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Food security: Challenges ahead

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Abstract

First Millennium Development Goal states the target of "Halving hunger by 2015". Sadly, the recent statistics for India present a very gloomy picture. India currently has the largest number of undernourished people in the world and this is in spite of the fact that it has made substantial progress in health determinants over the past decades and ranks second worldwide in farm output. The causes of existing food insecurity can be better viewed under three concepts namely the: 'traditional concept' which includes factors such as unavailability of food and poor purchasing capacity; 'socio-demographic concept' which includes illiteracy, unemployment, overcrowding, poor environmental conditions and gender bias; 'politico-developmental concept' comprising of factors such as lack of intersectoral coordination and political will, poorly monitored nutritional programmes and inadequate public food distribution system. If the Millennium Development Goal is to be achieved by 2015, efforts to improve food and nutrition security have to increase considerably.

Keywords: Food security, Challenges, India

The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. In many countries, health problems related to dietary excess are an ever increasing threat, In fact, malnutrion and foodborne diarrhea are become double burden.

Food security is built on three pillars:

- Food availability: sufficient quantities of food available on a consistent basis.
- Food access: having sufficient resources to obtain appropriate foods for a nutritious diet.
- Food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

Food security is a condition related to the ongoing availability of food. Concerns over food security have existed throughout history. There is evidence of granaries being in use over 10,000 years ago, with central authorities in civilizations including Ancient China and Ancient Egypt being known to release food from storage in times of famine. Yet it was only at the 1974 World Food Conference that the term 'food security' was established as a formal concept. Originally, food security was understood to apply at the nationallevel, with a state being food secure when there was sufficient food to "sustain a steady expansion of food consumption and to offset fluctuations in production and prices".

According to the United States Department of Agriculture (USDA). Food security incorporates a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors including droughts, shipping disruptions, fuel shortages, economic instability, and wars. In the years 2011-2013, an estimated 842 million people were suffering from chronic hunger. The FAO identified the four pillars of food security as availability, access, utilization, and stability.The United Nations (UN) recognized the Right to food in the Declaration of Human Rights in 1948, and has since noted that it is vital for the enjoyment of all other rights.

Measurement

Food security indicators and measures are derived from country level household income and expenditure surveys to estimate per capita caloric availability. In general the objective of food security indicators and measures is to capture some or all of the main components of food security in terms of food availability, access and utilization or adequacy. While availability (production and supply) and utilization/adequacy (nutritional status/anthropometric measures) seemed much easier to estimate, thus more popular, access (ability to acquire sufficient quantity and quality) remain largely elusive.The factors influencing household food access are often context specific. Thus the financial and technical demands of collecting and analyzing data on all aspects of household's experience of food access and the development of valid and clear measures remain a huge challenge. Nevertheless several measures have been developed that aim to capture the access component of food security, with some notable examples developed by the USAID-funded Food and Nutrition Technical Assistance (FANTA) project, collaborating with Cornell and Tufts University and Africare and World Vision.These include:

- *Household Food Insecurity Access Scale* (HFIAS) - continuous measure of the degree of food insecurity (access) in the household in the previous month

- *Household Dietary Diversity Scale* (HDDS) - measures the number of different food groups consumed over a specific reference period (24hrs/48hrs/7days).

- *Household Hunger Scale* (HHS) - measures the experience of household food deprivation based on a set of predictable reactions, captured through a survey and summarized in a scale.

- *Coping Strategies Index* (CSI) - assesses household behaviours and rates them based on a set of varied established behaviours on how households cope with food shortages. The methodology for this research is base on collecting data on a single question: "What do you do when you do not have enough food, and do not have enough money to buy food?"

World Summit on Food Security

The World Summit on Food Security held in Rome in 1996, aimed to renew a global commitment to the fight against hunger. The Food and Agriculture Organization of the United Nations (FAO) called the summit in response to widespread under-nutrition and growing concern about the capacity of agriculture to meet future food needs. The conference produced two key documents, the Rome Declaration on World Food Security and the World Food Summit Plan of Action.

The Rome Declaration calls for the members of the United Nations to work to halve the number of chronically undernourished people on the Earth by the year 2015. The Plan of Action sets a number of targets for government and non-governmental organizations for achieving food security, at the individual, household, national, regional and global levels.

