

Agriculture, hunger and food security

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Executive Summary

Despite a dramatic increase in global food availability and substantial progress in poverty reduction, hunger, food insecurity and undernourishment remain at unacceptably high levels and progress in addressing this dimension of poverty has been disappointingly poor. Almost 850 million people do not have enough to eat and, alarmingly, in many parts of the world, the number is on the increase.

Most people accept that agriculture is linked to hunger and food insecurity, but that the link is not necessarily direct or linear. Most also accept that producing more food will not necessarily alleviate hunger. The world already has more than enough food to feed its population adequately. Understanding how agriculture can most effectively contribute to food security remains a critical question, particularly for policy makers reviewing their approach to agricultural development within the wider framework of economic growth and poverty reduction.

Food security and adequate nutrition are determined by a number of factors that can be grouped as: a) the availability of food; b) economic access to food; and c) the way in which food is used (including interactions between diet and disease). Agriculture is of direct importance in at least the first two categories, and has indirect effects (especially through income) on the third. Thus, agriculture's contribution to food security can be framed by two key criteria:

1. Increasing the availability of food at prices the poor can afford.
2. Providing jobs and incomes that will give poor people the means to access food.

We understand much more about food availability than about agriculture's role in ensuring economic access to food. There is evidence that:

- increasing food supplies can lower food prices, but this need not automatically be detrimental for producers if productivity increases outweigh decreasing prices;
- agriculture can generate increased incomes for farmers on large and small farms and in the rural non-farm economy;
- increases in agricultural productivity, even where there is mechanisation, have pushed up agricultural wage labour rates, thereby increasing incomes;
- geographical, economic and social contexts matter: the evidence does not support fundamentalist positions on the small versus large farm, or the subsistence versus commercial farming debates; and
- malnutrition is only weakly correlated with income and economic wealth: other factors, notably basic health care, are of equal or greater importance depending on context.

Beyond this, two broad questions remain the subject of considerable debate:

1. Can the world meet an increasing demand for food? Specifically, how will changes in global and regional food supply impact upon prices and how will levels of hunger and food insecurity be affected?
2. Can agriculture make a significant contribution to tackling poverty – which remains the principal cause of hunger and food insecurity?

The impacts and implications of HIV/AIDS are pertinent in both areas.

How will affordable food be produced and supplied in a changing world context? We know that population growth will slow, incomes will increase and poverty will be reduced. But, at the same time, levels of hunger will remain high, the demand for cereals will increase, there will be a slower rate of agricultural production growth, and wheat and rice production will increase only modestly in developing countries. The response to these challenges depends on: a) the extent to which the world can physically continue to increase production levels and, more importantly, yields; b) the impact of changing patterns of food consumption, particularly consumption of livestock products in the developing world; and c) the impact of potential policy reforms in the developed world, particularly those that reduce support to farmers. There is generally little agreement surrounding these factors.

Questions on how agriculture can make a significant contribution to tackling poverty throw up further issues of debate, including the extent to which countries should pursue self-sufficiency, and the most appropriate agricultural development strategies (e.g. small versus large farms, subsistence versus market-oriented production).

So what are the implications for agricultural policy decisions? The main conclusion is that broad dimensions of each issue are fairly well understood and, in many cases, agreed upon, but that the details are missing. Closing the gap will, therefore, require empirical research to go beyond the broad dimensions of each issue and to understand clearly how the linkages between agriculture, income, poverty and food security play out in specific contexts and settings. In closing the evidence gap, emphasis needs to be placed on evaluating and learning lessons from policy design and implementation successes, as well as failures.

1. What is the issue and why is it important?

Despite a dramatic increase in global food availability and substantial progress in poverty reduction, hunger, food insecurity¹ and undernourishment remain at unacceptably high levels and progress in addressing this dimension of poverty has been disappointingly poor. Almost 850 million people do not have enough to eat and, alarmingly, in many parts of the world, the number is on the increase.

The consequences of undernourishment are severe and their reach is wide. As described in the next section, while only one of the Millennium Development Goals (MDGs) has a specific target for hunger, another four goals (improving primary education and reducing

¹ In this paper, hunger is defined as 'uncomfortable or painful sensation caused by a lack of food. Hunger can be experienced temporarily by people who are not food insecure, as well as by those who are' (DFID, 2003). The term is used to refer to the MDG and people's experience of food insecurity. In contrast, 'food security' is a term more useful for policy analysis and understanding the underlying causes of hunger. 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' (DFID, 2003).

child mortality, maternal health and disease) would be substantially facilitated by progress in reducing hunger.

While there is clear agreement on the urgent need to tackle hunger in the world – particularly where it has become a chronic and persistent characteristic of life for the poor – the role of agriculture in achieving this remains the subject of considerable debate. Some believe the solution lies almost exclusively in improving the physical performance of agriculture through a range of measures that often focus on new technologies. Others state that the causes of hunger and food insecurity are more complex and that improving agricultural performance is less important than tackling the underlying poverty that remains the fundamental cause of hunger and food insecurity.

Most people accept that agriculture, or at least the part that produces food, is linked to hunger and food insecurity, but that the link is not necessarily direct or linear. Most also accept that producing more food will not necessarily alleviate hunger. The world already has more than enough food to feed its population adequately. Understanding how agriculture can most effectively contribute to food security remains a critical question, particularly for policy makers reviewing their approach to agricultural development within the wider framework of economic growth and poverty reduction.

This paper synthesises evidence concerning the role of agriculture in reducing food insecurity, particularly its roles in making food available at lower prices, and in generating incomes so people can buy food. Areas are identified where a lack of knowledge or a divergence of views about appropriate agricultural responses to food insecurity are constraining the potential for agriculture to contribute to reducing poverty and hunger.

2. What we already know

2.1 Progress towards reducing hunger

Poor global progress in reducing hunger is illustrated by figures from the Food and Agriculture Organisation of the United Nations (FAO). The figures (albeit imperfect²) for 1999 show that 842 million people were undernourished (FAO, 2003a). This is just 19 million less than the FAO estimate for 1990–1992 and 18 million more than in 1995–1997. Progress in tackling hunger has also been geographically imbalanced, with the numbers experiencing hunger falling between 1990 and 1992 and between 1999 and 2001 in China, India, South East Asia, South America and West Africa, but increasing in central, eastern and southern Africa, and in the Near East. At current rates of progress the MDG target of halving the number of undernourished people by 2015 will not be met (see Figure 1).

² See Svedberg (1999), Smith (1998), Moseley and Logan (2001) for discussion on the difficulties of measuring these concepts.

