerability to climate change.

Agriculture consumes agrochemicals and large amounts of water. Climate change puts food security at risk and is expected to cause reduced water availability, increased landslides, a decline in fish stocks and lower agricultural productivity due to rising temperatures. Although Honduras's food security and climate-change policies are designed to address these threats, problems associated with the use of agrochemicals are not a priority. A major challenge is the lack of effective technology and knowledge transfer to peasants. The problem should be addressed by all the sectors, and the following measures implemented: facilitate equitable access to food for the most vulnerable groups; promote agroforestry development to improve food; encourage the use of environmentally- friendly farming practices; promote scientific research focused on national agricultural productivity problems and the use of new biotechnologies to improve this, and reduce the use and waste of harmful agrochemicals through natural organic solutions.

National characteristics

Honduras is one of the poorest, most unequal countries in Latin America. Its average income is US $4,243.00 per capita per year, and a population of 9.4 million. Although the national economy recovered slightly following the global economic crisis of 2008-2009, its finances declined in 2012 and 2013, due to a lack of fiscal discipline, higher current expenditure and high payments for debt service.

The fiscal deficit increased from 2.8% of GDP in 2011 to 7.6% in 2013, slowed growth and increased public debt. Since 2014, measures adopted by the current administration have led to fiscal consolidation. The 2015 World Bank Review notes the country's greater tax collection, better expenditure control, progress in tariffs, and adjustments to subsidies. Last year, the fiscal deficit fell to 4.4% of GNP and poverty rates declined. Nevertheless, 66% of Hondurans live in poverty, 46% in extreme poverty. Poverty in the countryside accounts for 70% of overall poverty and 58% of extreme poverty.

The most depressed rural areas are located in the west and south of the country where rains are scarce and irregular. The Global Climate Risk Index identifies Honduras as the country most severely affected by extreme weather events.

The agricultural sector accounts for nearly 40% of overall employment and the majority of rural employment. Nevertheless, Honduras relies heavily on imports to meet its food needs. Almost half the population lives in rural areas, while 72% of rural households obtain their livelihood from subsistence farming on small parcels. Despite this, the country imports almost all its maize and rice, while beans are produced locally almost every year.

Territorial size

Honduras lies between 12°58′ and 16°02′ of North latitude, and between 83°10′ and 89°22′ of West longitude. Its island territory extends to 17°30′ of North latitude and 82°30′ of West longitude. It has an area of 112,492 km², with a 2,401-km perimeter, 1,597 km of which are borders and 804, shores. It has the following islands: Islas de la Bahía; Islas del Cisne and the Crescent Moon Reefs in the Caribbean, and Isla de Zacate Grande and Isla El Tigre in the Gulf of Fonseca. To the North, it is bounded by the Caribbean Sea; to the East and South: Nicaragua; to the South: Gulf of Fonseca and El Salvador, and to the West, Guatemala.

Its relief consists of Caribbean lowlands, occupying 16.4% of the country. This region has narrow alluvial plains that are constantly flooded, with branches leading into the interior, following the depressions between the mountain ranges. The Pacific lowlands, accounting for 2% of the territory, encompass the Gulf of Fonseca coastline, with mangrove forests and narrow plains of fragmented dry forest. The valleys and highlands of the interior occupy 81.7% of the country's surface, 79% of which corresponds to the mountain system. Honduras consists of 37% of flat land and 63% of mountainous areas, most with a forest vocation. The terrain includes mountains with gradients of over 25 degrees, plains, valleys, rivers and other bodies of fresh water. The highest point is Celaque Mountain, with a height of 2,849 masl (meters above sea level).

Climate

Honduras has a warm tropical climate in the lowlands, which gradually changes to temperate in the higher areas. It has an average temperature of 26°C up to an altitude of 600 m on the Caribbean side. between 16 and 24°C between 600 and 2,100 m, and less than 16°C above 2,100 m. The South has a dry climate and an annual average temperature of 28°C. Rainfall varies considerably throughout the country, ranging from 900 to 3,300 mm depending on the region.

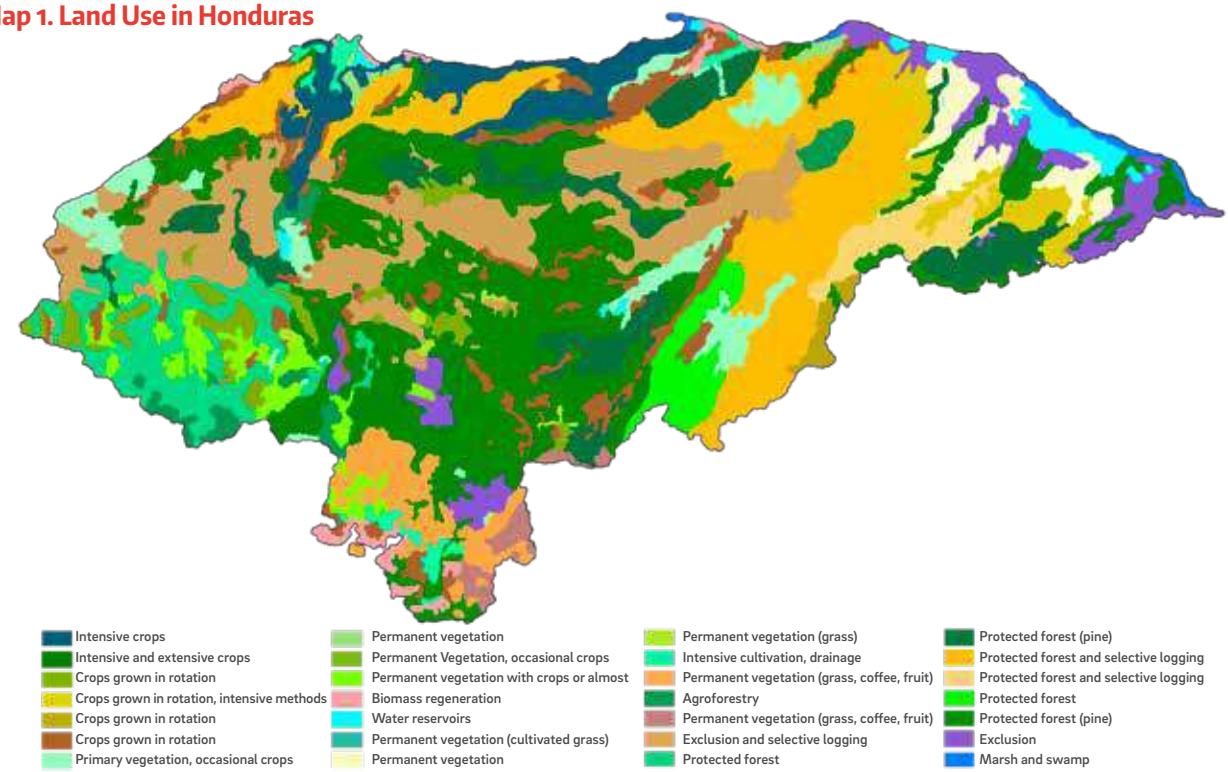
Its tropical location between two oceans and its topography create a wide variety of habitats, from cloud forest to coral reefs, with an enormous diversity of flora and fauna. It has 43,352 km² of forests. Wooded areas are steadily declining due to the felling and burning of their vegetation, which reduces biodiversity and limits the water sources on which the population depends.

