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PUBLIC POLICIES FOR FOOD SECURITY IN COUNTRIES WITH DIFFERENT DEVELOPMENT LEVELS

Leidy Diana de Souza de Oliveira, Eluiza Alberto de Morais Watanabe, Dario de Oliveira Lima-Filho and Renato Luiz Sproesser

ABSTRACT

The aim of this article is to analyze public policy for food security adopted in countries with different development levels. For this purpose, a review was made in available previous studies. We used the country income to establish the levels of development, according to the World Bank methodology. The high-income countries selected were United States, Australia, New Zealand and Canada; with upper middle-income, Brazil, South Africa and Malaysia; with lower-middle income, China, India and Ecuador and with low income, Ethiopia, Nigeria and Vietnam. The results show that income inequality between countries and within each nation are determinants of food (in)security. Therefore, public policies must have a specific approach in each context.

INTRODUCTION

Poverty and hunger are widespread issues throughout the world today and are considered priorities for United Nations [UN] development policies and their eradication is the primary goal of the millennium. According to a report by the UN Food and Agriculture Organization, hunger is both caused by and causes poverty, as it reduces the productive potential of the population, forming a vicious circle. Food intake directly affects the population's exposure to disease. In turn, poverty and hunger are affected by other variables, such as the availability of food, sanitation and nutritional care, and health. These variables are linked to family income and the ability to appropriately use income. Thus, all the variables mentioned are correlated with how the families are inserted in the process of social production (FAO, 2006).

Food security is defined as a situation where the population has, at any time, physical, social and economic access to a sufficient quantity and quality of food to meet daily needs and food preferences for an active and healthy life (FAO, 2003). The FAO report (FAO, 2008) shows that the number of people in the world who suffer from chronic hunger has increased recently in relation to the period in which the organization began tracking global trends in malnutrition (1990-1992). The number of chronically hungry people in the world was 830 million in 1990-92, showed decline in the mid-1990s and increased again in mid-2000, reaching 923 million people in 2008, almost one sixth of the world's population. The FAO estimates that this is mainly a result of high food prices, a result of a delicate balance between supply and demand.

Although food consumption is increasing globally, consumption patterns vary between countries, based on income levels Regmi and Gehlhar (2005). FAO (2006) points out that there is a discrepancy between what can and what should be done. It emphasizes that hunger is no longer a question of means, because there has never been so much food available and the production could also be increased without excessive pressure on prices. Therefore, the knowledge and resources exist to reduce hunger, what is missing are government policies to mobilize resources for the benefit of the hungry.

This study is relevant from both the macro and micro perspectives. Analysis of food security in various environments and market structures allows comparisons to be made that provide a basis for the formulation of more effective public and private policies for the modernization of food distribution in countries with different levels of development. Knowledge of the Food and Nutrition Security [FNS] policies adopted by some countries enables comparisons to be made between them. At the microeconomic level, the knowledge of the specific environment has been defined by King and Venturini (2005) as being essential to farmers, manufacturers and retailers in order to create value for products. Understanding the socio-political context and economic dynamics of a society is fundamental to understanding the FNS phenomenon (Pingali et.al., 2005).

Thus, this article aims to answer the following research question: what are the characteristics of food security in countries with different income levels? The general objective of the study is to analyze the government food security policies adopted in countries with different income levels. Specifically, it aims to: i) provide an overview of food insecurity in countries, together with its causes and consequences, ii) identify the impact of a country's income on the level of nutrition (malnutrition, overweight and obesity) and iii) identify the main strategies designed to combat hunger and programs promoting food security in different countries.

METHODOLOGY

This study uses the method applied by the World Bank [WB] (2009) for classifying countries according to level of annual gross per capita income, which gives a total of four groups, they are: i) low-income countries [LICs], that have an annual per capita income less than or equal to US\$ 935 ii) lower middle- income countries [LMICs], with per capita income between US\$ 936 and. US\$ 3,705, iii) higher middle-income countries [HMICs], with incomes between US\$ 3,706 and US\$ 11,455, and iv) high-income countries [HICs], with annual per capita income exceeding U.S. \$ 11,456. According to the most comprehensive rankings, the high-income countries can also be called developed [DCs], while countries with low and middle income constitute the group of developing countries. When the results can be generalized these terms may also be used here.

