

Household Food Insecurity (HFIS): Definitions, Measurements, Socio-Demographic and Economic Aspects

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1. Introduction

Poverty, food security and malnutrition are major concerns among international health, development and economic organizations. Increasingly, in the last decade, attention has been focused on means of eliminating food insecurity and hunger world-wide (Kennedy, 2002a). For example, the International Congress of Nutrition held in Bangkok, Thailand in 2009 devoted much emphasis on "Nutrition Security For All" (Proceedings:19th International Congress of Nutrition, 2009). Issues on malnutrition in women and children, school-feeding, the World Food Program, and combating hunger worldwide were addressed.

2. Development of HFIS Concept and Definitions

2.1 Development of HFIS Concept

Researchers prior to 1984 used the concept that hunger was equivalent to malnutrition. Extensive research in the late 1980s focused on understanding household food security, food insecurity, and hunger. And

this work led to conceptualize the concept of the food security, which was published in 1990 by the Life Sciences Research Office (LSRO) under the title of “Core Indicators of Nutritional State for Difficult-to-Sample Populations”. The 1992 International Conference on Nutrition and the 1996 World Food Summit both emphasized the critical need to decrease food insecurity and hunger globally. A total of 182 nations agreed to the definition of food security as "access by all people at all times to enough nutritionally adequate and safe food for an active and healthy life" (Kennedy, 2002a).

After this, several attempts were conducted in order to construct a definition of hunger relevant to the population under examination. Radimer et al. in 1992 interviewed 32 women of childbearing age from rural and urban regions of Upstate New York, using a method of naturalistic inquiry with subjects purposely sampled for maximum diversity. As perceived by these women, individual hunger has four components: (i) insufficient intake, (ii) nutritional inadequacy, (iii) psychological aspects (i.e. lack of choice and feelings of deprivation and loss of control), and (iv) social aspects (i.e. disruption of the social norm of three meals per day). The second level of hunger, i.e., that of the household, is also thought to have four components: (i) depletion of food resources, (ii) unsuitable food options, (iii) food anxiety, and (iv) the acquisition of food in socially unacceptable ways. Based on this, survey items were developed and evaluated, and three scales emerged for use as indicators of hunger at the household, adult and child levels.

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above (FAO, 2009).

2.2 Definitions of HFIS

There is a vast amount of literature dealing with definitions and conceptual models of HFIS. In 1992, Maxwell & Frankenberger reviewed and compiled the definitions formulated until that year. In addition to this review, recently a number of additional definitions have been formulated for HFIS in light of the evolution of the concept of food security. These, as well as Maxwell & Frankenberger’s compilation are collectively summarized by Table 1 below.

Table 1: Summary of definitions for the HFIS over the period 1975-2015.

No.	Definition	Reference
1	"Availability at all times of adequate world supplies of basic-food stuffs ..., to sustain a steady expansion of food consumption ... and to offset fluctuations in production and prices"	(UN, 1975)
2	"A condition in which the probability of a country’s citizens falling below a minimal level of food consumption is low"	(Reutlinger & Knapp, 1980)
3	"The ability to meet target levels of consumption on a yearly basis"	(Siamwalla & Valdes, 1980)
4	"Everyone has enough to eat any time – enough for life, health and growth of the young, and for productive effort"	(Kracht, 1981)
5	"The certain ability to finance needed imports to meet immediate targets for consumption levels"	(Valdes & Konandreas, 1981)
6	"Freedom from food deprivation for all of the world's people all of the time"	(Reutlinger, 1982)
7	"Ensuring that all people at all times have both physical and economic access to the basic food they need"	(FAO, 1983)
8	"The stabilization of access, or of proportionate shortfalls in access, to calories by a population"	(Heald & Lipton, 1984)
9	"A basket of food, nutritionally adequate, culturally acceptable, procured in keeping with human dignity and enduring over time"	(Oshaug 1985 in Wide <i>et al.</i> , 1985)
10	"Access by all people at all times to enough food for an active and healthy life"	(Reutlinger, 1985)
11	"Access by all people at all times to enough food for an active, healthy life"	(Word Bank, 1986)
12	"Always having enough to eat"	(Zipperer, 1987)