Water Resources

Honduras has a water surface of just 200 km². It comprises 21 hydrographic basins, 15 of which flow into the Caribbean and six into the Gulf of Fonseca. In a normal year, they discharge an average of 92.813 million cubic meters of precipitation, at a rate of 1,524 m³/s. Water availability is 11,500 m³/inhabitant/year. There is unequal water access, however, due to distribution problems. The scarcity of drinking water is due to the population increase, a shortage of investment in infrastructure for water collection, purification

[1] Carolina Alduvín Sainz, Coordinator. Sc.D, Profesora e investigadora de la Universidad Nacional Autónoma de Honduras, carolinalduvin46@gmail.com **[2] Napoleón Molina,** Sc.D., Project Coordinator, Heifer International Hondura, napomg@gmail.com **[3] Dinie Espinal,** MSc, Professor at the Department of Agricultural Science and Production / Zamorano University, drueda@zamorano.edu **[4] Carlos Almendares,** Sc.D., Head of the Department of Seed Certification, SENASA, Ministry of Agriculture, calmendares81@yahoo.com

Map 1. Land Use in Honduras



Source: Secretariat of Agriculture and Livestock, Info@agro, Directorate of Agricultural Science and Technology DICTA/SAG. Cartographic descriptors Datum WGS 1984 Zone 16N, Geographic units UTM, Units of mapping MTS, Units of measurement Km.

and distribution, as well as lack of maintenance. Moreover, a percentage of the water in the supply systems is lost through leaks, illegal connections and vandalism.

Land

Twenty-four percent of the national territory has agricultural soils, while 76% are for forest use. Nevertheless, over half the country is under cultivation. In fact, 30.5% of the territory is used for agriculture, despite its forest vocation, due to the demographic pressure to obtain land to produce food and guarantee food security, as well as opportunity costs, incentives and entry barriers to alternative land uses, which make forest activities less attractive as income generators.

Forests

In 2011, the Forest Statistical Yearbook estimated forest coverage of 6,598,289 ha, or 59% of the national territory, distributed as follows: 57% of broadleaf forest with 3,747,913 ha; 38% of coniferous forest or 2,579,153 ha; 2% mangrove with 130,894 ha; 2% of mixed forest and 1% of dry forest with 25,017 ha.

Characteristics of Resources and Ecosystems

Honduras has the following bioregions: broad-leaved tropical forest; conifer forest; temperate broad-leaved forest and mangroves. Its habitats include: montane forest; Atlantic Forest; Pacific dry Forest; pine-Oak forest and Caribbean and Pacific wetlands. There are eight life zones: low montane humid forest lm-HF; subtropical humid forest st-HF; low montane very humid forest lm-VHF; subtropical dry forest st-df; tropical rainforest tf; subtropical very humid forest st-vhf; very dry tropical forest vd-tf and dry tropical forest dtf.

The National Map of Honduran Plant Ecosystems, drawn up in accordance with the UNESCO classification system, reports 70 ecosystems, including lagoons, estuaries, reef

systems and cities. Working with an ecosystem approach is as yet in its infancy. Through the National System of Protected Areas (SINAPH), the aim is to have a minimum of 12% of each ecosystem under some form of conservation.

Biodiversity

Honduras has a high degree of biodiversity in relation to its size. According to the National Biodiversity Strategy and Action Plan (ENBPA), there are 718 bird species, 59 that are endangered within the country and five on the International Union for the Conservation of Nature (IUCN) endangered list; 228 mammal species, six endemic and 19 under threat; 211 reptile species and 111 amphibian species 36 endemic; 672 fish species, and 2,500 insect species, 14 endemic. There are no systematic records of other groups such as mollusks, or of arthropods other than insects.

In flora, 7, 524 vascular plant species have been recorded, 170 with limited distribution, 134 endemic and 35 with endangered habitats. The registration of fungi, algae, non-vascular pteridophytes or any kind of microbes has not been systematized. Knowledge of biodiversity and research on its components is developed through studies of local and regional flora and fauna, especially in protected areas.

Demographic characteristics and future trends

Of the estimated 9.4 million inhabitants, 52% are concentrated in cities and the rest in rural areas; 38.1% are under the age of 14, 58.3% ages 15 to 64 and 3.6% 65 or older. The country has a population growth rate of 2%, a birth rate of 27/1,000, a mortality rate of 5/1,000, net migration of 2/1,000; infant mortality of 24/1,000 (27% for boys and 21% for girls); a life expectancy of 70 years and a fertility rate of 3 children per woman.

The Economically Active Population (EAP) is approximately 3 million, while agriculture contributes 39.2% of GDP, industry 20.9% and services 39.8%. The unemployment rate is estimated at 27.8%, public debt accounts for 21% of GDP, the inflation rate is 11.9%, the investment rate totals 31.5% of GDP; and economic growth stands at 4%. Ethnically, the 2013 census reports that: 90% of the population are mestizo, 7% indigenous, 2% black and 1% white. The country has a literacy rate of 80% and an average of 11 years' schooling, while 3.8% of the GDP is assigned to education. There are nine distinct ethnic groups within the mestizo population with an estimated population of 600,000.

Lack of food and nutrition security

The World Bank's Food Program estimates that 60% of Hondurans experience some form of food insecurity. One in four children is malnourished, meaning that their lives are cut short. In the most depressed regions, 58% of children under 5 suffer from chronic malnutrition, characterized by low weight, low height, insufficient breastfeeding and complementary breastfeeding practices. A high priority for the Honduras Government is to eradicate poverty and increase food and nutrition security.

Farming Modalities

In Honduras, family farming coexists with medium- and large-scale private farms with plantation crops and industrial crops such as sugar cane and African palm. Since colonial times, the land ownership regime has been the main source of inequality in the income and living conditions of the country's inhabitants.

Agriculture is the primary source of income and food security for the rural population. Productivity, however, is low, inefficient and extremely vulnerable to external factors. In 2012, it accounted for 14% of GDP and 70% of exports. The agricultural sector lost almost a third of its purchasing power in the past two decades, due to the fall in prices of export crops. It has improved productivity in the lowlands by exporting nontraditional products such as fruit and vegetables, and diversifying rural economic activities such as tourism, handicrafts, fishing, sustainable wood production and processing, and environmental services.

Small and medium producers are excluded because of sharp differences within the rural sector and the challenges they face. Most grow low-value crops, for on-farm consumption and local markets. Women farmers face additional

challenges: less access to capital, training, inputs and markets. Women with access to land have smaller plots on less fertile soils, with less potential to grow export crops than men.

Quesungual

This is an ecologically friendly agroforestry system that has improved the living conditions of small farmers with scant resources. In Honduras, nearly 78% of the land used in agriculture is on slopes, where there are problems of safe water supply and soil erosion, which have been exacerbated by climatic variability and change. For generations, traditional agriculture has had a negative impact on livelihoods, food production and the environmental quality of the surrounding communities.

Two decades ago, peasants in the south-western part of the country - with the help of FAO - began to develop the system. Previously, the slash-and-burn method was used, which involved felling part of the forest and burning the waste. Parcels were cultivated from one to three years, until yields declined together with soil moisture and fertility. Farm workers were subsequently forced to move to a new plot of land to repeat the destructive cycle.