This research is based on bibliographic and documental data. The literature review was conducted systematically. Separate searches were conducted for "food security", "food insecurity", "obesity" and "malnutrition." Various combinations of the terms were also tried, and were the subject of extensive pre-testing to ensure they capture the relevant literature. In total, three databases were selected to cover the literature on social sciences (ISI Web of Science and Scopus) and medical and health (SciFinder Scholar). The review included articles published between 2000 and the survey date (June 14, 2009). In addition to these databases, Google Scholar was also used.

A total of 1050 articles were found, which were then subjected to screening because the studies were found to have a wide variety of research loci and also because the aim was to study countries with different income levels, so a group of countries was chosen to represent each income level within the WB's classification. The criterion for choosing the countries in each group was the quality of information available, since the literature

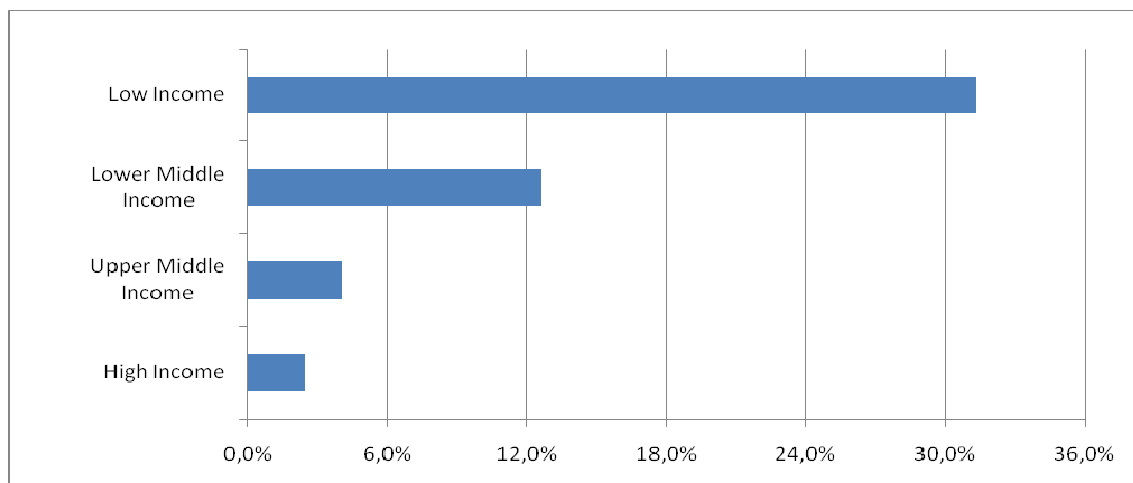
lacked the methodological rigor of the kind found in high quality journals. The high-income countries selected were the United States, Australia, New Zealand and Canada; with high-middle income, Brazil, South Africa and Malaysia; with lower middle-income, China, India and Ecuador and with low-income, Ethiopia, Nigeria and Vietnam. After the screening process, following these criteria, a total of 89 articles were considered.

Once the countries were selected, websites of national organizations, such as the Brazilian Institute of Geography and Statistics [IBGE], Department of Agriculture of the United States [USDA] and the Ministry of Health of New Zealand, were also consulted. Also, data were collected from international organizations such as FAO, World Health Organization [WHO], World Bank and the United Nation's World Food Program [WFP].

MALNUTRITION AND OBESITY

Malnutrition rates are inversely proportional to the income of the country, that is, the higher the income, the lower the rates of malnutrition, as shown in Figure 1. This is because the productive technologies and/or purchasing power of the country are influenced by its income. In this sense, it determines the country's ability to distribute food of quality and in sufficient quantity to the population.