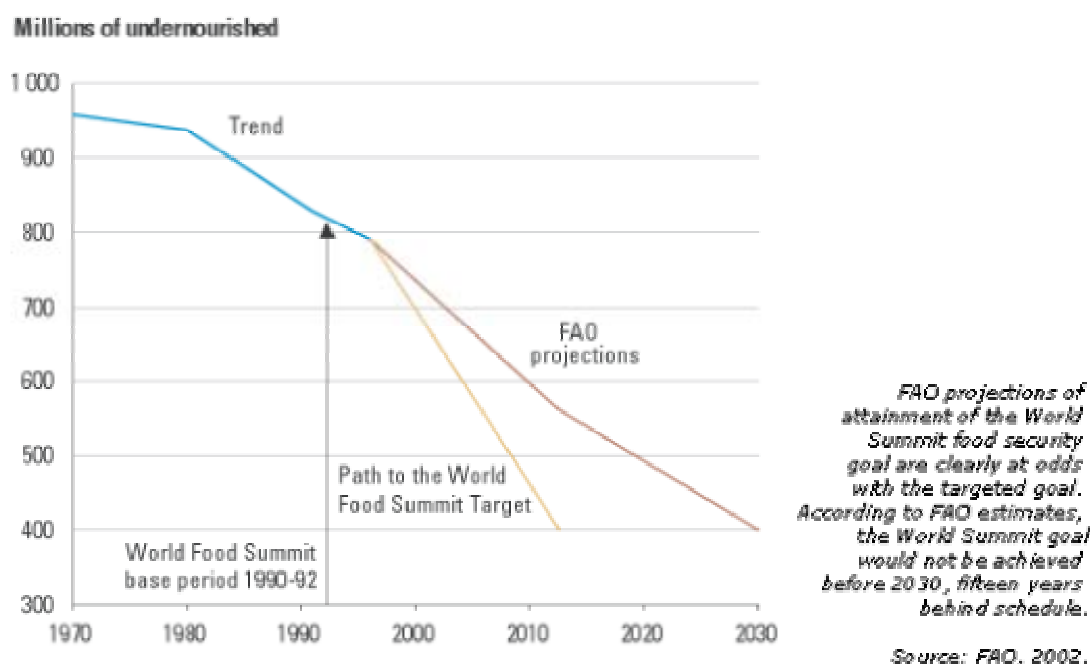


Figure 1: Progress towards the MDG undernourishment target

2.2 The implications of hunger for poverty reduction and the MDGs

The consequences of undernourishment are severe. Most directly it causes malnutrition, which leads to higher rates of child mortality and morbidity, affects the development of children in their early years and reduces labour productivity of adults. When young women are malnourished, it raises the chances of maternal mortality and makes it probable that they will give birth to babies of low weight who are at risk of early death or likely to show slow early growth³. Female babies of low weight are likely to become undernourished young women. Thus the cycle of nutritional deprivation can transmit disadvantage across several generations (Harper et al., 2003; Alderman et al., 2003).

Less directly, hunger and food insecurity may force people to undertake risky activities (e.g. prostitution, crime or migration) in a desperate bid to find food and work. Frequently, where mass migration takes place, it is the spread of diseases like measles and diarrhoea that leads to mortality, rather than hunger directly (Devereux, 2000).

The consequences of hunger and food insecurity also thwart progress towards other MDGs. Malnutrition erodes human capital, affecting people's resilience to shocks and reducing their productivity, with a significant impact on income poverty. In addition, the goal of empowering women is impeded by the damaging alignment of inequality and malnutrition. Improved nutrition can break this vicious cycle because dealing with malnutrition empowers women more than men, and improved nourishment of girls correlates with better school attendance and socio-economic status.

³ See Behrman et al. (2004) for a detailed review of studies on the economic impacts of malnutrition and estimates of the high economic pay-offs to taking action to remedy malnutrition.

In contrast, malnutrition compromises maternal health, is directly or indirectly associated with 60% of all child mortality, and hastens the onset of opportunistic infections and AIDS among HIV-positive individuals (Gillespie and Haddad, 2003), thus directly frustrating the achievement of MDGs on maternal health, child mortality and combating HIV/AIDS and other diseases.

2.3 The evolution of thinking about hunger and food insecurity

Ideas about hunger and food insecurity have developed along distinct although essentially complementary lines⁴.

Early thinking clearly linked hunger and food insecurity to reduced food availability. Hunger, and particularly famine, appeared to be a result of an acute food shortage, which could be best addressed through steps to increase the production and distribution of food. Thinking on food security was thus largely seen in terms of increasing aggregate food supply, an idea that fitted well with the focus of contemporary agricultural development thinking, particularly in Asia during the era of the Green Revolution. Increasing availability through technology-based productivity improvements seemed to offer the world a way out of hunger, famine and food insecurity.

But in the *early 1980s*, the idea that famines are caused by harvest failures alone was disputed, and gave way to explanations in terms of failures of 'entitlements', that is the inability of individuals to access the food they need due to poverty. This line of argument was most famously championed by Sen (1981), who illustrated his argument by explaining the Bengal famine of 1943 in terms of the disjuncture between soaring rice prices and farm labourers' stagnant wages, which left them unable to buy enough food. Food access, or 'entitlement' in Sen's terminology, certainly matters as much if not more than food availability. The focus of efforts consequently switched to addressing poverty rather than increasing food availability.

A number of *new perspectives* on food security have begun to emerge recently, and these challenge the entitlement approach. The challenge focuses on the way in which entitlement theory underplays the role of assets, makes famine victims appear passive and marginalises non-economic factors such as conflict and health. De Waal's (1989) analysis of events in Darfur in 1984–85, for example, judged famine to be more a crisis of health than of food. Other new perspectives (for a review see Maxwell, 1996) include a greater awareness of the heterogeneity of food insecurity and famine conditions, and of the many factors that potentially play a role in explaining events. Within this view, poor people's livelihoods, and the ways in which people strive to protect them, are seen as central to understanding food crises, particularly in Africa. People's vulnerability and their coping mechanisms for dealing with the hazards they face have become central points of interest.

⁴ Separated largely by the divide between the disciplinary worlds of the food security specialists who have tended to be either (general) agriculturalists or social scientists, and nutrition that has tended to see itself as branch of public health or medical science.

The nutrition dimension of food insecurity has also demonstrated considerable development of thinking. The early focus of nutritionists on protein deficiencies shifted to calorific intake, and subsequently to micronutrient deficiencies. There are also divides amongst nutritionists over approaches to addressing malnutrition (Schuftan et al., 1998; Pelletier, 2002). One camp suggests that the multiple facets of malnutrition require corresponding policies across many sectors and disciplines. The other camp worries that a multi-sectoral approach may be ineffective and unfocused and so will fail to offer compelling policy messages that promise to deliver measurable improvements within the (short) time horizons preferred by policy makers.