It was an inadequate, inefficient way of cultivating sloping land with fragile acid soils, which progressively depleted resources and food security. *Quesungual* consists of: 1) No slashing and burning: partial, selective and progressive vegetation management; 2) Permanently covering the floor: continuous depositing and distribution of the biomass coverage of native vegetation and crop residues; 3) Minimum soil disturbance: zero tillage and direct planting; 4) Efficient fertilizer use: accurate application regarding time, amount and form.

This system is used to cultivate maize, beans, sorghum, vegetables and soybeans. Farmers now clear the vegetation by hand. Trees that were

Box 1. Coffee growing as a feature of food security

Maritza Midence, Highland Coffee of Honduras, highland@cablecolor.hn

Honduras's coffee vocation is determined by its mountainous topography. This was first recorded in the 18th century, when the production of "abundant harvests of such excellent quality such as "moka" was already mentioned.

In 1974, devastating Hurricane Fifi affected crops in the high mountains to a lesser extent, and coffee was identified as a strategic cash crop. International prices suddenly rose by over 300% in 1975, as a result of the crippling frost that destroyed over 70% of Brazil's coffee plantations, which supplied approximately 40% of the world market at the time. Spurred by this incentive, Honduras exported its first million quintals in 1981. The minimum price guaranteed by the international quota system increased Honduran coffee production. In 1989, and the world coffee market changed to "free market" conditions, which have remained to this day.

Even without the quota system, Honduran coffee production continued to grow as a result of training producers, adopting new varieties and growing methods, and finding a market in Northern Europe, the US and Japan. Coffee exports grew exponentially from 1974 to 2001. In 2004, the first Cup of Excellence was held. As a result of this contest, the country committed to quality growth and is now the third largest producer in Latin America. It is also recognized as a producer of special and differentiated or gourmet coffee with international certification, accounting for 25% of total coffee exports.

Approximately 110,000 registered producers depend directly on coffee and generate jobs that occupy nearly a third of the EAP according to the National Institute of Statistics (INE 2016). Coffee is grown in almost 300,000 ha in 15 of 18 of Honduras' departments. Exports from the 2016/17 crop are expected to generate $1.2 billion USD in foreign exchange. Income depends on the quality and/or volume of production, the system used and its level of organization to pay for certification. There are guaranteed minimum prices when selling coffee certified by the Fair Trade Organization (conventional and organic). Specialist coffees generate much higher income than generic coffees, which provides more purchasing power for farmers to be able to meet their nutritional needs.

The Honduran Coffee Institute (IHCAFE), created in 1970 as an autonomous government agency, was privatized in 2001, and since then, has belonged to the producers. IHCAFE controls Honduras's coffee policy. In less than 50 years, coffee production has increased the value of farmworkers' labor. In Lempiras (L.), wages rose from L. 3.50/day ($1.75 USD) in 1970 to L. 10/day ($ 5.00 USD) in 1990, to L. 70/day ($4.67) in 2000, to L 120/day (US $6.32) in 2009 to L. 165/day ($7.17 USD) in 2017. It has also increased the price of their land which, according to the region of the country in which they are located, has risen from L. 14,000/ha ($7,000 USD) in 1970 to L. 214,000/ha ($9,300 USD) today.

previously cut and burned constitute a source of fruit, firewood and furniture wood, in addition to providing a fresh microenvironment for their crops. A typical plot contains approximately 20 large timber and fruit trees, in addition to hundreds of small trees and shrubs. They are regularly pruned to allow the passage of light and a period of recovery and thereby promote growth. This permits year-round cultivation on the same plot of land. By improving soil quality and management, the *Quesungual* system increases production, requires less labor, retains moisture better, is low-cost and has reduced greenhouse gas emissions and retained more carbon.

Major crops

According to the National Agricultural Survey, crops such as banana, plantain, sugar cane, African palm and pineapple are grown on more than 30,000 farms, with a cultivated area of 227,326 ha, producing 8,404,460 MT. Citrus fruits, coconut, papaya, mango and other fruit trees are common in family orchards, even in urban areas. Annual crops such as melon, watermelon, tomato, potato, chili and onion are produced at 8,840 farms covering 19,580 ha, with a productivity of 508,263 MT. Basic grains such as maize, beans and rice are planted on 117,647 ha, of which 80% are technified, the remainder involving subsistence farming.

Livestock

Extensive livestock production is carried out on 9.7% of the territory, on the best valleys and coastal plains, driving many small subsistence farmers onto the slopes. Preference is given to dairy and beef cattle, pigs and poultry and to a lesser extent, goats, sheep and bees.

Fishing

Most fishing is carried out using small artisanal boats, which catch shrimp and lobster, as well as fish, while aquaculture produces tilapia and shrimp.

Industries

The main industries are sugar, coffee, honey, preserves, textiles, woods, clothing, crafts, food processing and tourism.

Is the country self-sufficient in agriculture?

Definitely not. Domestic food production expanded in the 1980s and 1990s but has declined in recent years and is still insufficient to meet the needs of a growing population. A negative trend in per capita food production has therefore been observed that is exacerbated by the fact that postharvest losses are significant, despite the efforts undertaken made by specific projects. This is turn is compounded by inefficient marketing, transportation and storage.

Food and nutrition security

Food and nutrition security only exists when all people have access at all times to sufficient, safe and nutritious food to meet their nutritional needs and cultural preferences for leading a healthy, active life. Food availability in Honduras is related to the national capacity to produce it and allocate it for families' consumption. Agriculture is a major source of employment, income and foreign exchange that provides food and indirectly contributes, through imports, to supporting the country's food supplies.

Basic grains are crucial to the country's food security. They are produced by thousands of families who have historically inhabited the worst hillside lands. Their contribution, particularly of maize and rice, is declining. The balance between domestic production and total demand is negative for maize, the crop with the highest production and consumption. Since the 1990s, its production has steadily declined, registering a deficit of over 250,000 MT.

The country's food availability is therefore increasingly reliant on the international market, meaning that export crops and other sectors of the national economy become increasingly strategically important. Import capacity is a key element for guaranteeing Food and Nutrition Security. Measures are needed to intensify agricultural and rural development and thus increase food availability.

Food Access

This is the most important component for combating food insecurity. In the fight against poverty, facilitating access to food involves two aspects- The first involves producers,

by promoting access to means of production such as land and property deeds, technical assistance, improved seeds, environmentally-friendly fertilization, agroforestry, irrigation, year-round roads, markets, postharvest treatments, competitive prices and everything else required to make them efficient. The second entails stimulating the rural economy by generating more sources of employment and income, with access to credit for micro and small enterprises in depressed areas, and large agribusiness projects, to export vegetables and fruits and to produce bioenergy from sugar cane and oil palm in the most productive valleys and plains, without forgetting better market conditions.

Urban and rural poverty

Several factors are responsible for rural poverty in Honduras, particularly lack of access to and insecurity in land tenure, the abandonment of food production and the constant deterioration of the terms of trade for raw materials and agricultural foodstuffs, due, on the one hand, to the lower prices paid to the producer and, on the other, to the inflationary effects of the rise in oil prices, such as the sliding devaluation of the currency.