13	"An assured supply and distribution of food for all social groups and individuals adequate in quality and quantity to meet their nutritional needs"	(Barraclough & Utting, 1987)
14	"Both physical and economic access to food for all citizens over both the short and the long run"	(Falcon <i>et al.</i> , 1987)
15	"A country and people are food secure when their food system operates efficiently in such a way as to remove the fear that there will not be enough to eat"	(Maxwell, 1988)
16	"Adequate food available to all people on a regular basis"	(UN World Food Council, 1988)
17	"Adequate access to enough food to supply the energy needed for all family members to live healthy, active and productive lives"	(Sahn, 1989)
18	"Consumption of less than 80% of WHO average required daily caloric intake"	(Reardon & Malton, 1989)
19	"The abilityto satisfy adequately food consumption needs for a normal and healthy life at all times"	(Sarris, 1989)
20	"Access to adequate food by and for by, and for, households over time"	(Eide, 1990)
21	"Food insecurity exists when members of a household have an inadequate diet for part or all of the year or face the possibility of an inadequate diet in the future"	(Phillips & Taylor, 1990)
22	"The ability ... to assure, on a long term basis, that the food system provides the total population access to a timely, reliable and nutritionally adequate supply of food"	(Staatz, 1990)
23	"The absence of hunger and malnutrition"	(Kennes, 1990)
24	"The assurance of food to meet needs throughout every season of the year"	(UNICEF, 1990)
25	"The inability ... to purchase sufficient quantities of food from existing supplies"	(Mellor, 1990)
26	"The self-perceived ability of household members to provision themselves with adequate food through whatever means"	(Gillespie & Mason, 1991)
27	"(Low) risk of on-going lack of access by people to the food they need to lead healthy lives"	(Von Braun, 1991)
28	"A situation in which all individuals in a population possess the resources to assure access to enough food for an active and healthy life"	(Weber & Jayne, 1991)
29	"Access to food, adequate in quantity and quality, to fulfill all nutritional requirements for all household members throughout the year"	(Jonsson & Toole, 1991)
30	"Access to the food needed for a healthy life for all its members and ... not at undue risk of losing such access"	(ACC/SCN, 1991)
31	"Enough food available to ensure a minimum necessary intake by all members"	(Alamgir & Arora, 1991)
32	"The viability of the household as a productive and reproductive unit (not) threatened by food shortage"	(Frankberger & Goldstein, 1991)
33	Availability of sufficient food at all times for all people in order to ensure an active and healthy life.	(Haddad <i>et al.</i> , 1994)
34	'Food security can be defined as the state in which all persons obtain a nutritionally adequate, culturally acceptable diet at all times through local non-emergency sources. Food security broadens the traditional conception of hunger, embracing a systemic view of the causes of hunger and poor nutrition within a community while identifying the changes necessary to prevent their occurrence. Food security programs confront hunger and poverty.'	(Community Food Security Coalition, 1995)

35	One relevant level for food security analysis is that of per capita daily calorie supply equal to 1.55 times Basal Metabolic Rate...” (maintenance level plus needs for minimal activity)	(FAO: World Food Summit, 1996)
36	“When all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”	(FAO: World Food Summit, 1996)
37	Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.	(World Food Summit, 1998)
38	“Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.”	(FAO, 2009)
	“Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above.”	(FAO, 2009)
39	Food insecurity (FI) is defined as individuals and/or families in a household adjusting their dietary intakes or preferences because of a lack of physical or economic resources	(Anon., 2013)
40	Food insecurity (FI) is defined as limited or uncertain access to enough food for all household members to live active and healthy lives, has been linked in the United States to negative health outcomes in all age groups	As reported by Bovell et al., 2015)