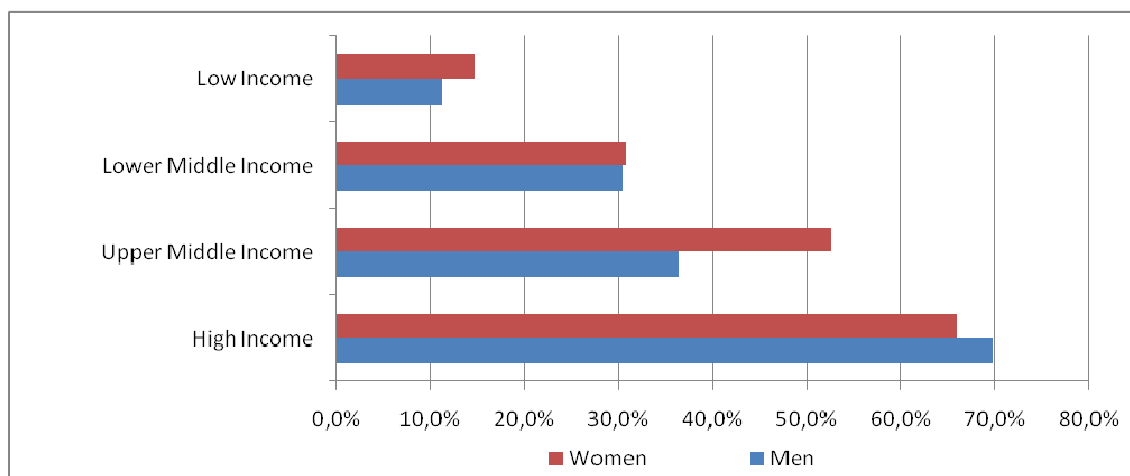
Figure 1: Percentage of the population undernourished in high, upper middle, lower middle and low income countries in 2004.



Source: Elaborated by the authors with data from the FAO (2009).

In HICs, health problems resulting from excess weight are more widespread than those related to malnutrition. In Figure 2, it can be seen that obesity increases in direct proportion to the income of the country, that is, the higher the income, the greater the population's vulnerability to obesity. This is due to the fact that as the income of the country increases, access to foods of low cost and low nutritional value is also increased. Moreover, according to the National Council for Food Security, these countries also have higher rates of urbanization, automation of daily activities, motorized transport, and therefore the rates of physical activity practiced are lower (CONSEA, 2007; WHO, 2005).

Figure 2: Percentage of the population overweight or obese in high, high-medium, medium-low and low income countries.



Source: Elaborated by the authors with data from the WHO (2005).

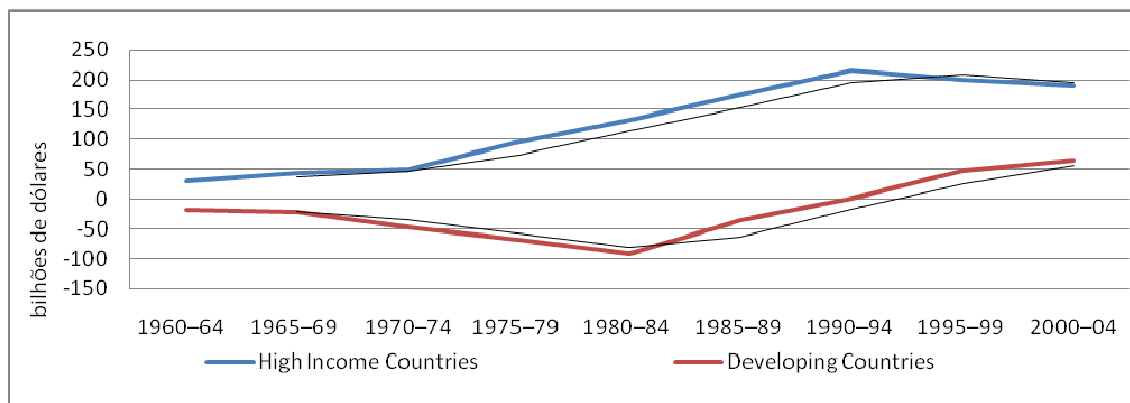
INCOME, AGRICULTURAL SUBSIDIES AND FOOD SECURITY

The World Bank (2008) has estimates of the support offered by the nations to farmers, either by direct payments or policies to support market prices. When crossing the data on subsidies offered to farmers with that on the income of countries, it is noted that the higher the income, the greater are the incentives for agricultural production (Figure 3).

Until the late 1980s, farmers in developing countries had a double disadvantage in terms of competitiveness in relation to those in developed countries: farmers in high-income countries were receiving subsidies, while in developing countries products were taxed. However, the two-period moving average trendline shows that since the beginning of the 1980s there has been a gradual decline in the taxation of farmers in developing countries and a growth in assistance. Subsidies to farmers in high-income countries grew until the 1990s and, since then, have remained constant.

Although it has been in decline over the past ten years, trade protectionism still has a major impact on world trade and can be measured by analysis of tariff and non-tariff barriers. Non-tariff barriers tend to be more frequently used in HICs, representing about two thirds of the total barriers in such countries. Regarding manufactured goods, trade policies are generally more protectionist in developing countries than in HICs. However, agricultural trade barriers are, on average, higher in HICs. Among poor countries there is a tendency towards increasing protectionism in agriculture, in order to protect local farmers from the subsidies offered in rich countries (World Bank, 2008).

