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Impacts of Climate Change on Food Accessibility

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Definitions:

Food security is often understood as comprising four pillars: availability (supply), access (discussed below), utilization (the body's ability to metabolise food nutrients, which might be impaired by illness) and stability (without periodic or seasonal shortfalls in the provision of food). "Food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." (FAO et al 2012: 57).

Food insecurity: A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory. (FAO et al 2012)

Food accessibility: refers to food affordability, allocation, and preferences that 25 enable people to effectively translate their hunger into demand. It is a measure of the ability to secure entitlements, which are defined as the set of resources (including legal, political, economic, and social) that an individual requires to obtain access to food. Poverty and vulnerability play a central role in food accessibility, as this component is centrally concerned with the purchasing power of households and individuals and the social dynamics governing access to food (Ziervogel and Frayne 2011).

Introduction

This standard definition of food security, noted above and which originated in the 1996 World Food Summit Plan of Action, has proven remarkably durable and is of interest to us for the pivotal role given to the notion of *access* to food. Yet definitional ease has not made the resolution of the problem any closer, and indeed 870m people are still chronically undernourished (FAO et al 2012). Indeed, events since 2007, when the numbers of hungry began to climb steeply in line with rising food prices and as part of a nexus of inter-related processes, have demonstrated that food insecurity remains a deeply intractable problem (Sage 2013), and one likely to be significantly exacerbated by climate change effects.

However, much of the scientific discussion around food security is framed by the imperative of producing more food: from 50 – 100 percent more by 2050 according to different sources. Yet this preoccupation with feeding a projected population of nine billion by mid-century – a one-third increase on today's population - overlooks the matter that up to half of global food currently produced does not reach a human stomach (IMechE 2012) but is lost or wasted between the field and the plate. Moreover around one-third of global grain production and the same proportion of arable land is currently accounted for by the production of livestock feeds which could otherwise feed people directly (Sage 2012). Third, the rush to biofuels as a way of enhancing energy security has had huge repercussions on food prices, and it has been estimated that the volume of maize (corn) currently diverted to ethanol distillation in the United States would be sufficient to feed at least 400 million people for one year.

Consequently, given that warming of the climate system is now unequivocal and that climate change is expected to pose major challenges for agricultural production, it is vital to better understand how this will shape access to food around the world. As climate change will likely have sharper and more immediate consequences on food access in poorer countries of the Global South, it is here that the chapter is focussed.

Access and entitlements

Whereas earlier definitions had placed emphasis upon the availability of food at all times, it was the work of an Indian economist Amartya Sen that did much to shift thinking around the causes of hunger. In his seminal work Poverty and Famines, Sen (1981) demonstrates that hunger and starvation are not conditions that inevitably arise as a consequence of a decline in food availability. Rather, they reflect the circumstances of people not being able to secure access to food. This can be explained, argues Sen, by understanding people's entitlement relations. On the basis of their initial endowments in land, other assets and labour power, a person has entitlements to his/her own production, the sale of labour power for wages or the exchange of products for other goods (for example, food). Under 'normal' conditions these entitlements provide the basis for survival; however, emerging circumstances – such as the possible effects of climate change - may unfavourably impact upon them. Thus, a drought-induced collapse of the local labour market severely impacts upon those whose main entitlement to food is drawn from the sale of their labour. Moreover, a rise in grain prices affects all those who purchase their food needs and who may simultaneously experience a collapse in the production or the price of their own commodities.

An understanding of entitlements has become a vital part of a social vulnerability approach which recognises the differential impacts of environmental, economic and other risks upon individuals, households, communities and regions. This approach breaks with past preoccupation with the arithmetic of food supply and human numbers in order to identify those who are most vulnerable to food insecurity and to better understand the basis of their survival strategies; that is their ability to cope with various forms of uncertainty whether chronic or on seasonal, periodic or irregular time scales. Moreover, recognising the influence of external factors (such as climatic or economic shocks) on local food provisioning systems reveals the nested interconnections that link the food security of individuals and households to the global level (Maxwell and Slater 2003).