3. Measurements Used to Assess HFIS

3.1 Direct Indicators

The measurement of food insecurity in affluent, western nations has been the focus of considerable research in recent years. In particular, there have been marked advances in the development of direct indicators to measure HFIS at the population level. The five direct measures of food insecurity employed in recent, major studies in the U.S. and overall the world are ; 1) the food sufficiency status question; 2) the Community Childhood Hunger Identification Project instrument; 3) the Radimer/Cornell Instrument and 4) the Food Security Core Module and its short form (Tarasuk, 2001). In addition, a new recent instrument, 5) Household Food Insecurity Access Scale (HFIAS). All of these instruments have been designed to be administered to the household head or person most responsible for food and food provision in the household in order for him/her to provide insight into household food insecurity. These instruments are discussed in the following subsections.

3.1.1 The Food Sufficiency Status Question.

The food sufficiency question is a one indicator, commonly referred to as “the U.S. Department of Agriculture (USDA) Food Sufficiency Question”. This question takes the form: “Which of the following statements best describes the food eaten in your household: 1. Enough of the kinds of food we want to eat, 2. Enough but not always the kinds of food we want to eat, 3. Sometimes not enough to eat, or 4. Often not enough to eat”. Analysis has shown that the two forms of the measure produce significantly different results. When the second response option is deleted, the third response —“sometimes not enough to eat” — nearly doubles in frequency (Keenan et al., 2003).

3.1.2 Community Childhood Hunger Identification Project Instrument

The Community Childhood Hunger Identification Project (CCHIP) hunger index is one of the first scales developed to measure hunger in families with at least one child under the age of 12 years. The scale comprises eight questions that indicate whether adults or children in the household are, or are not, affected by food insufficiency owing to constrained resources. These questions measure the frequency and duration of each such experience; the number of months’ occurrence within the past year and number of days’ occurrence within the past month. For this longer version, more interview time is required. Interpretation of the full questionnaire is more complex but provides information on the frequency and episodes of food insecurity and hunger (Keenan et al., 2003).

3.1.3 Radimer/Cornell Hunger and Food Insecurity Instrument.

The Radimer/Cornell Hunger and Food Insecurity Instrument consists of 10 statements that reflect the perceptions on food insufficiency for women in the household. It identifies the food insecurity experienced at the household, individual and child levels and maintains that food insecurity is a managed process. The

Radimer/Cornell items were developed from words taken from in-depth interviews of women experiencing food insecurity, which is a procedure that contributes to the instrument construct validity (Table 2).

Table 2: Radimer/Cornell Hunger and Food Insecurity Instrument items

(Source: Kendall *et al*, 1996)

Household level

1. I worry whether my food will run out before I get money to buy more
2. The food that I bought just didn't last, and I didn't have money to get more
3. I ran out of the foods that I needed to put together a meal and I didn't have money to get more food
4. We eat the same thing for several days in a row because we only have a few different kinds of food on hand and don't have money to buy more

Adult level

5. I can't afford to eat properly
6. I am often hungry but I don't eat because I can't afford enough food
7. I eat less than I think I should because I don't have enough money for food Child Level

Child hunger

8. I cannot give my child(ren) a balanced meal because I can't afford that
9. My child(ren) is/are not eating enough because I just can't afford enough food
10. I know my child(ren) is/are hungry sometimes but I just can't afford more food

To classify individuals by severity of food insecurity:

Food Secure: negative answers of all hunger and food insecurity items

Household Insecure: positive answers to one or more items (1-4) but not to adult or child level items

Individual Insecure: positive answers to one or more of items (5-8) but not to items (9-10)

Child Hunger: positive answer to items (9-10)

Response categories for items 1-10: Negative answers: "not true" Positive answers: "sometimes true" or "often true"

3.1.4 Food Security Core Module (18-item CFMSM)

The measure, known today as the USDA Core Food Security Module (CFMSM), was developed using previous research from the Cornell University Division of Nutritional Sciences and Research from the Community Childhood Hunger Identification Project (CCHIP). The questions within the 18-item CFMSM form a single overall measure called the food security scale. Each question within the CFMSM shares the characteristics of being asking about circumstances that occurred during the previous 12 months and assuring that the behavior or condition that is reported is due to financial limitations of the household.