Figure 3: Gross value of the subsidies offered to farmers in developed and developing countries, in the period from 1960 to 2004 (Billions of dollars).



Source: Elaborated by the authors with data from the World Bank (2008).

Nevertheless, the distributional consequences of agricultural trade protection can be harmful to the poorest families. The high level of support for production in HICs distorts prices in the domestic and global markets, to the disadvantage of producers and consumers, especially the poor, in developing countries.

FOOD AND NUTRITION SECURITY: CRITICAL FACTORS AND PUBLIC POLICY

High-income countries

In the 1980s and 1990s, hunger emerged as a social and public health problem in "first world" countries (Tarasuk, 2001). In North America, hunger rarely reaches the levels of deprivation that exist in the poorest countries and the domestic problems of food security differ from those found in many countries (Che and Chen, 2003). In most cases, food insecurity in the United States [USA] is occasional and not chronic and serious health effects are rare (Leblanc et. al., 2005).

However, the relationship between poverty and child development is not dramatic only in developing countries, there is also cause for concern in developed countries, where there are pockets of poverty and health disparities related to ethnicity/race, gender, income and education. In the U.S. the ethnic/racial diversity and gender are reflected in the rates of food insecurity. According to Chilton, Chyatte and Breaux (2007), it is clear that in developed countries, which have infrastructure, social welfare programs, income and greater investments in education than the global average, the effects of malnutrition are made apparent due to these disparities.

In a national survey of food security in the U.S. (Chilton et. al., 2005), substantially higher rates of food insecurity than the national average (11.1%) were recorded in families with incomes below the poverty line (37.7 %), families with children headed by single women (30.2%) or single men (18%), black (22.2%) and Latin households (20.1%). New Zealand, Canada and Australia also face problems of food insecurity especially in poor areas (New Zealand Ministry of Health, 2010; Australian Public Health Association, 2009; Health Canada, 2004).

All the surveyed countries make use of food banks (Rush, 2009; SIGNAL, 2001), which perform the primary role of meeting the food needs of vulnerable populations and redistributing surplus food, interfacing between food security and social policies, particularly a relationship between health, nutrition and the human right to food. The international growth of food banks in first world countries raises important questions, not only regarding food security but also for discussions on the current direction of welfare reform and social policies (Riches, 2002).

In Canada, the main strategy to combat food insecurity is to maintain food banks. And while the population has a high standard of living and the prospect of famine is remote, the number of food banks continues to increase, and their presence suggests that food insecurity not only exists but persists (Che and Chen, 2003). In Australia, the Strategic Inter-Governmental Nutrition Alliance (SIGNAL, 2001) has developed two strategic guidelines for achieving food security: by improving the nutrition of vulnerable groups and; combating structural barriers to a healthy and safe food, such as investment in technology in food production and waste reduction, social inclusion and investment in education (Australian Public Health Association, 2009; SINAL, 2001; National Public Health Partnership, 2001).

The food security programs in the U.S. include the Supplemental Nutrition Assistance Program [SNAP], which seeks to assist low-income families to buy food; School Meals, which consists in providing food at cost price in public schools; the Summer Food Service Program, which aims to provide food to school-age children during the holidays (includes offering food combined with sports activities); the Food Distribution Program, which aims to distribute food to the elderly, indigenous people, pregnant and breastfeeding women and people on low-income; the Women, Infants and Children program which provides nutritional support to women, infants and children and; the Child and Adult Care Food Program, which provides nutritious meals in shelters and poor regions (United States Department of Agriculture, 2009). In fact, in HICs, the health problems resulting from excess weight are much more widespread than those arising from malnutrition. Obesity has been shown to be associated with low socioeconomic status in the U.S. (Mauro et.al., 2008; Wang et.al., 2007; Wang, 2001; Hanson and Chen, 2007; Gordon-Larsen et.al., 2006; Okosun et.al., 2006; Albright et.al., 2005; Molnar et.al., 2004; Bove and Olson, 2006; Estabrooks et.al., 2003), Canada (Janssen et.al., 2006), AUSTRALIA (Proper et.al., 2005; Dollman et.al., 2005; Najman et.al., 2006) and New Zealand (Metcalf et.al., 2007). Families in a slight to moderate situation of food insecurity tend to gain weight by consuming high energy-dense foods (Gibson, 2003; Sarlio-Lahteenkorva and Lahelma, 2001), because of the existence of positive relationship between the cost and health food guidance (Drewnowski and Darmon, 2005). Another factor leading families in situations of food insecurity to be more likely to become obese is inconsistent access to food, characterized by periods of under-consumption followed by excessive consumption, seen as a form of compensation (Townsend et.al., 2001; Adams et.al., 2003)