Despite these apparently different ideas about food security and nutrition, common perspectives exist, namely a recognition that hunger and food insecurity have many causes and that these should be seen and understood in their specific context. The policy challenge for hunger and food security is clear – how to co-ordinate a coherent response across sectors.

2.4 Understanding agriculture's contribution to reducing hunger

The above brief review suggests that while 'improving' agriculture alone will not lead to a reduction in hunger and food insecurity, agriculture has played and will continue to play a fundamental role. Most commentators and policy makers frame agriculture's contribution in two key criteria:

1. Increasing the availability of food at prices that poor people can afford.
2. Providing improved jobs and incomes that will give poor people the means to access food.

To these two agriculturally 'specific' issues a further third dimension should be added: the extent to which increased incomes result in improved nutritional outcomes for individuals. These criteria are considered below.

Increasing the availability of affordable food

In many developing countries – and for the developing world as a whole – increased production of staple foods has comfortably outstripped population growth since the mid-1960s when the Green Revolution began to be adopted widely (Figure 2). Only in sub-Saharan Africa has the population grown faster than food supplies during the past 30 years.

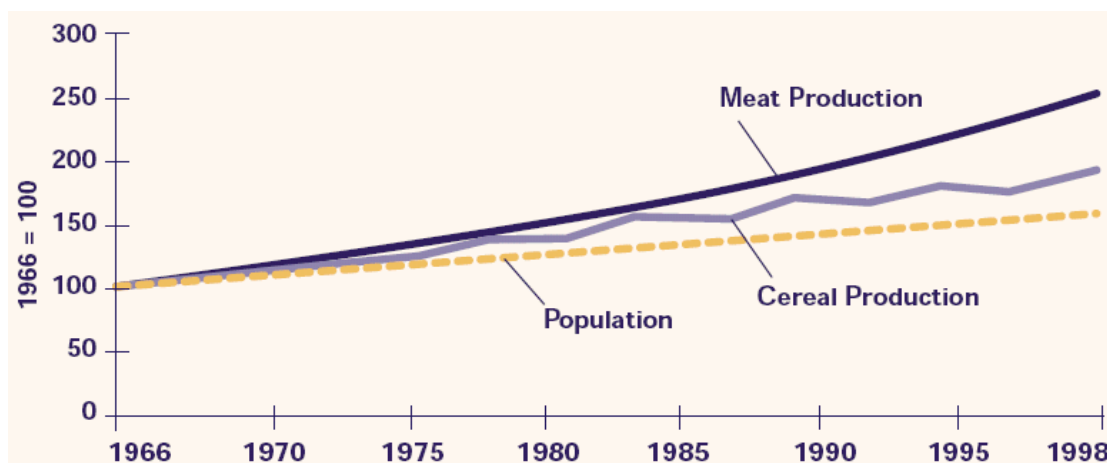


Figure 2: Growth in population and food production, 1966–1998. Source: Rosegrant et al. (2001)

Given the increase in per capita supply, and the relatively low elasticity of demand for basic foods, the real world market prices of the major traded grains have been in near continuous decline since the early 1950s (Figure 3)⁵. There have been only two exceptions to this trend: the price spike of 1973–74 and a lesser price rise in the late 1990s. In both cases the shocks were short-lived and the long-term trend was soon re-established.

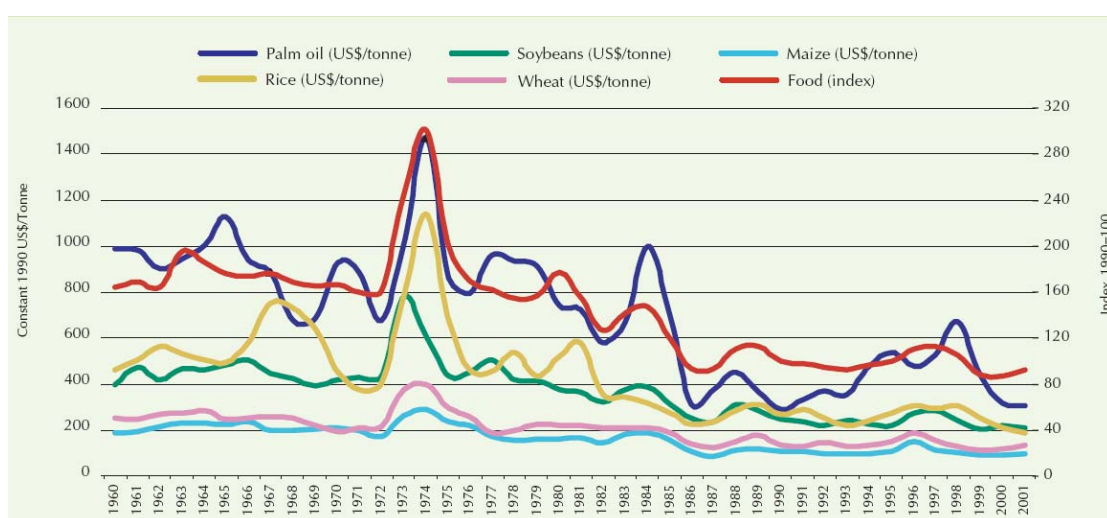


Figure 3: World Market Prices, 1960–2001 (constant 1990 US\$). Source: FAO (2003b)

At the individual country level, increased production of food grains can lead to a dramatic reduction in prices. This is of great benefit to the poor, both in urban and rural areas where many people buy and grow their own food. Bangladesh provides an excellent example. Between 1980 and 2000, the production of rice and wheat increased from less than 15 to over 25.7 million tonnes, increasing per capita availability over the same period from 425 to 510 grams per day, despite population increasing over the same period from 90 to 191 million people. Real wholesale prices of rice and wheat consequently fell dramatically (Figure 4), with the price of rice in Dhaka’s market falling from just over Taka 20 to around Taka 11 per kg over the two decades.

⁵ Mitchell and Ingco (1993) report a 78% fall in food prices overall from 1950 to 1992.

Despite declining market prices, farmers have successfully increased their production and yields – rice yields rose from an average of 2 tonnes to over 3.4 tonnes per hectare by the early 2000s – through the use of new varieties, fertiliser and, above all, expansion of irrigation. These improvements have allowed farmers to cut their unit costs of production and so offset the impact of falling prices on their incomes.

The Bangladesh experience represents a win–win situation for consumers and most producers: where productivity increases can match or outpace the fall in prices, both consumers and producers can be more food secure. Elsewhere however, especially in Africa, increasing production has been a double-edged sword for food security because increases in yields have not been substantial enough to protect producers from falling prices. There are a number of reasons for this, including thinner (and therefore more volatile) markets and higher transport costs that result in surpluses flooding local markets.