Non-coffee exports are neither constant nor uniform, which negatively affects the wages of the national labor force, which, in turn, undermines the food security of large segments of the rural and urban population. The crisis in the sector forces the rural population, especially young people, to migrate to cities and the US in search of job opportunities. Thus, poverty extends to urban areas, where it acquires new features and changes consumption patterns.

The surplus non-migratory labor force that does not migrate is located in the urban informal sector, expanding micro, small- and medium-sized enterprises, which account for nearly 34% of the EAP and produce approximately 25% of GDP. Although they suffer from the same limitations of the formal economy and threats to the passage of free trade agreements, companies on these scales are regarded as a decisive factor in the family economy of the urban poor and a source of hope for reviving the rural economy by creating new non-agricultural jobs. New interventions should consider these profound changes if food and nutrition security is to be achieved.

Unequal food access

The cost of the basic food basket for a family of five in the early 1990s was L. 10.04 and L. 34.00 in 1995. In 2010, it stood at L. 6,400.00, when the minimum wage was L. 5,500.00. At present, the cost is L. 7,700.00, well above the income of the poorest families. The price of the basic food basket changes on a monthly basis. Price instability and variability are due to low production, intermediation, scarcity, speculation and unemployment. Rising food prices, speculation and hoarding pose constant threats to Honduras' weak economy.

Remittances contribute to reducing the food and nutrition insecurity of the senders' dependents. In 2014, the impact of this type of income on the 284,000 households that declared receiving them was US $ 3,465 million, of which 53% are not poor and are the ones that support the country financially.

Main export/imports

The agri-food trade balance in Honduras has shown a downward trend, in which food imports are growing at a faster rate than agri-food exports. This trend has intensified since the 1990s, when the country adopted a policy of trade liberalization, as part of its agreements with international financial institutions - and expanded its Free Trade Agreements (FTA), especially with the US, and other trade liberalization mechanisms such as the Central American Customs Union.

There is increasing food dependence on the international market, especially regarding cereals. The exacerbation of these trends as a result of the Central American Free Trade Agreement (CAFTA) prompted the need for an agri-food strategy that would consider the impacts on the national economy, especially on agriculture, since a gradual tariff reduction program was only established to temporarily protect a group of sensitive agricultural products, such as white maize, rice, beef and pork, and milk and dairy products.

Impact of environmental vulnerability on food production

In recent years, the country has experienced growing environmental vulnerability with serious repercussions on the quality of life, especially regarding its population's food security. A key factor is the conflict between the current use and productive capacity of the soils. This is one of the country's main environmental challenges, since agriculture has been practiced on unsuitable where as early as the late 80s, it was estimated that 22,682 km² were overexploited.

Annual droughts, due to the El Niño Southern Oscillation (ENSO) phenomenon, cause recurrent food crises in the southern, central and western regions of the country, home to the largest peasant population, which depends on the production of basic foodstuffs. The rule is that during these years, over ¾ of the area under cultivation is lost.

Possibility of achieving MDG targets

Table 1 summarizes the status of the indicators used to assess the results of efforts in the country to achieve the goal of reducing poverty and hunger in the Millennium Goals (MDG). The results are positive for the chronic malnutrition indicator yet insufficient for overall child malnutrition.

Main agricultural challenges

1) Invest in women: Protect and strengthen women's capacity to provide food, health and nutrition security for their families. 2) Increase year-round access to and availability of foods with high nutritional value. 3) Improve knowledge of nutrition in rural households with an emphasis on dietary diversity. 4) Incorporate explicit nutritional goals and indicators into agricultural investments.

Priority objectives of nutritionally sensitive social protection

1) Focus activities on the populations with the greatest nutritional vulnerability such as pregnant women and children aged two or under. 2) Include nutritional education and counseling in social intervention programs to raise awareness about health care and seeking behaviors. 3) Integrate nutritional services into social protection interventions, which improve the quality and quantity of diets. 4) Reduce the acute long-term negative financial impacts of external financing, price and climate shocks by stepping up programs at times of crisis and focusing on impacted areas.

Priority objectives for improving nutrition through the health sector

1) Reduce micronutrient deficiencies. 2) Reduce anemia in pregnant and breastfeeding women. 3) Promote good food and nutrition practices. 4) Prevent and treat diseases. 5) Reduce low birth weight. 6) Improve reproductive health and family planning. 7) Correct moderate and severe malnutrition in children.

Table 1. Summary of indicators used

Indicators	Unit	1990-92	2004-05	Gap	Progress	2015
Overall child malnutrition (P/E)	%	21.4	18	-7.3	Insufficient	10.7
Chronic child malnutrition (T/E)	%	42.4	30	-8.8	Positive	21.2
Acute infant malnutrition (P/T)	%	1.8	2	-1.1	Negative	0.9
Proportion of undernourished persons	%	22	23	1	Negative	11
Undernourished persons	Persons	1.11	1.61	-0.62	Negative	0.99
Productivity in basic grains	Qq/mz	26	23.6	-2.7	Negative	n.a.
National food deficit (maize)	MT	49,992	271,276		Negative	0
Agrifood trade balance	USD	568	97		Negative	0
Total population	millions	5.03	7			9

Notes: NA = Not Applicable, there is no goal for the indicator. Although there was no target for 2015 for the maize deficit and agri-food trade-balance indicators, they should ideally have zero sum balances.

Institutionality

In 2009, the Law for the Establishment of a Country Vision and the Adoption of a National Plan for Honduras was approved, thereby institutionalizing the process of strategic planning for the country's economic, social and political development. Both include socioeconomic development initiatives to achieve food and nutrition security goals. In 2010, an Executive Decree was approved that resulted in the 2010-2038 Country Vision, which declares the food and nutrition security of the Honduran population a national priority, framing the Long-Term Food and Nutrition Security Policy (PSAN) and its Implementation Strategy (ENSAN) within the objectives, goals and strategic guidelines established.

The Country Investment Plan for the Agri-Food Sector (PIPSA) was also approved to expand the agricultural sector. This decree transforms the institutional Food and Nutrition Security framework by stating that the Food and Nutrition Policy is multisectoral and that its Implementation Strategy should be implemented by all the State Secretariats. At the same time, the Technical Unit for Food and Nutrition Security (UTSAN) was institutionalized as a national technical body for the coordination, planning, monitoring, evaluation and formulation of methodological procedures of the PSAN and ENSAN. The Interinstitutional Technical Committee on Food and Nutrition Security (COTISAN) was also confirmed as a consultative body that brings together public and private institutions and external cooperation agencies involved in this issue.

The coordination of international cooperation is overseen by the Technical Cooperation Secretariat (SETCO); programming and budgeting by the Ministry of Finance (SEFIN); the implementation and supervision of productive projects, by the Secretariat of Agriculture and Livestock (SAG); land tenure and legalization by the National Agrarian Institute (INA) and marketing and distribution, by the Secretariat of Economy (SE). Civil society participates through NGO, the Association of Municipalities of Honduras, municipal governments and their communities.