Another World Summit on Food Security took place in Rome between November 16 and 18, 2009. The decision to convene the summit was taken by the Council of FAO in June 2009, at the proposal of FAO Director-General Dr Jacques Diouf. Heads of State and Government attended the summit, which took place at the FAO's headquarters

The State of Food Insecurity in the World 2013 presents updated estimates of undernourishment and progress towards the Millennium Development Goal (MDG) and World Food Summit (WFS) hunger targets. The latest assessment shows that further progress has been made towards the 2015 MDG target, which remains within reach for the developing regions as a whole, although marked differences across regions persist and considerable and immediate additional efforts will be needed.

The 2013 report goes beyond measuring food deprivation. It presents a broader suite of indicators that aim to capture the multidimensional nature of food insecurity, its determinants and outcomes. This suite, compiled for every country, allows a more nuanced picture of their food security status, guiding policy-makers in the design and implementation of targeted and effective policy measures that can contribute to the eradication of hunger, food insecurity and malnutrition.

Drawing on the suite of indicators, the report also examines the diverse experiences of six countries in more detail, finding a mixed picture of progress and setbacks. Together, these country experiences show the importance of social protection and nutrition-enhancing interventions, policies to increase agricultural productivity and rural development, diverse sources of income and long-term commitment to mainstreaming food security and nutrition in public policies and programmes.

Pillars of food security

The WHO states that there are three pillars that determine food security: food availability, food access, and food use. The FAO adds a fourth pillar: the stability of the first three dimensions of food security over time.In 2009, the World Summit on Food Security stated that the "four pillars of food security are availability, access, utilization, and stability".

Availability

Growth in food production has been greater than population growth. Food per person increased during the 1961–2005 period. The y-axis is percent of 1999–2001 average food production per capita. Data source: World Resources Institute.

Food availability relates to the supply of food through production, distribution, and exchange. Food production is determined by a variety of factors including land ownership and use; soil management; crop selection, breeding, and management; livestock breeding and management; and harvesting. Crop production can be impacted by changes in rainfall and temperatures.The use of land, water, and energy to grow food often competes with other uses, which can affect food production. Land used for agriculture can be used for urbanization or lost to desertification, salinization, and soil erosion due to unsustainable agricultural practices. Crop production is not required for a country to achieve food security. Nations don't have to have the natural resources required to produce crops in order to achieve food security, as seen in the examples of Japan and Singapore.

Because food consumers outnumber producers in every country, food must be distributed to different regions or nations. Food distribution involves the storage, processing, transport, packaging, and marketing of food. Food-chain infrastructure and storage technologies on farms can also impact the amount of food wasted in the distribution process. Poor transport infrastructure can increase the price of supplying water and fertilizer as well as the price of moving food to national and global markets. Around the world, few individuals or households are continuously self-reliant for food. This creates the need for a bartering, exchange, or cash economy to acquire food. The exchange of food requires efficient trading systems and market institutions, which can have an impact on food security. Per capita world food supplies are more than adequate to provide food security to all, and thus food accessibility is a greater barrier to achieving food security.

Access

Food access refers to the affordability and allocation of food, as well as the preferences of individuals and households. The UN Committee on Economic, Social, and Cultural Rights noted that the causes of hunger and malnutrition are often not a scarcity of food but an inability to access available food, usually due to poverty. Poverty can limit access to food, and can also increase how vulnerable an individual or household is to food price spikes. Access depends on whether the household has enough income to purchase food at prevailing prices or has sufficient land and other resources to grow its own food. Households with enough resources can overcome unstable harvests and local food shortages and maintain their access to food.

There are two distinct types of access to food: direct access, in which a household produces food using human and material resources, and economic access, in which a household purchases food produced elsewhere. Location can affect access to food and which type of access a family will rely on. The assets of a household, including income, land, products of labor, inheritances, and gifts can determine a household's access to food. However, the ability to access to sufficient food may not lead to the purchase of food over other materials and services. Demographics and education levels of members of the household as well as the gender of the household head determine the preferences of the household, which influences the type of food that are purchased. A household's access to enough and nutritious food may not assure adequate food intake of all household members, as intrahousehold food allocation may not sufficiently meet the requirements of each member of the household. The USDA adds that access to food must be available in socially acceptable ways, without, for example, resorting to emergency food supplies, scavenging, stealing, or other coping strategies.

Utilization

The final pillar of food security is food utilization, which refers to the metabolism of food by individuals. Once food is obtained by a household, a variety of factors impact the quantity and quality of food that reaches members of the household. In order to achieve food security, the food ingested must be safe and must be enough to meet the physiological requirements of each

individual. Food safety impacts food utilization, and can by impacted by the preparation, processing, and cooking of food in the community and household. Nutritional values of the household determine food choice. Access to healthcare is another determinant of food utilization, since the health of individuals controls how the food is metabolized. For example, intestinal parasites can take nutrients from the body and decrease food utilization. Sanitation can also decrease the occurrence and spread of diseases that can affect food utilization. Education about nutrition and food preparation can impact food utilization and improve this pillar of food security.