Higher middle- income countries

In Brazil, South Africa and Malaysia, the great cause of lack of access to food, malnutrition and food insecurity is the low-income level of the population (Belik, 2003; Dunee and Edkins, 2008; Sharif and Merlin, 2001; United Nations Development

Program, 2005; Rocha, 2009). Thus, the price of food is a determinant factor in food security in these countries (Dunee and Edkins, 2008; United Nations Development Program, 2005; Agriculture Department of The Republic Of South Africa, 2002).

According to the National Survey of Sampling by Household (PNAD, 2004), in Brazil 60% of the population experience food security, 18% slight food insecurity, 14% moderate food insecurity and 8% severe food insecurity. In South Africa more than 35% of the population is vulnerable to food insecurity, about a quarter of children less than 6 years of age grow up malnourished and 43% of households have nutrient-poor food (Human Sciences Research Council, 2004). More than 21% of South African children aged 1 to 9 years were of short stature in 1999 and in 2005 this figure dropped to 18%, low weight increased from 3.7% to 4.5%, and the prevalence of low weight by height (reflecting chronic and acute malnutrition) decreased from 10.3% to 9.3% (Republic of South Africa, 2009). In Malaysia, in 1990, 24.5% of children less than 5 years of age were moderately malnourished and in 2002 the figure dropped to 11.1% (United Nations Development Program, 2005). According to the FAO (2008), between 2003 and 2005 malnutrition affected less than 5% of the total population of Malaysia. Both malnutrition and excessive weight and obesity are problems faced by poor people in South Africa (WHO, 2007) and Brazil (CONSEA, 2007).

Research carried out by Hoffmann (2008) into the determinants of food insecurity in Brazil, shows that: a) the likelihood of food insecurity is reduced in rural residences, with agricultural activities, the presence of persons under 18 years of age in the home and the schooling of the people of reference, b) the likelihood increases when the person is black or brown, is a woman or has an informal occupation and c) the most important determinant is a low per capita family income.

In the same context, in Brazil, the National School Nutrition Program [*PNAE*] focuses on offering food support to students at public schools and accredited philanthropic institutions, providing access to better nutrition to this segment (Santos *et al*, 2007). The Zero Hunger Program, created in 2003, aims to ensure the human right to adequate food of people who have little access to food, and is active in strengthening family farming, income generation and social articulation, mobilization and control. Within this program, the *Bolsa Familia Program* aims to directly transfer income, benefiting families in poverty (with incomes per person from R\$ 69.01 to R\$ 137.00, or between US\$ 40. and US\$ 79.) and extreme poverty (with monthly income per person of up to R\$ 69.00 or US\$ 39), and serves more than 11 million families (Brazil, 2009 a). The Food Acquisition Program was developed by the Brazilian government as a sustainable means of food security, with the aim of encouraging family farming. It is directed towards actions aimed at the distribution of agricultural products to individuals in situations of food insecurity and the formation of strategic stocks (Brazil, 2009 b).

Also in Brazil, the Food Security and Local Development Consortia (*CONSAD*) were created. These are institutionally formalized, regionally-based organizations made up of a number of municipalities that come together to develop activities, make assessments and execute projects for food security and nutrition and local development, generating jobs and income for the population (Brazil, 2008).

In South Africa, although most families depend on the food processing industry and retail food to meet their needs, subsistence agriculture or home-consumption is considered an important component of food security (Human Sciences Research Council, 2004; Watkinson and Makgetla, 2002). In 2000, a national strategy called Integrated Food Security Strategy was formulated, which aimed to integrate the various food security programs in the country and eradicate hunger, malnutrition and food insecurity by 2015. The main actions are: to increase the production and distribution of food, improve income and nutrition of the population and food safety and; increase employment opportunities (Department of Agriculture Republic of South Africa, 2002). Another food safety program in South Africa is the National Schools Nutrition Program, which aims to provide poor children with at least one meal a day, and to promote local development and create jobs by offering school meals (Republic Of South Africa, 2009). In Malaysia, school lunch programs, such as the Supplementary Food Scheme and School Milk Program are also considered fundamental in the fight against hunger. In addition there is the Applied Food and Nutrition Program (AFNP), which aims to increase local food production and improve nutritional education, health and basic education by improving the nutrition of mothers, infants and children (United Nations Development Program, 2005).