Public programs and projects related to Food and Nutrition Security

Table 2 summarizes the main programs and projects identified. Most projects distribute food, provided by USAID and WFP in the rural poorest departments of the country's West, South and Central

Table 2. Major government programs linked to Food and Nutrition Security

Program / project	Duration	Sponsor	Amount
Comprehensive Assistance to Vulnerable Groups	2003-2007	Government PMA	L. 20'000,000 L. 3'142,340
Atención Integral a la Niñez en la Comunidad AIN-C	2006-2010	World Bank Government	12'000,000 L. 3'000,000
Maternal and Child Coupon	2005 -	Government	L. 21'719,600
Integral Women's Development	2005 -	Government BANPRAF	17'200,000 30'301,750
Technical Assistance in Nutrition and Social Protection	2005 -	World Bank Government	1'000,000 L. 19'000,000
Rural Forestry and Productivity Project	2004-2006	World Bank Government	18'000,000 L. 4'000.000
Healthy Schools Program	Continua	G. Taiwan PMA	17'510,000 L. 29'870,000
Food and Nutrition Support Program	2006-2009	European Union	E. 13'500,000
Food Security/CA Regional Program	2006-2010	European Union	E. 12'000,000
Food Security-Honduras Special Program	2000-2007	AECI-FAO Government	2'664,759 L. 10'739,325
Approximate total			**123'229,987**

regions. They are implemented by national NGO and international NGO such as CARE, World Vision and Plan International (**Table 3**).

A state agency is required to direct and coordinate Food and Nutrition Security programs and projects. For the time being, they are implemented with a lack of integration, very little accountability and scant guidelines for a national policy and long-term strategic plan that would clearly and decisively reflect the will of the Honduran State to achieve the MDG Goals

Agricultural research

Agricultural research is scarce and largely unrelated to national development, particularly Food and Nutrition Security. It is carried out by the central government, through the Secretariat of Agriculture and Livestock (SAG), which has the Directorate of Agricultural Science and Technology (DICTA). In the public academic sector, it is undertaken by the National Autonomous University of Honduras (UNAH), the National University of Agriculture (UNA) and several mid-level agricultural technical schools. In the private academic sphere, it is carried out by Zamorano University and the University of San Pedro Sula (USPS). In the private sector, research is conducted by the Honduran Foundation for Agricultural Research (FHIA) and several fruit and agroindustry companies.

SAG-DICTA

A leader in the scientific and technological development of the country's agri-food sector, it implements public policies at the national level and provides services for producers. Its mission is to design, direct, regulate and implement programs of research, technology transfer and promotion to family agriculture that will enhance producers' innovation capacities in order to develop the agricultural sector and food security.

At its offices and central laboratories, as well as its 11 regional headquarters, it develops breeding programs for maize, sorghum, beans, rice, chili, tomato, potato, avocado and cassava, a plant and livestock production program, and a national seed, plant and fruit tree system. In the livestock sector, it promotes the production of pigs, poultry and fish farming. In technology transfer, priority is given to the training of technicians, the productive solidarity bonus and promoting household orchards.

It has implemented the National System of Phylogenetic Resources by officializing the National Committee for Phylogenetic Resources of Honduras (CONAREFIH), comprising public, academic and private institutions. With the help of FAO, it has produced the National Diagnosis of Phylogenetic Resources for Food and Agriculture. It established the National Information Exchange Mechanism (MNII), as a follow-up to the Global Action Plan adopted by 150 countries with regard to the International Treaty on Phylogenetic Resources for Food and Agriculture.

DICTA is a member of the Central American Integration System for Agricultural Technology (SICTA), the International Potato Center (CIP), the International Center for Tropical Agriculture (CIAT), the Inter-American Institute for Agricultural Cooperation (IICA) (FAO) and other regional programs. DICTA holds the rotating presidency of the Central American Cooperative Program for Crop and Livestock Improvement (PCCMCA), with the motto: "Let Us Generate Technology to Harvest Development".

Table 3. Major government programs linked to Food and Nutrition Security

Program / project	Duration	Financial entity	Amounts
Food Security PL80 Title II	2005-2009	USAID-CARE	5'500,000
Food Security in Santa Bárbara	2005-2009	USAID-ADRA	3'242,514
Rural Management in Food Security	2005-2010	USAID-Save the Children Honduras	3'008,176
Food Security Improvement and Risk Reduction in Western Honduras	2005-2009	USAID-World Vision	4'236,712
Approximate total			**15'987,402**

UNAH

This institution is responsible for higher education and professional training, as well as for undertaking teaching, research and outreach activities. In the agri-food sector, it offers professional degree programs in Agronomy Engineering, Forestry Engineering, Aquaculture Science and Coastal Marine Resources, Agroindustrial Engineering, Biology, Microbiology and Nutrition. At the technical level, short degree programs are available in Dairy Processing, Agricultural Production, Livestock Production, Food Technology, Food and Beverage and Coffee Quality.

Few university professors undertake research and not all of them publish for various reasons, the main one being the lack of recognition of the extra effort involved in publishing. Those who decide to research face challenges such as the lack of financial and logistical support. They also fear being constricted by institutional and customs bureaucracy, and working with inadequate, obsolete and insufficient equipment, if indeed it exists. There are no incentives such as a National System of Researchers and they barely earn some of the hundreds of points needed for their promotion every few years.

National University of Agriculture

This university offers degree courses in Agronomic Engineering, Veterinary Medicine, Food Technology, Natural Resources and Environment, and Agricultural Business Administration. It is located in the center of the country, in one of the richest, most productive departments regarding agriculture. Its mission is to contribute to the scientific, technological and socioeconomic development of Honduran society with an emphasis on the rural sector, through the training and improvement of professionals in agricultural and related sciences.

It has an Agro-Food Social Inclusion Observatory that conducts research to promote innovation and sustainable agro-food development in Honduras. It is equipped with a virtual library on health and other programs to protect natural resources and the environment and is supported by other universities and cooperation and research agencies such as IICA and the German International Cooperation Agency (GTZ).

Zamorano University

This university began as a Pan American Agricultural School in 1941 as a legacy of a transnational fruit company. It is located in Yeguare Valley, in the East of the country, and trains professionals to leverage the productive potential of the agricultural sector of tropical America. On the basis of the motto "Learn by Doing," it has trained 71 classes of agronomists, and engineers in agricultural science and production, agroindustry, agribusiness and socioeconomic development and environment.

It has the best facilities and laboratories in the country for studying biological sciences. The teaching staff and students are mostly Hondurans accompanied by colleagues from other countries in the region, North America and Europe. It has large tracts of land for crops, livestock facilities, workshops, greenhouses, ponds, warehouses, as well as forests and other ecosystems to undertake all the field practices required to produce food and manage natural resources.

All the students are boarders with permission to leave on some weekends. Students grow and process much of what they eat, in addition to marketing the surplus on campus. They have a strict schedule that include classes, laboratory and field practices, study hours and personal activities. In the last year, they go to other areas or countries to collaborate with companies or communities as part of their training and write a thesis on a research topic developed by their tutors.

FHIA

FHIA began as the research department of a fruit company. It is still private, yet willing to collaborate with the public and academic sectors. It is located in the North of the country, adjoining large plantations. It is dedicated to the improvement of tropical crops, especially export fruits such as bananas, citrus fruits, coconuts, pineapples and others. Another field of study is the fight against the different diseases that plague crops by studying the mechanisms of interaction between plants, vectors and pathogens. With its well-equipped laboratories and highly qualified technicians, the results of its research are the property of those who finance the operations, meaning that special permission must be obtained

to publish them. The government and private individuals have the option of contracting research or specific services within the scope of their interests and capacities.