Changes in agricultural production affecting food access

Regional scenario-building exercises using general circulation and statistical crop models point to a growing divergence between high and low latitudes in terms of agricultural output. Within the tropics there is particular concern for the effects of higher temperatures, with resulting heat stress on crops, animals and farmers; changing precipitation patterns, disrupting established cycles of rain-fed farming and associated livelihood activities; rising sea levels that will not only cause inundation of coastal farmland but trigger saline intrusions of freshwater acquifers; and increased likelihood of extreme weather events, such as drought and floods that will not only directly impact agricultural production, but destroy physical infrastructure affecting food storage and distribution. While any one of these aspects of climate change exert greater stress on food provisioning arrangements at local and regional level, it is anticipated that in practice there are likely to be dynamic interactions between these different variables creating greater turbulence and food price volatility on global markets (World Bank 2012).

For example, changes in temperature and in the amount, timing, and intensity of rainfall can result in reduced yields and lower overall levels of food production. This leaves households with inadequate amounts to sustain their consumption needs until the next harvest, and/or sell into local and regional markets. This decline invariably exacerbates price fluctuations which are likely to be transmitted into national urban food markets. Here access to food will be determined by the ability to pay higher prices and, depending on how these price rises occur alongside changes in income, can make existing food secure populations vulnerable to food insecurity in the future. In urban areas, food availability is seldom the major constraint, but rather it is lack of access to food for the urban poor, especially children. In some places urban agriculture provides some produce, although this too could be impacted by climate change through stress on urban water resources. Access to food in urban areas is also likely to be impacted by climate change because most food is purchased in urban areas. Food prices are a direct determinant of affordability and hence access. Food distribution systems in cities also play a role in food accessibility (Ziervogel and Frayne 2011).

It may be possible to make agricultural systems more resilient to climate change effects by changing farming practices, for example from staggering planting dates to practicing water conservation methods such as using mulches or rainwater harvesting techniques. The introduction of more heat or drought tolerant varieties of existing crops, or replacing those with new crop species, may also be an option but may have profound implications for household labour and other resources. With respect to livestock there is evidence to suggest that camels may be replacing cattle in dryland areas of East Africa given their greater capability to withstand drought conditions as well as their capacity to produce more milk over a longer lactation period. Certainly with the evidence demonstrating that, amongst resource poor low-income households, agriculture has a significant bearing on poverty reduction and therefore in reducing hunger and malnutrition, every effort must be made to make farming systems in vulnerable regions more resilient to the effects of climate change. Meanwhile, from an urban management perspective, supporting local food production in cities is important in promoting livelihoods and health, reducing costly food imports, using local waste productively, and contributing to sustainable livelihoods (Ziervogel and Frayne 2011).

Climate change impacts on livelihoods and food accessibility

> "A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation" (Chambers and Conway 1992: 7-8).

While at its simplest the notion of livelihoods represents a means of securing a living, its elements and structure can be complex as households and individuals mobilise their capabilities and assets to obtain food, employment, income. The great majority of the world's most food insecure live in rural areas of the poorest countries and, consequently, their livelihoods are almost entirely dependent upon agriculture, as small holder farmers, landless wage workers or pastoralists. It is this group of small-scale farmers and landless labourers, with limited resources who are particularly susceptible to the economic effects of climate change (HLPE 2012).

Protracted crises, where climate change may place greater pressure on resources (grazing land, water, firewood) can result in heightened insecurity that then results in severe disruption of livelihood activities. Initially the using up of stores is gradually replaced by the depletion of assets (such as jewellery, tools, utensils, animals, even land) as these are converted into food for survival.

One long-established livelihood strategy in rural areas has been periodic, seasonal or long-term migration to urban centres or other sites of employment in search of wage-earning opportunities. Whereas much mobility within and across national boundaries has hitherto been largely driven by socioeconomic factors, it is now recognised that environmental factors will increasingly influence migration. However, while environmental change can increase the incentive to move, it can also limit the capacity to do so (Black et al 2011). Moreover, people are as likely to migrate into places of environmental vulnerability as away from them.