Four categories have been defined to cover the range of severity of the food security scale using the 18-items, and it is categorized as follows; (1) the "Food secure households", (2) the "Food insecure without hunger", (3) the "Food insecure with hunger (moderate)" and (4) the "Food insecure with hunger (severe)" categories (Dill, 2002).

In 2006, the USDA introduced new language to describe ranges of severity of food insecurity. It made these changes in response to recommendations by an expert panel convened at USDA's request by the Committee on National Statistics (CNSTAT) of the National Academies. Even though new labels have been introduced (Table 3), the methods used to assess households' food security remained unchanged. So, statistics of 2005 and later years are directly comparable with those of earlier years for the corresponding categories (<http://www.ers.usda.gov>).

Table 3: USDA's revised labels describe ranges of food security

General categories (old and new labels are the same)	Detailed categories		
	Old label	New label	Description of conditions in the household
Food security	Food security	High food security	No reported indications of food-access problems or limitations
Food insecurity	Food insecurity without hunger	Marginal food security	One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake
	Food insecurity with hunger (Moderate)	Low food security	Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake
	Food insecurity with hunger (Severe)	Very low food security	Reports of multiple indications of disrupted eating patterns and reduced food intake

(Source: <http://www.ers.usda.gov> accessed 2009)

3.1.5 A Six-Item Subset (Short Form) of the 18-Item CFSM

A six-item subset-short form of the 18-item CFSM was developed for use when respondent burden and time and resource constraints are an issue. The six-item subset can distinguish between the three main categories of food secure, food insecure without hunger, and food insecure with hunger (moderate). However, it can only provide an indicator of the risk of children's hunger by measuring food insecurity with hunger (moderate) (Bickel et al., 2000).

3.1.6 Household Food Insecurity Access Scale (HFIAS)

The questionnaire consists of nine occurrence questions that represent a generally increasing level of severity of food insecurity (access), and nine “frequency-of-occurrence” questions that are asked as a follow-up to each occurrence question to determine how often the condition occurred (Table 4). The frequency-of-occurrence question is skipped if the respondent reports that the condition described in the corresponding occurrence question was not experienced in the previous four weeks (30 days) (Coates et al., 2007).

Each of the questions in the following table is asked with a recall period of four weeks (30 days). The respondent is first asked an occurrence question – that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers “yes” to an occurrence question, a frequency-of-occurrence question is asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks.

Example:

1. In the past four weeks, did you worry that your household would not have enough food?

0 = No (skip to Q2); 1 = Yes

1.a. How often did this happen?

1 = rarely (once or twice in the past four weeks)

2 = Sometimes (three to ten times in the past four weeks)

3 = Often (more than ten times in the past four weeks)

Table 4: Household Food Insecurity Access Scale (HFIAS) Generic Questions (Coates *et al.*, 2007)

No.	Occurrence Questions
1.	In the past four weeks, did you worry that your household would not have enough food?
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

3.2 Indirect Indicators

Beside the direct indicators, the instrument comprises indirect indicators, including dietary intake, socioeconomic status, food assistance program participation, health and nutritional status, clinical examination, biochemical indicators, and anthropometric indicators (measurement of the body size and body composition).