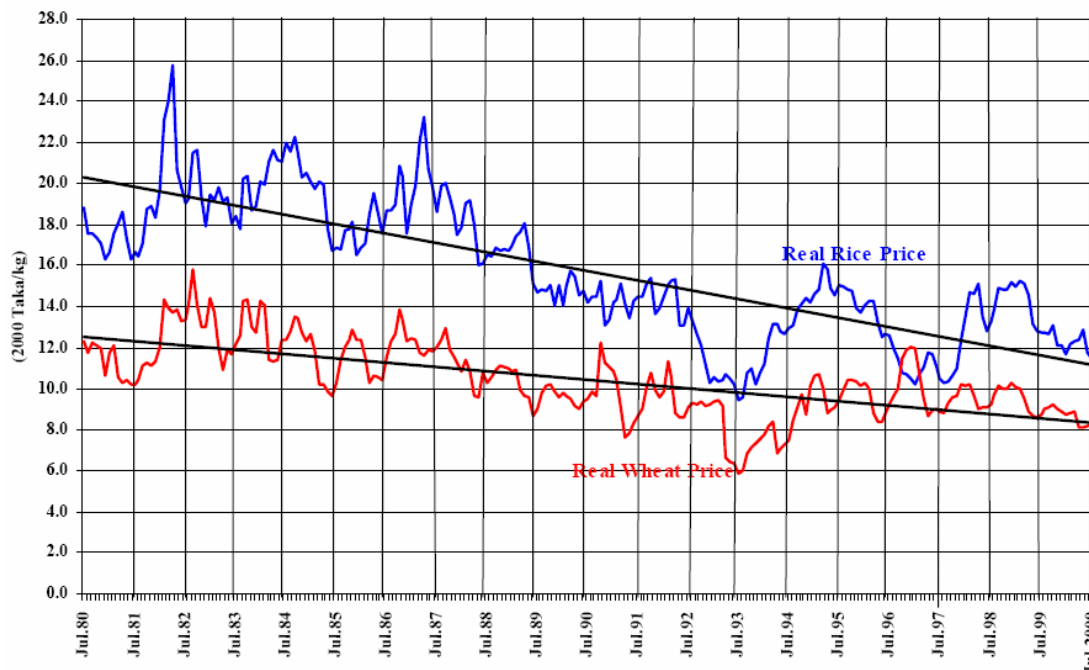


Figure 4: National average real wholesale prices of rice and wheat, 1980–2000, Bangladesh. Source: IFPRI

Generating sufficient income to allow people to access food

In looking at the other side of the hunger equation – improving access to food through increasing incomes – it is, for analytical simplicity, helpful to look at the impact of increasing agricultural productivity in three main areas:

- direct impact on farmers’ incomes, including those of smallholders;
- impact in terms of increasing rural employment opportunities and rural wage rates – including those in the non-farm rural economy; and
- wider impact on economic growth and poverty reduction more generally.

Higher incomes for farmers, including smallholders

Evidence shows that agricultural growth has increased farmers' (including smallholders') incomes from agricultural production and immediate downstream processing enterprises. Thus, Dev (1998) reports that in India average real income of small-scale farmers rose by 90% as a result of increases in productivity. Similarly, IFPRI argue that in Zimbabwe there was a 'smallholder green revolution' during the 1980s in maize and sorghum production in which yields more than doubled and 95% of crop area was planted with improved varieties (IFPRI, 2002). Lele and Agarwal (1989) cite evidence from Kenya, arguing that small- and large-scale farmers exist alongside one another, grow the same crops, and sell them in the same markets at similar prices.

There is similar evidence from Bangladesh where, despite highly unequal access to land, it appears that small-scale farmers have not been excluded from this technology. For the landless – around one third of the rural population – improved rice farming initially required more labour, but subsequently mechanisation reduced demand for labour. Nevertheless, the landless poor have largely found new jobs in other areas and now depend much less on farm labouring. Real wages have risen (Hossain et al., 2003; Hossain, 2002), although many of the additional off-farm jobs are themselves linked to the expansion of farming (Mandal, 2002a and 2002b).

Thus, we know that both small- and large-scale farmers can achieve higher incomes as a result of agricultural growth. There are many reasons, though, why this does not happen in practice, sparking a debate over whether smaller or larger farms should be the priority for agricultural policy. These debates will be considered later in the paper.

Increased employment opportunities and higher wages in rural areas

Accelerated agricultural development – particularly increasing agricultural productivity – typically creates more jobs and, depending on levels of unemployment and under-employment, pushes up wage rates both on- and off-farm.

On-farm, increasing agricultural productivity increases demand for labour in preparation, planting, weeding and harvesting and can result in higher wage rates. While intensification may involve some labour-economising measures, the ability to double- and even triple-crop the land has been shown to consistently increase the demand for labour, even if unit labour use falls (Binswanger, 1986). Evidence from India shows agricultural labour wage rates rising at a rate of 3% per annum during the 1970s and 1980s (Saxena and Farrington, 2003). In Bangladesh, short- and long-term wage effects are different and policy, in promoting the growth of agriculture, should mitigate against short-run food insecurity amongst the landless poor and marginal farmers who are generally the poorest section of society (Palmer-Jones and Parikh, 1998).

In addition, reports suggest that as farmers become richer, they are increasingly inclined to substitute hired labour for household labour, thus creating greater employment opportunities. Leavy and White (2000) note that in rural Africa, employment opportunities exist not only on large commercial farms but also in the smallholder sector in which there is an active labour market. Dev (1998) provides more evidence from India and suggests that

increases in agricultural productivity led to 125% increases in average incomes of the landless.

Agricultural development also generates new and better-paid jobs off-farm for the poor through linkages between agriculture and the wider rural economy. The combination of extra jobs within and outside farming can have strong effects on rural labour markets, pushing up wages and improving the ability of the poor to buy food. The case of Tamil Nadu (see box) is particularly interesting in this regard.

Agricultural development and its linkages in Tamil Nadu, India

In North Arcot District, Tamil Nadu, 11 villages were surveyed in the early 1970s at the start of the Green Revolution, and again in the early 1980s. During this time, there had been almost complete adoption of high-yielding varieties of rice, with much greater use of fertiliser and irrigation. Rice production increases had been modest but sustained – 60% increase in rice output from 1963–66 to 1977–80.

More remarkable was the change in incomes and other indicators of consumption welfare in the area: by any measure, the poor were about twice as well off in the early 1980s as in the early 1970s. Real wage rates rose by 20% for men and 10% for women. This was not a result of increased labour demand in farming: labour use per hectare actually fell, as the mechanisation of pumping and threshing cut jobs in rice farming and fewer labourers were hired. At the same time, members of farming households with increased incomes no longer offered themselves as casual labour, so less labour was actually available.