Lower middle-income countries

In China (Huang and Rozelle, 2009), India and Ecuador (Farrow et. al., 2005) food insecurity is concentrated in certain areas with large clusters of poverty. Approximately 50% of the world's population that is affected by hunger lives in India, where the rate of food insecurity is 35%. Nearly 9 out of 10 pregnant women aged between 15 and 49 years suffer from malnutrition and anemia and more than half of children less than 5 years are of short stature or experience moderate to severe malnutrition. China has 15% of the world's undernourished population, almost 123 million people. Nevertheless, rates of malnutrition (9% of the population in 2003-05) are lower than those found in Asia and the Pacific (16% of the population in 2003-05) (FAO, 2008).

Due to these high rates, the population is vulnerable to disease, high mortality, morbidity, low stature and reduced intellectual ability (Caballero and Popkin, 2002). In Ecuador, 26% of children less than five years of age are of short stature due to poor nutrition, in rural areas the figure is 31% and among indigenous communities it reaches 47% (WFP, 2009). On the other hand, high rates of excessive weight and obesity in Ecuador (Bernstein, 2008), China (Xu et. al., 2005) and India (Reddy et.al., 2002) are more prevalent in families of high socioeconomic status.

After recovering from the humanitarian disaster of the "Great Famine", which contributed to the deaths of 36 million Chinese between 1958 and 1961, the Beijing government made it a priority to ensure self-sufficiency in the supply of basic commodities to the Chinese diet (for example, rice and grains). In the 1990s, in order to meet the growing demand, China began to encourage its citizens to establish farms abroad. Initially, most of this investment was made in neighboring countries like Laos, Burma and Cambodia. However, the scarcity of land and the growth of the population in these countries led the Chinese government to reconsider this policy and turn its attention to Africa. In the past two years, the Chinese government has begun to

encourage state-owned enterprises in China to invest in plantations in Africa (Horta, 2009).

For Huang and Rozelle (Farrow et. al., 2005), increased investment in research and development in the agricultural sector can improve the rates of food security and income distribution and help reduce poverty in China. Horta (2009) believes that if China is really able to help launch a "green revolution" in Africa, millions of Africans will have the chance of a better future. However, if China's ambitious plans are not made with due consideration to the environment, in the future Africa might find itself in a similar situation to that found in China today.

As in China, the studies concerned with food safety in India (Swaminathan, 2001; Agoramoorthy, 2008) and Ecuador (Farrow et. al., 2005; De Janvry and Sadoulet, 2000) highlight agricultural productivity (climate, soil, management and land tenure), the structure of the labor market, income distribution, access to markets and social capital as key factors in food security. This is because increased agricultural productivity can increase farmers' incomes and reduce prices to consumers. The low productivity found in Ecuador and India is due to lack of investment in research and technology. Agriculture is largely an informal economic activity and financial institutions are ineffective at providing credit to farmers. In addition, the distribution and marketing of foods are deficient.

Ecuador and India are not self-sufficient in promoting food security and depend on programs promoted by international organizations such as the WFP, the largest humanitarian agency to combat world hunger. It also has sustainable development programs aimed at improving logistics and integration between supply chain members. The WFP works with governments in an attempt to promote the development of the national capacity for building food security by funding various food distribution programs (WFP, 2009, 2007).

The welfare programs offered in India are the most comprehensive in the world. Among them is the Mid-Day Meal Program [MDM], which aims to provide school lunches for elementary school students, and the Targeted Public Distribution System [TPDS], which subsidizes the purchase of food at lower prices to low-income families. The Integrated Child Development Services [ICDS] is the largest program to promote health, education and nutrition among women and children in India, and is funded by the World Bank, Cooperative for Assistance and Relief Everywhere [CARE], United Nations Children's Fund [UNICEF] and WFP, the program aims to distribute food supplements, promote preschool education, immunization, health care and growth monitoring (WFP, 2009, 2007).