Indirect indicators are defined as measures from which some level of vulnerability to food insecurity can be inferred (Radimer *et al.*, 1990). These indicators are less likely to be sensitive to prediction of the possibility of food insecurity in future time or measurement of the current food security level in a household. One of the major indirect indicators is the financial factors. These include three indicators: (i) financial resource constraint, (ii) indicators of resource augmentation strategies; and (iii) indicators of programmatic activities at the community level. The first indicator comprises three sub-indicators; a) income-based measure of poverty (income, parents' income, per capita, and others); b) income source as an indication of poverty; and c) indicators of extreme financial hardship (Maxwell and Frankenburger, 1992).

4. Potential Associated Factors of HFIS

4.1 Socio-Demographic Factors

Risk factors of food insecurity include any factor that affects household resources such as money, time, information, health or the proportion of those resources available for food acquisition (Campbell, 1991). There are many risk factors that can contribute to food insecurity and hunger. These risk factors are usually primarily financial, but socio-demographic risk factors (educational attainment, race/ethnicity, family composition, etc.), time, employment skills, housing status, health status, food skills or capabilities, health insurance status, social support, past economic hardship, abuse, and the immediate food environment (availability of affordable nutritious food) could also affect the food security status of households. (Alaimo, 2005).

In a study conducted by Olson *et al* (1996), the significant variables involved in food insecurity were identified to be the following: low income, low educational level, single-head of household, renting a home, six or more people in the household, and minority race or ethnicity. As a result, in designing a research framework by which to study food insecurity, it is critical to recognize multiple socio-demographic and contextual factors as determinants for individual and household risk of food insecurity.

4.1.1 Age

Because significant interactions were found between household food insecurity and age group and sex, the researchers separated the subjects into 12 groups: boys < 2 years old; girls < 2 years old; boys 2-5 years old; girls 2-5 years old; primary school boys aged 6–10 years old; primary school girls 6–10 years old; adolescent

boys 11-18 years old; adolescent girls 11-18 years old; adult men 19-65 years old; adult women 19-65 years old; aged men > 65 years; old and aged women > 65 years old.

Drawing attention to the nutrition of children below five can at the same time provide information about past and current food insecurity/malnutrition in a community and provide information about future long term food insecurity. Moreover, children in the age group < 5 years are those who have not attended school yet, thus ensuring their household food security can be a key to guiding their education in the close future.

4.1.2 Marital Status and Occupation

Children living in female-headed families are nearly five times more likely to live in poverty than their counterparts living in married-couple families. With some exceptions, the poverty rate for children living in female-headed families was higher than that found in married-couple families (Frith-Terhune et al., 2000). The proponents of the economic deprivation perspective argued that the potential effects of single parents is not due to the physical absence of one parent but to the absence of the economic resources generated by the absent parent. Therefore, the effects of marital status on child well-being will be reduced when income is controlled or when families are matched in income level (Jiyoung & Younghee, 2008). Some studies indicated that children in female-headed families achieve superior nutritional status to that of families in male-headed households (Johnson & Rogers, 1993; Gangopadhyay & Wadhwa, 2003).

It is thought that urban living generally implies greater female labor force participation and a more distinct separation of dwelling location from the work location for both men and women. Other stylized facts suggest that the higher proportion of female-headed households and the smaller household sizes in urban areas are, the lower the household's supply of alternate caregivers and this results in harsher tradeoffs for women between time spent on income generation (their productive role) and time spent on their reproductive, maternal and caring roles (Ruel et al., 1999).

Policies that promote the status of women, provide formal and informal education, and reduce time burdens do much to ensure that women, infants, and children get their fair share of food and non-food inputs into nutrition. When women control income, a higher proportion of that income is spent on food and other inputs that improve nutrition and health. These policies also promote food production, because they avoid the underutilization of entrepreneurial talent (Bouis & Hunt, 1999).