The main point, however, was the strength of growth linkages. For every rupee generated in increased farm output another R 0.87 was created in the off-farm economy; about half in the demand for inputs, marketing and processing of crops, and half in meeting consumer demand.

Source: Hazell and Ramasamy (1991)

Impact on the wider economy and growth

Looking to the impact on the wider economy, cross-country comparisons find a strong relationship between progress in agriculture, broader economic growth (i.e. that in the non-agricultural sector) and progress in reducing poverty throughout the economy.

Generally, the countries that increased agricultural productivity most rapidly have also witnessed the most significant reductions in poverty. Ashley and Maxwell (2001), citing Datt and Ravallion (1996), argue that increasing yields by one third can reduce the numbers in poverty by a quarter or more. Similarly, Thirtle et al. (2003) use data observations between 1985 and 1993 in 48 developing countries to show that for every 1% increase in recorded agricultural productivity there was a corresponding fall of between 0.6 and 1.2% in the number of people living below US\$ 1 a day.

The links between agricultural growth and broader development in secondary and tertiary economic sectors are well documented and do not need to be discussed further here. But

focusing policy attention on agriculture remains important. Suffice to say, agricultural growth is critical to broader economic growth and tends to benefit the poor more than growth in any other sector. Thus, Lipton (see, for example, 2001) argues that no other sector offers the same possibilities to create employment and lift people out of poverty.

Does the pattern of agricultural growth matter?

Clearly, differences exist in the pattern of agricultural development. While it is generally accepted that agricultural growth is good for poverty reduction, dispute remains about the extent to which these differences matter as far as the impact on the poor is concerned.

There are a number of strands to this debate, including:

- the merits of smallholder versus large commercial farms;
- the impact of commercialisation; and
- the impact of cash cropping.

Smallholder versus large commercial farms

Generally speaking, where agricultural development has taken place on small farms with labour-intensive techniques, generating incomes for farmers whose spending is predominantly on locally-produced goods and services, the creation of jobs and incomes for members of poor households has been greatest and the impact on poverty and hunger highest. This is perhaps most sharply illustrated in South and East Asia where farm-level evidence from the 1970s supports the theory that farm size is inversely related to per-hectare productivity (Lele and Agarwal, 1989).

Where 'improved farming' has been carried out mainly by large-scale farmers using labour saving, capital intensive techniques, and where farmers spend much of their additional income on sophisticated goods produced outside the locality, the impact on poverty and hunger has been less marked. This is well illustrated by the experiences of Brazil and Mexico in the 1990s, when progress in agriculture was typically concentrated amongst farmers with capital to invest who were well placed in the emerging marketing chains. This type of growth did little to reduce hunger and poverty as most smallholders became marginalised (David et al., 2000).

However, the view that improving yields in smallholder farming will lead to poverty reduction (epitomised in IFPRI, 2002) is being challenged. Small-scale farmers tend to be limited more by cash or seasonal labour than by land scarcity. They struggle to innovate because new technology is capital-biased and reflects long-term investment by the private and public sectors in meeting the needs of farmers in the North. Furthermore, lost economies of scale mean that, compared to large-scale farmers, smallholders have fewer skills to manage new technologies, pay more for inputs and receive less for outputs, find it difficult to meet new commodity chain requirements and experience problems in managing dangerous chemicals (Ashley and Maxwell, 2001).

The fragmentary evidence against small-scale farming stems from emerging understanding of the impact of global change on agriculture. The conditions on which the small farm efficiency argument rest are breaking down: globalisation is leading to very different conditions where non-traditional markets (with high transaction costs and greater risks) are

promoted and greater capital investment is required for agricultural modernisation (Kydd and Dorward, 2001).

The impact of commercialisation on food security

Since the 1980s, there has been concern that the commercialisation of agriculture, that is, more production for the market and less for subsistence, could undermine food security and poverty reduction. In some cases, this concern results from a narrow preoccupation with household-level self-sufficiency as central to food security, and a lack of recognition of agriculture's role in ensuring access to food. There are other concerns though, including:

- market prices vary over seasons but poor households often sell their crops at the lowest price because of an urgent need for cash for credit payments, school fees, medical bills, etc;
- since women do not market commercial crops, they lose control over income and household food supply; and
- crops produced for market are seen to offer a less direct route to improved nutrition than stable production of staple foods.

So what does the evidence tell us? One of the most thorough syntheses of commercialisation was undertaken by IFPRI (von Braun, 1995). Ten synthesised country case studies of commercialised small-scale farming found that commercialisation was associated with, or led to:

- increased staple food production – risk aversion prevented smallholders from specialising completely in high-value crops and they continued to grow subsistence staples;
- increased demand for farm labour and use of hired labour; and
- generally higher incomes and better child nutrition – but with low elasticity from incomes to child nutrition (i.e. a relatively large increase in income is required for a more modest increase in nutrition).

When commercialisation left smallholders worse off, it was more often the result of bad policy rather than a function of commercialisation itself (von Braun, 1995). The IFPRI findings were supplemented by others, including de Walt et al. (1990), who studied rural Mexico and confirmed the association of commercialisation in farming with higher mean income and better child nutrition.

The impact of cash cropping on food security

One particular manifestation of commercialisation is cash cropping. Whilst commercialisation can include market-oriented production of staple food crops (for example maize, wheat or rice), cash cropping involves crops produced for cash that have a higher value than those consumed for food within the household. It also tends to require a greater degree of specialisation (Poulton et al., 2001).

Concerns have long been expressed that the expansion of cash cropping amongst smallholders could undermine their food security. This issue has been the subject of extensive and rather inconclusive analysis, and evidence from different studies point to dissimilar outcomes.

Perhaps the most comprehensive review of the issue (Maxwell and Fernando, 1989), found no conclusive evidence to suggest competition between cash and food crops or that increased cash incomes necessarily resulted in better nutrition. Their findings supported neither a food first approach nor cash crop fundamentalism. They concluded that much depends on the farming system, the choice of crops and the policy context.

Generalisation on this issue is unwise, but Longhurst, cited in Maxwell (2001), provides a useful codification of the circumstances in which the development of cash cropping is likely to be more or less promising for poverty reduction and food security. Longhurst concludes (perhaps not surprisingly) that the introduction of cash crops into farming systems was generally more likely to have a positive impact on household-level food security when cash crops:

- are grown by both men and women;
- are farmed in combination with marketable food;
- generate regular rather than periodic cash flows with early rather than delayed income flows; and
- are processed locally.

In the case of cash cropping and broader commercialisation, there are differences between short- and long-term impacts. The policy implication is that interventions to promote market-oriented production should be complemented by buffering measures to protect the subsistence bases of the poorest households.