Stability

Food stability refers to the ability to obtain food over time. Food security can be transitory, seasonal, or chronic. In transitory food insecurity, food may be unavailable during certain periods of time. At the food production level, natural disasters and drought result in crop failure and decreased food availability. Civil conflicts can also decrease access to food. Instability in markets resulting in food-price spikes can cause transitory food insecurity. Other factors that can temporarily cause food insecurity are loss of employment or productivity, which can be caused by illness. Seasonal food insecurity can result from the regular pattern of growing seasons in food production.

Chronic (or permanent) food insecurity is defined as the long-term, persistent lack of adequate food In this case, households are constantly at risk of being unable to acquire food to meet the needs of all members. Chronic and transitory food insecurity are linked, since the reoccurrence of transitory food security can make households more vulnerable to chronic food insecurity.

Effects of food insecurity

"Famine and hunger are both rooted in food insecurity. Chronic food insecurity translates into a high degree of vulnerability to famine and hunger; ensuring food security presupposes elimination of that vulnerability."

Stunting and chronic nutritional deficiencies

Many countries experience ongoing food shortages and distribution problems. These result in chronic and often widespread hunger amongst significant numbers of people. Human populations can respond to chronic hunger and malnutrition by decreasing body size, known in medical terms as stunting or stunted growth. This process starts *in utero* if the mother is malnourished and continues through approximately the third year of life. It leads to higher infant and child mortality, but at rates far lower than during famines. Once stunting has occurred, improved nutritional intake after the age of about two years is unable to reverse the damage. Stunting itself can be viewed as a coping mechanism, bringing body size into alignment with the calories available during adulthood in the location where the child is born. Limiting body size as a way of adapting to low levels of energy (calories) adversely affects health in three ways:

- Premature failure of vital organs during adulthood. For example, a 50-year-old individual might die of heart failure because his/her heart suffered structural defects during early development;
- Stunted individuals suffer a higher rate of disease and illness than those who have not undergone stunting;
- Severe malnutrition in early childhood often leads to defects in cognitive development

Challenges to achieving food security

Global water crisis

The water tables are falling in scores of countries (including northern China, the US, and India) due to widespread overpumping using powerful diesel and electric pumps. Other countries affected include Pakistan, Afghanistan, and Iran. This will eventually lead to water scarcity and cutbacks in grain harvest. Even with the overpumping of its aquifers, China is developing a grain deficit. When this happens, it will almost certainly drive grain prices upward. Most of the 3 billion people projected to be born worldwide by mid-century will be born in countries already experiencing water shortages. After China and India, there is a second tier of smaller countries with large water deficits – Afghanistan, Algeria, Egypt, Iran, Mexico, and Pakistan. Four of these already import a large share of their grain. Only Pakistan remains self-sufficient. But with a population expanding by 4 million a year, it will likely soon turn to the world market for grain.

Regionally, Sub-Saharan Africa has the largest number of water-stressed countries of any other place on the globe and as of an estimated 800 million people who live in Africa, 300 million live in a water stressed environment.It is estimated that by 2030, 75 million to 250 million people in Africa will be living in areas of high water stress, which will likely displace anywhere between 24 million and 700 million people as conditions become increasingly unlivable. Because the majority of Africa remains dependent on an agricultural lifestyle and 80% to 90% of all families in rural Africa rely upon producing their own food,water scarcity translates to a loss of food security.

Multimillion dollar investments beginning in the 1990s by the World Bank have reclaimed desert and turned the Ica Valley in Peru, one of the driest places on earth, into the largest supplier of asparagus in the world. However, the constant irrigation has caused a rapid drop in the water table, in some places as much as eight meters per year, one of the fastest rates of aquifer depletion in the world. The wells of small farmers and local people are beginning to run dry and the water supply for the main city in the valley is under threat. As a cash crop, asparagus has provided jobs for local people, but most of the money goes to the buyers, mainly the British. A 2010 report concluded that the industry is not sustainable and accuses investors, including the World Bank, of failing to take proper responsibility for the impact of their decisions on the water resources of poorer countries. Diverting water from the headwaters of the Ica River to asparagus

fields has also led to a water shortage in the mountain region of Huancavelica, where indigenous communities make a marginal living herding.