4.1.3 Household Size (Number of Children)

The following results, related to the household size, were obtained from one study conducted by Garret & Ruel in 1999 in an investigation of whether the factors that determine food and nutrition security are different or not between rural and urban areas (Mozambique). The implications of these differences are for the design and operation of food and nutrition programs:

1- Greater household size has a large negative impact on calorie availability, with the effect initially greater in rural than in urban areas. The negative effect was larger in rural areas than in urban ones for small household sizes, although larger household sizes begin to have a positive effect at in the cases of 10 and 13 members in rural and urban areas, respectively. Perhaps additional members in rural areas have limited opportunities to improve household income and food availability but stronger social networks in rural areas eventually begin to compensate for this effect.

2- When household sizes are the same, households with larger numbers of children or the elderly will, because these individuals have lower calorie requirements, have a lower number of "Adult Equivalents" than those with young adults. The same per capita sums, then, could be used to provide more food for a smaller number of "Adult Equivalents," thus creating a positive relationship.

4.1.4 Education

Food insecurity and lack of education are two of the most dramatic deprivations developing countries are currently experiencing. The capacity and productivity of populations are closely associated with their levels of education. State action to promote food security should involve a range of policies and programs in the education. Poverty is more prevalent in households with limited schooling (Burchi & De Muro, 2007). Mothers with more education are less likely to have children who suffer from acute malnutrition. Other studies also suggest that the educational levels of mothers and the children's health environment contribute to children's nutritional status (Morales et al., 2005).

Ajani et al. (2006) interviewed 482 teachers employed in secondary and primary, public and private schools using an interviewer-administered questionnaire (USDA 18-Question Household Food Security Questionnaire Module). The study results suggested that the educational status of the household head influenced the food security of the studied households. Moreover, the educational status of the mother, living conditions of the family, access to health care, and household income level all contribute to proper breast-feeding and weaning

practices, to reduce the incidence of morbidity, and to maintain good nutritional status for children (Kruger & Gericke, 2003).

Studies from Saudi Arabia showed that education can increase incomes, improve household food security of the poorest families (through conditional cash transfers) help empower poor people, and contribute to the growth and development of local markets. Although the material standard of living for less-privileged Saudi families was relatively high, the educational attainment of the parents was low, and the poor education of mothers was identified as a source of risk to children's health (Von-Braun et al., 1993).

4.1.5 Ethnicity

Household food insecurity includes discrimination against ethnic groups. Early research found large racial/ethnic, and income disparities within low income households experiencing food insecurity. In the USA, the statistical analysis of food insecurity of the races indicated that 12.5% of all people, including 8.2% white people, 24.7% black people and 21.5% all Hispanic people were suffering from poverty and malnutrition (U.S. Census Bureau, 2007).

4.2 Economic Factors

4.2.1 Poverty and Household Income

Poverty is understood as a root cause of hunger and food insecurity (Wehler et al., 1992; Rose et al., 1999). Socially demeaning food acquisition methods, such as using a food pantry, borrowing from others, etc., may be employed to maximize food resources. Adverse effects on health and nutrition status may or may not occur, depending on the extent of the deprivation, coping tactics, and food choices. As the situation deteriorates, an increased reliance on low-cost foods and decreased quality in the diet develops. As stated by Derrickson (2000), once financial security weakens further, there is generally a reduction in food intake takes place (Radimer et al., 1992).

A Finnish study of 25 to 64 years old men and women the associations between economic disadvantage, food insecurity and self-reported body weight were investigated (Sarlio-Lahteenkorva & Lahelman, 2001). Food security was assessed by five separate items concerning economic fears and experiences related to sufficient supply of food during the past 12 months, and a combined scale in which those with affirmative responses to four to five items were classified as hungry. Low household income, recent unemployment and economic problems in childhood were all found to be predictors of the food insecurity.

It was documented in Burns (2004) that Jeffrey & French (1996) carried out a study of 20 to 45 years old women aiming at understanding demographic differences in obesity prevalence. They concluded that economic deprivation contributes to the high rates of obesity among women of lower socioeconomic status in ways not accounted for by the many demographic and lifestyle variables in their statistical model. Their finding that meal skipping was nearly twice as high in the income group that made < \$10,000 per year than the higher income groups could possibly indicate food insecurity as a factor.