Low-income Countries

Together Asia and Sub-Saharan Africa contained 750 million (89%) of the people who experienced hunger in the world between 2003 and 2005. Africa is home to 15 of the 16 countries where the rate of hunger exceeded 35% of the population (FAO, 2008). All the countries on the continent have income restrictions and therefore, find it difficult to practice and promote health (Steyn and Walker, 2000).

Ethiopia is one of the poorest countries in the world and about 90% of the population is rural. In this layer, more than half suffer from food insecurity (Barnett, 2001). Poverty and food insecurity are endemic, and are exacerbated by the frequent droughts that plague the region, wars and lack of public policy (Doocy et.al., 2005). In Nigeria, in 1990, 18% of the population (14.4 million) suffered from food insecurity and that number increased to 36% (32.7 million) in 1992 and to 40.7% in 1996. In 2004, this proportion was over 40% (Babatunde and Oyatoye, 2005). In Vietnam, in 1979, 32% of the population was malnourished, a figure that dropped to 18% in 2000, and there is a high incidence of underweight women and children (Gill et.al., 2003).

In Vietnam, significant action has been taken to combat poverty. The rates of poverty fell from 58% of the total population in 1993 to 29% in 2002, with the rapid economic growth. Yet many people continue to lack physical, economic and social access to sufficient, safe and nutritious food to meet energy needs. Other people are likely to experience food insecurity due to small changes in household production, income or health (FAO, 2004).

According Feleke, Kilmer and Gladwin (Feleke et.al., 2005) seven factors affect household food security in Ethiopia: technology used, farming systems, farm size, soil quality, family size, aggregated *per capita* production and access to markets. Soil degradation is extensive, reducing the average agricultural production and increasing the farmers' vulnerability to drought (Holden et. al., 2005).

Nigerian agriculture is unable to feed its population (Oriola, 2009). While the food supply grows at 2.5%, the demand grows at 3.5% (Ojo, 2007). Desertification of the country has adversely affected food production in the region, emphasizing the need for government intervention and actions. Therefore, Nigeria is plagued by food shortages, hunger and malnutrition (Oriola, 2009; Ojo, 2007).

Food security strategies in Ethiopia are based on three pillars: increasing agricultural food production and food quality and strengthening the capacity to manage food crises (Ramakrishna and Demek, 2002). In 1996, the National Food Security Program was implemented, which has struggled to streamline food security, mainly due to a lack of coordination and the structural position of the food security desks, which had insufficient autonomy to influence the activities of the various departments involved (Amare, 2000). The WFP is the main program that helps feed the population (International Federation of Red Cross and Red Crescent Societies, 2008).

Another program adopted in Ethiopia is the Food Security Program (FSP), which has led several interventions to change the situation of families from one of food insecurity to food security. This plan was formulated for the period from January 2005 until August 2009, with the aim of combating chronic food insecurity among 5 million people and improving food security for 10 million people ⁸⁵. Since Nigeria's independence, the government has made efforts related to food safety, such as the creation of the National Food Operation Program in the 1970s, which provided funds for agriculture and helped farmers (Oriola, 2009).

Vietnam has developed 5- and 10-year national programs, the Socio-Economic Development Plan [SEDP] (2001-2005) and the Socio-Economic Development Strategy

[SEDS] (2001-2010), in order to eliminate hunger among families and reduce the number of poor families. In 2001, the government enacted the National Nutrition Strategy (2001-2010), which focuses on helping disadvantaged regions by reducing food insecurity, improving the food security of vulnerable groups and calls for increased cooperation between sectors and organizations. Other programs that aim to reduce child malnutrition to 20% by 2010 are the National Program of Action for Children and the Strategy for the Protection and Care of People's Health (Gill et. al., 2003).

Table 1 summarizes the main causes/consequences of food insecurity and the major FNS policies in the studied countries.

Table 1: Main causes/consequences of food insecurity and FNS major policies in the studied countries.

	High Income Countries	Medium High Income Countries	Medium Low Income Countries	Low Income Countries
Average Rate of Malnutrition	2.5%	4.1%	12.6%	31.3%
Average Rate of Obesity	67.85%	44.5%	30.65%	12.95%
Main causes of Food Insecurity	Disparities related to ethnicity / race, gender, income and education		Low technology and agricultural productivity,	
Main consequences of Food Insecurity	Obesity - due to reduced food quality and lack of variety		High mortality, morbidity and	
Main government welfare policies	National food distribution programs to vulnerable groups.		International organizations mainly	
Main progressive or sustainable public policies	School meals*; Investment in food production technology and waste reduction, social inclusion and investment in education.	School meals*; Containing inflation and incentives for family agriculture.	Modest investments in increasing agricultural productivity and incentives for agriculture.	
Trade protectionism and subsidies to farmers	High; with growth stagnating	Low, though growing		

Source: elaborated by the authors

* The school meals policy was considered to be sustainable investment in education and therefore provide long-term results.