2.5 The relationship between increasing incomes and food security – the importance of other factors

Whilst the role that agriculture can play in improving income has been demonstrated, the routes by which this might be achieved are contested – debates about cash versus food crops, subsistence versus market-oriented production and small versus large farms have already been explored. Beyond this, unfortunately, the links between income and nutrition are no clearer.

Changes in food intake and nutrition are not simply or only influenced by income. Empirical work consistently demonstrates that malnutrition is, perhaps surprisingly, only weakly correlated with increasing economic wealth (see for example Mason, 2002; Glewwe et al., 2001). Evidence indicates that other factors also play a role, although their importance – including the relative importance of income changes – varies significantly between places, over time and between different groups in society (see for example Penders and Staatz, 2001; Smith and Haddad, 2002; Webb and Lapping, 2002). The most important of these factors are:

- women's health;
- women's literacy;
- health facilities; and
- safe water and good hygiene.

2.6 Drawing some conclusions

The broad picture from the evidence is clear. Food security and nutrition are determined by a number of factors that can be grouped as:

- the availability of food;
- economic access to food; and
- the way in which food is utilised – including the many interactions between diet and disease.

Agriculture is of direct importance in at least the first two of these and has indirect effects (especially through income) on the third. We understand much more about food availability than about agriculture's role in ensuring economic access to food. There is evidence that:

- increasing food supplies can lower food prices, but this need not automatically be detrimental for producers if productivity increases outweigh decreasing prices;
- agriculture can generate increased incomes for farmers, on both large and small farms and in the rural non-farm economy, although growth in small farms is more like to have poverty-reducing effects by stimulating the local economy;
- increases in agricultural productivity, even where there is mechanisation, have pushed up agricultural wage labour rates thereby increasing incomes;
- geographical, economic and social contexts matter: the evidence does not support fundamentalist positions on the small versus large farm, or the subsistence versus commercial farming debates; and
- malnutrition may be only weakly correlated with income: economic wealth and other factors, notably basic health care, are of equal or greater importance depending on context.

3. What we don't know – areas of remaining debate and disagreement

Hunger and food insecurity remain seemingly intractable problems. In looking to the future and the contribution of agriculture to their resolution, two broad areas remain the subject of considerable debate:

1. Can the world meet an increasing demand for food? Specifically, how will changes in global and regional food supply impact upon prices and how will levels of hunger and food insecurity be affected?
2. Can agriculture make a significant contribution to tackling poverty, which remains the principal cause of hunger and food insecurity?

Interwoven through both these questions is an additional issue: the growing impact of HIV/AIDS and its implications for agriculture and food security.

3.1 Meeting the increased demand for affordable food – can it be achieved?

Trends in world food production and supply are summarised by de Haen et al. (2003). Globally, population growth will slow down, incomes will grow and the incidence of poverty will be reduced. However, in developing countries, while levels of hunger will remain high

and the demand for cereals will increase (Figure 5), there will be a slower rate of agricultural production growth with wheat and rice production increasing only modestly. Agricultural trade surpluses in developing countries will become deficits by 2030. In the light of these changes, how will affordable food be produced and supplied?

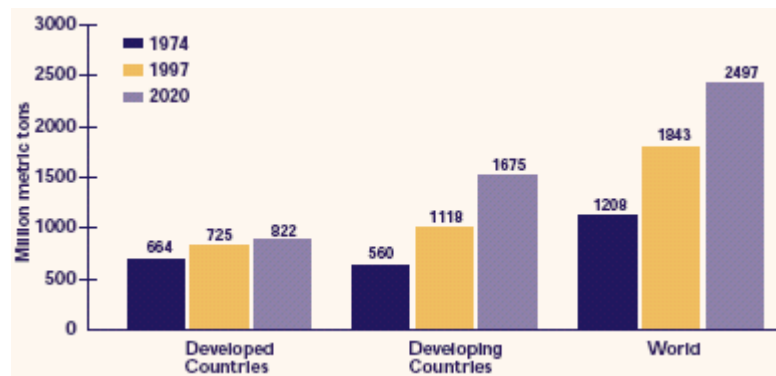


Figure 5: World demand for cereals – 1974, 1997 and 2020. Source: Rosegrant et al. (2001)

This issue is the subject of much discussion. Debates partly represent new variants on Malthusian concepts of carrying capacities, but others reflect a concern for more immediate and potentially far-reaching impacts of possible changes in the global agricultural economy. However, three factors are likely to have a major influence on the availability and price of global food, particularly basic grains:

1. The extent to which the world can physically continue to increase production levels and, more importantly, yields.
2. The impact of changes in the pattern of food consumption, particularly the increasing consumption of livestock products in large parts of the developing world.
3. The impact of possible policy reforms in the developed world, particularly the implications of reduced support to farmers.

Increasing production and yields

During the last half of the 20th Century, global food production increased markedly. The Green Revolution in Asia resulted in increases in productivity in that region of a similar magnitude. China quadrupled and India tripled the value of their respective outputs. Inevitably, the easier options for increasing food production have been exploited first. The question is: can similar rates of progress be continued, particularly in the face of increasing pressure on land and water and increasing recognition of the need to balance productivity gains with long-term sustainability? Evidence of a slowdown in progress is already emerging: average rice yields have been slowing since the 1970s, particularly in areas that achieved major growth during the Green Revolution.

Views on our ability to cope with this predicament fall essentially into two camps (Pretty, 1995):

1. 'Environmental pessimists' who believe that the natural limits on further growth in production of food supplies have or are being reached. For this group only population control will prevent a Malthusian crisis.

2. 'Business-as-usual optimists' who believe that market forces will ensure that supply will always meet increasing demand through constant evolution of technological advances.

Pretty subdivides this second group in terms of their differing positions on the most appropriate way to achieve increased output and yields. He characterises one group as 'new modernists', given their belief in the extension of high-input farming to areas such as Africa⁶, while a contrary position is taken by the advocates of 'sustainable intensification', who argue that yields can and must be increased while conserving the environment through the use of intermediate or low-input techniques.

Evaluating these views is difficult. Just as technological advances disproved Malthus' theory, we cannot predict the implications of new technologies (e.g. genetically modified varieties), particularly when decisions about their adoption are based on political as well as scientific judgements.

Changes in patterns of consumption – the increasing importance of livestock

An increasing proportion of developing world agriculture is devoted to producing livestock, both directly and indirectly through the growing of feeds such as yellow maize and soyabeans (Pinstrup-Andersen et al., 1999). If large parts of Asia were to increase consumption of animal products to anything like the levels seen in the developed world, there would be a major increase in demand for feed grains in those countries or from imports. Either way, world grain prices would probably rise. The implications would be most severe for developing countries where agricultural trade balances would make it increasingly costly and difficult to import food to ensure national-level availability.