National School of Forestry Sciences

This school trains foresters and engineers for the management and use of Honduran forests. It provides training in agroforestry and forestry to various groups of farmers. It is located at the entrance to the city of Siguatepeque, on the North Highway, in the center of Honduras.

Research capacities

Research capacity is limited in quality and areas-of- interest. Educational institutions have an enormous accumulated deficit in terms of laboratories, equipment, material and specialized professionals, budget and training programs. This is very difficult gap to close since, although education is considered a national priority, research is not always part of the training process.

Local areas of strength

In the country, nearly everything has yet to be done or established, meaning that all initiatives are welcome; what is needed is support and recognition. Many efforts have gone unrecognized because they have not been published in indexed journals, yet they can be used as a basis. A great deal of information is scattered in various sources, which much be collected, organized and validated to foster a new research culture.

Scientific collaboration networks inside and outside the country

The Secretariat for International Cooperation, the Secretariat of Science and Technology and its Honduran Institute of Science, Technology and Innovation (IHCIETI), SAG, the Secretariat of Health (SS) and others keep documents and data on their respective interventions. The main higher-education institutes have some means of promoting scientific research. However, the most efficient form of collaboration is achieved through the personal contacts each active researcher has established abroad.

Another form is scientific networks, such as the Latin American Network of Biological Sciences (RELAB), under the aegis of UNESCO, sponsor courses, scientific meetings, internships, training and other forms of assistance. Since 1975, it has helped scientists from less developed countries participate more frequently in programs and refresher courses in the most advanced countries with respect to biotechnology, bioinformatics, biodiversity management and other leading-edge topics. Although Honduras joined in 1990, it has scarcely participated in these activities. FAO's REDBIO is concerned with agricultural research issues across the continent, and other networks on more specific issues. IANAS, which brings together the Academies of Sciences, is the best example and a network could be created for Food and Nutrition Security. IANAS is concerned with various issues such as water, energy and Food and Nutrition Security.

Access to and maintenance of databases for monitoring farming systems

We have regular access to SIMPAH, INFOAGRO through the Internet.

Development of trained workforce and status of national education systems

This is carried out at the institutions mentioned earlier, as well as at the intermediate level. It is essential to increase their budgets, quality and quantity in order to transfer practical and theoretical knowledge, and sensitize and strengthen farmers, regardless of the scale at which they operate. It is vital to analyze their needs and gaps, allocate resources to close them and implement strategic plans to improve their services and bring them to the entire population.

There are radio programs that share good agricultural practices and advice on the rational and proper use of agrochemicals. They provide criteria for the selection and preparation of food to provide the greatest benefits and ensure a balance of all the nutrients. They operate in conjunction with existing broadcasts and improve the state's agricultural outreach services. It is essential to link university centers to value chains and to adapt the courses offered by these centers to the demands of the producers, processors, merchants and exporters that comprise them.

Energy challenges

Honduras is among the 30 countries with the lowest per-capita energy consumption in the world, equivalent to 0.6 tons of oil. The country meets half its energy needs with internal sources. It has the potential to be energy self-sufficient, since it has abundant natural resources serving as renewable energy sources.

The energy matrix comprises fossil fuels and the use of biomass. There is a small wind farm with generators to meet the demand of municipalities and hamlets a few kilometers South of the capital. Fuel wood generates 43% of domestic energy and at the residential level accounts for more than 87% of the fuel used. This is followed by fossil fuels, used to produce 62% of the country's electricity. A total of 84% of households are connected to the national electricity grid. The main cities have been electrified, while fewer than half the households in remote regions have coverage. Plans are underway to provide 2GW by 2022, through 40 projects, including renewable energy.

Economic energy is wasted. Every year, coffee produces 90,000 MT of waste, which would guarantee 10 times the country's electricity needs. Although livestock and poultry waste have the potential to produce 72 MW biogas power, they are not used either. Solar energy production is as yet incipient, with just one program for 6,000 families in the South of the country sponsored by the World Bank, which currently does not exceed 25 kW. Zamorano University has just inaugurated the largest solar-energy park in Latin America, with the capacity to produce 1,500 MW hours, equivalent to 30% of the electricity demanded by the university campus.

Development of aquaculture and marine resources

This subsector includes artisanal and industrial fisheries, and the Caribbean, Pacific and mainland regions. It generates over 55,000 positions, mostly in the industrial aquaculture export sector. This subsector accounts for 4% of national exports to the US and German markets.

The viability of fishing is threatened. The industrial fleet has shrunk by 30% this century. Boats date from the 1980s and do not meet current quality, efficiency or hygiene standards. There is a higher incidence of overfishing in territorial waters, because non-adult specimens are not returned to the water. The varieties under the greatest pressure are lobster, shrimp, giant snail and coastal sharks. External regulations such as CITES attempt to mitigate certain practices, which mainly affect artisanal fishing.

The ecological quality of coastal waters has declined due to organic contamination from sewage and agroindustrial waste, heavy metals and non-biodegradable material. The problem of land waste is exacerbated by the temperature increase caused by climate change, which decreases the amount of oxygen dissolved and affects the growth of fish. Increased acidity reduces the availability of calcium for the formation of fish bones, forcing the more susceptible species to migrate to cooler waters. Honduras lost half of its 150,000 ha of mangroves between 1980 and 2005, due to the expansion of shrimp farms. Continental aquaculture offers more sustainable long-term production, although at present, this sector creates fewer than 10% of the jobs in the subsector. The main type of fish produced is tilapia in factories, in addition to several domestic mini-farms or those attached to highway restaurants. Trout farms have not flourished.

Measures to take advantage of food and minimize waste

Hondurans in the countryside tend not to waste food. SAG promotes the construction of artisanal silos to minimize postharvest losses. Bt maize is authorized and released throughout the country. Since it is not bitten by pests, it maintains greater integrity and is therefore able to resist fungus attacks.

Conflicts among food, energy and fiber production

Conflicts are virtually non-existent since maize is used entirely to feed either livestock or humans; so far it is not used to produce ethanol or fibers. The same is true of other food crops.

Main infectious diseases

The main diseases are caused by food or water contamination: bacterial diarrhea; hepatitis A, and typhoid fever; vectors: dengue and malaria, Zika and chikungunya; acute respiratory infections, caused by sudden changes in temperature and contact with water, leptospirosis.

Food regimen

Honduras is regarded as a malnourished country due to the population's deficient intake and generally unbalanced diet. An average of fewer than 3,000 kilocalories is consumed per day per person and is estimated that 70% of these calories come from relatively low-carbohydrate foods such as corn, cassava, rice, beans, potatoes, potatoes, bananas, sugar and wheat. Cereals provide over 50% of protein, and there is a significant deficit of animal protein. Fish consumption is still low in relation to the national potential.

There are deficiencies in calcium, iodine, iron and sodium chloride requirements; while cases of geophagy have been reported among peasants. High temperatures cause excessive perspiration, which increases the demand for salt. There are also significant vitamin deficiencies due to ignorance and the fact that people are not used to including fresh vegetables in their diet. Most of these deficiencies occur in rural areas. Forty percent of the population suffers from malnutrition, which is particularly acute in infants.