Land degradation

Intensive farming often leads to a vicious cycle of exhaustion of soil fertility and decline of agricultural yields. Approximately 40% of the world's agricultural land is seriously degraded. In Africa, if current trends of soil degradation continue, the continent might be able to feed just 25% of its population by 2025, according to UNU's Ghana-based Institute for Natural Resources in Africa.

Climate change

Extreme events, such as droughts and floods, are forecast to increase as climate change takes hold. Ranging from overnight floods to gradually worsening droughts, these will have a range of impacts on the agricultural sector. By 2040, almost the entire Nile region, which once included large areas of irrigated agricultural land, is expected to become hot desert where cultivation is impossible due to water limitation. According to the Climate & Development Knowledge Network report *Managing Climate Extremes and Disasters in the Agriculture Sectors: Lessons from the IPCC SREX Report*, the impacts will include changing productivity and livelihood patterns, economic losses, and impacts on infrastructure, markets and food security. Food security in future will be linked to our ability to adapt agricultural systems to extreme events. For example, the Garifuna women in Honduras are helping to ensure food security locally by reviving and improving production of traditional root crops, building up traditional methods of soil conservation, carrying out training in organic composting and pesticide use and creating the first Garifuna farmers' market. Sixteen towns have worked together to establish tool and seed banks. Efforts to plant wild fruit trees along the coast are helping to prevent soil erosion. The aim is to reduce the communities' vulnerability to the hazards of shifting

Weather patterns

Approximately 2.4 billion people live in the drainage basin of the Himalayan rivers. India, China, Pakistan, Afghanistan, Bangladesh, Nepal and Myanmar could experience floods followed by severe droughts in coming decades. In India alone, the Ganges provides water for drinking and farming for more than 500 million people. The west coast of North America, which gets much of its water from glaciers in mountain ranges such as the Rocky Mountains and Sierra Nevada, also would be affected. Glaciers aren't the only worry that the developing nations have; sea level is reported to rise as climate change progresses, reducing the amount of land available for agriculture.

Another way of thinking about food security and climate change comes from Evan Fraser, a geographer working at the University of Guelph in Ontario Canada. His approach is to explore the vulnerability of food systems to climate change and he defines vulnerability to climate change as situations that occur when relatively minor environmental problems cause major

impacts on food security. Examples of this include the Irish Potato Famine which was caused by a rainy year that created ideal conditions for the fungal blight to spread in potato fields, or the Ethiopian Famine in the early 1980s.Three factors stand out as common in such cases, and these three factors act as a diagnostic "tool kit" through which to identify cases where food security may be vulnerable to climate change. These factors are: (1) specialized agro-ecosystems; (2) households with very few livelihood options other than farming; (3) situations where formal institutions do not provide adequate safety nets to protect people.

Agricultural diseases

Diseases affecting livestock or crops can have devastating effects on food availability especially if there are no contingency plans in place. For example, Ug99, a lineage of wheat stem rust which can cause up to 100% crop losses, is present in wheat fields in several countries in Africa and the Middle East and is predicted to spread rapidly through these regions and possibly further afield, potentially causing a wheat production disaster that would affect food security worldwide.

In urban population

The key issue which catalyzes the problem of food insecurity in urban areas and needs to be addressed is the large proportion of informal workforce resulting in unplanned growth of slums which lack in the basic health and hygiene facilities. Rural-to-urban migration has shown a gradual increase, with its share in total migration rising from 16.5% to 21.1% from 1971 to 2001 (9). These rural migrants form a large chunk of population referred to as 'informal sector'. The emergence of these rural origin pockets in the urban areas has resulted in a number of slum settlements characterized by inadequate water and sanitation facilities, insufficient housing and increased food insecurity (10). Another important point which might promote food insecurity is the dependence of this labourer class on daily employment wages which tends to be variable on different days of the month and thus the food procurement and access is also fluctuating. A striking issue is that in India, all the privilege of the government schemes and programmes, aimed at helping the urban slum people, is enjoyed only by those slums that are notified. Ironically, around 50 % of the urban slums are not notified and thus are deprived of the government schemes. People from these un-notified slums have to buy their food from the common market at the competitive price and are devoid of the subsidized food made available through Public Distribution System (PDS) (11). In spite of rapid economic growth since the early 1980s and 1990s, the access and absorption indicators of urban food insecurity convey a notion that there has been relatively negligible improvement in nutritional intake and deterioration in terms of food security.

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