Reforms to global agricultural trade

Farmers in the developed world are generally heavily subsidised and produce more than domestic demand would justify. This surplus production has put pressure on international grain prices and, consequently, they have fallen consistently in real terms over the past 50 years.

The negative impact of these policies and measures on the ability of developing countries to compete in global agricultural markets has become the focus of a major campaign for their removal. However, on the other side of the balance sheet, relatively cheap grain has become vital to consumers (particularly urban consumers) in the increasing number of developing countries that depend on food imports to meet their needs.

If world agriculture was liberalised and developed countries cut support to their farmers, the prices of some products, including basic grains, would probably rise. Measuring the extent of this 'price effect' of liberalisation, even in the short term (1–2 years) is difficult

⁶ De Haen et al. (2003), for example, adopt a new modernist position. They argue that future production increases will be heavily dependent on yield improvements (79%) and much less dependent on land expansion (20%).

given the inevitable contextual variations, but most analysts predict that world prices of basic foods would rise, perhaps by as much as 15% in real terms (Valdés and Zeitz, 1995).

The degree to which any such increase in global grain prices would result in higher consumer prices would depend on two main factors. Firstly, the degree to which any increase in import price is transmitted to the retail price. The international grain price accounts for only part of the retail price of food, while other costs (particularly transport) often represent a major portion of the cost consumers will pay. As these costs should remain unaffected, the proportional increase in retail prices is likely to be less than the increase in international prices would initially suggest. The second factor is the possible countervailing impact of increases in domestic production in response to increased producer prices⁷.

3.2 Realising agriculture's potential to reduce hunger and food insecurity – getting agricultural policies right

Moving from the global dimension to focus on the national level, there is general consensus on agriculture's positive contribution to food security through its role in increasing the availability of affordable food and the incomes of the poor. There is however, a notable lack of consensus over the steps needed to achieve this. In looking at this aspect of the hunger and food security debate, two key questions emerge:

1. Should policy makers focus on self sufficiency or on increasing the ability of their countries and people to access the food they need?
2. What agricultural strategies will have the greatest impact on alleviating hunger and food insecurity?

Is domestic food self-sufficiency a sensible national policy objective?

The extent to which countries should invest in domestic self-sufficiency, or use their agricultural resources to produce higher value crops and import food for basic needs remains a niggling question.

Aiming for domestic self-sufficiency can result in inefficiencies and high costs especially, as history shows, when this is attempted through the use of state agencies to supply inputs and credit and then purchase, transport and store produce. Input provision and credit tend to be subsidised, initially to promote adoption, but once subsidies are in place, they can be difficult to remove. Produce may be bought at 'floor prices' that sometimes exceed a comparable economic value, such as an import parity price. Transport of both inputs and produce may be heavily subsidised, particularly when uniform 'pan-territorial' prices are set across the country. Storage and spoilage while in store have direct costs.

Such costs are likely to exist even when public agencies operate well, but when they lack performance incentives, they are likely to remain inefficient, thus raising costs still further. Operating costs can be a major drain on public funds. In the early 1990s the Grain Marketing Board in Zimbabwe ran deficits equivalent to 5% of Gross Domestic Product

⁷ This assumes a wedge between import and export parity prices. Prices might be pushed down, but clearly not to their original level.

(GDP), while in the 1970s and 1980s in Tanzania, the National Milling Corporation accumulated a debt of more than US\$ 600 million (Coulter and Poulton, 2001).

Efforts of some Asian countries have been more successful. Bangladesh, China, India and Indonesia all used variants of this model, with considerable state intervention in food markets, to foster agricultural development. In all cases, great success was achieved in increasing production of staple foods to levels close to, or above, domestic self-sufficiency and, often, reducing the cost of food to consumers. Could the same success have been achieved with less state intervention? Perhaps yes: Thailand has achieved even better farm performance without the panoply of state intervention and subsidies. Before making firm conclusions, it is essential to remember that cross-country comparisons are bedevilled by thickets of contextual factors.

This is a live debate and especially pertinent to Africa, particularly countries that remain remote from world markets. Policy makers face situations where, in most years, there is a clear advantage to maintain domestic production of maize, the main staple food. The more favoured agricultural lands can deliver maize to centres such as Harare at US\$ 100 a ton or less. An import parity price for white maize from the US is rarely below US\$ 220 a ton and even South African maize registers an import parity of up to US\$ 190 a ton (Coulter and Poulton, 2001).

What of the inevitable years of harvest failure that occur once or twice a decade? In the absence of domestic reserves, the aftermath of a bad harvest may see delays in obtaining commercial imports, and possible speculation by both farmers and traders holding stocks off the market in the hope of rapidly escalating prices. Add to this scenario unpredictable actions by governments in various attempts at price control and the ingredients exist for extremely large increases in the prices of staples over a few months. Some of these elements applied in 2001 when maize prices in Malawi rose by four times or more in less than one year.

The general question is this: can staple food availability be entrusted to market forces when critical conditions for market efficiency (adequate information, many buyers and sellers, predictable and stable public policy) are lacking? If not, what needs to be done? More effort to make the markets work? Maintain some limited, judicious public intervention to guard against the calamity that befell Malawi in 2001? Or abandon the free market model for staple foods, accept heavy state intervention and look for ways to make such intervention more efficient and at lower cost than in the past?

This debate is active in southern Africa; see Jayne et al. (2002) for a view favouring complete market liberalisation and Kydd (2002) for arguments in favour of limited and strategic action by the state to correct for market failure and create institutions that can make markets work.

What are the best agricultural development strategies?

There is probably less of a consensus now – particularly amongst development agencies – on the best (in terms of impact on poverty and hunger) agricultural development strategy than at any time over the past half-century or longer (Ashley and Maxwell, 2001). This is

particularly true of Africa, where an unsuccessful model based on improving performance through technology supported by publicly owned development agencies has been replaced by the equally disappointing response of farmers to the liberalisation of markets. Key points in the debate are considered below.

Where should development efforts be focused to achieve the greatest return in terms of reducing poverty and hunger? Should they be focused on high-potential areas where development options are greatest, or in the poorest areas where there are fewer potentials and options, but where poverty is greatest?

Who should they be focused on? Here the debate sees at least three positions:

1. Accept the demise of the peasantry and work with large-scale farmers whose success will act as a catalyst to generate wealth and jobs for those whose farms are not viable. Proponents of this view (see Maxwell, 2004) identify changes in global supply chains as being major new obstacles to smallholders that will prove insuperable for many or most.
2. Work with smallholders, but accept that most innovation, investment and commercialisation will come from only that (possibly very small) portion with more land and capital than the average. Some claim that these farmers will then create enough jobs locally, through hiring labour and spending on local goods and services, to boost the welfare of other farm households (David et al., 2000).
3. Focus on the poorest and most disadvantaged smallholders to tackle poverty and hunger and reduce vulnerability directly (IFPRI, 2002).