CONCLUSIONS

The rate of malnutrition in the studied countries is inversely proportional to income, showing that income is a determinant of food security. The most alarming situation is in Ethiopia, where 46% of the population is undernourished. Income inequality between countries and within each nation are determinant factors for food (in)security. The main causes of food insecurity in high-income countries are disparities related to ethnicity/race, gender, income and education. In the LMICs and LICs, the determinant factors of food insecurity are institutional inefficiency, the low level of technology used in agriculture and, in turn, low productivity. These results are in line with the argument put forward by North (North, 1990) that institutions affect economic development through their effects on transaction costs and production, which, in addition to the technology used, represent the total cost of the country.

Note that the lower the income of the country, the lower the level of investment in technology, and in the LICs investment is almost nonexistent. Agriculture begins to appear as a critical factor in food security in higher middle-income countries and is propagated through the LMICs and LICs. The lower the country's income, agriculture becomes even more critical, because the country does not have enough income to import food and also to invest in technology and productivity. Thus, public policies that promote better income distribution between countries are necessary. International investments in technology aimed at increasing productivity in these countries are essential for the promotion of food security. Agri-food policies, by improving the health of the population and assisting in combating hunger, poverty, malnutrition and child mortality, also provide employment and income, move, streamline and exert leverage on the economy, contributing to economic development and social.

In HICs, the rates of food insecurity and malnutrition are very low, the main cause for concern is obesity, for which the rates are higher in low-income groups. This situation is beginning to be repeated in the HMICs. In LICs and LMICs obesity is prevalent in high-income families. In other words, obesity becomes a problem among groups with higher socio-economic status in LICs, but as the country's income increases the risk of obesity affecting the poorest members of the population increases. This happens, according to Monteiro (2003), because the low-income population, despite having access to food, tends to economize by purchasing lower quality and less variety of food. For the HICs, as they possess sufficient quantity and quality of food for people, whether locally produced or imported, the main food security issue lies in the access to food by disadvantaged groups. Food banks are used in all the studied HICs as a means of alleviating food insecurity in these groups, as well as in other short-term policies with palliative effects. Welfare policies are also used effectively by national governments in the HMICs, while in the LMICs and LICs such policies are predominantly carried out by international organizations. This is because the country's income impacts on their ability to promote and finance such policies, making foreign aid essential in the fight against poverty and hunger.

Food policy, which makes high energy-dense foods relatively cheaper than healthy foods such as fruits and vegetables, should be reviewed in HICs and HMICs. Efforts should be made at the national and international levels to make healthy foods more accessible to the low-income population. For this, as highlighted by WHO (2003), it will necessary to combine agricultural policy, pricing policies, regulatory actions and

consumer education. These approaches involve cooperation between governments, universities and the food industry.

Compensatory policies, despite lacking long-term effectiveness, play an important role in integrating those sections of the population located at the margins of consumption due to historical factors. However, given that irregularity of consumption and low food quality have led to obesity in low-income groups in HICs and HMICs, food distribution programs currently conducted on a monthly basis should be undertaken more frequently and emphasize the distribution of healthy foods in order to make them more accessible to families in situations of food insecurity. Furthermore, nutrition education programs could receive more attention in such countries.

In addition to public welfare policies, HICs also use sustainable policies to combat food insecurity, which aim to reduce social inequality through investment in education and creating jobs and income. Mechanisms such as agricultural subsidies and protectionist trade policy are also used in these countries, and are increasingly being applied in developing countries.

However, trade policies are unable to ensure fair competition or to achieve goals such as food security and rural development, as they create distortions in consumption, because the distributional consequences of agricultural trade protection can be harmful to the poorest families. Other policy instruments designed to increase productivity are more beneficial than trade protection. Liberalization, therefore, should be combined with sustainable public policies, which aim to increase income and farm productivity, since in developing countries, government strategies to reduce food prices and fight inflation are important in promoting the consumption of food.

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