In their study, Garret & Ruel (1999) found that expenditure levels are higher in urban areas but calorie availability is not, which, in addition to greater expenditure on non-food needs, may reflect higher prices and lower energy requirements due to lower physical activity. Education, which is assumed to affect income levels, is higher for both men and women in urban areas, though women still lag far behind.

4.2.2 Financial Support and Food Expenditure

Many ways can be used to improve the food security mechanisms so as to attain and maintain food security. In the U.S.A, for example, two forms of food assistance programs (FAPs) exist at the international level: food aid and food-related international finance. These are merely cross-border extensions of domestic FAPs, involving the transfer of resources into a country for subsequent distribution by the recipient government or NGOs to individual beneficiaries therein via different schemes such as; food stamps (e.g.: The National School Lunch Program (NSLP); Special Supplemental Program for Women, Infants and Children (WIC)); Supplementary feeding programs (e.g.: Child Nutrition Programs (CNPs)); food-for-work schemes; food subsidies and food price stabilization; micronutrient fortification; nutrition education; and information and early warning systems (Barrett,2002)

At the household level, the levels and sources of income are determined by the differences in employment between men and women. The household's total income portfolio is comprised of labor income, as well as income from other factors of production (e.g., land and capital) and non-factor income sources. Non-factor income includes unearned income sources from the sale of property or other consumer durable goods; pension or other government transfers; net income from gifts and remittances; lottery winnings; savings; and net borrowing or lending. In addition to the sources of income correspond to the following labor-based categories two categories have been included to capture income from other sources of production and unearned income. The first of these includes unearned income sources like rents, pensions, government transfers, sales of property and consumer durable goods, interest earned on loans, overseas earnings from household members residing away,

lottery winnings, and savings. The last income category consists of net inter-household transfers of gifts and remittances and net borrowing and lending (Levin et al., 1999).

4.3 Urbanization Process and HFIS

4.3.1 Population Growth and Urbanization

Three major forces are spurring the rapid growth of urban populations in developing countries: (i) natural increase (the difference between births and deaths); (ii) rural-urban migration, and, to a lesser extent, international migration; and (iii) reclassification of rural areas into urban areas (Henderson, 2002).

In the past few decades, rapid growth in the urban populations of developing countries has dramatically altered the distribution of the world's urban population (Cohen, 2006). However, by 2020, nearly 85% of the population of Latin America and more than half the residents of Africa and Asia will be living in urban areas (IFPRI, 2003). In Asia as a whole, during 2000-2025 the urban population is projected to increase from 1.39 billion to 2.51 billion capita, while the rural population will remain constant at 2.30 billion persons.

Urbanization influences domestic food production and consumption, promotes rural-urban competition for natural resources, and stimulates social and economic change. These effects of urbanization affect the food security and nutritional status of urban populations, and, to a certain extent, that of rural populations. Naturally, not all of the urban population is affected in similar ways or to similar extents. Yet, the heterogeneity of cities has not been appropriately incorporated into food consumption and nutrition surveys, as several researchers have noted in recent years. It is difficult, therefore, to avoid making inequitable and discriminatory policy recommendations for certain population groups in urban areas. Future research on urban issues must take into account the diversity of urban populations (Gaston et al., 2005).

4.3.2 Urban versus Rural Areas

Urbanization is a pervasive and accelerating phenomenon in the developing world that is shifting the locus of poverty and food insecurity away from rural areas. In just two decades, more poor and undernourished people will be living in cities than in rural areas. Malnutrition in the poorest areas of cities often rivals that of rural areas (Overmeyer, 2004). On the other hand, determinants to, and consequences of, food insecurity among rural and urban populations in different societies is still a matter of debate.