Should they focus on less favoured areas? These include poor households in areas of low agricultural potential that are remote from markets and supplies of inputs. There are two positions on this question:

1. In remote areas, employment opportunities in the rural non-farm economy are often limited. Thus, in spite of poor prospects in farming, people are heavily dependent on crops and livestock for their livelihoods. The promotion of and investment in agriculture should therefore be viewed as a safety net provision in itself, irrespective of whether such agriculture is contributing to growth.
2. In many of these cases, food security will be assured more by the ability to buy in food, rather than by trying to produce more. The questions posed for such areas are those of jobs and incomes. The difficulty lies in trying to create jobs where resources and infrastructure are scarce and markets remote. The answer probably lies in a combination of marginal agriculture, forestry, fishing, tourism, public employment in provision of services and physical infrastructure (and its maintenance), public transfers for social protection and regional equity and in migration to work elsewhere (Hite, 1997). Agricultural development may not, in these areas, be a prime mover in reducing poverty and improving food security.

What is the role of technology? Should development efforts focus mainly on yield-raising technology or on less intensive approaches that minimise variation? Malawi is a good case in point – which is the better option: high-yielding hybrid maize with fertiliser applications or lower-yielding open-pollinated varieties requiring less fertiliser?

Which crops? Should the accent be on crops that will be largely consumed within the household or on income-generating cash crops?

3.3 Implications of HIV/AIDS for agriculture, hunger and food security

The HIV/AIDS epidemic is both a cause and effect of food insecurity. Rates of infection, viral loads and opportunistic infections will rise with malnutrition, which lowers immunity. In turn, the epidemic is likely to contribute to food insecurity as those living with the virus lose labour time and capital to the effects of the disease.

The general picture is largely agreed, but evidence of the detail and the strength of the socio-economic processes occurring is incomplete. In particular, little is known for certain about how the epidemic may affect farm production within the context of overall economies that are also suffering the impacts of epidemic disease. Losses of labour and labour productivity immediately catch the eye, but the loss of capital as funds are diverted to health care may be equally important. Indeed, it can be argued that since populations of even the worst affected countries are expected to grow, and with them their labour forces, then the potential for reduced capital investment per worker is the more pressing concern both for the overall economy and for agriculture.

A tentative conclusion is that HIV/AIDS will have only a limited effect on the supply side of food security – the land will not disappear and the rural labour force will increase despite the ravages of the epidemic; but that it will strike hard at people's access to food, and undermine the utilisation of food by those who are HIV-positive (Wiggins et al., 2004). The policy implications in this case point towards the demand for food and how to replenish lost capital.

An alternative speculation is the 'New Variant Famine' hypothesis (de Waal and Whiteside, 2003). They highlight four factors that characterise those affected by the HIV/AIDS epidemic: a) household labour shortages; b) loss of assets and skills due to adult mortality; c) the burden of care for sick adults and orphans; and d) the vicious interactions between malnutrition, HIV infection and progression. The combined impact of these may undermine the effectiveness of longstanding strategies to cope with the threat of famine, or in some cases coping strategies may be rendered impossible or dangerous. Food insecurity may then degenerate into famine in which households affected by AIDS face outright starvation. However, the hypothesis remains just that and there is no evidence to corroborate the theory.

4. Emerging key questions and how to close the evidence gap

The previous sections of this paper show that there is a good level of understanding of the broad dimensions of the relationship between agriculture, hunger and food security. We are

aware of the relationship between agriculture and food availability, and we are slightly less knowledgeable about agriculture and food access. We can, therefore, argue that:

- increasing food supplies can lower food prices but this need not automatically be detrimental for producers if productivity increases outweigh decreasing prices;
- agriculture can generate increased incomes for farmers, on large and small farms and in the rural non-farm economy, although growth in small farms is more likely in the first instance to have poverty-reducing effects by stimulating the local economy;
- increases in agricultural productivity, even where there is mechanisation, have pushed up agricultural wage labour rates thereby increasing incomes;
- geographical, economic and social contexts matter: the evidence does not support fundamentalist positions on the small versus large farm, or the subsistence versus commercial farming debates; and
- malnutrition may be only weakly correlated with income – economic wealth and other factors, notably basic health care, are of equal or greater importance depending on context.

In highlighting some ongoing debates and knowledge gaps, the previous section demonstrated the contested issues that lie beneath the following questions:

1. Can the world meet an increasing demand for food?
2. How will changes in global and regional food supply impact upon prices and how will this affect hunger and food insecurity?
3. Can agriculture make a significant contribution to tackling poverty, which remains the critical cause of hunger and food insecurity? Through what kind of agricultural development strategy?

4.1 Closing the evidence gap

First, there is a general pattern in all the areas that we've explored in this paper: the broad dimensions of each issue are fairly well understood and, in many cases, agreed upon, but the details are missing. Closing the gap will, therefore, require empirical research to go beyond the broad dimensions of each issue, and to understand clearly how the linkages between agriculture, income, poverty and food security play out in specific contexts and settings.

Second, and linked to the first point, there are plenty of examples of research into components of strategies, but studies comparing different strategies for agricultural development are less common. In addition, research needs to look more at success stories. When funding research, development agencies naturally train their sights on the problem cases, on difficulties and challenges. It is possible that we know too much about failure and too little about success.

Third, several sources note that, quite often, we know what to do, but the 'how' question of implementation is usually less well understood (Omamo, 2003). It is often assumed, but not necessarily the case, that when the outcome of agricultural strategy is disappointing it is because of bad policy. However, even good policies can be implemented poorly. There have always been fewer researchers working in the fields of public administration, development management, decentralisation and even 'governance' than in other areas, and their work has sometimes been seen as having below average prestige within the social

sciences. Understanding policy failures and successes needs to incorporate perspectives from these disciplines.

Finally, despite the acknowledgement by all involved in implementing development programmes that evaluation is the route to learning and improved practice, it remains surprising how much does not get systematically, rigorously and independently evaluated with publication (in the strict sense of the word) of the results. A pertinent and current example is that of the food crisis that occurred in southern Africa in 2001. The international community spent several hundreds of millions of dollars on relief programmes and continues to contribute millions of dollars to food distribution and supplementary feeding. However, the evidence base on which programming decisions are being made is rather thin. While this was inevitable in the early stages of the crisis, after two and a half years still too little has been done to improve the evidence base.

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