For example, in dryland areas, where rainfall variability is a significant contributor to poverty and food insecurity and where mobility is a long-established livelihood strategy, analysis of long-term global data sets demonstrates high rates of net out-migration (de Sherbin et al 2012). However, the same work reveals high rates of net inward migration into coastal zones including flood-prone and cyclone affected areas. As people move toward major urban conurbations in search of employment, their exposure to climate hazards is not necessarily alleviated. For example, in Dakar, Senegal, 40% of migrants who moved there between 1998 and 2008 live in areas of high flood risk. In many countries - Bangladesh, Nigeria, Egypt, Vietnam amongst them - very densely populated coastal regions are continuing to attract inward migration but are highly vulnerable to storm surges and sea-level rise.

Climate change impacts on access to food amongst marginalised populations

Climate change can deepen the fault lines of existing inequalities that operate along multiple social axes, principally of gender, age, marital status, ethnicity and ascribed status within the prevailing society (eg caste). This has implications for entitlement relations and access to food, as outlined above and consequently for nutritional security. Even within the household under normal conditions, it has been well documented that the allocation of food frequently favours males over females.

Tightening stocks may disproportionately affect women and girls who eat what remains in the pot after the men have fed. Yet the work performed by women and girls may increase as a consequence of climate warming and drying. The gender roles of water and fuel collection may make journeys longer and leave women little time to pursue income-generating activities.

Furthermore, in developing countries as a whole, women constitute approximately 43 percent of the agricultural labour force yet are typically disadvantaged in terms of access to inputs (water, fertilizers, and seeds), credit, and lack titles to land. This affects farm productivity and leaves female headed households more vulnerable to food insecurity. Women farmers are generally more likely to produce a greater variety of foods for household consumption than men who are more locked into extension services encouraging commodity production. Small-scale production of fruits and vegetables by women has a greater chance of maintaining nutritional security.

Marginalisation is a complex social, economic and political process which takes many different forms in different societies. However, it is not difficult to imagine scenarios where climate change serves to exacerbate and deepen marginalisation and enflame hostilities as groups struggle to retain their existing rights and access to resources. It has been argued, for example, that climate change will worsen instability in already volatile regions. Burke et al (2009) use regression analysis of climate variation and conflict events in Africa to demonstrate that increases in temperature are strongly related to conflict incident. Others, however, argue for a more nuanced understanding of the ways that climate parameters (temperature, but also precipitation) may trigger or alleviate conflict (O'Loughlin et al 2012).

Another way in which marginalisation may occur is through powerful storm events that damage transport infrastructure, causing landslides or flooding of roads and rail lines, destroying bridges and so on, and restricting the capacity of moving food supplies from food surplus to food deficit regions. Stored food can also be lost at village and household level from increased pest and fungal damage, through to regional warehouses suffering power outages affecting bulk reserves. Under such circumstances rising prices for food may exacerbate political tensions and widen social divisions.

Conclusion

While addressing vulnerability to climate change requires urgent attention, it must be remembered that this is another confounding variable alongside existing determinants of food insecurity. Improving access to food will not automatically result from increased agri-commodity production especially under the prevailing model of highly mechanised, large-scale, high-input farming that dominates throughout the developed world and is being promoted as the solution for the South. This model currently produces enough food to feed the world, yet almost one billion are hungry. Such technologies do not enhance the human right to adequate food (De Schutter 2011).

Rather, improving access to food under climate change will require public investment in strategies for community based adaptation. This will include on-farm experimentation utilising locally developed seeds and knowledge; better water management practices involving rainwater harvesting, storage and use; soil moisture conservation and other techniques. Yet building local resilience to climate change must be accompanied by institutional efforts at multiple scales in order to ensure individual, household and community entitlements are secured in order to improve access to food.

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