Biological use and consumption of food

A person's health status is determined by what s/he eats, while a balanced diet enables him or she to take advantage of all the nutrients contained in food. Health is influenced, among other things, by nutritional status, nutritional and health knowledge, the care received and the health conditions of households and communities. In order for food intake to produce desirable results, the body must be free of disease, particularly infections that negatively impact nutrient and food energy utilization.

Global malnutrition

Also called moderate-to-severe underweight, the official indicator for measuring the MDG Goal is defined as: "The number of children under 5 with lower than normal weight". The country's rate global nutrition rate has varied since it began to be measured in 1990, although in the past two years, it has remained stable at around 18%.

Chronic malnutrition or stunted growth

This is measured by the delay in growth in relation to chronological age. In Honduras, it affects 31% of children ages 0 to 5 and has irreversible effects on people's development. It is related to long-term conditions, including chronic food shortages, frequent infections, incorrect dietary practices and extreme poverty.

Spatial distribution of malnutrition

Geographically, child malnutrition is concentrated in rural areas, where it doubles the chronic prevalence of urban areas, decreasing in larger cities, and increasing in smaller ones. The areas with the highest incidence of undernourished children are the West, South and Center, in that order.

Per-capita consumption of simple vs. processed foods

Honduras is undergoing a process of food transition that it shares with neighboring countries. The growing urbanization and diversification of the Honduran population's sources of income and greater exposure to the consumption patterns of industrialized countries, as well as the aggressive transnationalization of agri-food chains, trigger a series of changes in consumption and the national food culture. Simple foods from peasant agriculture are being replaced by foods with a higher degree of processing, derived from agroindustries.

This food transition requires rethinking food-security strategies and interventions in order to significantly reduce food-insecurity indicators, particularly in urban areas, which involves addressing a two-fold challenge: persistent hunger in the population living in extreme poverty on the one hand, coupled with the rapid increase in the number of non-communicable diseases associated with dietary habits such as obesity, hypertension and diabetes in the urban population.

Consumption patterns and their changes, and the implications of food imports

The pattern of food consumption in a population refers to the set of foods most commonly used by the majority of the population. In urban areas,

17 products are used by 75% or more of households, whereas in rural areas, only five are consumed, namely: eggs; rice; beans; sugar and salt. The number of foods used by 50% of the population totaled 31 in the cities and 20 in the countryside. These differences show that food diversification is not the same in urban and rural areas. The greater the diversification, the better the quality of a person's diet. **Table 4** shows the percentage of households using the most common foods at the national, urban and rural levels.

In urban areas, more animal protein is consumed whereas in the countryside, only cheese, eggs and poultry are eaten. In rural areas, 85% of households use vegetable shortening, compared to only 58% in cities; the remainder consume oil or margarine. Beans are commonly used in about 90% of households, as is sugar. Over 50% of households eat rice, pasta and pastry; corn seed is only reported in the western and eastern regions, whereas fewer than 50% of households in the Central region consume tortillas. Both juices and soft drinks are mainly consumed in the Central region.

In rural areas, the number of food products used in households is noticeably lower, which reduces the dietary quality of their inhabitants. The greatest diversity of food is consumed in the Central region and the smallest in the western region. The basic basket consists of 31 products for the cities and 20 for the countryside. The most commonly used vegetables are onions, tomatoes and potatoes, while the most popular fruits are bananas, plantains and oranges. Food consumption is affected by poverty levels. Non-poor households consume 31 products, those living in relative poverty use 29 while those in extreme poverty ingest 20.

Food quantities

Household purchases, or apparent consumption, are indicators of food availability. The unit is gross gram available per capita per day; values are expressed as medians. Six categories are created and corn seed is expressed in grams of tortilla (**Table 5**).

Table 4. Proportion of households using each food by area

Food	National	Urban	Rural
Refined sugar	94	95	94
Eggs	91	93	88
Rice	91	93	90
Beans	91	91	92
Salt	81	80	82
Cheeses	78	90	65
Poultry	81	89	73
Bananas and plantains	76	83	68
Tomato	67	82	51
Onion and similar	72	82	62
Sauces and dressings	69	81	56
Pasta	74	80	68
Potatoes and tubers	67	78	55
Condiments	68	78	58
Pastry and similar	73	77	69
Citrus fruits	74	77	72
Dehydrated soups	74	75	73
Vegetable shortening	71	58	85
Cream	59	74	43
All kinds of chile	55	71	38
Sod		70	42
Liquid milk	56	70	42
Juices and soft drinks	52	66	38
Sausages and ham	47	67	26
French bread and similar	47	64	30
Breakfast cereals	45	63	27
Margarine	46	60	31
Vegetables for salad	46	59	32
Tortillas	37	59	15
Boneless beef	41	57	25
Avocado	39	51	26
Squash and christophenes	50	48	52
Corn kernels	48	22	74
Carrot and beet	32	47	17
Vegetable oils	29	44	13
Cornmeal	35	43	27
Pork	33	43	22
Various desserts	37	41	33
Beef with bone	31	41	21
Fish and shellfish	34	39	28
Tropical fruits	24	34	13
Powdered milk	26	32	20
Apples and the like	17	24	9
Other vegetables	19	21	17

Table 5. Daily amount available per capita and in each food group

Name	National	Urban	Rural
Number of households	**7438**	**5076**	**2362**
Products of animal origin			
Liquid milk	0	48	0
Fresh cheese	8	11	0
Thin cream		11	0
Eggs	26	29	22
Boneless beef	0	8	0
Beans	38	38	43
Cereals			
Rice	50	50	45
Tortilla	128	96	340
Pasta	8	8	6
Sugar and fats			
Sugar	47	46	47
Vegetable shortening	14	10	18
Vegetables and fruits			
Tomato	18	22	4
Onion	7	9	4
Potato	19	23	0
Green and ripe banana	39	42	30
Green and ripe plantain	12	35	0
Oranges/lemons	9	15	2
Other			
Sodas	48	71	0
Salt	9	8	11
Herbs	15	8	4

Nutritional Sufficiency of Food Availability

Here we analyze the available amount of energy and nutrients per capita and per day, in addition to its relation to Daily Dietary Recommendations (DDR), expressed as percentage of adequacy. The DDR are proposed by INCAP.

By area of residence

Average energy availability, expressed in kilocalories per capita, is slightly higher in urban areas with 2,234 Kcal, whereas in the countryside it drops to 2,177 Kcal. Both cover 95% of the population's average needs. About 20% of both areas have a 30% or more deficit in energy adequacy, meaning that they are in a critical situation, which could be called "undernourishment".

In both urban and rural settings, most energy is obtained from cereals. As for the contribution of macronutrients to total energy, it has been found that the contribution of carbohydrates is greater in rural areas, where it amounts to 66%, than in the cities, where it totals 58%. The reverse occurs with fats, the consumption of which is higher in urban areas, 30%, than it is in the countryside, where it is 23%. In proteins, the contribution to total energy is similar in both areas.