It seems that per capita energy consumption is generally higher in rural than in urban areas, regardless of income or expenditures. This does not necessarily imply that urban residents are not as well-nourished as rural ones, since the energy needs, costs for calories, and diet composition of both may be different. Moderate to severe nutritional deficiencies are common among the lower socioeconomic strata in both urban and rural settings. The effect of location on food availability and intake has not been completely resolved. Some of the urban poor may be more vulnerable to food insecurity than the rural poor who are engaged in subsistence agriculture. The impact of seasonality on food availability also needs to be considered; the urban poor are subject to smaller seasonal fluctuations in food availability and, hence, in food intake, than are the rural poor (Dostie et al., 2002). This nutrition transition is accompanied by demographic changes in life expectancy and fertility rates as well as an epidemiological transition, whereby patterns of diseases shift away from infectious diseases to higher prevalence of obesity and chronic diseases. (Ruel et al., 1999).

It is reasonable to assume that rural occupations tend to use more energy than urban ones, and, hence, rural energy requirements tend to be greater. On the other hand, the rural diet is more often based on staples (since staples are a relatively inexpensive source of calories) than is the urban diet. However, the urban poor are often employed in manual activities, which are likely to have higher energy requirements than the average urban job. Researchers have found that the cost of calories, particularly of cereals, sugar, and animal products, is lower in rural, than in urban, areas. (Gregory et al., 2007; Whiting & Unwin, 2009).

Malnutrition among urban children is currently undeniable problem. In Thwin (2001) study, rural mothers had better-nourished children. This was partly explained by the interaction of independent variables. For example, illiteracy is more prevalent among the heads of households in urban (6%), than in rural, areas (4.5%); the ratio of food expenditure to total income is higher for urban families (15%) than rural ones (6%); the proportion of information on health and nutrition obtained from sources other than trained personnel is higher in urban areas (80%) than in rural areas (57%).

4.3.3 Urban Poverty and HFIS

No developing country can afford to ignore the phenomenon of urbanization. Within the next 20 years, more poor and undernourished people in developing countries will live in cities than in the countryside. Even in regions with relatively low levels of urbanization, including Africa and parts of Asia, millions of the poor already live in cities (IFPRI, 2003)

With increased economic development and urbanization, populations in many developing countries are consuming more processed foods, including more refined grains and foods with higher content of saturated fat, sugar, and salt. During this transition, symptoms of under- and over-nutrition coexist at the population level, with wealthier households exhibiting symptoms of the "diseases of affluence" including obesity, and poorer

households exhibiting food insecurity and malnutrition. But recent work indicates that under- and over-nutrition can coexist in the same household (Garrett et al., 2003).

The impact of poor or negative economic growth is felt severely by low-income urban households since a large part of their budget is devoted to essential non-food items such as fuel and transportation, which limit their ability to meet basic food needs. During periods of economic contraction, there is a high likelihood that incomes of the urban poor will decline disproportionately, and that this decline will then be translated into reduced caloric intake by households. Calorie consumption in many of the low-income urban households is already so low that any further decline in intake can have serious consequences, particularly for vulnerable individuals. Maintaining or achieving food security for such low-income urban households therefore is crucial (Abdulai & Aubert, 2004).

Not only is food consumption closely related to economic conditions, but so is health, particularly that of children in urban slums. The availability of a regular job for household heads is linked to a raised socioeconomic status for the household and thus to an improvement in living conditions, that's, in housing and hygiene, and in access to services such as health care and water supplies. Raising incomes is thus likely to improve health. When food prices are increased and access to sufficient food is reduced, some poor urban households, especially recent migrants, tend to fall back on their rural connections (Laraia et al., 2006).

During times of economic growth, the urban poor generally benefit, as do most other population groups. However, economic growth may not always result in increased food consumption and improved nutritional status of the urban poor. For example, during the economic expansion in the Philippines in the 1970s, because real wages fell, the urban poor did not significantly improve their nutritional status, despite low cereal prices (Zhang, 2004).

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