Minerals

The average per-capita calcium availability in cities covers 89% of DDR, whereas in the countryside, the figure is 55%, and as low as 30% in the case of severe deficits. Per-capita iron availability, in both urban and rural settings, covers 100% of DDR. There is a zinc deficit across with board, with adequacy levels of 75%. In cities, 60% of households have a deficit of over 30%, whereas in the countryside, rates can be as high as 43%. Only 15% of households have an acceptable level of this mineral. Low zinc availability is complicated by high fiber intake, which hampers its absorption.

Vitamins

The vitamins included in the study are adequate in both areas, but when distribution of households is analyzed by level of adequacy, a proportion of households have a deficit of every vitamin. For riboflavin, 20% of rural households and those in the East and West have levels of below 70%, which is in itself a deficit. As for Vitamin C, both areas of residence and the three regions have average adequacy of 120%. However, analysis of households by percentage of adequacy shows that in the countryside and the East, over 30% of households have a deficit of over 30%. With respect to Vitamin A, the consumption of fortified sugar means that on average, availability more than meets DDR, with over 150% adequacy. Fortified sugar accounts for 60% of Vitamin A availability.

Policy considerations

The first step is to acknowledge malnutrition and food insecurity, and the main challenges to reducing both are: 1) the complexity of intersectoral coordination; 2) the lack of awareness among top-level decision-makers of the scale and magnitude of the problem, particularly its social and economic consequences in the near future; 3) the lack of social pressure and commitment from within the country to eradicate malnutrition; 4) limited financial resources for implementing programs of the correct scale and duration, and 5) limited availability of qualified personnel in developing countries to adequately address the problem.

Distortions created by subsidies and other agricultural policy models

Price stabilization mechanisms and actions to improve food security are in place, which the government uses to reduce distortions in the domestic market. Honduras supports the elimination of distortions in the agricultural sector and within the framework of the Doha Round, it has called for continued negotiations on special safeguard mechanisms to ensure farmers' food security.

Since maize is the most important crop, its production is protected by a price band and purchase agreements between producers and agribusiness. This mitigates the effect of price fluctuations in the international market on the domestic market. The Honduran Institute of Agricultural Marketing (IHMA) is responsible for this process. The IHMA Executive Committee approves the band each year in January and submits it to the Agricultural Development Council.

The agreements allow maize to be imported with tariff preferences. For each quintal of national white maize, three tariff-free quintals can be imported and up to four if it is yellow maize. Products imported in this way must be processed and can be sold as whole grain on the national market to industries that are not part of the agreement.

Despite these protectionist measures, low levels of technology and profitability persist. An unintended result of the policy differentiating between white and yellow maize has been to distort the market. Freezing the prices of products in the basic food basket, usually decreed by the state, has debatable results, since it lacks the necessary information to set prices. This has caused market distortions for these products.

Promotion of nutrition-sensitive agriculture to provide healthy, sustainable diets associated with resource use and food prices

SAG-DICTA has developed biofortified strains of maize and beans. Biofortification naturally increases the concentration of nutrients such as iron, zinc and Vitamin A in staple crops in the basic basket. To achieve this, Honduras received support from the AgroSalud project, sponsored by the International Advisory Group on Agrarian Research (CGIAR) and the Canadian International Development Agency (CIDA). AgroSalud operates in 14 countries in Latin America and the Caribbean to benefit the most vulnerable segments. With the support of the International Maize and Wheat Improvement Center (CIMMYT), the Olanchano 03 maize variety was released. This strain of maize is characterized by a high content of the essential amino acids lysine and tryptophan. Lines of maize with significant zinc content have also been identified and are expected to be released in the near future.

In 2016, the Bean Research Program (PIF) at Zamorano University, in conjunction with SAG/DICTA's National Bean Research Program, released a variety of biofortified bean with a bright red grain known as "Honduras Nutritivo", characterized by its high iron and zinc content. It also has a high potential yield and is extremely adaptable to various environments. Resistant to the Bean Yellow Mosaic Virus (BYMV) and the Common Bean Mosaic (CBM), it is suitable for the country's low and intermediate zones. This variety was evaluated with the support of the AgroSalud project, Harvest Plus, the International Center for Tropical Agriculture (CIAT) and other institutions.

Policies that encourage technological innovation

The Law for the Promotion and Development of Science, Technology and Innovation created the National Science, Technology and Innovation System, which in turn established the Secretariat of

Science, Technology and Innovation (SENACIT) and the Honduran Institute of Science, Technology and Innovation (IHCIETI). Much work remains to be done to create an economic and institutional environment that will foster innovation and competitiveness in the country. Honduras currently ranks as one of the countries with the lowest competitiveness and innovation in America.

The National System of Agro-Food Science and Technology (SNITTA), led by SAG, was created for the purpose of developing and encouraging technological-agro-food innovation. In terms of Central- American Agricultural Policy, SNITTA supports instruments involving technological innovation and public investment within the framework of competitiveness.

The Central American Agricultural Policy promotes conditions to develop a modern, competitive, equitable, regionally linked Central-American agriculture. One of its six priority areas is technology and innovation. Honduras forms part of FONTAGRO, a cooperation mechanism between Latin America and Spain, which promotes innovations in family agriculture, competitiveness and food security. It supports projects and initiatives involving strategic issues, through calls for submissions, contests and seed funds.

Policies that develop human resources: education, gender, equity

The Basic Law on Education guarantees the human right to education and establishes the principles, guarantees, aims and general guidelines of national education. It defines the National Education System structure. Decree No.34-2000 for the Law on Equal Opportunity for Women is designed to integrate and coordinate the actions that the state and civil society must implement to eliminate all forms of discrimination against women and obtain equality between men and women. The 1999-2015 Policy for Gender Equity in Honduran Agriculture establishes the basis for achieving sustainable development with gender equity and alleviating poverty, the root cause of food insecurity.

Policies to promote the consumption of healthy foods

The Food Guide for Honduras was sponsored by FAO, PAHO, INCAP, the Secretariat of Health, Presidential Office, Pedagogical University and World Vision. It acknowledges the fact that the national diet is monotonous and that most of the population lacks information that would allow them to make the best use of available foods. It is an educational tool that promotes the consumption of healthy, varied and culturally acceptable foods. It is self-taught with extremely precise instructions reinforced by illustrations.

It recommends the daily consumption of foods from all the macronutrient groups, emphasizing fruits and vegetables to prevent diseases. Meat, fish or offal should be included at least twice a week, the consumption of fried foods and sausages should be reduced, while processed foods should be avoided as much as possible, as well as excess salt. The consumption of bottled soft drinks and sweets should be limited, at least eight glasses of water should be drunk a day and a daily half-hour walk is recommended. The guide helps to select and combine foods in order to prevent disease and recommends the best cooking and preparation methods. Its distribution is free, although real or functional illiteracy prevent it from being fully applied.

Comparative advantages of national agriculture

National agriculture has two comparative advantages: the country's geographical location and its climatic diversity. Honduras is in a privileged geographical position that gives it access to the markets of Mexico, the US and Canada. This also allows it to serve as a distribution base in Central America. It has the conditions to build deep water ports on both coasts.

Honduras has an interesting climatic diversity and a variety of ecosystems. Its climatic conditions include semi-dry Caribbean islands, tropical humid conditions in the North and dry tropical conditions in the South, while its ecosystems encompass different types of forests and important marine-coastal resources.

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